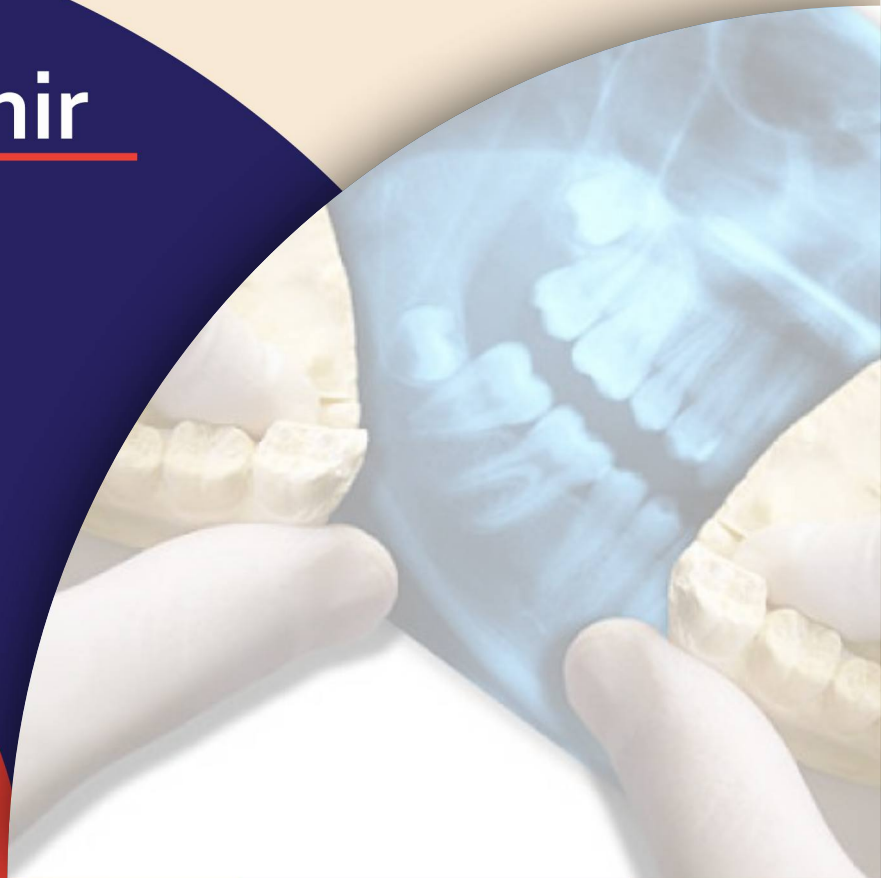# Souvenir

10th-11th September 2022

19th National Conference of
The Indian Association of Forensic Odontology

"Dentistry in the Delivery of Truth & Justice"

G. Pulla Reddy Dental College & Hospital, Kurnool, Andhra Pradesh

Message from Desk of
Organizing Secretary

Dear Colleague,

Greetings from the Organizing Committee!

Welcome to the 19th Annual National Conference of the Indian Association of Forensic Odontology organized by the Department of Oral & Maxillofacial Pathology, G. Pulla Reddy Dental College & Hospital, Kurnool, Andhra Pradesh on 10th and 11th September 2022.

G. Pulla Reddy Dental College & Hospital is the brainchild of Late Sri. G. Pulla Reddy Garu, popularly known as sweets Pulla Reddy nationally/internationally a renowned Philanthropist, great humanist. G.Pulla Reddy Dental College & Hospital established in 2006, is affiliated to Dr. NTR University of Health Sciences and recognised by the Dental Council of India. The college is running under the management by G. Pulla Reddy Charities Trust, Hyderabad. The Trust was instituted by Late Sri. G. Pulla Reddy in 1977 with the motto of rendering services to the society. The college has been accreditated with NAAC in 2021 and has Post Graduation in 6 subjects.

The outbreak of COVID-19 has disrupted the lives, livelihoods, and communities in the past year. To curb its effect, countries all over the world have been forced to adopt social distancing norms and travel restrictions. While most people did not contract the infection, all our lives were dramatically disrupted as the lockdown locked away our everyday contacts and activities. In this extreme situation, for the well-being and safety of everyone involved, the IAFO Office has taken the conscientious decision to hold a Virtual Conference this year.

It is our honor to host the 19th Annual National Conference of the Indian Association of Forensic Odontology and we are excited to bring to you a host of experts from around the world, keynote lectures, scientific extravaganza, a unique online platform for scientific deliberations, and time for networking with old and new colleagues.

"See" you there!!!
Warm Regards,

Dr. A. Ravi Prakash,
Organizing Secretary
19th IAFO National Conference,
Kurnool, Andhra Pradesh

Souvenir

Keynote Speakers

Dr. Jeremy Peter Graham
Senior Lecturer, Dentistry and Oral Health
La Trobe University, Melbourne, Australia
Consultant Forensic Odontologist
Victorian Institute of Forensic Medicine, Victoria

Reminiscences of Three DVIs

Dr. Derek Congram
Forensic Specialist, ICRC
Regional Delegation for East Asia, Beijing, China
Sr. Researcher, Global Justice Lab,
University of Toronto, USA

A Pragmatic Approach towards Teeth: Collaboration between Forensic Odontology and Forensic Anthropology

Dr. Ashith B. Acharya
Professor and Head
Department of Forensic Odontology
SDM College of Dental Sciences & Hospital
Sattur, Dharwad, Karnataka

Implications of Digitization in Forensic Odontology Techniques in Student Training

Dr. Bram Bekaert
Associate Professor and DNA Expert
Faculty of Medicine, Forensic Biomedical Sciences, KU Luven, Belgium

Forensic Age Estimation using DNA methylation markers?

Dr. Samarika Dahal
Associate Professor and Head
Dept. of Oral Pathology and Forensic Dentistry
Maharajgunj Medical Campus, Institute of
Medicine, Kathmandu, Nepal

A decade of first-hand experience in Forensic Dental Identification

Dr. Hemlata Pandey
Forensic Odontology & Human Identification Lab,
Seth GS Medical College and KEM Hospital
Mumbai

Dental Ethics and Jurisprudence in India

Dr. Sudheer B. Balla
Assistant Professor, Dept. of Forensic
Odontology, Panineeya Institute of Dental
Sciences & Research Center
Hyderabad

Age Estimation practices in Children and sub-adults from India

Souvenir

Speaker's Profile

Reminiscences of Three DVIs

Dr. Jeremy Peter Graham

Australia

Dr. Jeremy Peter Graham holds the Licentiate of Dental Surgery from the Dental Board of Victoria, the Bachelor of Dental Science and the Post-graduate Diploma in Forensic Odontology from the University of Melbourne, M.Phil. from Monash University and a Graduate Certificate in Higher Education from La Trobe University. He is a registered dentist and Specialist Forensic Odontologist. He graduated in 1975. For the first four years following graduation, he served as a Dental Officer in the Royal Australian Navy. For the next seven years, he was a part-time Kindergarten Dentist with the Royal Dental Hospital of Melbourne and part-time with his father at his City practice. He then practised part-time for three years at a suburban practice before buying his practice in Caulfield, merging the City practice with it in 1998. He retired from clinical practice in 2018. In 2000, he became one of seven Forensic Odontologists at the Victorian Institute of Forensic Medicine, being involved in many human identification cases in Victoria and overseas. He has delivered lectures to the Victoria Police, professional groups, community groups and students. He has been employed as an Identification Coordinator with Coronial Admissions and Enquiries (Department of Justice) since 2013. He is an Adjunct Senior Lecturer at the School of Public Health and Preventive Medicine, Faculty of Medicine, Nursing and Health Sciences, Monash University. He served as a Forensic Odontologist in the Royal Australian Naval Reserve from 2007 to 2018. In 2005, he first started tutoring second-year Dental students at the Melbourne Dental School, The University of Melbourne, later giving various lectures for both years. In 2008, he gave six lectures and tutorials to first-year Dental students at the Bendigo Campus of La Trobe University. He retired from the University in July 2022.

A Pragmatic Approach towards Teeth: Collaboration between Forensic Odontology and Forensic Anthropology

Dr. Derek Congram

Canada

Dr. Derek Congram is a forensic specialist for the International Committee of the Red Cross Delegation for India, Nepal, Maldives and Bhutan, and is Co-Director of the International Centre for Humanitarian Forensics of the National Forensic Sciences University in India. He is a board-certified (DLAF, #20) forensic anthropologist and archaeologist, specializing in medico-legal and humanitarian applications. His work, teaching, and research focus on the investigation of disappeared persons: their location, identification, repatriation, and memorialization. He has worked in more than 25 countries for governments, universities, non-governmental, and international organizations, including the United Nations, International Criminal Court, United States Departments of Justice and Defense and the Argentine Forensic Anthropology Team. His primary interests are the Geographic Information Science (GIS) analysis of body disposal in conflict contexts and professional ethics. He promotes victim families as being central to forensic and humanitarian investigations.

Speaker's Profile

Dr. Ashith B. Acharya

India

Implications of Digitization in Forensic Odontology Techniques in Student Training

Professor Ashith B. Acharya is a top 1% forensic researcher in the world and heads India's first exclusive department of forensic odontology in SDM College of Dental Sciences in Dharwad. With more than 19 years' work experience, he was an international advisor and examiner to universities in the UK and Australia, and is editorial board member/reviewer in reputed forensic, dental and forensic odontology Journals. He also is part of international committees that recommend quality assurance in the global practice of forensic dentistry. He teaches and trains dentists and dental students, and serves as a consultant in forensic dental cases referred by police from across India. He is most famously known for providing opinion on bite mark analysis in the 2012 New Delhi sexual assault case (the Nirbhaya case) wherein his report was upheld by the Supreme Court of India. He has also provided opinion in historical anthropological/archaeological cases in India, such as the Annigeri samples and the Ajnala remains. As a graduate student pursuing forensic odontology in the University of Adelaide in 2001, he assisted in the re-identification of an Australian citizen who perished in the World Trade Center attack of 11 September 2001. Dr. Acharya is a founder-member of the Indian Association of Forensic Odontology and currently its Secretary. A keen researcher, he has published 45 journal articles, mostly in renowned international forensic and dental journals; he has also contributed to government reports, and chapters on forensic odontology in eminent textbooks such as Shafer's Oral Pathology.

Dr. Bram Bekaert

Belgium

Forensic Age Estimation using DNA methylation markers?

Dr. Bram Bekaert is a DNA expert witness for the Belgian courts and the quality manager for the Department of Forensic Medicine at the University Hospitals Leuven in Belgium. He holds an associate professorship at the Department of Forensic Medicine, University of Leuven and has co-founded the MSc course Forensic Biomedical Sciences within the Faculty of Medicine. Professor Bekaert is an elected advisor on the DNA Evaluation Committee and a board member of the Royal Belgian College of Forensic Medicine. He is the founder of the project Benefit of the Doubt, in which students reinvestigate cold cases and potential miscarriages of justice. In collaboration with the Leuven Biomedical Technology Lab, he is a pioneer in using educational VR applications for crime scene investigation. His research interests focus on applying next-generation sequencing techniques for forensic investigations and developing new tools such as RNA-Seq for the time of death estimation and DNA methylation analysis for age estimation. Recently, he expanded his research into single cell sorting and sequencing for complex casework samples.

Speaker's Profile

A Decade of first-hand experience in Forensic Dental Identification

Dr. Samarika Dahal is an UK-trained forensic odontologist who specialized in human identification as an Australia Awards fellow in Australia. She is a National and International trainer for the past 4 years, having trained over 1000 participants from more than 10 countries. She has Organized and participated as invited speaker and moderator in Panel discussion and conferences to speak on Leadership, Team building, communication skills related to dignified management of the dead and Hospital Preparedness to Emergencies. She has worked as regional expert with various government institutes, NGO and INGO to provide them knowledge and skill under capacity building projects of South Asia. She is currently Vice President of Nepalese Associaion of Oral Pathology. She is a member of Disaster Victim identification Team Nepal since 2011 and currently working member of Interpol dental disaster victim identification subworking group.

Dr. Samarika Dahal

Nepal

Dental Ethics and Jurisprudence in India

Dr. Hemlata Pandey is an Assistant Professor, Forensic Odontology Consultant at the Department of Forensic Medicine and Toxicology at Seth GS Medical College and KEM Hospital in Mumbai (India). She is the first in India to have established a forensic odontology and human identification laboratory at a government medical college and autopsy centre. She has done BDS (India), MSc. in Forensic Odontology (Wales, UK), LLB from India, Diploma in Forensic Human Identification (London, UK) and is a PhD Scholar. She is also trained in International Humanitarian Law and the Criminal Justice system. She provides expertise at the request of the State Police and Central Bureau of Investigation in Courts in India. She is the Chief Faculty of the Indian Board of Forensic Odontology, and Faculty in several other Postgraduate courses in other countries. She is Visiting Faculty of the State Police Academy and Police Training School in Maharashtra, India. Dr. Pandey is Visiting Professor at the University of Turin, Italy and Honorary Professor at D Y Patil University, Navi Mumbai. She is President of Association Forensic Odontology for Human Rights (AFOHR) and Executive Committee member of the Indian Association of Forensic Odontology (IAFO).

Dr. Hemlata Pandey

India

Age Estimation practices in Children and sub-adults from India

Dr. Sudheer B. Balla, Assistant Professor and Head of the Department of Forensic Odontology in Panineeya Institute of Dental Sciences and Research Centre, Hyderabad, is an active researcher and dental academician. He has nearly 8.5 yrs of experience teaching and practicing forensic odontology. He acquired his master& degree in forensic odontology (MFOdont) from the University of Dundee, Scotland, United Kingdom. In addition, he provides expert opinions for the cases referred to the department by police and the Forensic medicine & toxicology department of Osmania Medical College & Hospital, Hyderabad. He delivered more than 15 keynote lectures in various CDE programs, forensic seminars, national and international conferences. He did research in collaboration with multiple researchers from India and abroad. He constantly researches and has published 35 articles in various national and reputed international journals.

Dr. Sudheer B. Balla

India

Souvenir

Workshop

Human Remains Recovery: Exhumation to Examination

During the workshop on human remains recovery and examination, the participants will be sensitized to skills required for exhumation of skeletal remains, maceration of the remains, and their examination, all of which are essential for establishing the biological profile of the deceased and criminal investigations. The participants will be taught the finer details of skeleton remains examination including details of anthropometry. Participants will be tasked with identifying individual bones, and estimate the sex, stature, and probable age of the skeletal material. This workshop will be intensive and hands-on, and will cover all the three major topics of forensic anthropology: Exhumation, Maceration, and Examination.

Workshop Resource Persons

Dr. Deepak V. MDS, FIBFO, PGDFAO
Asst. Professor,
Dept. of Oral & Maxillofacial Pathology & Microbiology ,
MR Ambedkar Dental College & Hospital, Bengaluru

Dr. Mohan Kumar K. P. MDS, PGDFAO
Professor, Dept. of Oral & Maxillofacial Pathology & Microbiology
College of Dental Sciences & Hospital, Davengere

Souvenir

Resource Person's Profile

Dr. Deepak V.

Dr. Deepak V is an Assistant Professor at the Department of Oral & Maxillofacial Pathology and Microbiology. He is a Consultant Forensic Odontologist at the Centre for Forensic Dentistry and Coordinator at the Internal Quality Assurance Cell, M R Ambedkar Dental College & Hospital, Bengaluru, Karnataka. He is an Adjunct Faculty at the Centre for Forensic Odontology, Yenepoya Dental College, Yenepoya University, Mangaluru, Director and Chief Dental Surgeon at Kshema Specialists Clinic, Bengaluru, Karnataka. He has been active in forensic odontology and has given numerous invited talks on disaster victim identification, oral pathology and forensic odontology. He is an Assistant Editor for the Journal of Oral &Maxillofacial Pathologists, Executive Committee Member ofIndian Association of Forensic Odontology, Executive Committee Member of Indian Dental Association, State Representative for Indian Dental Association for the year 2017-18, Organizing Secretary at 15th National Conference of Indian Association of Forensic Odontology and Verification Officer, Observer<Squad & Examiner to Rajiv Gandhi University of Health Sciences, Bengaluru. He has presented 07 papers at international conferences, 21 at national and 23 Publications in National & International Journals. He is a life member of Indian Dental Association, Indian Association of Oral & Maxillofacial Pathologists, Indian Association OF Forensic Odontology and Digital Pathology Association.

Dr. Mohan Kumar K. P.

Dr. Deepak V is an Assistant Professor at the Department of Oral & Maxillofacial Pathology and Microbiology. He is a Consultant Forensic Odontologist at the Centre for Forensic Dentistry and Coordinator at the Internal Quality Assurance Cell, M R Ambedkar Dental College & Hospital, Bengaluru, Karnataka. He is an Adjunct Faculty at the Centre for Forensic Odontology, Yenepoya Dental College, Yenepoya University, Mangaluru, Director and Chief Dental Surgeon at Kshema Specialists Clinic, Bengaluru, Karnataka. He has been active in forensic odontology and has given numerous invited talks on disaster victim identification, oral pathology and forensic odontology. He is an Assistant Editor for the Journal of Oral &Maxillofacial Pathologists, Executive Committee Member ofIndian Association of Forensic Odontology, Executive Committee Member of Indian Dental Association, State Representative for Indian Dental Association for the year 2017-18, Organizing Secretary at 15th National Conference of Indian Association of Forensic Odontology and Verification Officer, Observer<Squad & Examiner to Rajiv Gandhi University of Health Sciences, Bengaluru. He has presented 07 papers at international conferences, 21 at national and 23 Publications in National & International Journals. He is a life member of Indian Dental Association, Indian Association of Oral & Maxillofacial Pathologists, Indian Association OF Forensic Odontology and Digital Pathology Association.

Workshop

3D Forensics - Digital Documentation to Analysis

- The workshop aims to provide the participants with the basic knowledge of 3D technology.
- All the registered individuals will receive didactic instructions regarding the scientific rationale and techniques of 3D scanning and 3D printing.
- The workshop shall focus on the concepts of different 3D scanning techniques, image processing, 3D printing, applications of 3D technology in forensics. The participants shall also learn regarding the accuracy of various 3D scanning and printing technology, the factors affecting their accuracy and SOPs for the same.
- Demonstration of 3D image acquisition, image processing and 3D printing. Demonstration of basic tools used in 3D modelling software and interpretation using 3D tools.

Workshop Resource Persons

Dr. Abraham Johnson
Assistant Professor
School of Medico Legal Studies
National Forensic Sciences University

Dr. Gargi Jani
Project Lead
National Forensic Sciences University

Souvenir

Resource Person's Profile

Dr. Abraham Johnson

Dr. Abraham Johnson is currently working as an Assistant Professor at School of Medico Legal Studies, National Forensic Sciences University, India. He is the Program coordinator and In-charge Head of the Laboratory of Forensic Odontology and Radiology. He has graduated in dentistry from College of Dental Sciences and Research Centre and further completed his Masters in Forensic Odontology from National Forensic Sciences University. Presently, he is pursuing his doctorate studies in 3D Forensics. He is a member of various International and National organizations like INTERPOL Forensic Odontology Group, Indian Association of Forensic Odontology, Indo-Pacific Academy of Forensic Odontology, Indian Dental Association and serving as Coordinator at International Centre for Humanitarian Forensics. He has been a consistent achiever of many awards at scientific conferences. He has received the 'Excellence in Forensic Odontology- Sushruta Award' for the year 2018, at New Delhi. He has also received 'Best Postgraduate Student of the Year in Forensic Odontology' from Indian Health Professionals Society at Pune. He is also the recipient of 'Talent of the Year - 2016 Award' from Indian Dentist Research and Review, held at Banglore. He is an avid reader and seeks lot of interest in research. He has guided and prepared young minds for research. Under his supervision, the state-of-the-art forensic odontology laboratory also received "Emerging Forensics Department Award" at the Legal Desire Summit and Awards, 2020 for the expertise and contribution towards forensic training and research.

IAFO Office Bearers

Founder President

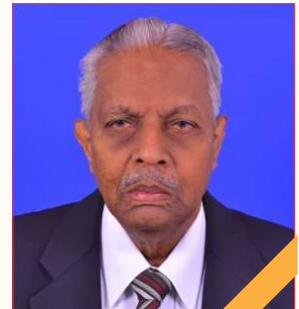Dr. J. G. Kannappan

President & Founder Secretary

Dr. S. BalaGopal

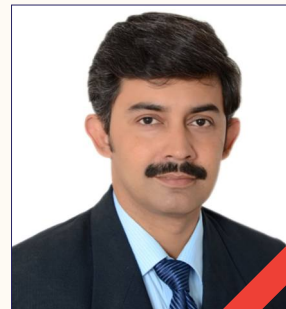**President Elect**

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& Preventive Dentistry
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IAFO/2022/601	ARTIFICIAL INTELLIGENCE IN FORENSIC ODONTOLOGY – A NEW HORIZON

Registration No. - IAFO/2022/555

AGE ESTIMATION METHODS TO DETERMINE MAJORITY IN INDIAN ADOLESCENTS: A REVIEW

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Abstract

Background: Estimation of age is an essential aspect for various medico-legal purposes aiding in decisions in lawsuits and the age frauds in sports. Different age estimation methods are being studied for Indian adolescents for dental age estimation. Objective: The purpose of this literature review was to present the main methods in age estimation that are being used to assess age in Indian adolescents. Material and Methods: The database searched was PubMed and the terms used were "Age Estimation", "Oral Structures", "Teeth And Bone". Original articles about age estimation methods written in English between 2020 and 1st September 2022 will be selected. Results & Conclusion: awaited and will be presented in conference.

Registration No. - IAFO/2022/170

NANO SLEUTH IN FORENSIC SCIENCE- AN OVERVIEW

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Abstract

Human identity is mainstay of civilisation and the identification of unknown individuals has always been of paramount importance to the society to identify the deceased to ensure proper burial and religious services as well as other issues such as criminal investigations, insurance settlements, and military proceedings that can be resolved only with a positive identification. Identification of the dead from the bones/ body parts in a legal setting forms an essential component of forensic anthropology. The Big Four of personal identification mainly comprises of determination of age, sex, stature and ethnicity of the individual. Nano forensics is emerging as a novel discipline in the field of forensic science which has set new horizons in the field of science and technology. Nanomaterials have the property of enhancing the detection limit at nanoscale level, hence it has been widely used for fingerprint analysis, explosive detection, drug screening, toxic substance analysis and DNA analysis. Nano analysis is transforming the investigation process by making them more accurate, faster, and more sensitive. Hence this paper aims to overview various applications of nanotechnology in forensic science.

Registration No. - IAFO/2022/015

JUSTICE BY PROTEOMICS: A PARADIGM SHIFT IN FORENSIC INVESTIGATIONS

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Abstract

Protein is a major component of the biological system and reflects the transcriptional and translational program of the cell types. Body fluids and tissues are also commonly found at crime scenes and proteins in them can be used to identify and convey genetic information in the form of single amino acid polymorphisms, the result of non-synonymous SNPs. Proteins are made up of chains of units called amino acids. There are 20 naturally occurring amino acids that are encoded by DNA. A three-letter sequence of DNA corresponds to a specific amino acid which can also be deduced by reading the amino acid sequence and comparing it with a reference standard. Because proteins contain information about genotype (sequence) and phenotype (expression levels), proteomics can both identify biological samples and characterize the conditions that produced them. While DNA analysis is proficient in determining the identity of the person from whom the sample originated, it is unable to distinguish between fluid or tissue type. Proteomics, on the other hand, can classify human body fluids via chemical reaction assays, enzyme activity assays, immunoassays, and microscopy-based assays. In addition to serving as a valuable orthogonal method to genomic analyses, proteomics can be used in cases where nucleic acids are absent, degraded, or uninformative. This presentation, therefore, focuses on the applicability and significance of proteomic applications in evidence-based forensic investigations.

Registration No. - IAFO/2022/005

DENTAL JURISPRUDENCE

Dr. Anup Bose[1]

[1]Private Dental Practitioner

Abstract

Dentistry is a now growing in a rocket speed; new treatment options, new dental materials, discoveries of newer techniques and surge in esthetic demand of the population making the dentistry available to more number of people. We the doctors are treated as next to God in the society. Hence the expectations of our patients are equally increasing. Sometimes it becomes unrealistic as well. And the issues of litigations arise. To err is human and we are not immune to error. Sometimes we, the doctors commit some mistakes, mostly unintentionally. This also paves the road for the lawsuits. Thus being a health care provider we must know, update ourselves and practice some dos and don'ts to save ourselves and to protect the right of our patients. There are some guidelines laid down by the governing authorities to follow. The presentation will give a detailed insight to the dental practice ethics and regulations (Indian perspective) and this will help the doctors to prevent untoward litigations and face if any lawsuits comes from malicious intentions.

Registration No. - IAFO/2022/024

FORENSIC EVIDENCE IN CHILD ABUSE

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Abstract

World Health Organization (WHO), "Child abuse or maltreatment constitutes all forms of physical and/or emotional ill-treatment, sexual abuse, neglect or negligent treatment or commercial or other exploitation, resulting in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power." About 60%–75% of child abuse victims present with head, face, and mouth injuries. Dental practitioners and auxiliaries come in regular contact with children and their care givers and thus have an opportunity to assess not just their physical and psychological conditions but also their family. The American Dental Association appended the code and it states that dentists are obliged to familiarize themselves with perioral signs of child abuse to report suspected cases to appropriate authorities consistent with state law (house resolution 23S-1B). Human rights watch reports that no doctor in India has received any training in child abuse identification, examination, reporting, or rehabilitative procedures. The Indian Parliament passed the Protection of Children from Sexual Offences (POSCO) act in 2012. Under this, all forms of sexual abuses are specific criminal offenses. If a clinician suspects that a child has been or is being sexually abused, he /she is required to report this to the authorities. Dentists can protect children from sexual assault and its consequences by teaching the parents about safe, unsafe and uncomfortable touch and how to keep their children safe. They can teach children how to protect themselves also.

FORENSIC MICROSCOPY – A TRACE OF THE LIE BENEATH

Dr. Sonal Saigal[1]

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Abstract

A wide variety of forensic analyses are carried out using microscopes. Microscopes are used to observe samples or objects to obtain detailed information about their morphology, size, structure, chemical constituents, magnetic properties or chemical or electrical properties. Since the early 1800s, the microscope has been used to help solve crimes. Despite its popularity in crime laboratories, it remains one of the most commonly used tools. A wide range of evidence, from micrometer-sized particles to hair and paint chips, can be collected and sent to a laboratory for microscopic analysis, during which its history can be deduced for the purpose of solving a crime. Through microscopy, we can learn about the origin, fate, and routes a material has taken from a crime scene to a crime victim. The goal of this presentation is to provide a concise overview of the role of microscopy and the applications of various types of light, electron, and probe microscopes in the field of forensic science, to aid in understanding the use of microscopes and their importance in forensically important investigations, and to shed light on how to improve the ease and accuracy of research in this field.

Keywords: Forensic Microscopy, crime scene, research

Registration No. - IAFO/2022/375

FORENSIC ENTOMOLOGY: DEBUGGING DECOMPOSITION DATA

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Abstract

Insects are the dominant group of animals on earth today, with nearly 30 million species. They occur practically everywhere and far outnumber all other terrestrial animals taken together. Forensic entomology (FE) is the study of these ubiquitous creatures, insects in a legal context, which can be broadly divided into three main areas: urban entomology, stored products entomology and medico-criminal entomology entailing the study of insects and fauna found in and around the carcasses and their use mainly in the estimation of post mortem interval (PMI). FE is not only used for the PMI estimation by studying stages of decomposition, pattern of arthropod succession or estimating the age of the immature stages of the arthropods, but also can be used to determine elderly and child physical abuse or neglect, determination of poisons/ drugs, food contamination, presence of wounds, transport and relocation of human remains etc. The entomological data can also be used in cases related to illegal killing and poaching of wild animals. In recent years, the status of FE in India is expanding. So, this paper attempts to highlight the importance of FE in ever evolving field of forensic odontology.

Registration No. - IAFO/2022/392

DENTISTRY IN THE DELIVERY OF TRUTH & JUSTICE

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[2]Professor and Head, Index Institute of Dental Sciences, Malwanchal University, Indore

Abstract

An elementary approach to human identification in forensic sciences is Forensic Odontology, which is a specialized field of dentistry which deals with the application of dental science to the law i.e., the use of dental evidence in the interest of justice. The substantial use of dental implants for oral rehabilitation has remarkably revolutionized the dental treatment. Though teeth are the hardest structures in the body and can withstand high temperatures, certain incineration events can make them very fragile. In such circumstances, dental implants play a pivotal role in forensic identification of humans. The physical properties of high corrosion resistance, high structural strength and high melting points contributes to retention of intact implants following incineration. Several methods used for implant identification are Implant Recognition Software (IRS), radiographic recognition of dental implants and assessment of batch number of the dental implant. This paper presents a review of the available literature highlighting the critical role of Prosthodontist in identification of a deceased individual through dental implants.

Registration No. - IAFO/2022/017

DNA FINGERPRINTING IN FORENSIC ODONTOLOGY- A REVIEW

Dr. Sharlene Sara Babu[1], Dr. S Sunil[2]

Abstract

When human remains are extremely damaged or degraded by mass diasters mainly when there is little remaining material to perform visual identification (eg fires, explosions, decomposing bodies or skeletonized bodies) teeth are often the only available source of DNA. The tooth is considered to be the storehouse of DNA, thus delve into the methods of obtaining DNA from teeth can extend the reach of molecular advances in forensic sciences and strengthen the view of DNA as "a molecular signature in forensic odontology".

Registration No. - IAFO/2022/236

APPLICATION OF ARTIFICIAL INTELLIGENCE IN FORENSIC ODONTOLOGY – IS IT TRANSFORMATION TOWARDS UNVEILING THE TRUTH?

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Abstract

Forensic odontology is the branch of dentistry which focus on personal identification of deceased individual for medico legal purpose, and at a mass disaster or crime site. It has an integral role in providing dental evidence for the legal system, when facial recognition becomes inconclusive and in estimation of age of unknown victims. The technological advancements have revolutionized the forensic investigations, and recently artificial intelligence models have gained popularity as these can be trained and applied for problem solving tasks. Artificial Intelligence has opened new horizons in forensic odontology such as in identification of bite marks, biological age determination, sex determination, soft tissue face prediction from skulls and in prediction of mandibular morphology. Studies have reported the diagnostic performance of intelligent systems equivalent to human intelligence, with an additive effect of an elimination of human errors. It has been suggested as a promising tool in identifying victims in medico legal situations. To this consideration, this paper aims to highlight the applications of artificial intelligence in forensic odontology and its contributory role in forensic investigations. It also aims to discuss the future scope of this technology and whether it has a potential to replace human intelligence in forensic investigations.

Registration No. - IAFO/2022/159

ACCURACY OF MAXILLOFACIAL IMAGING IN THE ASSESSMENT OF FACIAL SOFT TISSUE THICKNESS IN FORENSIC FACIAL RECONSTRUCTION- A SYSTEMATIC REVIEW

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Abstract

Introduction- Forensic facial reconstruction (FFR) is a method for reproducing facial features of dead individuals, starting from the skull for the purpose of identification. Most facial reconstruction techniques employ sets of average values of the facial soft tissue (FSST) thickness at some landmark sites. Various 2D and 3D imaging modalities have been used to assess the FSST. The purpose of this systematic review is to find out the accuracy of various 3D maxillofacial imaging modalities in assessing FSTT. Materials and Methods- The population, intervention, comparison, outcome (PICO) model was used to develop inclusion criteria and search terms. Population was retrospective databases of patients undergoing 3D maxillofacial imaging, the intervention was analysis of retrospective studies employing CT or CBCT for FSTT collected from the PubMed, Web of Science, Cochrane Library, and Scopus databases, published from January 2005 to June 2022, Compared with Ultrasonography or MRI imaging and the outcome was to assess the accuracy of 3D imaging modality in assessing the facial soft tissue landmarks. The whole search process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement. 21 research studies were included for further analysis. Results and Conclusion- Identification of certain landmarks is more accurate on CT and CBCT, as compared to USG and MRI. Further results will be available during the presentation.

Registration No. - IAFO/2022/281

AN ANALYSIS OF LIP PRINTS, FINGERPRINTS, AND BLOOD GROUPS- AN INTERDEPENDENCE LINKS OF IDENTIFICATION

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Abstract

Aim: The aim of the study is to analyse the predominant lip print pattern, finger print pattern and ABO blood group in the study population and see if there is any correlation among them that might help in personal identification. Method: Lip print pattern, finger print pattern and ABO blood groups of 150 individuals (males and females) in the age group of 18-25 years will be collected and compared. Background: Identification plays a major role in any crime investigation. Lip prints and finger prints are tools employed in identifying an individual. The pattern of wrinkles on the lips has individual characteristics like fingerprints. The various lip print patterns are reticular, vertical pattern, intersected pattern, branched pattern, partial vertical pattern. The various finger print patterns are loop, whorl, arch, and other pattern. These two in combination might help in identification of an individual. They might be a simple yet useful tool compared to sophisticated molecular techniques. Reason: The correlation between fingerprints, lip prints and blood group, if any, might help in identification of an individual.

Registration No. - IAFO/2022/006

AGE ESTIMATION BY PULP TO TOOTH AREA RATIO USING MAXILLARY CENTRAL INCISOR: A COMPARISON BETWEEN CAMERIERE'S AND INDIAN METHOD ASSESSED IN KERALA SAMPLE USING RADIOVISIOGRAPHY

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Abstract

Age estimation of an individual whether living or dead is an unapproachable task in forensic investigations. As teeth are more resistant to most peri- and post-mortem changes, they are frequently used for identification and age estimation when other human remains are in poor state. However, most methods are destructive and require extraction of teeth which is not feasible in living individuals. Cameriere's et al. put forth a radiographic method of age estimation by pulp to tooth area ratio (AR) and revealed a linear regression between age and the AR. In the present study, we are comparing age estimating method of Cameriere's and Indian formula of the pulp to tooth area ratio in Kerala sample population using maxillary Central Incisor.

Registration No. - IAFO/2022/027

PTERYGOPALATINE FOSSA: RADIOGRAPHIC ASSESSMENT USING CONE BEAM COMPUTED TOMOGRAPHY

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Abstract

Introduction: Pterygopalatine fossa (PPF) which is also called 'the Piccadilly Circus of the face'. Conditions like infective, inflammatory, neoplastic and different ethnic groups can affect the size and volume of this fossa. Radiographic evaluation provides the valuable information of such conditions. Aim: This radiographic study conducted in order to estimate the width and length of pterygopalatine fossa and morphological variations of the PPF using CBCT images. Materials and methods: CBCT scans 56 patients were included in the study. Therefore a total 112 pterygopalatine fossa were examined. The protocol of assessing the shape of pterygopalatine fossa was adopted by the method of tracing and classification given by M. Puche-Torres et al (2017) Results:-Type II pterygopalatine fossa is most commonly seen followed by Type I. Type III and IV pterygopalatine fossa are seen in 16% and 1.7% respectively. There was significant difference found between gender in type I and Type III. Conclusion: Our study is one of the initial studies performed on PPF on CBCT which provides an elaborative approach on type and width of pterygopalatine fossa among Indian population.

Registration No. - IAFO/2022/188

ASSESSMENT OF CANINE SEXUAL DIMORPHISM IN PERMANENT DENTITION IN KASHMIR POPULATION-AN ORIGINAL STUDY

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Abstract

Background: Among the various calcified structures in the human body, teeth are highly resistant to destruction and decomposition. These have emerged as the excellent material for anthropological, genetic, odontologic and forensic investigations. Canines are also the least extracted teeth being less affected by periodontal disease. Canines exhibit the greatest sexual dimorphism amongst all teeth in the human dentition. Objective: To assess the use of permanent canines in sexual dimorphism as well as to describe the dimensional characteristics of canines among the population of Srinagar district of Jammu and Kashmir, India. Materials and Methods: The study comprised of 100 participants from Srinagar district with equal gender distribution in the age group of 17–30 years. Partially erupted/ectopically erupted teeth, patients with dental/occlusal abnormalities, teeth showing physiologic/ pathologic wear and tear were excluded from the study. Clinical crown height (CCH), maximum mesiodistal diameter (MMD) and maximum buccolingual width (MBL) of maxillary and mandibular canines were measured using digital Vernier caliper. Results: In permanent dentition, CCH and MMD showed significant differences except mandibular canines were not showing significant differences in MBL (P < 0.05). Conclusion: Canines can act as pivotal role in gender determination.

Registration No. - IAFO/2022/315

GENDER DETERMINATION USING MAXILLARY SINUS AND BIZYGOMATIC WIDTH

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Abstract

Introduction: The identification of human skeletal remains is considered the first challenging and important step of unknown skull and is mandated by laws and social rules. The adult skeleton for identification of gender is usually the first step of the identification process. For identification of gender, various denser bones are used e.g. skull, pelvis and long bones. Maxillary bone is denser and well preserved in various calamities so it is frequently used for gender determination. Materials and Methods: In the present study subjects of known age and sex is studied with the help of Computer tomography scans. Axial CT images were used to measure the anteroposterior and mediolateral dimension of maxillary sinus and bizygomatic distance in 30 patients (15 males and 15 females) to investigate whether these parameters could be used to determine the gender of an individual for forensic identification. The t-test for independent samples was used to compare these values in males and females and the data were subjected to discriminative analysis using spas software. Results: A statistically significant difference with p value <0.01 was observed in the bizygomatic distance with mean 9.78±0.33cm for males and 9.40±0.27cm for females and also in Anteroposterior dimension of maxillary sinus with mean 4.04±0.06cm for males and 3.72±0.08cm in females. Conclusions: we can conclude that computerized tomography measurements of bizygomatic distance and anteroposterior dimension of maxillary sinus may be useful to support gender determination in forensic medicine when other methods are inconclusive.

Registration No. - IAFO/2022/008

MALTREATMENT OF ADOLESCENT: AN ONLINE SURVEY TO ASSESS EPIDEMIOLOGY AND AWARENESS OF HIGHER SECONDARY SCHOOL ADOLESCENTS AT KANPUR RURAL REGION, UTTAR PRADESH

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Abstract

Context: Adolescent maltreatment is a state of mental, physical, economic, and sexual abuse experienced by a person under the age of 18 and is a crime that prevails globally. Aims: The aim of this online study was to evaluate the level of awareness and epidemiology of the young generation of the rural region toward adolescent maltreatment in the Kanpur rural region, which can be used as a guideline for planning future interventions. Settings and Design: The study was a descriptive cross-sectional online study. Subjects and Methods: The study was done on 545 rural secondary school adolescents in 1 month period, using a standardized self-administered questionnaire. Statistical Analysis Used: The collected data were analysed using SPSS version 21 software and appropriate statistical tests and logistic regression analysis. Chi-square was applied, and $P < 0.05$ was considered statistically significant. Results: Among 545 adolescents (60%) were boys. The most common domains of adolescent maltreatment among female adolescents were neglect (29.5%), psychological (39%), physical (17.9%), and sexual (16.1%), and among male adolescents, these were neglect (36.8%), psychological (26.9%), physical (24.2%), and sexual (6.2%). Demographic variables included substance abuse of parents, father's education, parents living status, and having other jobs, which were significantly related variables to adolescent maltreatment and neglect ($P < 0.05$). Conclusions: Adolescent maltreatment and neglect challenges in India need to be considered carefully and widely, particularly among the underprivileged, disadvantaged, and socioeconomically backward populations of rural communities where adolescent protection systems are not fully established.

Registration No. - IAFO/2022/022

PRECISION AND APPLICATION OF NOVEL 3D PRINTING CUTTING-EDGE TECHNOLOGY IN THE RECREATION OF 3D HUMAN BITE MARKS ON INANIMATE OBJECTS FOR SUPERIOR PRESERVATION, EXAMINATION AND RECOVERY OF FORENSIC DENTAL EVIDENCE OF SUSPECT'S DENTITION: AN ORIGINAL RESEARCH STUDY

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Abstract

Introduction: Bite-mark analysis is extremely complex, with many challenging factors involved in a forensic dentist's ability to determine the identity of the perpetrator. It's also typically used in conjunction with other types of physical evidence. When an investigator sees something on a victim that even resembles a bite, a forensic dentist is called in immediately, because bite marks change significantly over time. Forensic dentists then take measurements of each individual bite mark and record it. They also require many photographs because of the changing nature of the bites. Bruising can appear four hours after a bite and disappear after 36 hours. If the victim is deceased, the dentist may have to wait until the lividity stage clears when details are visible. The bite photography must be conducted precisely, using rulers and other scales to accurately depict the orientation, depth and size of the bite. The photos are then magnified, enhanced and corrected for distortions. Forensic dentists then make a silicone cast of the bite mark. They then compare transparencies of the mould with those of the bite-mark cast, and photos of both the bite mark and the suspect's teeth are compared to look for similarities. But these techniques have various shortcomings and fail to work once the bite mark diminishes with time. However the upper hand 3D printing technology offers is in the immediate & accurate preservation and recreation of the original bite marks without loss of any surface details over a period of time. Aim of the study: To analyse the utilization of a novel method of recreating 3D human bite marks with rapid prototyping methodology and to test its effectiveness over the currently existing testing methodologies in identification of the probable suspect's bite. Materials and Methods: The subjects (n=15) were instructed to sit in an upright position and were asked to bite into an apple. All participants were blinded in the study. The recorded bite mark from one subject was promptly scanned using an intra-oral 3D scanner and a digital file was obtained. Data was analysed to create a virtual STL file format for the design of the bite mark to be fed as input to a 3D SLA printer to produce the prototype of the bite mark. Additionally using SLA technique a 3D printed model was also created. Alginate impressions of the all the subject participant's dentition was made for comparison of match followed by cast fabrication with dental stone. The observer was also blinded to eliminate bias. Results: The bite mark on the preserved apple was compared with both the cast and the 3D printed replica and tried for a match with all the remainder subject's dental casts. To be more precise, non-metric analysis by digital superimposition of the bite mark was also carried out. Virtual planning and designing of an overlay of the cast as well as the 3D scan of the

bite mark impression was done to investigate points of concordance discrepancy. Conclusion: The newer technique of 3D printed bite mark based overlay showed promising results. Within the limitations of the present research study, analysis revealed it to be a match extending the promising scope of 3D printed replicas an effective tool in bite mark analysis.

Registration No. - IAFO/2022/044

SEXUAL DIMORPHISM OF PERMANENT MAXILLARY TOOTH: SHAPE IS MORE RELEVANT THAN SIZE – A 3D GEOMORPHOMETRIC ANALYSIS

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Abstract

Introduction: Tooth shape is genetically coded by the Amelogenin proteins coded by the X and Y chromosomes. The hypothesis of the present study is to assess the sexual dimorphisms of the shape of the Permanent maxillary first (UM1) and second molars (UM2) in a South Indian population. Methods: Pre-treatment dental casts of 60 males and 60 females were digitized using a laser scanner. Landmarks (n=28) based on anatomic and geometric evidences were marked in three dimensions using Slicermorph software. The X, Y and Z coordinates of landmarks thus obtained were analysed using Procrustes superimposition, principal components analysis, regression and discriminant function analysis to test the shape changes, allometry and differences between the sexes. Results: The centroid size and shape of the UM1 and centroid size of UM2, did not show significant difference between the sexes. However, the shape of the UM2 was significantly different between Sexes. (P< 0.01) UM2 showed 6.96% allometry which was 3 times that of the UM1 (2.39%). Accuracy of classification of sex was 95% using shape data of UM1 and UM2. Conclusion: The shape of the UM1 and UM2 can be used to discriminate sex. The UM2 showed higher allometry compared to UM1, probably owing to the farther distance from the primary field of influence. The genetic coding of AMEL genes from X and Y chromosomes and influence of dentin deposition by the Y chromosome could account for the shape variations between the sexes.

Keywords: Geometric morphometry, sex estimation, dimorphism, landmark data, procrustes analysis

Registration No. - IAFO/2022/061

COMPARISON OF SEXUAL DIMORPHISM USING RADIOMORPHOMETRIC MEASUREMENTS IN MANDIBULAR CANINE – A RETROSPECTIVE STUDY

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Abstract

Identification of unknown human remains is mainly done by establishing biological profile. One of the important aspects of biological profile is sex determination. Sex determination with the help of tooth is done by both metric and non-metric methods. Studies has shown that there is specific odontomertric difference between males and female and it is population specific. The aim of present study is to accesses the degree of sexual dimorphism exhibited by mandibular canine at crown and at cervix and to compare the degree of sexual dimorphism at crown and at cervix. Materials and Method: Maximum mesiodistal diameter of the mandibular canine at crown and at cervix is measured in 250 randomly selected OPGs with the help of Image J Software and the data is statistically analysed. Results: Statistical analysis revealed that maximum mesiodistal diameter at crown and cervix is higher in males compared to females. Index of Sexual Dimorphism calculations showed a higher value at cervix than at crown. Conclusion: Radiomorphometric measurements at cervix of mandibular canine shows a better sexual dimorphism than at crown. It plays a significant role in establishing biological profile of an unknown human remains.

Registration No. - IAFO/2022/256

A COMPARATIVE STUDY OF CONE BEAM COMPUTED TOMOGRAPHY AND OCCLUSAL RADIOGRAPHS FOR DETERMINING SEXUAL DIMORPHISM USING LINEAR AND ANGULAR MEASUREMENTS

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Abstract

Introduction: Gender determination is often relied upon in forensic investigations. Skull is the second most commonly used bone for determination of gender. Both maxilla and mandible can be used for gender determination. Because of its compact nature, it can be used in gender identification as it expresses strong univariate sexual dimorphism. Thus, dental arches analysis can be used to determine gender. Various types of radiographs have been utilized for gender identification like skull radiographs, conventional radiographs like periapical radiographs, occlusal radiographs and hand wrist radiographs. In present times, the latest imaging modality of cone beam computed tomography CBCT) provides images that represent a series of contiguous cross-sections like conventional CT (computerized tomography), thus providing three dimensional information of an entity within an object that can be studied in an integrated interactive manner. Aim: To compare angular and linear measurements using occlusal radiographs and cone beam ct for determining sexual dimorphism. Materials and method 10 occlusal and 10 CBCT of patients-radiographs were grouped into males, females and combined sample. The radiographs were carefully processed, and the images obtained were traced for angular and linear measurements. The teeth used for measuring the angular and linear measurements in each arch are canine, first and second premolar. Results: Results established evidence that angular and linear measurements using both occlusal and CBCT radiographs.

Registration No. - IAFO/2022/146

DIGITAL IMAGE QUANTIFICATION OF FUNGIFORM PAPILLAE AND TO ASSESS TASTE BUDS AMONG GERIATRIC AGE GROUP

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Abstract

Background: Taste buds are peripheral structures responsible for sensing taste compounds in food and drink. Each taste bud contains several specialized epithelial cells, including taste receptor cells for recognizing sweet, bitter, umami, sour, and salty compounds. Some of the subjective variability attributed to taste experience could be related to wide variations of taste bud density. The aim of the present study is to investigate histomorphometry changes of taste buds in fungiform papillae and density of fungiform papillae of geriatric age group, Mysore Material and Method: 30 Specimens were collected from male and female cadavers representing geriatric adult age (65-80 years). Methylene blue dye was used to identify the fungiform papillae. The images were taken using a 48-megapixel camera and analysed on Adobe Photoshop for clarity of images. Taste bud densities are quantified in this study using research microscope with digital camera, 20.0 software and reconstructed two regions of human cadaver tongues. Results: Mean wall length of fungiform papillae was 0.09 ± 0.4 and 0.08 ± 0.2 in males and females respectively. Taste bud density (Mean/cm _SD) was 102.2 ± 1.2 in males and 111.2 ± 2.3 in females. Mean and standard deviation of fungiform papillae density was 13.3 ± 2.01. The density of fungiform papillae was correlated with taste buds with positive correlation ($r= 0.79$) was seen, which was also statistically significant ($p<0.001$). Conclusion: Identification of fungiform papillae and assessing density proved to be a non- invasive tool. Differences in taste bud density that extend across adult age groups probably confound some inferences about the effects of aging on taste sensitivity that are derived from cross-sectional studies of human populations. Moreover, it enables to generate more evidence-based science between anatomy and forensics.

ASSESSMENT OF DENTAL AGE USING ATTRITION IN GUNTUR POPULATION, SOUTH INDIA

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Abstract

Objectives: To assess the consistency of dental age change in teeth, for evaluation of actual age of an individuals and to revise the utility of determination of age from teeth in forensic odontology to compare and correlate between the degree of attrition and actual age using Average Stage of Attrition (ASA) Materials and Methods: The sample comprised of 200 adult subjects (132 males and 68 females) from South Indian state of Andhra Pradesh. All the individuals are relatively belongs to same geographical area. All the individuals are examined clinically and selected sound and healthy molars (Ist and IIst molar) with normal occlusion of all four quadrants were included for this study. The Li C and Ji G (1995) criteria were used for ASA. The data obtained and regression analysis was done using statistical software package. Results: The total number of 132 males (66%) and 68 females (34%) were included with mean age of 32.71 ± 2. Maximum individuals were in the age group of 26-35 years. Comparison of mean among maxillary molar (M1) and mandibular molar (M2) using unpaired t – test was not statistically significant. The mean and SD of molars of all four quadrants using unpaired t-test showed statistically significant value ($p \leq 0.01$). The comparison of actual age with estimated age was not statistically significant. Conclusion: ASA method has got significant value in determination of age from teeth in forensic odontology. However it is essential and necessary to assess whether ASA is suitable for other geographic populations.

Keywords: Dental age, Attrition, Average Stage of Attrition, molars, Forensic odontology

Registration No. - IAFO/2022/150

MORPHOMETRIC AND VOLUMETRIC ANALYSIS OF MASTOID PROCESS FOR GENDER DETERMINATION IN FORENSIC ODONTOLOGY: A RETROSPECTIVE CONE BEAM COMPUTED TOMOGRAPHIC STUDY

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Abstract

Background: Personal identification is crucial in natural mass disasters and in man-made disasters when the body is highly mutilated and fragmented. The mastoid process of the skull is important in this regard for sex determination, since it is one of the most protected region and is resistant to damage. Aim: To assess the usefulness of morphometric and volumetric analysis of the mastoid process for gender determination in forensic odontology. Materials and Methods: The study comprised of 60 retrospective CBCT skull images (30 males and 30 females) of known sex within the age group of 17–65 years. Radiographic measurements of the length, width, height and volume of the right and left mastoid processes were made using customized software. Statistical Analysis: The Wilcoxon signed rank test, the Mann–Whitney U test, and discriminant functional analysis were used to analyze all the collected data. Results: In the present study, the mean values of length, height, width and volume of the mastoid process were found to be higher in males than in females. The height of the mastoid process was found to be a good indicator of gender determination, with a sensitivity of 76.7%, a specificity of 76.7%, and an overall accuracy of 76.7%. Conclusion: Mastoid process is a good indicator of gender determination. The volume can also be included as an additional parameter along with length, height, and width. We therefore recommend the use of the mastoid process for gender determination in personal identification in forensic odontology.

Keywords: CBCT, gender determination, mastoid process, volumetric analysis.

Registration No. - IAFO/2022/426

A CROSS-SECTIONAL STUDY CORRELATING DERMATOGLYPHICS AND PERIODONTAL DISEASE, DENTAL CARIES AND MALOCCLUSION

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Abstract

Introduction: Cummins and Midlo defined dermatoglyphics as the study of intricate dermal ridge configurations on the skin covering the palmar and plantar surfaces of hand and feet. These configurations are results of both environmental and genetic factors. Aim: Aim of this study was to assess among school children aged 13 – 16 years in Gujarat, the relationship between finger prints and periodontal disease, dental caries and malocclusion. Materials and Methods: Oral examination of 1000 school children aged 13 – 16 years old was carried out across different cities of Gujarat. The oral examination was carried out for: (a) Periodontal disease using CPI (Community Periodontal Index), (b) Dental caries using WHO with IL criteria (DMFT Index + Initial Lesion), & (c) Malocclusion using Angle's Classification. The method of recording of fingerprint patterns of the study subjects was by ink – stamp method given by Cummins and Midlo. Three basic types of ridge patterns found in the distal phalanges of the digits – whorl, loop and arches, were calculated. The fingerprint records were later sent to the fingerprint expert for analysis and cross checking. Results: Increased frequencies of loop pattern were observed in children with healthy periodontal status, lower DMFT score and with type II malocclusion. Increased frequencies of whorls pattern were observed in children with bleeding from gums, higher DMFT score and type I malocclusion. Conclusion: A possible relation between dermatoglyphics and different dental diseases exists as seen in different studies and further research with larger sample size will yield a conclusive result.

Registration No. - IAFO/2022/599

POTENTIAL SOURCES OF DNA FROM ORAL AND MAXILLOFACIAL REGION

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Abstract

Identification of an individual with usual conventional modalities like dermal ridge finger print, radiological and forensic pathological methods becomes difficult in mass disasters like natural, accidental or man made events such as earthquakes, floods, airplane crashes and terrorist attacks that result in multiple human fatalities. As a result, forensic scientists often turn to DNA analysis. The recent advances in molecular biology have revolutionized all aspects of dentistry. The development of DNA studies has provided powerful approach for identification of unknown remains. DNA finger printing is a tool used to unravel all the mysteries associated with the oral cavity and its manifestations during diseased conditions. It is being increasingly used in analyzing various scenarios related to forensic science. DNA analysis in forensic science requires a sample from either an individual (living or dead), crime or incident site. The oro-facial region is a good source of such material due to the fact that certain oral tissues are relatively resistant to environmental degradation and destruction by thermal, electrical and mechanical insult. Here we present a description of various sources of DNA from the oral and maxillofacial region.

Key words: DNA analysis, Oral and Maxillofacial region. Forensic science

SCOPE OF PERIODONTICS IN FORENSIC DENTISTRY: A REVIEW

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Abstract

Forensic odontology is the application of dentistry in the administration of law and promotion of justice by proper handling, examination and evaluation of dental evidence. The evidence derived from teeth can be used to determine the age of a child or adolescent as a proof for undertaking them into juvenile custody and also used to identify the person to whom the teeth belong, which can be done using either dental records or antemortem photographs. Periodontics is a clinical dental specialty used to identify the morphology and pathology of periodontium of an individual. There are also studies wherein the knowledge of periodontics is used to estimate the age by determining the level of attachment of periodontal ligament, root transparency and root length. The aim of this article is to highlight the contribution of a periodontist towards the field of forensics to unravel various crime scenes. The use of periodontal tissues along with saliva and implants have shown to play a critical role in identification. Thus, the dental professionals play a significant role in keeping accurate dental records and providing all the necessary information to the legal authorities so that they may recognize malpractice, negligence, fraud or abuse, and identify unknown humans.

ROLE OF CBCT AND OPG IN GENDER DETERMINATION: A SYSTEMATIC REVIEW

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Abstract

Craniofacial imaging modalities play an important role in human identification by comparative dental analysis and reconstruction profiling. Skeletal structures especially mandible show remarkable sexual dimorphism thus having a pivotal role in gender determination. Literature search revealed that both 2D and 3D radiographic techniques have significant role in forensic dentistry. However in recent times research is focused on assessing the role of CBCT in forensic dentistry because of its precision, reduced distortion and radiation exposure. This paper is aimed to appraise the role of CBCT and OPG in gender determination by assessing mandibular anatomical landmarks. An electronic search to find relevant original articles was carried out using Pubmed, Clinical key, Trip and Cochrane databases using the key words: Cone beam computed tomography, CBCT, orthopantogram, OPG with terms "Gender", "Sexual Dimorphism" with the Boolean operator "and" between them in different combinations. Article were screened and selected according to definite eligibility criteria. Findings of the study revealed that both 2D and 3D imaging modalities are comparable in gender determination, with their own strengths and limitations.

Registration No. - IAFO/2022/275

COMPARATIVE ANALYSIS OF LIP PRINTS, PALATAL RUGAE & FINGER PRINTS PATTERN AMONG DIFFERENT AGE GROUPS OF ANDHRA PRADESH & THEIR CORRELATION WITH BLOOD GROUPS & DENTAL CARIES

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Abstract

Background: Humans identification is prerequisite for personal, social and legal reason and is a crucial and an exigent task in forensic investigation. Lip prints and palatal rugae patterns are considered to be unique to an individual and hence, hold the potential for identification. Fingerprints have been the gold standard for personal identification within the forensic community. Determining the blood group of a person from the samples obtained at the site of crime, helps identify a person. At present, Dactyloscopy, Cheiloscopy & Rugoscopy is been shown to be highly individualistic and remain consistent throughout life. Also, they are extremely useful tool for preliminary investigations to resolve many biomedical-legal problems. Aim: To assess lip prints, palatal rugae & finger print pattern among different age groups & correlation with blood groups & dental caries Objectives: 1.To study the pattern & type of lip prints, palatal rugae & finger prints among individuals. 2. To evaluate the diversity of these patterns at different age group. 3. To assess the relationship between these patterns and dental caries & blood groups. 4. To determine the use of lip prints, palatal rugae & finger print pattern in sexual dimorphism. Methodology: This descriptive, cross-sectional study will be carried out by collecting, lip prints, palatal rugae & finger prints images taken on cases with a DSLR camera. All the images will be analysed by an image analyser software. Lip prints will be classified, based on Suzuki's & Tsuchihashi's classification and finger prints classified, based on Michael's and Kucken's classification. Caries incidence documented using mouth mirror, probe & explorer. ABO and Rh blood groups of each individual will be recorded. The information collected regarding all the selected cases will be recorded in a master chart in excel sheet & will be sent for analysis. Study sample size: 100 individual of age 1-80yrs (50 male & 50 female). Inclusion criteria: Lips free from any pathology, having normal transition zone between mucosa and the skin. Palate free, Thumb finger from any pathology and deformity. Exclusion criteria: Subjects with congenital abnormalities /malformation. Subjects with surgeries like orthognathic or surgery for cleft palate, bony and soft tissue protuberance, active lesions, deformity of scars and trauma to the palate. Statistical analysis: Data analysis will be done with the help of computer using SPSS statistical package. Using this software, chi square test and spearman's correlation test will be done for qualitative variables and 'p' values are calculated. Results: awaited. Conclusion: The present study is intended to assess the pattern of lip prints, finger prints, palatal rugae and the incidence of dental caries among different age groups. The correlation between fingerprints, lip prints and blood group, if any, will help in identification of an individual. These two in combination as a forensic tool might help in mass disaster victim identification. They might be a simple yet useful tool compared to sophisticated molecular techniques.

Registration No. - IAFO/2022/541

MACHINE LEARNING TECHNIQUE IN CHEILOSCOPIC CHARACTERISTICS DETECTION AND PATTERN CLASSIFICATION

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Abstract

Background: Machine Learning (ML) is a field enhancing the rapid growth of technology. Though use of digital softwares for cheiloscopic investigations have been attempted with limited success, the use of ML based techniques are scarce and seldom have been employed in forensic odontology. Aim: To identify cheiloscopic patterns through machine learning based methods and to correlate the segmented patterns with age and gender of individuals. Methodology: A pilot study was conducted in the department of oral pathology and microbiology, FDS, RUAS with a sample of 30 lip prints of individuals on obtaining informed consent. A lip impression was made after applying dark lipstick and transferred to a white paper to record the wrinkles and grooves without smudging. The images obtained were photographed and subjected to MATLAB software analysis. The lip outlines were extracted using image segmentation. Parameters like area, diameter, extent and perimeter were assessed. Neural networks were used to train the lip print patterns, later the test prints were subjected for classification into type I-V (Suzuki and Tsuchihashi's method). Results: Significant differences were observed in the parameters assessed and lip print patterns in both genders. ML based techniques enhance the uniqueness of cheiloscopy in forensic identification. Conclusion: For the first time a novel ML based technique of cheiloscopic recognition was performed with promising outcomes. In the ever-evolving age of global digitization, cheiloscopic evaluation through AI and ML could offer new panoramas for personal identification of individuals and gender determination.

Keywords: Machine Learning (ML), Cheiloscopy, Forensic Odontology, MATLAB, Suzuki and Tsuchihashi's method

Registration No. - IAFO/2022/019

FORENSIC FACIAL RECONSTRUCTION: THE FINAL FRONTIER

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Abstract

Forensic facial reconstruction is a technique of both scientific methods and artistic skill. Here the face is rebuild onto the skull to recreate the ante mortem appearance of an individual for his/her identification and recognition. They may be used when post-mortem decomposition makes identification difficult by usual means. The reconstruction techniques can be divided into two types i.e. two dimensional (2D) and three dimensional (3D) techniques. They are carried out and analysed either manually or by using specific software. The 3D techniques can be based on the Anthropometrical American method, the Anatomical Russian method or the Combination Manchester method. In this paper, I will review all the methods reported in literature and to determine the best out of them. An extensive literature search in Medline, Pub med, Science direct and various Published research and review articles was carried out. We found from our search that Combination Manchester method was the best and most accurate method for the positive identification of an individual. Forensic facial reconstruction is a rapid, non-invasive and efficient method where reconstruction can be repeated at any time if required. Visual identification by the individual's family and associates becomes easy and more defined.

PROSTHODONTICS IN FORENSIC ODONTOLOGY: NEW HORIZONS

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Abstract

Forensic odontology is the forensic science that is concerned with dental evidence. It is a relatively new science that utilizes the dentist's knowledge to serve the judicial system. The most common role of the forensic dentist is the identification of deceased individuals. Dental structures are the hardest and most resilient tissues of the human body. Teeth on exposure to post mortem influences will survive longer than other body tissues as the materials used to restore damaged teeth are extremely resistant to physical, chemical, and biological destruction. Forensic identification based on assessment of prosthodontic appliances is assuming greater significance, as labelling of dentures and other prosthetic appliance could provide vital clues for patient identification. The most common role of the forensic dentist is the identification of deceased individuals. Forensic identification based on assessment of prosthodontic appliances is assuming greater significance, as labelling of dentures and other prosthetic appliance could provide vital clues for patient identification. Various recommendations have been made concerning the importance of denture identification. This paper presents a review of available literature highlighting the fact that how a prosthodontist can play a key role in identification of a deceased individual if trained to do so.

RECENT TRENDS IN FORENSIC ODONTOLOGY: AN OVERVIEW

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Abstract

Every human being has unique identity in life. Forensic odontology is an emerging branch of science which has a greatest scope of development. The most challenging feature of forensic dentistry includes the identification of dental remains, recovery, and analysis of evidence which match with the suspects. An objective comparison using recent technology would strengthen the validity of evidence in forensic dentistry. It has been established as an irreplaceable science in medico legal matters and in the recognition of the deceased individuals. The forensic odontologist makes use of the knowledge of dentistry in bite mark analysis, fixation of identity in mass disaster, age determination, domestic violence, and child abuse cases. Therefore, the duty and responsibility of forensic odontologist have enhanced in recent times in various medicolegal cases. This article provides an overview of the trends that are evolving in recent times which are used in the field of forensic odontology.

Registration No. - IAFO/2022/173

SIGNIFICANCE OF DERMATOGLYPHICS IN PEDIATRIC DENTISTRY

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Abstract

Dermatoglyphics, coined by Cummins and Midlo in 1926, is a branch of genetics dealing with the skin ridge system. They have been studied for fortune telling by palmists and as a definitive and irreversible tool for identification by forensic experts. From cradle to grave, until the body decomposes fingerprints remain unchanged. In many respects, it has been used as an adjunct to other restraints, serving as a channel to resolve broader biomedical problems. Dermatoglyphics can be a good diagnostic adjuvant for identification of various genetic disorders, oral diseases, and helpful in forensic science. In pediatric dentistry, an essential skill is an assessment of the behavior of children before initiating treatment. Finger prints used as an accessible index for determining the extent of children's cooperation in dentistry before initiating treatment. This could prove to be a valuable, noninvasive anatomical tool which could be used for screening of ECC and hence in devising measures for prevention of the disease. It also help in predicting the malocclusion in pediatric patients. Hence in this presentation I emphasis about the various applications of dermatoglyhics in pediatric dentistry.

Registration No. - IAFO/2022/051

AGE ESTIMATION USING MANDIBULAR MORPHOMETRIC TRAITS: IS IT TRUSTWORTHY??

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Abstract

With increasing incidence of violence, accidents and mass disasters, identification of mortal remains becomes very important. Age estimation is one of the essential factors in human identification and mandible is the second most durable bone of the body which demonstrates age related changes. The bone remodelling is a continuous and complex process, which occurs throughout our life and the various remodelling fields in the mandible, which undergo changes include the gonial region, antegonial region, condyle and ramus. Many studies on different mandibular morphological features and metrical parameters to determine age have been reported by various authors. But a potential confounding factor in the age estimation using mandibular morphologic traits is the different types of vertical facial types in both sexes. Bjork in his study of craniofacial growth by implant method found that mandibular morphological variations occur when the mandible rotates clockwise or anti clock wise and the direction of rotation could be predicted by examination of the structural changes. This suggests that the vertical facial type is related with morphological pattern of mandible. Given the potential of mandibular morphology to be influenced by growth pattern, it is important to recognize it.

Registration No. - IAFO/2022/184

DENTISTRYS CARDINAL ROLE IN FORENSIC ODONTOLOGY- DELIVERING JUSTICE ANDTRUTH

Dr. Minha Majeed Kak[1]

Abstract

The sub-discipline of dental science which lies at the interface of dentistry and the law is Forensic odontology. Forensic odontology is that branch of dentistry which attempts to identify unknown victims of crime. In the detection and resolution of crime and in legal proceedings, Dentistry has much to contribute. Forensic odontology has also played a role in the identification of multiple casualties from disasters such as earthquakes and tsunamis, mass atrocities and road accidents. The most durable organs in the bodies of vertebrates and can therefore yield vital evidence are the teeth. Dental identification is based on individual characteristics of the dentition thus making the particular responsibility of dentists to maintain accurate records for their patients which might later become vital evidence in expensive insurance claims and most importantly, in ensuring that justice is done in courts of law. The collation of ante-mortem and post-mortem dental records for unidentified victims continues to be one of the best and most frequently used methods of identification. When the dismembered bodies are beyond visual description, dental records do guide in retrieving information from the unavowed persons. This paper will include the list of famous international cases which have involved dental forensic science ranging from 49 AD.

Registration No. - IAFO/2022/368

3D PRINTING AND ITS APPLICATION IN FORENSIC ODONTOLOGY: AN EMERGING TREND

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Abstract

Three-dimensional (3D) printing is the forerunner in today's digital dentistry for dental implants, study models for prosthodontics, orthodontics and surgery, the manufacture of dental, craniomaxillofacial and orthopedic implants, and the fabrication of copings and frameworks for implant and dental restorations. However, we are yet to see forensic odontologists, lawyers, and expert witnesses appreciate, embrace the advantages of 3D printing for its use in court of law. This may be due to a perception of it being complicated technology, high cost, or simply a lack of understanding of what can be done with 3D printing. As with forensic anthropology or pathology, 3D printing is well suited to forensic odontology as replicas of human bones and teeth can be 3D printed with straightforward methods. The major application of 3D printing in forensic odontology includes bite mark analysis, 3D-computed tomography facial reconstruction, dental age estimation, sex determination, and physical models or for identification of individuals. Given that these technologies are evolving rapidly and changing the face of forensic science, the presentation collates current developments, practical and scientific overview of 3D printing technologies, working and applications of 3D printing techniques in forensic odontology.

Registration No. - IAFO/2022/227

AADHAR CARD QUICK READ CODE AND NUMBER – UPCOMING TREND IN FORENSIC DENTISTRY IN INDIA

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Abstract

Personal identification is of prime importance for forensic and medicolegal purposes especially in case of natural calamities, crime, accidents, state of unconsciousness, or loss of memory. The denture labelling is an important method which has been used in personal identification. The two methods of denture marking that have been followed are the surface marking methods and the inclusion methods. The surface method is relatively inexpensive and easy to apply but they wear off very easily. The inclusion method is relatively more permanent and provides a more predictable result but the disadvantage is that it is more expensive and is usually made by trained personnel in dental laboratories. In India, we need a method that is cost effective and could be easily identified by all the people of the society. The Aadhaar card QR code/number serves just the above mentioned purpose. Recently, few case reports have been documented in literature where the Aadhar number has been incorporated into the dental prosthesis which will help in the personal identification if the necessity arises in the future. Hence this, paper reviews the role of Aadhar Card Quick Read Code and number in personal identification in India.

Registration No. - IAFO/2022/116

KNOWLEDGE AND PERCEPTION OF DENTAL PATIENTS TOWARDS FORENSIC ODONTOLOGY

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Abstract

Introduction: Forensic odontology is a lesser-known branch of Forensic Medicine. The importance of the science is not yet recognised especially in terms of maintaining a National dental registry and its implication in solving many health care issues and criminal investigations. It is imperative to assess the knowledge and perception of public towards the science. Hence a cross sectional study was done to assess the perception and knowledge about forensic odontology among dental patients. Methodology: A cross sectional survey using a self-administered questionnaire was done on a group of dental patients attending a dental facility. Questions were asked to assess their knowledge and perception about forensic odontology including their willingness to share their dental record details for a dental registry. Results: 322 respondents completed the questionnaire. About 21% (67) of the respondents had come across the term forensic odontology, however 53% (171) of them had heard about Forensic Medicine. Education and age of the patient were a few factors influencing the response and a meagre 12% (39) of them were ready to share their dental record details with the National Dental Registry if required. Conclusion: The respondents in the study had little knowledge about forensic odontology and majority of them were reluctant to share their dental records in case of starting a National dental registry. Hence, there is a need to increase awareness and alter the perceptions regarding forensic odontology.

Registration No. - IAFO/2022/596

FORENSIC ANTHROPOLOGY

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Abstract

Forensic anthropology applies the science of physical or biological anthropology to the legal process. Anthropology is the study of humans, and in this forensic discipline physical or biological anthropologists focus their studies on the human body as it relates to explaining the circumstances of an accident or solving a crime – often homicide. Forensic anthropology involves applying anthropological research and techniques to medicolegal issues. There are three subsections within the field of forensic anthropology, including: • Forensic Osteology (the study of the skeleton), • Forensic Archaeology (involves the controlled collection of human remains), • Forensic Taphonomy (involves the study of changes to the body after death, including decomposition and environmental modification). Forensic anthropologists analyse human remains, typically in criminal investigations. Their study of human remains aids in the detection of crime by working to assess the age, sex, stature, ancestry and unique features of a skeleton, which may include documenting trauma to the skeleton and its post-mortem interval.

Registration No. - IAFO/2022/326

PRELIMINARY STUDY ON MANDIBULAR MORPHOLOGY AS A FORENSIC IDENTIFIER OF THE FACE TYPE

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Abstract

Background and objectives: The facial index is a tool for determining an individual's race or ethnicity, as well as sexual dimorphism. The current research was undertaken with the aim of establishing the mandibular morphological norms as a forensic identification factor in different facial index types, viz., mesoprosopic, euryprosopic, and leptoprosopic. Materials and Methods: Forty CT scans were analyzed for the face types and were grouped into leptoprosopic, euryprosopic and mesoprosopic face types. Height, maximum width, lingual cortical bone (mean thickness of 3 points in the middle region), buccal cortical bone (mean thickness of 3 points in the middle region), and basal cortical bone thickness (mean thickness of 3 points in the basal region) were measured on the mandible. The obtained data was tabulated and amended for the correlation coefficient test and ANOVA statistical analysis. Results: Mandibular buccal bone thickness correlated with face type and cortical bone thickness at the central incisor, first, and second molars by-0.5**, -0.4**, and -0.5**, respectively. An increase in mandibular height was noted in the leptoprosopic face and mandibular width was increased in the euryprosopic face types. The difference noted between the different face types for the different measured parameters was statistically significant ($p<0.01$). Conclusion: There exists a definite correlation between the face type and the cortical bone morphology. Leptoprosopic face types show thinner cortical bone than the other facial types. Thus, it can be concluded that cortical bone thickness can be taken as a forensic identifier for the face type and the forensic facial approximation procedures.

Keywords: Face Index, Face Type, Forensic Identification, Mandibular Morphology

Registration No. - IAFO/2022/040

EFFECT OF SLEEP, DIETARY AND STRESS PATTERN ON THE ORAL HEALTH STATUS OF LOCO-PILOTS IN CHENNAI- A PROSPECTIVE STUDY

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Abstract

Introduction: Railways has become a lifeline of our system with regards to commuting and the importance of loco-pilots is unquestionable. The roles of loco-pilots are known to come under the category of high stress. There has been quite a lot of emphasis on the influence of stress, abnormal diet and sleep patterns on the oral health status of an individual. Psychodermatoglyphics is devoted to identification of a connection between the similarities of the skin pattern and the mental health. So this survey is aimed to assess the correlation between the thumbprint, stress, sleep pattern and its effect on dietary pattern among southern railways loco-pilots. This survey also aims at bringing about awareness among the workers on how their occupational influences their oral health status. Objective: To assess the correlation between the thumbprint, stress, sleep pattern and its effect on dietary pattern among the southern railways loco-pilots. Materials and methods: Sample size: 200-male drivers in the age between 30 to 45 working in southern railways at Chennai central and Edmore railway station. Workers with systemic illness, periodontal diseases and on psychological medications are excluded. Data Collection: 1. Perceived Stress Scale 2. Epworth Scale 3. Hamilton Depression Rating Scale (HDRS) 4. Hamilton Anxiety Rating Scale (HAM-A) 5. OHI AND DMFT scale 6. Provide dietary chart counselling. The results will be analysed and tabulated.

Registration No. - IAFO/2022/317

COMPARISON OF AGE ESTIMATION METHODS USING ROOT TRANSLUCENCY AND PDL LOSS IN EXTRACTED TEETH

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Abstract

Introduction: Teeth are useful indicators of age in living and dead person. The Dental evidentiary material could be used for court presentation in destructive and non-destructive methods of preservation. Teeth are used to estimate age and sex in the young and old, as well as the living and dead. Our study examined two parameters— Root translucency and PDL loss on a heterogeneous sample. Method: The extracted teeth with age and sex were collected from adults in Karnataka population, with age range between 22 – 60 years. Methods such as Johanson and Lamendin were utilised in assessing changes such as Root translucency and PDL loss. We are looking at the very good co-relation co-efficient (R) among the methods and also least Standard Error of Estimate (SEE) between estimated age and actual age. Result: The study is under process, the results will be presented at the time of presentation. Conclusion: It is anticipated that this study helps to find out best reliable method for the estimation of age.

Keywords: Age estimation, extracted teeth, PDL, root translucency and chronological age.

Registration No. - IAFO/2022/029

FOR A MEN OR WOMEN? GENDER ESTIMATION FROM FORAMEN AND CANALS OF MAXILLA BASED ON CONE BEAM COMPUTED TOMOGRAPHY

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Abstract

Background: The incisive canal (IC) and foramen (IF); greater palatine canal (GPC) and foramen (GPF) are an important anatomical structure in the maxilla that should be considered during many dental procedures. Aims: To associate IC, IF, GC & GF morphology and dimensions for gender determination by means of cone-beam computed tomography (CBCT). Materials & Method: A retrospective study was conducted on archived CBCT records of patients who sought treatment at the institute. 3D imaging software was utilized in image reconstruction and measurements. The parameters evaluated were the IC shape and dimensions in sagittal and coronal views; the diameter of GPF and length of GPC with distance from center of GPF to mid-maxillary suture (MMS) and distance from center of GPF to anterior nasal spine (ANS) and GPC location relationship with tooth on right and left side. The variables were compared according to gender using two-sided Chi-square test and t test. 95% confidence level was obtained at p<0.05. Results: Out of the 74 CBCT images assessed, only 50 (27 males & 23 females) images fulfilled the inclusion criteria. No substantial variances in IC morphologies were found in perspectives with reference to gender. There was significant difference in length of GPC (p<0.005) between males and females. Effect size significance is present in IC length, diameter of GPF and distance from center of GPF to MMS. Conclusion: There is no association between IC morphology & GPC morphology and gender. However, substantial variation in IC length and GPC length was observed between genders.

Keywords: CBCT, Incisive canal, Nasopalatine canal, greater palatine canal, greater palatine foramen.

Registration No. - IAFO/2022/329

CORRELATION OF LIP PRINTS AND BLOOD GROUPS: AN AID IN FORENSIC SCIENCE

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Abstract

Forensic dentistry represents an overlap between the dental and the legal professions. It plays a major role in the person identification. Several structures of human body abetted with various methods do exist for forensic evaluation. Lip prints play a vital role in transfer of evidence and are considered similar to finger prints in forensic and personal identification. We conducted this study to ascertain the prevalence of different blood groups in different lip patterns and to identify gender on the basis of lip print patterns to find a co-relation between lip prints with blood groups which can further help out in forensic identification.

ASSESSMENT OF KNOWLEDGE AND AWARENESS OF DENTAL FORENSICS AMONGST MEDICAL OFFICERS, LAWYERS, POLICE OFFICERS IN INDORE DISTRICT - A PILOT STUDY

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Abstract

Background: Forensic odontology/ Dental Forensics, a challenging branch of Forensic Medicine which deals with law. It provides authenticated evidences and documentations of victims and plays a vital role in crime investigations but seems to be in its primitive stage in India. Aims & Objectives: To assess the knowledge and consequently the level of awareness of dental forensics amongst medical officers, lawyers, police officers in Indore District. Materials and methods: A Questionnaire based cross-sectional study was conducted amongst medical officers, lawyers, police officers. Chi square test was done and was calculated by using SPSS 28 software which was found to be statistically significant ($p < 0.05$). Results: The composed results showed that there is a necessity for changes in the current practice of evidence collection and should give prime importance to Dental Forensics amongst forensic odontologists medical officers, lawyers, police officers for crimes investigations and the administration of justice. Conclusion: There was lack of awareness on forensic odontology amongst medical officers, lawyers, police officers which shows the mirror image of the existing condition of our country.

Keywords: Dental Forensics, Lawyers, Medical Officers, Police Officers.

Registration No. - IAFO/2022/404

VIRTUAL AUTOPSY TO VIRDENTOPSY: RISING FRONTIERS IN FORENSIC ODONTOLOGY

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Abstract

One of the most resilient remnants preserved in human remains are "Teeth". Forensic odontology has progressed immensely and presently has a key role in victim identification process. Virtual autopsy concept came with whole body volume documentation using post-mortem CT, MRI, 3D surface scan. With advances in forensic odontology like CBCT, micro-CT, 3 D printing, advanced artificial intelligence algorithms and availability of 3D digital dental records; Virtual autopsy and forensic odontology has gained momentum to an extent that Virtual Dental Biopsy concept is increasingly becoming popular. This presentation shall summarize the new upcoming frontiers in the field of forensic odontology, and highlight new concept behind Virtual dental autopsy or VIRDENTOPSY and its future utilization.

Registration No. - IAFO/2022/527

POSTMORTEM ORAL MUCOSAL CHANGES- A VITAL FORENSIC AUTHENTICATION TO PESTICIDE POISONING

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Abstract

Background: Suicidal attempts consuming pesticides & drugs have shown a rise both in rural & urban set up as it is licentious and an instant measure. Poisoning is one of the third causative factor for death following vehicle accidents and fire incidences. Since oral cavity is the first to come into contact with ingested pesticides, the histopathological changes may prompt the cause of death and act as confirmatory evidence in forensic investigation. Objective: The present study evaluated the histopathological changes in oral tissues induced by pesticide poisoning. Methodology: This was a cross-sectional pilot study conducted on oral tissues obtained from deceased patients during autopsy. The study samples were obtained from 10 cases of ingested pesticide poisoning, and the control samples were obtained from road traffic accident cases. All samples were subjected to histopathological examination and changes were recorded. Results: Significant degenerative changes were observed in the epithelium and connective tissue components, such as collagen, muscles, nerves, vasculature, adipose tissue, and salivary acini and ducts, in the poisoning cases. The oral tissues of the road traffic accident cases did not show any notable degenerative changes. Conclusions: The degenerative changes in the study samples can be attributed to the direct contact of the pesticide with the autopsied oral tissues when the poison was consumed. There are instances in which the entire body may not be recovered or may not be in an examinable state. In such cases, an oral autopsy could provide additional evidence for determining the cause of death in suspected poison cases.

Keywords: Autopsy; Degeneration; Histopathology; Oral mucosa; Pesticide; Poisoning

Registration No. - IAFO/2022/232

GENDER IDENTIFICATION THROUGH MANDIBULAR RAMUS: A DIGITAL ORTHOPANTOMOGRAPHIC STUDY

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Abstract

Aims and Objectives: (1) To determine the usefulness of mandibular ramus as an aid in sex determination. (2) To evaluate Anteroposterior | superioinferior angle of mandibular condyle. Materials and Methods: A study conducted using orthopantomographs of 60 males and 60 females, which were taken using Kodak 8000C Digital Panoramic and Cephalometric System (73 kVp, 12 mA, 13.9 s). The age group ranged between 18 – 45 years. Mandibular ramus measurements were carried out using Master View 3.0 software. The measurements of the mandibular ramus will be subjected to Discriminant function analysis. Results: Maximum ramus breadth, Minimum ramus breadth, Condylar height, Projective height of ramus. Coronoid height were calculated for both the sexes differently with the formula & analyzed with Discriminant function analysis using Fischer exact test. The P value was statistically significant with the P value & lt; 0.05 for the following parameters Max. Ramus breadth, Condylar height and Projective height of ramus. Conclusion: Mandibular ramus measurements can be a useful tool for gender determination.

Registration No. - IAFO/2022/530

EVALUATING THE RELIABILITY OF TWO DIFFERENT DENTAL AGE ESTIMATION METHODS IN BENGALURU CHILDREN

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Abstract

Background - Forensic dentistry is the legal field of dentistry which analyzes dental evidence in the interest of justice. Dental evidence has been gathered for the identification of victims and suspects in mass disasters, abuse, and organized crimes. Pediatric dentistry specialty is used for identification of individuals and age estimation which include eruption sequence, Schour and Massler chart, Cameriere's method, Moorrees method, Demirjian's method using dental maturation chart, Nolla's stages of calcification. It also plays an important role in recognizing child abuse. Aim - The aim of the study was to estimate the age of individuals with two different methods (London Atlas and Demirjian's methods) in a sample population of Bengaluru and to compare relative accuracy of the methods in estimating the chronologic age of an individual. Materials and Methods - Orthopantomograms (OPGs) of 464 children (242-males; 222-females) of Bengaluru population, aged between 3 and 18 years were taken and age estimation was done using two different methods. Results - There is a strong positive and statistically significant correlation between chronological age and both measures of biological age. Amongst the two methods, Demerjian's method is marginally stronger than the London Atlas method (0.98 vs. 0.96) in estimating the chronological age of an individual. Conclusion – Both the methods are applicable for the local population however Demirjian's method is marginally stronger than that of London Atlas method in estimating the chronological age of an individual in the sample population.

Registration No. - IAFO/2022/598

ISOLATION OF EPITHELIAL CELLS FROM TOOTH BRUSH AND GENDER IDENTIFICATION BY AMPLIFICATION OF SRY GENE

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Abstract

Introduction: This study determines the importance of tooth brush from which DNA can be isolated and used for sex determination in forensic analysis. Materials and Methods: A total of 30 samples were collected and stored at room temperature for different periods of time interval. The epithelial cells adhered to the bristles of toothbrush were collected and genomic DNA was extracted and quantified using Nanodrop1000 spectrophotometer. Results: Gender identification was done by amplification of sex determining region on Y chromosome (SRY) gene using real-time polymerase chain reaction and minimal amount of DNA (in Pico grams) with 100% sensitivity and 73.3% specificity, i.e., all male samples showed positive results and out of 15 female samples 4 showed false positive results, i.e wrongly identified as males. Conclusion: With this study, we conclude that PCR is a valuable and sensitive procedure where minute contamination may cause alteration in the result, i.e., 4 females showed false positive result. Minute amount of DNA in picograms, which was collected at different intervals is enough for amplification of SRY gene and tooth brush can be used as one of the very valuable sources of gender identification.

Registration No. - IAFO/2022/287

EXTRACTION OF DNA FROM BURNT TEETH

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Abstract

Disasters like fires, explosions, bombings, aviation accidents that require human identification should be initiated with an immediate response and thereby forensic dentistry plays a very significant role. These disasters can cause the human remains to be damaged excessively as they are exposed to very high temperatures of about 300 degree Celsius to more than 1000 degree Celsius. Teeth being a very good source of DNA can be used for DNA profiling even after such catastrophic events as they survive such high temperatures. Polymerase Chain Reaction (PCR) analysis is an important molecular biology tool in forensic odontology, requiring relatively low concentrations of target DNA for quantification. This review highlights on the quantification and identification of DNA from incinerated dental remains.

Registration No. - IAFO/2022/253

COMPARISON OF TWO DENTAL AGE ESTIMATION METHODS IN CHILDREN AND ADOLESCENTS: A PILOT STUDY

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Abstract

Aim: In the current study we compared dental age estimated using both Demirjian's comprehensive chart and London atlas methods for association with the known chronologic age in children and adolescent patients from a dental college in New Delhi. We also determine if sexual dimorphism existed in dental age estimated Demirjian's comprehensive chart and London atlas methods. Methods: Dental age estimation was performed by both Demirjian's comprehensive chart and London atlas methods on 100 orthopantomogram records (50 males and 50 females) of orthodontic patients. The results of estimated dental age by both the methods were compared and analysed using paired t-tests. The mean difference between both the methods was obtained to find the correlation and significance level. Results: There was an overestimation of dental age by Demirjian's comprehensive chart was +1.3 in males and +0.5 in females respectively. London Atlas overestimation was +1.4 years in males and +0.5 years in females. A statistically significant difference ($p<0.0001$) was found when mean chronological age of the participants was compared with dental age estimated using either Demirjian's comprehensive chart or London Atlas. Conclusions: Our results points towards more accuracy of London atlas compared to Demirjian's comprehensive chart for estimating dental age on population of New Delhi. Our results forms basis of future large sample sized studies with more observers for inter-observer reliability and reduced bias.

Keywords: Forensic dentistry, Demirjian's method, DAEcc, Dental age estimation, London atlas.

Registration No. - IAFO/2022/109

DENTAL AGE ESTIMATION USING CHAILLET'S METHOD

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Abstract

Background: Age estimation forms one of the most important sub disciplines of forensic sciences and is important for medico legal issues1. In forensic dentistry, there is a need to determine the age of unidentified skeletons or individuals .Age estimation is important in birth certificate is not available, especially in children. Morphological and radiological analysis of teeth helps in chronological age estimation. Several authors have tested the Demirjian's method against their population groups with varying success. However, results were less accurate if population of different ethnic origin were compared to Demirjian's standards. Hence they highlighted the necessity to create databases representative for each population As a result Indian specific regression formulae using the modified Demirjian's eight teeth method following the gender-specific French maturity scores were developed. Therefore, this study was aimed to investigate the relationship between chronological age and dental age using the Chaillet's Method. Methodology: 37digital panoramic images of patients aged between 7-25 years were selected from the archives based on the inclusion criteria. The chronological age of each person was noted. Dental age was calculated as per Demirjian's scores for tooth development and using Chaillet's formula. Statistical analysis was performed with SPSS software (version 22). Results: The chronological age was 17.6years among females and 18.45 years among males. Dental age estimated by using Chaillet's method among females 13.9years and among females was 14.26 years. Chaillet's method of dental age estimation shows under estimation of 3.7years as compared to chronological age.

Registration No. - IAFO/2022/312

COMPARISON OF LATENT LIP PRINT DEVELOPMENT AND RETRIEVAL FROM INANIMATE SURFACES

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Abstract

Introduction: Identification of a person is of paramount importance in a medico-legal investigation. At present more and more people use protecting lipsticks and permanent lipsticks. With these lipsticks a latent lip print is generated by contact with a surface and, like with the latent fingerprints occur, this latent lip print can be developed. Aims: This study aims to retrieve latent lip prints from various inanimate surfaces like thermocoal plate, bone china, and glass to compare the efficacy of developers i.e. fingerprint powder, Sudan III, Vermillion, and its comparison with standard lipstick prints. Current research assesses the effectiveness of particular surfaces in the retrieval of lip print in personnel identification. Methods and material: This study included a total of 30 subjects. Latent lip print was developed on the different inanimate surfaces by pressing the lips against the different surfaces. After collecting samples, a camel hair brush was used to retrieve all three chemicals individually by simply tapping on all three surfaces. Application of chemicals was continued until the print became clearly visible for the study. Developed latent lip print was then compared with the visible lip print. Subsequently, a standard lipstick print was developed from the same subject. All the samples were coded and graded according to the patterns suggested in the literature. Statistical analysis used: Discrete data were summarized in number and percentage and compared by chi-square ($\chi 2$) test. Analyses were performed on SPSS software (Windows version 17.0). Results: The overall outcome was found to be highest in Fingerprint powder (58.9%) followed by Sudan III (28.9%) and Vermilion (10.0%) the least (Vermilion < Sudan III < Fingerprint powder). Comparing the overall outcomes of three developers, $\chi 2$ test showed significantly different and higher favourable outcome in Fingerprint powder as compared to both Sudan III and Vermilion ($\chi 2=92.09$, $p<0.001$) Conclusions: It is concluded that the fingerprint powder act as the best developer and thermocol plate can act as the best inanimate surface for retrieval of lip print. The findings of this study may be beneficial for investigators in using best developer at crime scene and best inanimate surface for investigation.

Registration No. - IAFO/2022/058

ADOPTION OF 3D SCANNERS IN SCOURING FOR FORENSIC EVIDENCE

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Abstract

Crime scenes are unstable environments, which are often short lived and present difficult types of data to visualise easily and effectively to other individuals who were not present at a scene. Laser scanning technology is increasingly being used in forensic anthropological research to obtain virtual data for archival purposes and post hoc measurement collection. A 3D Scanner speeds up the process of crime scene investigation by creating an accurate three-dimensional representation of the scene of the crime. Advantages of the scanner over traditional means of documentation such as photography include the ability to obtain measurements in all dimensions, the ability to reconstruct missing elements, and the ease with which generated images can be interpreted. We can use the scanner to take measurements, inspect evidence, and analyse blood spatter or bullet trajectory. It allows analysts to collect precise dimensions, evidence and features to be recorded for later analysis.

Registration No. - IAFO/2022/062

RESEARCH ON PALATAL RUGAE IN FORENSIC ODONTOLOGY – WHERE DO WE STAND?

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Abstract

Palatal rugae are considered to be stable landmarks that can be of value in forensic odontology. There have been several studies in the last couple of decades that involve identification and comparison of palatal rugae in different races of people, in people with different types of occlusion, in families across generations, and also in different genders. This review is a consolidation of these results from the literature, and suggests future directions for research.

Registration No. - IAFO/2022/045

ASSESSMENT OF MORPHOLOGICAL CHARACTERISTICS OF TONGUE FOR PERSONAL IDENTIFICATION: A DIGITAL PHOTOGRAPHIC STUDY

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Abstract

Introduction: Tongue act as a real proof of life as it is an inimitable, well protected from the external environment and there are no two tongues with similar morphological features even between identical twins. This study aims to assess the morphological characteristics of tongue and its variations as observed on digital photographs for personal identification. Material and methods: Study sample included 200 participants above 18 years reported to Bharati Vidyapeeth Dental College and Hospital, Sangli. The subjects were screened and included according to the inclusion and exclusion criteria. Front view photographs were taken from a predetermined distance of 6 feet using a professional Nikon 90d micro lens camera. The obtained data was compared and statistically analyzed in terms of morphological features of tongue such as shape, border, and fissures with its variations. Results: The mean age of the subjects was 38.60±15.58 years and included 61% of males and 39% of females. Overall, U shaped tongue was the most frequently observed (72%) followed by V shape (22%) & bifid type (6%). Gender-wise comparison of tongue characteristics revealed that mild form of fissure numbers (1-3) and shallow fissures were most common in males compared to females with statistical significance (P= 0.016 & P= 0.045 respectively). Conclusion: Tongue morphological characteristics and its variations are unique with respect to each individual. Hence, it can be adopted by dentists as a chair side technique on a routine basis. Inclusion of tongue features in dental records will aid in a more reliable and effective personal identification.

Registration No. - IAFO/2022/202

POST MORTEM INTERVAL ESTIMATION USING THANATOMICROBIOME – LINKING DEATH TO THE MICROBIAL CLOCK

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Abstract

Post mortem interval (PMI) refers to the time period between death and examination of a body and is vital in solving criminal and civil cases concerning medico legal investigations. Forensic studies rely on biochemical, anthropological and histopathological evidences to find the above. But in advanced cases of decomposition, the above methods are not reliable. Post three days of death, even entomological methods have limitations due to seasonal and geographic variation among insects. Thanatomicrobiome is the microbial community associated with host after death and has emerged as a novel method to estimate PMI in advanced stages of decomposition. Bacteria are of utmost importance here due to their role in decaying process and they spread throughout the body and consolidate in areas like oral cavity and intestine. The postmortem microbiome has shown much promise as bacterial succession changes in a predictable and clock-like manner across mammalian species within the same environment in response to changes in a decomposing source. Hence this review paper will emphasize on oral thanatomicrobial samples that can be collected and analyzed through various new methods to aid in PMI along with their pitfalls and limitations.

Registration No. - IAFO/2022/471

ESTIMATION OF INNER-CANTHAL DISTANCE OF AN INDIVIDUAL USING THE INCISAL WIDTH OF MAXILLARY CENTRAL INCISOR-A PILOT STUDY

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Abstract

Dental evidence is a valuable tool in identifying individuals in forensic odontology.This study is based on the fact that the ICD is attained by the age of 1 year, after which the growth in this area is slow in contrast to outer orbital dimension.This stable landmark can be identified, located and measured accurately. The aim of this study was to derive at a formula to calculate the ICD in Mangalore population by using the incisal width of maxillary central incisor. This study attempts to showcase the usefulness of deriving inner-canthal distance by using incisal width of maxillary central incisor which can be used as an adjuvant to support and aid in sketch analysis for person identification.30 subjects between the age group of 18 and 35 yrs were considered in this study. The data obtained was tabulated and analyzed using Statistical Package for Social Sciences, Version 16 (SPSS).Results showed a highly significant correlation between inner canthal distance and incisal width of maxillary central calculated from the wax bite.

Registration No. - IAFO/2022/472

GENDER DIMORPHISM OF MAXILLARY FIRST PERMANENT MOLAR – A FORENSIC RADIOGRAPHIC STUDY

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Abstract

Identification of an individual is based on characteristics like gender, age and racial background unique to that individual. Out of all the parameters, the determination of gender falls first in line. Teeth are the most rigid structure and can withstand adverse conditions and serves as excellent evidence in forensic and anthropological studies and investigations. Gender dimorphism has been studied with metric and non- metric features in different populations. The present study aims to determine the gender of an individual based on the mesiodistal dimensions of permanent maxillary first molar teeth from a panoramic radiograph and analyze sexual dimorphism exhibited by the tooth. Mesiodistal width of 100 permanent maxillary first molar teeth was measured from a panoramic radiograph of 50 male and 50 female patients between the age group of 18- 40 years. Investigators performed the Statistical analysis using SPSS software. Results showed no statistical significance in the mesiodistal width of permanent maxillary first molar between males and females. In conclusion, the mesiodistal width of maxillary molars measured from panoramic radiographs has not demonstrated significant sexual dimorphism.

Registration No. - IAFO/2022/354

CONE- BEAM COMPUTED TOMOGRAPHY STUDY OF MENTAL FORAMEN CHARACTERISTICS IN AN URBAN EASTERN INDIAN POPULATION

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Abstract

Aim: Assessment of morphologic and morphometric characteristics of the mental foramen (MF) in an urban Eastern Indian population and the evaluation of gender differences on the same. Material and Methods: Cone-Beam Computed Tomography (CBCT) images of 100 adult males and 100 females, aged 18-60 years, were randomly selected from institutional records and examined for the MF position (horizontal and vertical), opening angle, shape and dimensional measurements; vertical distance from the superior border of the foramen to alveolar crest and inferior border of MF to base of the mandible. The prevalence and characteristics of the accessory mental foramen (AMF) were additionally evaluated. The effect of gender on characteristics of MF and AMF was assessed. Results: The horizontal position of MF was in between the roots of premolars in 48.0% and 44.0% of males and females, respectively. In a higher proportion of females (98.0%, p = 0.006), the vertical position of MF on the left-side was located apically to the apex. The vertical (3.64 mm; p<0.001) and horizontal (3.64 mm; p<0.001) diameters of MF and occurrence of AMF (16.0%, p = 0.046) on the left-side were higher in males. The opening angle of MF (right-side: 24.13 degrees, p = 0.001; left-side: 24.21 degrees, p<0.001) was higher in females. Conclusion: The study revealed significant gender variations in certain MF characteristics and noted prevalence of accessory structures in our study population which if validated in large scale studies may be of bearing in a forensic case scenario.

APPLYING ARTIFICIAL INTELLIGENCE TECHNOLOGY IN FORENSIC ODONTOLOGY: A PILOT STUDY OF AN AUTOMATED PERSONAL IDENTIFICATION PROCESS

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Abstract

Forensic odontology (FO) deals chiefly with the identification of the individual through the remains, which mainly includes teeth and jawbones. Artificial intelligence (AI) technology has proven to be a breakthrough in providing reliable information in decision making in forensic sciences. AI technology has been widely applied in FO for identifying bite-marks, predicting mandibular morphology, gender determination, and age estimation. Most of these AI models are based on either artificial neural networks (ANNs) or convolutional neural networks (CNNs). The aim of this study was to suggest an automatic detection of natural teeth and dental treatment patterns based on panoramic radiographs of jaw and teeth using deep learning to promote its applicability as human identifiers. This dataset consisted of natural teeth, prostheses, teeth with root canal treatment, and implants. The detection of natural teeth and dental treatment patterns including the identification of teeth number was done with a pre-trained object detection network which was a convolutional neural network. The results of the studies are promising, performance of convolutional neural network using dental panoramic radiographs in automatically identifying teeth number and detecting natural teeth, prostheses, treated root canals, and implants. This model can be a promising tool when identifying victims of mass disasters and as an additive aid in medico-legal situations.

Keywords: Artificial Intelligence, Machine Learning, Radiography, Forensic Odontology; Neural Networks, Computer, Forensic Anthropology

APPRAISAL OF ASSOCIATION BETWEEN CHEILOSCOPY AND LIFE-STYLE DISORDERS: A SYSTEMATIC REVIEW

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Abstract

Background: Global lifestyle disorders like hypertension, diabetes mellitus and obesity occur in genetically susceptible individuals in presence of precipitating factors and their early diagnosis could improve mortality rate. This lead to extensive search for reliable non- invasive screening tool in individuals predisposed to such conditions. Association has been reported between dermatoglyphics and genetically related diseases. Similarities between lip and finger prints encouraged researchers to find relationship of cheiloscopy with genetically determined conditions. Aim: This systematic review aimed to find if cheiloscopy could be used as a reliable tool to screen diabetes, hypertension and obesity. Methodology: An electronic search was carried out using PubMed, PubMed Central, Clinical Key, Google scholar and Trip databases via keywords: diabetes, hypertension, and obesity in combination with "cheiloscopy or lip prints" with Boolean operator "and" between them. Eight original research articles that met the eligibility criteria were included. Results: Studies reported that cheiloscopy could act as potential predictive tool to screen diabetes and hypertension, however, no significant difference in obese and non-obese individuals was found with regard to lip print pattern. Conclusion: To validate cheiloscopy as a reliable predictive tool more elaborate studies which assess various age groups, gender and population from different regions of world are warranted.

Registration No. - IAFO/2022/217

ADVANCED GLYCATED END PRODUCTS IN HUMAN DENTINE AND THEIR RELEVANCE IN AGE ESTIMATION: A REVIEW

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Abstract

Advanced glycation end-products (AGEs) are proteins or lipids that become glycated after exposure to sugars. AGEs are the biomarkers implicated in aging and the development, or worsening, of many degenerative diseases, such as diabetes, atherosclerosis, chronic kidney disease, and Alzheimer's disease. Maillard reaction is a nonenzymatic reaction of blood glucose with body proteins that leads to cumulative chemical modifications of tissue proteins throughout the body, resulting in formation of advanced glycation end-products (AGEs). In aged persons, the teeth usually appear more brown than those in young subjects. This phenomenon is characteristic of ageing. The Maillard reaction also occurs in dentinal collagen and as a result, AGEs accumulate near dental canals during one's life. This phenomenon results in brownish discoloration and modification of the mechanical properties of dentine. Mechanical indentation analysis, fluorescence spectroscopy, immunohistochemical staining and immuno-electron microscopy in demineralized dentine have been used to detect AGEs formation. The main purpose of this review was to determine whether AGEs produced by Maillard reaction accumulate in human dentine physiologically. Because dentinal collagen does not regenerate within one's lifetime, the accumulated amount of AGE in dentinal collagen is a potential indicator of human age, making it applicable in forensic medicine.

NON- METRIC DENTAL TRAITS: FROM IDENTIFICATION TO PROXY FOR DNA

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Abstract

The phenomenon of anthropological schooling of tooth anatomy are of two types, one is based on measurements and the other is concerned with morphological features. The last- mentioned mainly provides details on identification, racial differences and evolutionary changes in human dentition. Teeth are robust tissue in the human body and they are preserved good after death and burial although sometimes the skeletal and DNA preservation is deficient. The classical implementation in the study of non- metric dental traits include ancestry identification in forensic cases, archeological and paleontological studies. In order to carry out these application in worldwide a series of plaques are standardised. These plaques showed particular features of permanent and deciduous dentition. The ASUDAS plaques are widely used and main advantages of these dental traits are they are assumed to be controlled by genes and their morphology remains stable. Also ASUDAS traits are highly heritable, selectively neutral and evolutionarily conservative. The recent studies shows correlation between neutral genetic variation and dental morphological variation among modern human population. Therefore these batteries of features walks from identification to proxy for DNA.

Keywords: Non- metric, dental traits, ASUDAS, DNA, plaques.

Registration No. - IAFO/2022/687

AGE AND GENDER DETERMINATION USING PALATAL RUGAE PATTERNS IN PATIENTS REPORTING TO A TERTIARY CARE HOSPITAL IN TRIBAL REGIONS OF EASTERN GUJARAT

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Abstract

Introduction – In the oral cavity, palatal rugae are permanent, unique to each individual and can establish identity through discrimination. These rugae due to their internal position, are protected from trauma and high temperatures by lips, cheek, tongue and buccal pad of fat teeth and bone. In spite of these merits, rugae have not often been used as a widespread forensic tool. Rugae pattern are specific to some racial groups facilitating population identification. Keeping this in mind, the study was conceptualized to check these trends in the local tribal population Aim & Objectives – Examination of palatal rugae pattern in patients reporting to a tertiary care hospital in tribal regions of Eastern Gujarat. - Analyse and identify the differences in the palatal rugae patterns in the tribal population of Eastern Gujarat - Age determination using palatal rugae patterns - Gender determination using palatal rugae patterns Methodology – Inclusion criteria - 500 males and 500 females will be included in the study. Once casts are fabricated after impressions, they will be numbered with details for identification. Using the classification given by Kapali and Kotze et al to categorize rugae shapes each plaster cast will be examined. Obtained data will be further statistically analyzed by using SPSS software 20 and results will be obtained accordingly by using Chi-square analyses. Results – Data will be presented after required statistical analysis

Registration No. - IAFO/2022/422

EVALUATION OF INFLUENCE OF AGE AND GENDER ON THE SHAPE AND DIMENSIONS OF NASO-PALATINE CANAL USING CONE BEAM COMPUTED TOMOGRAPHY (CBCT)

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Abstract

Introduction: The naso-palatine canal (NPC) is a very important anatomical structure that might be subject to neurovascular damage during surgical procedures in the anterior maxilla. To avoid, the damage to neurovascular bundles causing complications, it is necessary to assess the morphology and dimensions of NPC. Aim and Objective: The aim and objective of this study was to analyze and evaluate the influence of age and gender on the shape and dimensions of NPC using Cone Beam Computed Tomography (CBCT). Materials and Methods: 100 CBCT images were evaluated for size and shape of the naso-palatine canal and the distance between the incisive foramen and the anterior nasal spine, and the distance between the anterior border of the naso-palatine canal and the labial surface of the buccal plate were recorded. Results: The naso-palatine canal's length decreased and its diameter increased with aging. The length and diameter of the canal was significantly larger in men than in women. The distance from the naso-palatine canal to the labial surface of the buccal plate was not gender-related but decreased with age. The distance to the labial cortical surface decreased significantly with loss of incisors. Conclusion: NPC is an important anatomical structure with different diversities and variations of the morphology and size of NPC in different people. CBCT is a valuable diagnostic tool to differentiate anatomical and morphological variations and influence of age and gender on the shape and size of the NPC in the anterior maxillary region.

Registration No. - IAFO/2022/424

APPLICABILITY OF CAMERIERE'S ITALIAN MODEL AND POPULATION SPECIFIC MODEL IN KARNATAKA POPULATION

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Abstract

Introduction: Age estimation is a very important aspect of Forensic science especially when information relating to the deceased is unavailable. Its importance is priceless in a country like India where in, on one hand birth records of 10 million children every year go unregistered and on the other hand there is significant rise in involvement of minors in various crimes. Delivery of justice can be appropriately made if the age is determined accurately and hence the accurate method of age estimation plays a pivotal role in correct justice being done. Aim: To assess the accuracy of Cameriere's Italian model and Population specific model of dental age estimation among the children in Karnataka Methodology: 700 digital OPGs from the archives of OMR dept were analyzed using Cameriere's Italian model and population specific model of dental age estimation based on normalized open apices method. Result: Better accuracy was achieved with population specific model. Conclusion: Population specific model is more appropriate than Cameriere's Italian model and Indian specific model for the present population.

Registration No. - IAFO/2022/413

DNA FINGERPRINTING – AN ADVANCEMENT IN FORENSIC ERA

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Abstract

Establishment of a person's individuality is important for legal and humanitarian purpose. The need for personal identification also arises in natural mass disasters like earth quakes, tsunamis, landslides, floods etc and in man-made disasters such as terrorist attacks, bomb blasts, mass murders, and in cases when the body is highly decomposed or dismembered to deliberately conceal the identity of the individual. The 'big four' of forensic odontology is the determination of age, sex, stature and ethnicity. Dental remains as teeth is an excellent material in living and nonliving populations for anthropological, genetic, odontologic and forensic investigations. Teeth being the hardest and chemically the most stable tissue in the body are selectively preserved and fossilized, thereby providing the best records for evolutionary change. Teeth provides an excellent source of genomic DNA as they remain virtually unaffected by environmental assaults. DNA fingerprinting refers to the approach of determining an individual's DNA characteristics. DNA profiling reveals the genetic makeup of a person. This paper portrays an overview of Dental DNA profiling for personal identification in forensic science.

Registration No. - IAFO/2022/084

TONGUE PRINT-AN INFORMATION IMMUNE TO FORGERY

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Abstract

Tongue is a unique organ of the human body, which acts as a proof in life, as compared to human DNA, serves as a tool for identification in forensic odontology. Variety, colour, shape, tongue geometry, textural variation, moisture and movement of tongue are factors considered for assessment of tongue prints. Shape of tongue is analysed by reference points on the lingual tip and V-shaped lingual sulcus. Tongue print is the information carried on the exposed portion of the tongue. Lingual impression is a new biometric authentication, emerging as a novel tool in forensics. Dorsal surface of the tongue provides significant details from morphological and structural point of view due to genetic independence, stability over time, physical protection in the mouth, hence immune to forgery. Lingual impression combined with photographic image is one of the most secure methods for identification in forensic dentistry, in addition to rugoscopy and cheiloscopy. Tongue characteristics exhibit sexual dimorphism, thus aiding in identification of the person, and has lot of advantages compared to other biometric systems. Research into preparing proper algorithm for tongue image analysis has been done. Factors which hinder tongue prints include pathologies and anomalies of tongue.

Registration No. - IAFO/2022/376

FORENSIC ODONTOLOGY PHOTOGRAPHY- ANALOG TO DIGITAL

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Abstract

A picture is worth a thousand unspoken words. Forensic photography resulted from the modernization of criminal justice systems and the power of photographic realism. During the nineteenth and twentieth century these two developments were significant to both forensic photography and police work in general. They can be attributed to desire for accuracy. The first use of forensic photography was in the nineteenth century by Alphonse Bertillon. Forensic photography is the fair and accurate recording of a scene or object, of legal interest by a camera. No matter how well an investigator can verbally describe a crime scene; photographs can tell the same story over and over more easily as it freezes time and records the evidence. Forensic photography is an integral part of any trial and the judgement is often based upon crime scene photographs to prove prima facie evidence. The type or style of photography used to immortalize the crime scenes and evidence is called technical photography. This presentation aims to shed light on the various aspects of forensic photography with advancements and importance of the diverse applications.

Registration No. - IAFO/2022/285

MICROSCOPES IN FORENSIC ODONTOLOGY-A REVIEW

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Abstract

The analyses of dental structures is a fundamental tool in forensic sciences. The use of microscopes in forensic sciences has an impact on the accuracy of human identification and forensic analysis. Besides conventional light microscope, various other microscopes from Polarized to Phase contrast and even Scanning Electron microscopes are used to evaluate the available dental evidence. Newer microscopes like Virtual Comparison microscope and Multiphoton microscope are also being explored for their accuracy in evaluating dental evidence. A forensic odontologist must microscopically understand the essential identifying and distinguishing features of not only dental tissues of different species but also various dental materials. Aim of this paper is to briefly review the utility of different types of microscopes in analysis of forensic dental evidence.

Registration No. - IAFO/2022/601

ARTIFICIAL INTELLIGENCE IN FORENSIC ODONTOLOGY – A NEW HORIZON

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Abstract

The human brain is an inimitable structure that has always made researchers and scientists inquisitive from time immemorial. Field of science has witnessed various inventions with the advent of technology for creating a model that can simulate the functioning of the human brain. The deed of the constant search has given rise to what is known as artificial intelligence (AI), which is a highly evolved system capable of mimicking functioning of the human brain. A.I leverages computers and machines to mimic the problem solving and decision making capabilities of the human mind. Forensic odontology involves in identifying people for child abuse, crime, sexual assault, mass calamities, and other legal issues. Their moral duty compels them to provide justice to the victims and their families, especially when there is no other evidence other than the dental remains. Automated technique based on Convolutional Neural Networks for staging lower third molar development for estimating the age of a person, gender and mandibular morphology after applying on panoramic radiographs was developed. The potential uses of AI and the review of the studies of the applications of AI in forensic odontology were discussed.

Faculty Poster Abstract

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IAFO/2022/330	DENTURE LABELLING: PAST, PRESENT AND FUTURE
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IAFO/2022/113	DIGNITY OF THE DEAD A MAJOR SOCIAL RESPONSIBILITY
IAFO/2022/405	BIBLIOMETRIC ANALYSIS OF LITERATURE ON METHODS OF AGE DETERMINATION BY TEETH
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IAFO/2022/517	3D PRINTING IN FORENSIC ODONTOLOGY-AN OVERVIEW

STRAING FORM THE STAIN BY FORENSIC TOOTH SLEUTH- HOW??

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Abstract

It is an age-old process of collecting blood and saliva in liquid form in investigation of crime. But many a times by the time have investigation team reaches the site of crime, liquid might evaporated and remains as stain. In such condition, extraction of saliva or blood from stain becomes that mandatory. When the oral cavity involved in the crime, saliva is usually found at the scene of the crime beside bite marks or lip prints. However, dried saliva stains are undetectable to the naked eye, making them more challenging to identify and recover. Therefore, a better collecting technique is needed in order to first recognise the undetectable saliva stains on human skin before proceeding on to other techniques for extracting DNA. Chemicals, lasers, and ultraviolet light, quartz arch tube and argon ion laser have all been used to identify dried saliva stains. In Fluorescent spectroscopy a compound such as Tryptophan, an aromatic amino acid present in salivary amylase, emits light with a unique emission making spectrum, it a useful tool for identifying dried saliva stains on skin.

DENTURE LABELLING: PAST, PRESENT AND FUTURE

Dr. Pragati Rawat[1]

[1]Assistant Professor, Department of Prosthodontics and Crown & Bridge, Subharti Dental College and Hospital, Swami Vivekanand Subharti University, Meerut, Uttar Pradesh

Abstract

Denture labelling has been introduced in the field of Prosthodontics for identification purpose by Forensic experts in case of any disastrous, life-threatening events. According to the American Board of Forensic Odontology guidelines restorations, caries, missing teeth and/or prosthetic devices are being used in dental identification of the individuals whether alive or dead. It also helps in identifying individuals in the Honourable Court for settlement of cases so that Justice can be served properly. This Poster describes the various methods that have been used in the past as well in the present for Denture labelling and also what the future holds for it.

Registration No. - IAFO/2022/308

CHILD ABUSE: WILL DIGITIZATION GIVE JUSTICE???

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Abstract

The incidence of child abuse has increased dramatically over the past two decades, to the point where approximately 3.6 million cases were reported. The impact of child abuse is life long and irrevocable or sometimes can be as brutal as death of the victim. Forensic odontology is of great concern in identification, examination and evaluation of bite marks in sexual assaults, child abuse and in personal defence situations. Identification of the victim and exposing the suspect is not an easy task in medico legal cases, in which answers by individuals are misleading or inaccurate to arrive at proper conclusion. In such instances, dental tissues can be reliable evidences as they are often preserved, even if the person is skeletonized, decomposed burnt or dismembered. So they can be used to determine the age, sex and ethnicity of the person who could be either a victim or a suspect. Digital forensics has revolutionized the traditional forensic investigations in terms of acquisition, analysis, and reporting of forensic evidence. At the same time, digitization can be a double edged sword as it can be manipulated and hacked. This poster is an attempt to explore digital forensics in child abuse.

Registration No. - IAFO/2022/172

RECENT DEVELOPMENTS IN FORENSIC ODONTOLOGY- A REVIEW

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[2]Postgraduate Student, Department of Oral Medicine and Radiology, Rural Dental College, PIMS, Loni, Maharashtra

Abstract

Every human being has unique identity in life. Forensic odontology is a branch of forensic sciences that uses the skill of a dentist in personal identification, bite mark analysis, fixation of identity in mass disaster, age determination, domestic violence, and child abuse cases. Forensic odontology is an evolving science and has a greater scope of development. In case of a crime scene, forensic odontologists play a major role in investigating and interpreting dental evidence. Recent advances in the field of genetics and molecular biology have contributed to the rapid growth of forensic odontology. Conventional methods used in forensic odontology include dental record maintenance, two-dimensional dental and maxillofacial imaging, bite mark analysis, cheiloscopy, and rugoscopy. In addition to this, recent concepts such as facial reconstruction, denture identification, DNA fingerprinting, and tongue prints have been introduced in the field of forensic odontology. This poster gives an overview of recent advances used in identification in forensic dentistry.

Keywords - Denture, DNA, facial reconstruction, forensic odontology, microscopy, tongue prints.

Registration No. - IAFO/2022/046

DIGITAL DENTAL FORENSICS; FUTURE TREND IN THE DELIVERY OF TRUTH AND JUSTICE

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Abstract

The discipline of Forensic odontology holds a major responsibility in the investigation of crimes by identifying the victims of crime and disaster through shreds of dental evidence. In the digital world of the 21st century, Digital dental forensics is an important and emerging domain in the field of forensic odontology. Over the last decade, it has attained a key role in the acquisition, analysis, and reporting of forensic dental evidence. Advances like digital dental records, digital radiography, and photography, virtual autopsy, computer-assisted analysis of bite marks, forensic bio-robots, and the discovery of artificial intelligence have revolutionized conventional forensic dental investigations more reliably and effectively. The application of digital technologies has a wide scope. But it is essential to adopt and expand the use of digital technology in forensic investigations as well as in forensic odontology training programs. This would strengthen the validity of evidence in forensic investigations. Hence, this poster highlights the recent advances and applications of digital dental forensics.

Registration No. - IAFO/2022/113

DIGNITY OF THE DEAD: A MAJOR SOCIAL RESPONSIBILITY

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Abstract

Mass disaster such as earth quake, flood, tornado, terrorist attack, tsunami, industrial accidents, infectious disease outbreaks cause large number of deaths in short period thrusting an highly demanding task of identifying the dead bodies. This involves a series of activities including recovery and retrieval, transportation to temporary mortuaries, storage and preservation, identification of dead body using methods ranging from visual identification to DNA finger printing and other scientific methods for identification of deceased & release of the dead with due care. This provides support to the bereaved with medico-legal aspects associated with disposal of the dead, documentation and information management. One of the most important reasons to identify unknown person is non identification may result in numerous issues and some families feel that the uncertainity is more difficult to cope with than the definitive identification from both legal and administrative point of view, non identification creates additional problems. So here we are discussing some of the applied methods and techniques used in the identification process and standard operating protocols which can be used under such mass disaster circumstances.

Registration No. - IAFO/2022/405

BIBLIOMETRIC ANALYSIS OF LITERATURE ON METHODS OF AGE DETERMINATION BY TEETH

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Abstract

Age determination is done by skeletal or dental methods. Age determination by teeth is an important component of Forensic Odontology and a major focus area for research. The present study was conducted to analyze the literature published in the area of dental age determination. A literature search was performed on Pubmed using MeSH term "Age determination by teeth" with a subheading of methods and restricting to Major. The detailed search was imported into VOS viewer version 1.6.18. Bibliometric Analysis was performed using Text Data from Title and Abstract. Minimum of 25 occurrences was selected as inclusion and Network Visualization map was created for 94 terms. The search on Pubmed gave 842 results from 1975 till August 2022, however most of the studies are published in the last decade. The Bibliometric analysis shows three clusters. The first cluster was formed my articles in which the age determination was based on Tooth/Teeth Measurements. The second was based on methods in which sequence of eruption was recorded using Panoramic Radiographs etc. The third cluster was formed by articles in which the age estimation was based on Third Molars. Bibliometric Analysis is considered by many as an exploratory step after literature search. It shows clusters of research and is also used to find lacunae in topics on research in a particular area. The present study will help decide on further topics for research in the area of age estimation.

Registration No. - IAFO/2022/504

FINDING THE TRUTH

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Abstract

Forensic odontology is that branch of dentistry which deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of dental findings in the interest of justice. Forensic dental identification plays a primary role in the identification of remains when post-mortem changes, traumatic tissue injury, or lack of fingerprint record invalidate the use of visual or fingerprint method. Each dental professional has a responsibility to understand the forensic involvements associated with their dental practice. The practicing dentists and the dental students should be made aware of the available technologies and its use in forensic dentistry. New researches have to be encouraged in the field of forensic dentistry which will pave way for incorporating newer technologies in establishing the human identity.

Registration No. - IAFO/2022/204

FACIAL RECOGNITION IN FORENSIC MEDICINE

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[3]Reader, Department of OMDR, Rural Dental College, Loni

Abstract

They say looks don't matter but not when it comes to serving justice. Face is one of the most fundamental parts of the body that contributes to individual identity. Although the use of the face as a means of forensic identification had been displaced by the use of fingerprints and DNA, the multiplication of captured video and photographs of criminal events has gradually brought the comparison of faces to the forefront of the investigative and judicial scene. Face recognition is a task that humans perform routinely and effortlessly in our daily lives. Face recognition has several advantages over other biometric modalities such as fingerprint and iris: besides being natural and nonintrusive, the most important advantage of face is that it can be captured at a distance and in a covert manner. Face recognition is used for two primary tasks: 1. Verification (one-to-one matching): When presented with a face image of an unknown individual along with a claim of identity, ascertaining whether the individual is who he/she claims to be. 2. Identification (one-to-many matching): Given an image of an unknown individual, determining that person's identity by comparing (possibly after encoding) that image with a database of (possibly encoded) images of known individuals. There are numerous application areas in which face recognition can be exploited for these two purposes.

Registration No. - IAFO/2022/544

NON-METRIC DENTAL TRAITS: A FORENSIC OVERVIEW

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Abstract

Dental morphology is a highly heritable characteristic, also stable with time and has a fairly high state of preservation. The term "trait" has been defined as a distinguishing feature, or characteristic of an individual. Dental traits or characteristics are features such as ridges, bulges, cusps, grooves, pits, junctions and relationships that occur in different parts of the crowns or roots of the teeth which vary in size, range and dimension. Nonmetric dental traits have a crucial role in ethnic classifications of a population which helps in forensic racial identification purposes. Each of these traits may be more prevalent or least prevalent in a particular population. Since these traits powerfully characterize a population, they play an important role in forensics especially in disaster victim identification. Data exists for Indians for only a few features. There are few studies found to be reported with respect to the prevalence of non-metric dental traits in the South Indian population.

Registration No. - IAFO/2022/474

ROLE OF PROSTHODONTICS IN FORENSIC ODONTOLOGY

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Abstract

Forensic odontology is a subspecialty of dentistry that has as its main focus on the identification of deceased persons. This is usually a single victim but comparisons between postmortem findings and antemortem dental records have been shown to be the preeminent method for identification in mass disaster situations. Forensic odontology brings knowledge of orofacial structures, their variation between people of differing ancestry, and the implications of dental treatment to the identification process. Role of a prosthodontist in forensic dentistry comes into play in cases where the victim has lost natural dentition and has been wearing prosthesis. Any loss of natural tooth or multiple teeth, require prosthodontic rehabilitation. Each dental prosthesis is made exclusively for its bearer and is unique. Thus dental prosthesis serves as a primary identifier in forensic investigations involving unidentified deceased bodies. This paper aims to throw light on the various techniques through which the dental prosthesis can be used in forensic examinations and the significance of the unification of Prosthodontics and Forensic Odontology for the ease of forensic investigations.

Registration No. - IAFO/2022/561

AGE & SEX –RELATED MANDIBULAR DIMENSIONAL CHANGES IN UTTAR-PRADESH POPULATION - A CBCT STUDY

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Abstract

Forensic odontology is an important & evolving branch, established for critical issues like medico-legal cases & identification of unknown human remains in cases of putrefaction, skeletonization or mutilation. In these cases, secondary methods, such as establishment of an anthropological profile, are useful & important through the age, sex, & ancestry & stature estimation, among other parameters of forensic interest. Human identification through dental remains whether odontogenic or non odontogenic or simple radiographs is a well-established & reliable method & plays a vital role in forensic odontology. The mandible is the largest & most rigid bone in the facial skeleton. It undergoes remodeling& morphological alterations throughout the life time of an individual. Studies have demonstrated age & gender related changes using various parameters such as gonial angle, bigonial width, mandibular ramus height & mandibular maximum length as representative of these alterations in mandible. Therefore, the present study aims to determine the association of the dimensions of these parameters with the age and gender of an individual.

Registration No. - IAFO/2022/288

APPLICATION OF NUCLEAR FORENSICS IN FORENSIC ODONTOLOGY

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Abstract

Nuclear forensics is the examination of nuclear and other radioactive materials using analytical techniques to determine the origin and history of this material in the context of law enforcement investigations. Nuclear material and radioactive sources are toxic and poisonous to people and the environment, and strict measures are required to ensure that their use remains for peaceful purposes. Many nuclear forensic cases are not publicized due to law enforcement sensitivities or nuclear security concerns. However, enough work has been published to gain suitable insight into the state of practice in nuclear forensics. Nuclear forensics is applied in the context of legal proceedings under international or national law related to nuclear security. However, in forensic odontology, nuclear forensic science is often poorly understood. Hence its application in forensic odontology needs discussion and emphasis. Although not commonly used in everyday forensic practice, the forensic scientist should have an awareness of this distinct forensic science, as the need may arise for its application in field casework. The purpose of this paper is to provide an overview of modern nuclear forensic sciences and by sampling the literature, illustrate its application as applicable to forensic odontology.

Registration No. - IAFO/2022/433

AN ERA OF EVOLUTION OF METHODOLOGY IN FORENSIC ODONTOLOGY- A REVIEW OF LITERATURE

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Abstract

Significant role of the Forensic Odontologist has been recognized in person identification and in age/gender estimation especially in cases of mass destruction or disaster. A variety of techniques, basic or advanced; and numerous methods, expensive or inexpensive have been devised, evaluated and evolved over the years since the inception of Forensic Odontology in India. This paper combines a comprehensive review with a critical appraisal of the various techniques and/or methods developed, practiced for age and gender estimation in the specialty.

Registration No. - IAFO/2022/517

3D PRINTING IN FORENSIC ODONTOLOGY-AN OVERVIEW

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Abstract

Forensic Odontology is a significant part of the forensic sciences and has been an integral part of criminal investigation. Presenting physical models of evidence in court is a recognized practice, however often a number of legal and ethical concerns prevent the investigators from presenting any physical evidence that is of human origins in the court. This causes the judicial systems to rely merely on photographs of these evidences which cannot always provide the accurate amount of information. There has been a rapid development and utilization of three-dimensional (3D) printing technologies in engineering, health care, and dentistry. Like many technologies in overlapping disciplines, these techniques have proved to be useful and hence incorporated into the forensic sciences currently there is limited research to demonstrate the lack of reporting. Therefore, this paper aims to describe the potential applications of 3D printing in forensic science, highlight the need to create good practice for 3D printing trnd to develop accurate and admissible 3D printed models while exploring the techniques.

Registration No. - IAFO/2022/538

A POSSIBLE PERSPECTIVE ON THE PARTICIPANTS IN THE USE OF ARTIFICIAL INTELLIGENCE IN FORENSIC ODONTOLOGY

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Abstract

Context: The phrase "artificial intelligence" (AI) is a generic one that refers to the use of a computer to simulate intelligent behaviour with the least amount of human involvement. Dental evidence is used in forensic odontology to support both civil and criminal cases. Every stakeholder should be familiar with this technology because it will be used to incorporate artificial intelligence in forensic dentistry in the future. Objectives: This review aims to provide a general overview of the potential roles played by different stakeholders in the future use of artificial intelligence in forensic odontology. Evidence Acquisition: In order to determine the various stakeholders' contributions to the widespread and successful application of artificial intelligence in forensic dentistry, a thorough literature search was conducted in PubMed and Google Scholar. Results: Various people involved in the analysis and data recording expressly for forensic odontology use applicable relevant artificial intelligence-built algorithms. Conclusions: Diverse stakeholders employed pertinent artificial intelligence-built algorithms for analysis, data recording, and interpretation expressly for forensic odontology use by taking an evidence-based approach. Additionally, there are a number of stakeholder limits that one should work to overcome. Artificial intelligence can be a boon in Forensic Odontology and improve the efficacy of the end product if there is an interdisciplinary integrated approach among all stakeholders.

 Keywords: Artificial Intelligence, Forensic Odontology, Stakeholders, Application

Registration No. - IAFO/2022/146

ASSESSMENT OF THE ACCURACY IN MEASURING THE ENAMEL AND DENTIN THICKNESS OF MAXILLARY INCISORS WITH OPTICAL COHERENCE TOMOGRAPHY (OCT)

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Abstract

In the application of scientific human skeletal variation in medico-legal matters, virtual anthropology is the current technique performed to examine skeleton and its body parts. Digital imaging techniques are used in many areas of dentistry and forensic dentistry. Among all digital imaging modalities, digital periapical radiography (PR) is the most widely used, however, new contemporary imaging techniques Optical coherence tomography (OCT) can be also used. The aim of this study was to assess the accuracy and reliability of enamel and dentin thickness measurement through intra and inter-observer error analysis, and comparison was made between periapical radiographs and OCT methods. In this study 15 maxillary first premolar were used which extracted for various reasons. Enamel and dentin thicknesses and maximum cervical crown widths (MCCW) of 15 premolar teeth were examined in both OCT and periapical radiographs. The results obtained with the exact maximum cervical crown widths were compared Image J software version. A digital calliper was used to measure the actual MCCW of the teeth. Results exhibited no significant differences in the measurements by the intra or inter-observer error analyses. The intraclass correlation coefficients (ICC) were more than 0.95 by both intra and inter-observer error analyses. There were significant differences in the measurements by PR and OCT methods. By parameters, OCT showed the highest R value (0.962) with the least error in different methods and observers. In conclusion, dentin and enamel measurements by OCT was highly accurate and reliable as in the conventional method (PR). OCT evaluations should be recommended for implementation in the future anthropological studies especially in countries with limited source of dental data.

Student Paper Abstract

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Registration No. - IAFO/2022/057

AGE ESTIMATION BY THE ERUPTION STATUS OF THIRD MOLAR AMONG THE STUDENTS IN SOUTH INDIA

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Abstract

Background and objectives: Eruption of wisdom teeth usually occurs between 17 and 24years of age. Third molar development is usually used for age assessment after the puberty. It has high ethnic variation and so it cannot be generalized to other population. It is also influenced by age and sex. Non-eruption of third molar is common and extraction is done routinely in dentistry. Materials and methods: Sample size of 1000 students were taken between the mentioned age group by multistage random sampling. All participants were examined clinically for the eruption status of third molar in all the four quadrants.

Registration No. - IAFO/2022/429

AGE ESTIMATION BY USING POSITION OF MANDIBULAR FORAMEN RELATIVE TO RAMUS WIDTH USING DIGITAL PANORAMIC RADIOGRAPHS IN KASHMIR POPULATION

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Abstract

Introduction: Mandibular foramen is one of the most important landmarks located on the ramus of the mandible that can help in forensic identification especially in determination of age and sex of an individual. Aim: The aim of this study was to assess the usefulness of digital panoramic radiographs to determine age using linear measurements made with respect to position of mandibular foramen along the ramus width in the population of Kashmir people. Materials and Methods: It is a retrospective study in which 240 OPG (120 male & 120 female) of different patients in age group of 10 to 70 years were collected. OPGs were studied for each side to evaluate age and gender variations in terms of position of mandibular foramen on the ramus in anteroposterior dimension. The linear measurements were calculated by using Adobe Acrobat Reader, and findings were statistically analyzed. Results: A regression equation was obtained separately for males and females for estimation of age of the individuals which is Males: $Age = 103.3 - 122.2 * AFW/RW$ and Females: $Age = 98.74 - 120.3 * AFW/RW$. Males showed a higher average value in terms of ratio of anterior mandibular foramen width and ramus width when compared with females. A significant correlation is seen between age and ratio of anterior foramen width and ramus width. Conclusion: The ratio AFW/RW showed higher sexual dimorphism and can be used for age estimation of individuals in age group of 10-70 years.

Registration No. - IAFO/2022/348

TOOTH CORONAL PULP INDEX AS A TOOL FOR AGE ESTIMATION – A RETROSPECTIVE CONE BEAM COMPUTED TOMOGRAPHY STUDY

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Abstract

Background: Age estimation through teeth is one of the most reliable method as teeth are hardest part of body and could be preserved for long time without gross changes. Thus age estimation from tooth coronal index using CBCT is based on reduction in size of dental pulp cavity with advancing age as a result of secondary dentin deposition. Aim: To evaluate dental age assessment reliability through Tooth Coronal Index (TCI) method. Methodology: A retrospective study involving 60 CBCT images from age group of 20 to 60 years where retrieved from department data base. The age groups were divided into eight groups (Group I – VIII). Mandibular canine, 2nd premolar and 1st molar either of one side is considered. The height of crown and height of coronal pulp cavity were calculated and TCI was measured for each tooth. Age estimated was compared with chronological age to evaluate reliability of age assessment through TCI. Statistical analysis was done using SPSS version 19. Results: Negative correlation was observed between real age and TCI of mandibular 1st molar, mandibular 2nd premolar and mandibular canine. Thus, best dental age estimation was obtained in age group of Group I and VIII. Conclusion: Teeth are more resistant to thermal, chemical and mechanical stimuli and thus considered as one of the reliable indicators. Thus, Tooth coronal index can be considered as one of the reliable parameters in estimating age of individual because of its accuracy.

Registration No. - IAFO/2022/076

EFFECT OF HIGH TEMPERATURES ON PERMANENT EXTRACTED TEETH FIXED WITH DIFFERENT ORTHODONTIC ATTACHMENTS: AN IN VITRO FORENSIC STUDY

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Abstract

Background: Fire remains one of the major causes of morbidity and mortality throughout the world and identification of a body from the fatal fire remains a daunting task. Dental evidences may provide a clue to solve the mystery of victim identification, since dental structures are the last to get destroyed under extreme conditions. Although a number of studies have examined high temperature changes in dental restorations, endodontically treated teeth and various prosthesis etc, very few studies have examined the effects of high temperature on various orthodontic attachments. Aim: To evaluate the macroscopic, stereomicroscopic and radiographic changes in unrestored extracted teeth and extracted teeth fixed with different orthodontic attachments after exposure to an experimental range of high temperatures. Materials and Methods: The study was conducted on 40 extracted teeth which were divided into four groups: Group 1 - 5 unrestored premolar teeth and 5 unrestored molar teeth, Group 2 - 5 premolar teeth fixed with metal brackets, Group 3 - 5 premolar teeth fixed with ceramic brackets, Group 4 - 5 molar teeth fixed with molar bands along with buccal tubes. The effect of incineration at 200°C, 400°C, 600°C, 800°C, 1000°C for 20 min at each target temperature after furnace reached to desired temperature followed by subsequent cooling was studied. Results: All teeth groups showed changes, such as fissures, cracks, fragmentation, enamel bursting and enamel and dentin separation according to temperature range exposed as well as changes in orthodontic attachments.

Keywords: Burn out furnace, Fire, Orthodontic material, Personal identification, Stereomicroscope.

Registration No. - IAFO/2022/094

COMPARISON BETWEEN THREE DENTAL AGE ESTIMATION METHODS USING ORTHOPANTOMOGRAMS FOR JUVENILE STATUS PREDICTION

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Abstract

Background- Age plays an important role in identification of an individual and dental age is considered to be vital as tooth development shows less variability than other developmental features. Dental age estimation is required in forensic medicine while governing justice to an individual involved in civil and criminal litigation as well as in circumstances in which the birth certificate is not available or the records are suspect. Aim- To evaluate chronological age based on the dental developmental stages of third molars by using three adult age estimation techniques (Chaillet and Demirjian's, Mincer and Kohler) using orthopantomograms to determine the juvenile status of an individual. Material and Method- The study was conducted using orthopantomograms of individuals attending Manubhai Patel Dental College and Hospital, in the age range of 14-23 year. With regression analysis, chronological age was estimated in all the three methods. Result- Strong corelation of age with developmental stages of third molar was obtained and it was found that Kohler's method was better in determining the age nearest to the actual age. Conclusion- Numerous reports have been published on the age estimation issue concerning adolescents and young adults in whom third molar development was frequently investigated similar to the present study. Though there are different methods for age estimation in adolescents/juvenile, according to this study, Kohler's method was found to be one of the reliable methods for juvenile age estimation when all the third molars are present.

Registration No. - IAFO/2022/380

COMPARISON OF MORPHOMETRIC PARAMETERS OF MANDIBULAR RAMUS WITH THAT OF MENTAL FORAMEN IN THE GENDER DETERMINATION USING ORTHOPANTOMOGRAM

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Abstract

Introduction: Identification of Gender is an important part of medicolegal practice which can be determined 100% accurately when entire adult skeleton is available. When whole skull is not available, the most dimorphic part of skull would be mandible. It plays an important role in determining the gender of the individual as they are distinctly variable. Aim and Objectives: The aim and objective of the present study is to compare the morphometric parameters of mandibular ramus with that of mental foramen in OPG for gender determination. Materials and Methods: The present study is an age matched retrospective study including digital orthopantomograms of fifty males and fifty female patients after fulfilling the inclusion criteria. The OPGs will be selected from the subjects age ranging from 18 to 40 yrs. Five different mandibular ramus parameters (maximum ramus breadth, minimum ramus breadth, condylar height/maximum ramus height, projective height of ramus, and coronoid height) will be measured bilaterally resulting in total 200 rami. Morphometric analysis will be performed on bilateral mental foramina. The measurements will be performed by reference lines drawn from the anatomical landmarks using the in built software. The distances will be measured on OPG in millimeters. The Results will be analysed and Statistical analysis will be performed using the statistical package for the social sciences (SPSS). Results: Awaiting.

Registration No. - IAFO/2022/418

ANALYSIS AND CORRELATION OF MANDIBULAR INDICES ON ORTHOPANTOMOGRAPH AND ODONTOMETRY ON MANDIBULAR DENTAL CASTS FOR GENDER ESTIMATION IN LOCAL POPULATION: A CROSS SECTIONAL OBSERVATIONAL STUDY

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Abstract

Aim and Objective - This study aimed to analyse and correlate the mandibular indices with which the gender can be estimated by using Orthopantomography (OPG) and Odontometry on mandibular dental cast. 1) To measure and correlate the gonial angle, bigonial width, ramus height and mental index on OPG for gender determination. 2) To measure and correlate the mesiodistal width (MD) and intercanine distance of mandibular teeth on mandibular dental cast for gender determination. Material and Method - The study will include160 subjects within the age group of 18-69 years. A cross sectional observational study will be conducted using OPG (SIDEXIS XG SOFTWARE) and mandibular dental cast measurements. Each parameter of OPG and mandibular dental cast will be analysed and correlated and the above parameters will be recorded and measured. The OPG and mandibular dental cast parameters will be subjected to descriptive statistics. Results - The study will be conducted by using SPSS v 20.1, IBM. OPG parameters (bigonial width, ramus height and mental index) and mandibular cast parameters (MD width average and intercanine distance) will be subjected to descriptive statistics and the results will be obtained. Conclusion - Based on the results it will be enabled whether Orthopantomograph and Odontometry would serve as useful tool for gender estimation of an individual.

Registration No. - IAFO/2022/372

ASSESSMENT OF AGE USING THIRD MOLAR ERUPTION PATTERN

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Abstract

Introduction: Forensic dentists can help identify bite mark injuries, cases of abuse, and the age of both victims and perpetrators. Many crimes are solved with the help of forensic dentistry, and many families whose loved ones die in mass casualties have found peace and closure with the help of this field of study. Forensic age estimation plays a crucial role in the process of identification in both the dead and the living. Generation of biological profile is an important prerequisite in the identification of dead. In the living, age assessment is necessary in civil and criminal law. Dental age estimation methods are of particular value because teeth are highly resistant to mechanical, chemical, or physical impacts and time. In the biological age determination of a person's teeth at adolescence, the third molar (M3) or wisdom tooth development is considered a dependable method used over the years. Aim: To estimate the age of the individual from the eruption pattern of third molar. Objectives: To evaluate third molar eruption pattern clinically and radiologically and to correlate with chronological age. Materials and Methods: The present study is a gender matched prospective study, that is planned to carry out on 48 subjects aged between 18 to 25 years. After obtaining informed consent, all the participants will be subjected to standard clinical dental examination and radiological examination by taking digital orthopantamograph. Later the radiological age assessment will be done by following the grading system given by Demirjian et al. Results: Awaiting.

Registration No. - IAFO/2022/370

ASSESSMENT OF FRONTAL SINUS DIMENSIONS TO DETERMINE SEXUAL DIMORPHISM

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Abstract

Introduction: Identification of gender of unknown individuals is decisive part in forensic sciences. At times when only skull remains are found & other means of identification fails, the sex determination will become more difficult. Radiographs of frontal sinus can be used for identification of human remains, frontal sinus is used for this purpose due to is unique shape and nature with respect to every individual just like fingerprints. It is widely accepted that development of frontal sinus is completed by 20 years of age &remains stable until further enlargement of the chambers which occurs as a result of bone resorption during advanced age.

Aims & objectives: The aim of the study is to evaluate reliability of frontal sinus by comparing various parameters on the digital PA skull radiographs for sex determination. Materials & Methods: The study includes 60 individuals who visits the department of oral medicinal radiology, Meghna Institute of Dental Sciences. They are divided into 3 groups according to their age and gender i.e; (20-30years, 30-40years, 40-50years) with 10 males and 10 females ineach group respectively and results will be assessed and sent for statistical analysis. Results: Awaiting.

Registration No. - IAFO/2022/208

CNN BASED AMELOGLYPHIC COMPARATIVE ANALYSIS OF DECIDUOUS AND PERMANENT TEETH

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Abstract

Background: Alterations to the matrix are reflected as defects in the structural organization of enamel. The enamel rod end patterns can be exploited for personnel identification and could be duplicated by various methods, such as using cellulose acetate paper, these are outdated methods. The deep learning techniques have seldom been used to classify enamel rod prints in deciduous and permanent teeth. Aim: The present study aims to analyse the ameloglyphic patterns of both deciduous and permanent teeth by manual and deep learning techniques. Methodology: Extracted deciduous (n=60) and permanent teeth (n=60) will be considered for the study. Following acid etching with 37% phosphoric acid the tooth surface will be dried, using the peel technique a print will be obtained on a cellulose acetate strip. The print will be photomicrographed under a research microscope and the image will be analyzed via the Verifinger Software followed by CNN (convolutional neural network) based analysis for classification. The initial training of enamel rod patterns will be followed by validation. The patterns obtained will be evaluated for possible correlation with age and gender of the individuals. Results: CNN based technique offers a reliable method for ameloglyphics classification compared to the cumbersome manual software method. Conclusion & Clinical Significance: The tooth prints are unique they are believed to exhibit dissimilarity both between teeth of different individuals and of the same individual. This uniqueness of tooth prints with the aid of deep learning techniques could be used as a valuable tool in forensic science for personal identification.

Keywords: Ameloglyphics, Artificial Intelligence, Deep learning, Tooth prints, Enamel rod print

Registration No. - IAFO/2022/293

COMPARATIVE ANALYSIS OF CHEILOSCOPY AND DACTYLOSCOPY: AN AID IN GENDER DETERMINATION

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Abstract

Introduction: Forensic dentistry plays a vital role in detection and resolution of crimes, civil, proceedings and personal identification. The least invasive and cost effective procedures among all methods of human identification is the study of lip prints and finger prints. The uniqueness of lip and finger prints and their further association can be useful in the gender determination. Gender determination is one of the most important characteristics of human identity. Aim and Objectives: The present study is aim to determine the distribution of different lip prints and finger prints and their correlation in identifying the gender. Materials and Methods: The Cross sectional study is comprised of 100 healthy individuals 50 in each gender in the age group 18-25 years. Individual hypersensitive to lipsticks, with any scars, congenital, pathological anomalies, trauma and inflammatory conditions affecting lip prints and finger prints will be excluded from the study. Lip prints will be obtained by red colored lipstick Finger prints of both hands will be collected using stamp pad with endorsing ink. Lip prints will be analyzed by Tsuchihashi Y classification, and finger prints will be studied by kucken classification. Results and Discussion: Obtained data will be subjected to suitable statistical analysis and results will be presented with supporting scientific literature in the conference.

Registration No. - IAFO/2022/294

ANTHROPOMETRIC STUDY OF CRANIOFACIAL FEATURES TO DETERMINE GENDER

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Abstract

Introduction: Forensic anthropology is the practical application of a knowledge of general anthropology to law, especially in quetions related to medicolegal identity, and human research of forensic dentistry. Gender determination is one of the most important characteristics of human identity. It is necessary for dead bodies, because it allows the detection of the total number of individuals during mass disasters, situations of intersexuality, rape, investigation of maternity, paternity. Anthropological patterns have been investigated in different regions around the world for human identification. Methods involving physical anthropology present high rate of accuracy for human identification and gender estimation. Aim and Objectives: Present study aim to determine the gender through different craniofacial variables using physical anthropometric methods. Materials and Methodology: Institutional based Cross sectional study comprised of 100 healthy individuals 50 in each gender in the age group 18-25 years individuals with mixed origin, history of congenital craniofcial anamolies, trauma, reconstructive surgery or having craniofacial deformity will be excluded from the study. By using calliper and measuring tape the following craniofacial measurements will be recorded i.e. cranial circumference, facial height, interzygomatic width, intercanthal distance, distance from left gonial angle ro tight as well to menton region taken while patient is in neutral, relaxed facial expression without lifting the head and while breathing calmly. Results and Discussion: Obtained data will be subjected to suitable statistical analysis and results will be presented with supporting scientific literature in the conference.

COMPARISON OF AGE ESTIMATION METHODS USING ATTRITION AND ROOT TRANSLUCENCY IN EXTRACTED TEETH

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Abstract

Introduction: Teeth are useful indicators of age-at-death and non-destructive methods ensure preservation of dental evidentiary material which could be used for court presentation. Teeth are used to estimate age in the young and old, as well as the living and dead. This paper examined two parameters—dental attrition and root dentin translucency on a heterogeneous sample from the subjects. Method: The extracted teeth with age and sex were collected from adults in Kerala population, with age range between 22 – 60 years. Methods such as Johanson, Lamendin and Li and Ji methods were utilised in assessing changes such as attrition and root dentin translucency. We are looking at the best co-relation co-efficient (R) among 4 methods and also Standard Error of Estimate (SEE) between estimated age and actual age. Result: The study is under process, the results will be presented at the time of presentation. Conclusion: It is anticipated that this study helps to find out best reliable method for the estimation of age.

Keywords: Age estimation, extracted teeth, attrition, root translucency and chronological age.

Registration No. - IAFO/2022/412

3D RECONSTRUCTION OF FACE IDENTITY DISCLOSED

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Abstract

Human identification connotes determination or establishment of individuality of a person living or dead. The call for forensic identification arises for humanitarian reasons, in mass disasters, to resolve criminal investigation and legal problems of insurance settlements, inheritance, funeral rites and for grief resolution of family and friends. The big four of forensic identification are determination of age, sex, stature and ethnicity. Forensic craniofacial reconstruction is a technique to reconstruct human face from unidentified face from skull remains for human identification and facial recognition. Facial bones and teeth are the most resilient structures in the human body that can withstand the destructional and decompositional forces even under extreme forces and/or temperature. Facial reconstruction relies on the principle of building a "face" onto the skull based on the application of mean tissue thicknesses for given anatomical landmarks. CBCT offers affordable 3D craniofacial reconstructions, with a reduced radiation exposure. CBCT utilizes various landmarks that are well defined points on the head and may be classified as cephalometric and craniofacial. The studies have reported that all CBCT image measurements were found to be satisfactorily accurate compared with the physical measurements. This paper summerize 3 dimensional reconstruction of face to reveal the identity of an individual.

Registration No. - IAFO/2022/459

MANDIBULAR CONDYLAR RAMUS HEIGHT -AN IDENTIFICATION TOOL IN AGE ESTIMATION AND GENDER DETERMINATION: A DIGITAL PANORAMIC RADIOGRAPHIC STUDY IN KASHMIR POPULATION

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Abstract

Introduction: Identification of the skeletal remains is of paramount importance in forensic dentistry and medico-legal investigations. Mandible play a vital role in sex determination, as it is the most dimorphic bone of skull, which is often recovered intact. Aims and Objectives: The aim of the study was to assess the usefulness of digital panoramic radiographs to determine sex and age using linear measurements made with respect to Mandibular Condylar Ramus Height (CRH) in the Kashmiri population. Objectives: 1. To correlate the Mandibular Condylar Ramus Height with Gender and Age. 2. To derive a regression equation for age estimation by using Mandibular Condylar Ramus Height. Materials and Methods: A retrospective study conducted on total of 240 patients (120= Males and 120=females), which were further divided into four age groups 10-25, 26-40, 41-55, and 56-70 years. The linear measurement done by measuring the distance from the condylion to the intersection of the orientation line with the inferior border of the ramus. Results: Males showed significantly higher average value of mandibular condylar ramus height (both right & left side) than females. There is increase in mandibular condylar ramus height with increasing age. The regression equation derived for age estimation is: Male: Age = - 43.69+ 35.16* CRH, Female: Age= 16.62 + 9.442* CRH. Conclusion: Mandibular condyle ramus height can be used for age and gender determination.

Registration No. - IAFO/2022/028

ASSESSMENT OF PALATAL RUGAE PATTERN AMONG MALES AND FEMALES FOR SEX DETERMINATION

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Abstract

Introduction: Palatal rugae are irregular folds present in the anterior 2/3rd of the palate in transverse direction. Analysis of palatal rugae is an important identification tool in sexual dimorphism in humans. The present study was undertaken to determine accuracy of rugae in gender identification. Materials and Methods: One hundred die stone casts of known gender were collected and different rugae patterns were examined. Number of rugae were noted and tabulated. Using discriminant function analysis, equation was derived for the samples. Accuracy of this equation in correctly identifying gender was determined in 25 masked casts.

Result: Gender = 0.398(divergent) + 0.335 (wavy) – 0.302 (convergent) + 0.273 (straight) + 0.245 (circular) – 0.022 (curvy). Centroid value: Male = .126, Female = - .148. Accuracy of the equation in indentifying gender was 68%. Discussion: Prahlad G et al had a Jack knife accuracy of 80% in their study. The accuracy of our study is 68%. This is probably because of the difference in the methodology in which the study was done.

Registration No. - IAFO/2022/130

AGE ESTIMATION WITH CEMENTAL INCREMENTAL LINES- A PHASE CONTRAST AND STEREOMICROSCOPIC STUDY

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Abstract

Background: Age estimation is an important factor in forensic science for human identifcation. Teeth resist decomposition at death unlike other tissues. The gradual structural changes that take place throughout the life have made teeth useful indicators for age estimation. Cemental annulation is a microscopic method for the determination of age based on the analysis of incremental lines of cementum. Light microscopy as well as specialized microscopic techniques have been employed to enhance the assessment of the cemental annulations. Aim: To estimate age with cemental incremental lines in human teeth using phase contrast and stereomicroscope. Materials and methods: A total of 51 normal teeth will be included in the study (sound teeth without any associated pathologies) Longitudinal ground sections will be prepared and observed under phase contrast microscope and stereomicroscope. The number of incremental lines in the total cementum width will be calculated with the following formula: Number of incremental lines (n) = X/Y, where X is the total width of cementum (from DCJ to cementum surface) and Y is the width of cementum between the two incremental lines. Estimated age (E) = number of incremental lines (n) + eruption age of tooth (t). Results: The measurements obtained will be subjected to statistical analysis for age estimation.

Registration No. - IAFO/2022/012

INTERZYGOMATIC AND INTERCANTHAL WIDTH: GENDER DETERMINATION METHODS IN FORENSIC DENTISTRY

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Abstract

Background: Personal identification is a subtle perception and often one of the most significant priorities in the investigation of criminal cases, mass disasters, and in forensic concerns. Gender determination is one of the important parameters in forensic identification. The study of anthropometric characteristics is of fundamental importance to solve problems related to such cases. Aim: This study aimed to determine gender using physical anthropometric methods like interzygomatic & intercanthal width. Materials and Methods: A cross-sectional study was conducted among 60 individuals (30 males and 30 females) in the department of Oral Pathology, Govt Dental College & Hospital Srinagar. Interzygomatic width, and intercanthal width was determined using a digital sliding caliper. All the measurements were taken twice. The final value was the average of the two obtained values. Results: There was significantly higher mean interzygomatic & intercanthal width in males as compared to females. Conclusion: The craniofacial features may serve as diagnostic markers for gender identification and can be used interchangeably.

Registration No. - IAFO/2022/337

SIGNIFICANCE OF FRONTAL SINUS AND NASAL SEPTUM PATTERNS AND PNEUMATISATION OF SPHENOID SINUS FOR PERSONAL IDENTIFICATION – A RETROSPECTIVE CBCT STUDY

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Abstract

Background: Identification of a body is the cornerstone of forensic investigation. If primary methods of identification are impossible (absence of comparative DNA samples, fingerprints, and teeth records), it can be performed using radiographic techniques, whenever antemortem images are available. Visual comparison of antemortem and postmortem images, such as frontal sinuses radiographics and CBCTs can allow identification. The uniqueness and reliability of frontal sinus and nasal septum patterns is used for human identification in forensic science. personal identification can also be done by assessment of pneumatisation of sphenoidal sinus. Aim & Objectives: This study aims to evaluate the use of frontal sinus and nasal septum patterns and the pneumatisation of sphenoidal sinus for personal identification. To correlate all the parameters to find which is more accurate for identifying a person. Materials & Method: Study Design: A Retrospective Study. Study Population: A study of 90 CBCT images, [45 males and 45 females] acquired from the archives that were generated using PLANMECA PROMAX 3D MID PROFACE CBCT machine and assessed with PLANMECA ROMEXIS Sample size: Sample of 90 CBCT images obtained from the archives. CBCT images of patients between 18-65 years of age. Conclusion: Imaging of the human body, especially the head and neck region, has been useful in forensic dentistry for proving medicolegal cases and in human identifications during mass disasters. Hence, this study determines the reliability and accuracy of frontal sinus, sphenoidal sinus and nasal septum pattern as a tool for personal identification.

AMELOGLYPHICS AND THEIR RELATIONSHIP WITH BLOOD GROUP IN CHILDREN: AN INVITRO STUDY

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Abstract

Ameloglyphics', means the study of patterns of enamel rods (amelo meaning enamel; glyphics meaning carvings). These prints can be duplicated by various methods such as cellulose acetate tape, rubber base impression materials, etc. Acetate peel technique is a well-known technique for replicating surface details. There are various applications of ameloglyphics such as personal identification, crime scene identification and susceptibility to dental caries. The enamel rod end patterns may also be used to identify the susceptibility of an individual to common dental conditions that are acquired during one's lifetime. Variations in the enamel rod end patterns on the enamel surface differ between primary and permanent teeth among gender, siblings and familial tendency. Various diseases usually influence particular blood group like duodenal ulcer in O and gastric ulcer in A blood group. Personal identification is becoming attractive/complement to traditional methods of identification. Various applications of ameloglyphics such as early detection and susceptibility to developing dental caries or certain other systemic diseases can be the future scope. This study will focus on identification of common enamel rod end pattern in particular blood group which in future can help in forensics for personal identification. The aim of this study was to find correlation between ABO blood group with ameloglyphic pattern in pediatric population.

Keywords: Ameloglyphics, Blood group, Children, Enamel rods.

Registration No. - IAFO/2022/306

MORPHOMETRIC ASSESSMENT OF FORAMEN MAGNUM, MAXILLARY SINUS AND ORBITAL INDEX IN GENDER DETERMINATION – A CBCT RETROSPECTIVE STUDY

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Abstract

Rationale: The Foramen Magnum is an important landmark of the skull base and is of particular interest in anthropology, anatomy, forensic medicine and other medical fields. Maxillary sinuses of various species are known to exhibit sexual dimorphism. The orbit is the bony socket in the skull where the eye and its appendages are situated. The relationship between the orbital height and orbital width is given by orbital index which varies in different races and in different regions within the same race. Aim & Objectives: To assess the reliability of foramen magnum, maxillary sinus and orbital index in gender determination. Materials and Method: 60 CBCT volumes acquired from the dental archives were used. The circumference of Foramen magnum were measured from axial sections. The volume of Maxillary sinus were measured from coronal, sagittal and axial sections. The orbital height was measured in sagittal and axial planes and orbital width was measured in coronal section with which the orbital index was calculated. Conclusion: Identification of gender from available skeletal remains is of great medico legal significance. Thus, the present study will clearly express if morphometric analysis of foramen magnum, maxillary sinus and orbit will be one of the reliable parameters for gender determination.

Keywords: CBCT, foramen magnum, maxillary sinus, orbital index, forensics

Registration No. - IAFO/2022/266

SEXUAL DIMORPHISM IN GREATER PALATINE FORAMEN INCLUSIVE OF ADJACENT ANATOMIC STRUCTURES

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Abstract

Aim: It is a well-known fact that humans have wide range of sexual dimorphism, which plays a pivotal role in solving medico-legal cases, anthropological studies and identification in natural calamities. Earlier studies have put forward that various orofacial structures like permanent dentition, mandible, hyoid bone are effective for sex determination. This study provides insight into the potential of greater palatine canal (GPC), naso-palatine canal (NPC) and Greater Palatine Foramen (GPF) for sex determination. Method: 50 male and 50 female Cone Beam Computed Tomography (CBCT) images of patients between age 18 to 45 years were selected. They were analysed using Planmeca imaging software. Measurements of GPF length, angulation with respect to hard palate, relation between NPC and GPF, distance between GPC and Mid-Maxillary Suture and dimensions of GPF at opening of oral cavity were done. Finally, all measures were subjected to statistical analysis using IBM SPSS Version 28. Independent-t test was used for analysis of difference between male and female measurements. Results: GPC length on right (p- <.001) and left(p-0.50), angulation of GPC left (p- 0.33), angle between GPC and NPC left (p- 0.001), distance between GPC and MMS left (p- 0.018) and anteroposterior and transverse dimensions of GPF on both sides (p- <.001) showed statistically significant difference between male and female CBCT images. Conclusion: Our results highlight a statistically significant difference between male and female. A more precise morphological measurement of GPF in relation to adjacent structures such as NPC, MMS proves to have sexual dimorphism in humans.

Registration No. - IAFO/2022/353

RACE IDENTIFICATION USING CRANIOFACIAL STRUCTURES AND SKELETAL AND DENTAL TRAITS

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Abstract

Forensic Anthropologists are usually the ones who supply the most information about bone research. The shape and structure of the skull, particularly the appearance of the skull, can be used to determine sex and ancestry. Caucasoid, Mongoloid, and Negroid are the three major racial categories that forensic dentists can identify. Both skeletal and dental traits can be used to identify race of an individual. The aim of this review is to explain how race determination is used for person identification and its implications towards facial reconstruction in forensic odontology.

Registration No. - IAFO/2022/378

KNOWLEDGE, ATTITUDE AND PRACTICES OF FORENSIC ODONTOLOGY AMONG DENTAL PROFESSIONALS AND DENTAL STUDENTS IN TELANGANA   A QUESTIONNAIRE BASED STUDY

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Abstract

Introduction: The term "forensic" is derived from the Latin word forensic, which means, "pertaining to the forum," which means "court of law", where trials and debates were held. Odontology refers to the study of teeth. It is the science and art of applying dental evidence to the law. It has immense importance in examining dental evidence and in the identification of victims of mass disaster, abuse or organized crimes. In this growing field of era, awareness of forensic odontology plays a crucial role. This study helps us to assess the knowledge and awareness among dental professionals and students. Aim and objectives: The aim of the study is to assess the knowledge, attitude, and practices (KAP) regarding forensic odontology among dental professionals and dental students in Telangana. Materials and Methods: The present study is a questionnaire-based study including undergraduates, graduates, and post graduates in Telangana. A Questionnaire will be given to the subjects those who are willing to participate in the study. The filled in questionnaire will be collected, the cumulative results will be assessed and- sent for statistical analysis. Results: Awaiting

Registration No. - IAFO/2022/388

VIRTOPSY IN FORENSIC ODONTOLOGY– A SYSTEMATIC REVIEW

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Abstract

Background: Virtual autopsy developed by Richard Dirnhofer was presented in 2003 as an non-invasive tool in forensic science to document and analyze forensic findings in dead persons. The virtual autopsy can be applied in a broad number of forensic situations, such as thanatological investigations, carbonized and putrefied body identifications, mass disaster cases, age estimation, anthropological examinations, and skin lesion analyses. In the initial period, virtopsy researchers used only CT and MRI for detection of the outcomes as adjunctive aids, but the new combined modern virtopsy method uses angiographic methods, photogrammetry or 3D surface documentation and MRI. Dental Post-mortem full-body CT charting has been considered as a treasured and supplementary tool in the human dental identification technique. The Virdentopsy project was inaugurated in 2020, during the COVID-19 pandemic, to allow the correct process of human remains by collecting dental data from teeth and jaws, which was then transmitted to forensic odontologists remotely for an expert opinion to achieve a generic profile of the unidentified human remains. Aim of the Study: To assess the relevance of virtual autopsy in forensic odontology. Research Question: Can virtual autopsy be used as an effective tool in forensic odontology? Materials and Methods: With the Medline, Cochrane and Medknow database (English literature) taken as reference, articles that have undergone Randomized Control Trial will be chosen and finally selected for the study after having met the criterion for Systematic Review. Result: Since the study is still in progress, the result will be discussed on the day of presentation.

A REVIEW ON FORENSIC FACIAL RECONSTRUCTION TECHNIQUES

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Abstract

The face of an individual has several different types of exclusive features and thus, is of great importance in identification and recognition of a person. Facial reconstruction is an effective forensic technique that can help recreate a victim's facial appearance from the skull sufficiently accurate to achieve identification. Forensic facial reconstruction is used in both forensic science and investigation and also in archaeological studies. In forensic science, this method is used to assist law enforcement agencies to identify missing deceased persons where the conventional methods of identification are unsuccessful. In archaeology, it is used to identify the faces of the people from the history, bone remains, embalmed bodies, etc. Reconstruction techniques are usually based on the relationship between the underlying hard tissues, such as bone structure, and soft tissues such as the facial muscles and facial features. Facial reconstruction can be a feasible alternative to identify the remains from a decomposed, mutilated, or skeletonised corpse. It is important to remember that although the outcomes are empirical in nature, the technique has been applied widely in many situations. The reconstruction techniques can be divided into two types: Two dimensional (2D) and three dimensional (3D) techniques; even, they are carried out and analysed either manually or by using specific softwares on a digital format. Recent advancements in technology and computer-based techniques have increased the accuracy and validity and also decreased the time needed to analyse the process. I consider the most commonly used facial reconstruction techniques in this paper with a brief description the techniques.

Keywords: Forensic facial reconstruction, Forensic facial approximation, two-dimensional reconstruction, three-dimensional reconstruction, identification, facial modeling, forensic art, forensic science.

Registration No. - IAFO/2022/009

UNMASKING THE INCLUSIONARY!

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Abstract

Mitochondria are the organelles responsible for producing cellular energy in the form of ATP. They include the individual's mitochondrial DNA (mtDNA), which has a size of roughly 16,500 base pairs. An extranuclear Mitochondrial DNA (mtDNA), is an extracellular genome has a high copy number, lack of recombination property, and matrilineal inheritance and some characteristics that make it useful for forensics. Due to the fact that mitochondrial DNA (mtDNA) is present in all biological material, even when nuclear DNA is not, forensic geneticists have consistently found it to be a useful tool for genetic investigation. In forensic biology, mtDNA typing has become a standard procedure for analysing old bones, teeth, hair shafts, and other biological samples with low nuclear DNA contents. This presentation highlights the features of mtDNA in comparison with nuclear DNA, their derivation methods and its applications in forensic science.

Registration No. - IAFO/2022/503

ADVANCING FORENSIC ODONTOLOGY – A BOON TO THE FUTURE PUZZLES

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Abstract

Forensic odontology is an evolving science and has a greater scope of development. Recent advances in the field of genetics and molecular biology have contributed to the rapid growth of forensic odontology. It has established as an indispensable science in medico legal matters and in the identification of the dead person. Forensic dental identification plays a primary role in the identification of persons in mass disasters (aviation, earthquakes, Tsunamis), in crime investigations, in ethnic studies, and in identification of decomposed and disfigured bodies like that of drowned persons, fire victims, and victims of motor vehicle accidents, remains when postmortem changes, or lack of fingerprint record invalidate the use of visual or fingerprint method. Various methods have been developed to determine age, sex, and ethnicity of the person, using dental tissues. Forensic odontology includes tooth prints, radiographs, photographic study, rugoscopy, cheiloscopy and molecular methods. Data collection methods and supplementary technologies used in forensic dental identification have undergone significant transformation. In this paper the knowledge of the evolving trends in the recent concepts used in forensic odontology will be discussed.

Registration No. - IAFO/2022/092

EVALUATION OF VARIOUS METHODS OF DIVISION OF LIPS FOR CHEILOSCOPY- A SYSTEMATIC REVIEW

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Abstract

The uniqueness of the characteristic patterns formed by the labial mucosa is well known today as 'Cheiloscopy'. It acts as an adjunct to fingerprint and DNA analysis. Various methods have been employed in recording of these prints like direct method using photography or indirect methods them using cellophane tape or carbon powder. Most of the researchers have used the classification by Suzuki and Tsuchihashi along with some modifications. During the analysis of these recorded patterns there arises ambiguity about which area of the lips to be taken into consideration. Some researchers have taken only the central portion of the lower lip for analysis while some divide the lip into 2, 3, 4 or 6 parts. The aim of this systematic review was to evaluate the effect of various methods of dividing the lip for analysis of the lip print pattern on the degree of uniqueness. A systematic search was performed in various electronic databases up to August 2022 to include original studies in English language according to the PRISMA guidelines.

Keywords: Cheiloscopy, Forensic odontology, Lip prints, Suzuki and Tsuchihashi classification.

Registration No. - IAFO/2022/010

GENDER DETERMINATION USING CHEILOSCOPY

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Abstract

Introduction: The study of lip prints is known as "Cheiloscopy" (from the Greek words cheilos, "lips", and skopein, "see"). Lip print identification has been proposed as an additional tool for crime investigation because of the supposed uniqueness of labial grooves. Objectives: To determine the variation of lip print pattern among study subjects. To determine uniqueness of lip print pattern among study subjects. To compare & correlate the variation of lip prints among males and females. Materials and methods: A cross-sectional study will be conducted on 100 dental students by recording lip prints with lip paint/color on transparent overlay and transferred on to a bond paper. It will be then photographed using stereo microscope available in the department of oral pathology and microbiology, Govt. Dental College & Hospital, Srinagar. Lip prints thus recorded will be later analyzed. Results: Awaited. Conclusion: Lip prints in gender determination promise an avenue yet to be fully explored. Lip prints are unique to each individual and can be used for personal identification.

Registration No. - IAFO/2022/324

FORENSIC ODONTOLOGY: PAST, PRESENT AND FUTURE

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Abstract

Forensic odontology has come a long way since its inception way back in 19th century and with each passing moment, and the advancements in the field of science our understanding of this vast field seems to be punitive but the future promises to add to our existing knowledge which will help us in solving many unsolved mysteries. One of the unique characteristics of human morphology is the human dentition as there are multiple surfaces with individual characteristics which are never similar even in identical twins. In cases of mass disasters, fires, murders, and many other scenarios the use of Forensic Odontology is one of the key to identification. Without the mastery of forensic dentistry, the investigation process and identification of victims and perpetrators would be nearly impossible. Although its development in India has been slow, and it has only lately been acknowledged as a distinct branch. So, it is the time we should appreciate the various advances that have taken place in the development of this wide and unique branch of dentistry from the beginning. This presentation is going to highlight the progression of forensic odontology from the era of bare visualization to the era of digitalization.

Registration No. - IAFO/2022/371

ARTIFICIAL INTELLIGENCE ENDORSEMENT: A NEW FORMULA IN FORENSIC ANALYSIS

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Abstract

From many years forensic analysis was described as detailed process of detecting, investigating and documentation of any security incident or violation. Forensic experts apply scientific principles and methods for identification and provide an opinion. This is not only time consuming, but frequently affected by many factors that are tough to overcome. To subside these limitations Three-dimensional convolutional neural networks (3D CNN) of artificial intelligence (AI) is introduced. This is crucial in image processing and recognition using deep learning to perform various descriptive tasks, which automatically detects the important features without any human supervision. This network lays the bridge between forensic medical experts and engineers. This paper emphasizes on the network which bought a new trend to forensic medicine and acts as a guide in improving forensic analysis.

Registration No. - IAFO/2022/301

THREE-DIMENSIONAL PRINTING IN FORENSIC DENTISTRY – A REVIEW

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Abstract

Introduction- As forensic science continues to develop and harness the utility of emerging technologies, the scope and use of three-dimensional (3D) scanning and printing tools at the crime scene and in the analysis, interpretation and presentation of forensic materials is increasing in the criminal justice system. There are many ethical and legal concerns involved in the transfer, transport, and submission of mortal remains as evidence in court. In such cases forensic odontologists play a major role in investigating and interpreting dental evidence. 3D printing enables creation of accurate physical models that may minimize the previously encountered errors during forensic analysis. Aim - This paper is an attempt to enhance the knowledge of the forensic expert and to give an insight on the importance of 3D printing in forensic odontology and to outline its possible applications

Keywords: 3D printing, forensic dentistry, 3D scanning, dental evidence

Registration No. - IAFO/2022/356

DENTURE LABELLING: ITS CONTRIBUTION IN THE FIELD OF FORENSIC ODONTOLOGY

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Abstract

The Prosthodontists are playing a very important role in forensic dentistry as they are concerned with fabrication of various prosthesis which can serve as an important tool for identification. Labeled dentures can be important in identifying the owners in case of an accident, loss of memory, states of unconsciousness, being inadvertently misplaced on admission to a hospital or, in identifying the bodies of those who have died in a calamity. A number of labeling systems are available and can be broadly separated into either surface marking methods or inclusion systems. This paper reviews the varied methods of denture labelling and its significance.

IMPORTANCE OF CONE-BEAM COMPUTED TOMOGRAPHY (CBCT) IN SUCCESSFUL FORENSIC IDENTIFICATION AND ANALYSIS

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Abstract

Aim: To review and highlight the importance of cone-beam computed tomography (CBCT) in successful forensic identification and analysis. Introduction: Dentists qualified in forensic science are serving the judicial system by giving expert opinion in cases related to human identification, bite-mark analysis, craniofacial trauma and malpractice. Teeth and bones of calvarium are important structures from a forensic point of view, as they are extremely resilient to destruction or decomposition, even under temperature variations. Radiology is inevitably an important tool in forensic investigations for the identification of humans, especially in cases where the body is decomposed, fragmented, or burned. The CBCT is a non invasive, recently developed technology that has seen an exponential rise in the use for visualizing dental anatomy and pathologies. The advent of CBCT in the arena of maxillofacial 3D imaging has contributed immensely to forensic science such as the age estimation through teeth, analysis of bite marks, determination of race and sex. The advantages of accuracy in imaging the anatomy, digitized technology favoring easier comparison of records and storage of records for a longer period, cost reduction, dose reduction, and easier portability have made it an unavoidable adjunct in forensic investigations.

Keywords: CBCT, forensic odontology, radiology.

Souvenir

Registration No. - IAFO/2022/162

AMELOGLYPHICS – A MIRROR WITHIN YOU

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Abstract

Forensic odontology is a relatively new science that utilizes the dentist's knowledge to serve the judicial system. "Ameloglyphics" means "the study of enamel rod end patterns" (amelo-enamel, glyphics-carvings) are considered as hard tissue analog to fingerprints. Teeth have highest resistance to environmental effects like fire, dessication, decomposition and may be used as forensic evidence. Soft tissues are unable to provide reliable information of human identification in mass disasters, it is largely feasible with skeletal remain especially teeth. Enamel is a product of ectoderm derived cells called ameloblasts. Basic structural unit of enamel is enamel rods (enamel prisms). Biometric analysis revealed that enamel rod end pattern is unique for each tooth in an individual and may be used as an adjunct with other methods for personal identification. This record must be updated periodically to overcome enamel loss due to wear and tear. Shape of enamel prisms approximates to one of the three main patterns. Electron microscopy reveal that enamel rods have keyhole/paddle-shaped pattern with rounded head and narrow tail region. This paper aims to appraise basis of using enamel rod end patterns, methods for obtaining pattern that are employed in personal identification in mass disasters.

Registration No. - IAFO/2022/052

ORAL MANIFESTATIONS OF POISONOUS CASES IN VIEW OF FORENSIC ODONTOLOGY – REVIEW

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Abstract

Toxicology is the science dealing with properties, action, toxicity, fatal dose, detection, estimation of interpretation of the result of toxicological analysis, and management of Poisons. A Poison is defined as any substance when administered to a living body through any route (inhalation, ingestion, surface absorption, etc.) will produce ill health or death by its action, which is due to its physical-chemical or physiological properties. Poisoning is a medical emergency that represents a major health problem all over the world. Oral poisoning is a major cause of mortality and disability worldwide, with estimates of over 100,000 deaths due to unintentional poisoning each year and an overrepresentation of children below five years of age. The oral cavity is the major insight for poison consumption cases because it is easy to analyze which type of poison by using the color changes. The oral cavity can be described as a window to changes occurring in the human body; almost all systemic variations show manifestations orally. It can be considered as a region with tremendous potential, especially in regard to coming to a final forensic diagnosis. This paper reviews the oral manifestations that each poisonous substance caused in patients.

Registration No. - IAFO/2022/552

JUST A DROP OF SALIVA! KNOWING THE UNKNOWN

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Abstract

Forensic Odontology is a branch that helps the dentists in giving person's identification during mass calamities, drug abuse, intoxication, cases of sexual assault, child abuse to name few. Saliva as a diagnostic tool has been gaining interest in forensics due to its nature as a biological fluid, being clinically informative and multipurpose thereby making it useful for novel approaches in prognosis, laboratory or clinical diagnose. Salivary tests can be used for wide variety of forensic studies, where the samples are collected from either drinking glasses, cigarette butter, at crime scenes, in cases of bite marks, etc. The samples of DNA from oral swabs can be easily be obtained, which in turn can be used for identification of the individual at the scene of a crime or personal identification in cases of mass disasters. Thus making saliva an attractive, non-invasive & potential tool in forensic odontology by researchers and investigators for studies. This paper aims to review saliva for its application in forensic odontology as an identification marker.

Registration No. - IAFO/2022/263

ROLE OF ORTHODONTIST IN FORENSIC FACIAL APPROXIMATION

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Abstract

Forensic facial approximation is art and science of reconstruction of face to create a likeness to face of deceased both for forensic and archaeology purposes. It is highly skilled procedure and brings commonality in principles of anthropology, forensic sciences, anthropometry, anatomy, palaeontology, forensic odontology with orthodontics. Various attributes and skills of orthodontist aid in dental and skull profiling and corresponding sex, age and ethnicity based soft tissue assessments for facial soft tissue thickness (FSTT) may aid in life-like appearance. Knowledge of using latest digital technologies including 3D facial scan, stereo photometry allows orthodontist to assist anthropologist & forensic specialist in virtual reconstruction. This paper reviews commonality in concepts of various forensic discipline with orthodontics that enhance the accuracy of contemporary digital software used in forensic facial approximation.

Registration No. - IAFO/2022/291

CHEILOSCOPY AN AID IN GENDER DETERMINATION

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Abstract

Introduction: The identification of unknown individuals always has been paramount importance to the society. Dentist has a pivotal role in the identification of person as mouth provides infinite evidence with distinctive features of teeth, lips, ad palate. The Wrinkles and grooves on the labial mucosa called sulci labiorum, forms characteristic pattern called lip prints. They are unique to individuals except for monozygtic twins. The uniqueness and permanence of lip prints makes it a reliable tool in gender determination. Aim and Objectives: The present study is aim to determine the distribution of different lip prints on paper and disposable paper cups, and their correlation in identifying the gender. Materials and Methods: The Cross sectional study is comprised of 100 healthy individuals 50 in each gender in the age group 18-25 years. Individual hyeprsensitive to lipsticks, with any scars, congenital, pathological anomolies, trauma and inflammatory conditions affecting lip prints will be excluded from the study. Lip prints will be obtained by red colored lipstick applying on lips gently without smudgging prints are taken first on executive bond sheet ad on disposable paper cups. Lip prints will be analysed by Tsuchihashi Y classification. Results and Discussion: Obtained data will be subjected to suitable statistical analysis and results will be presented with supporting scientific literature in the conference.

Registration No. - IAFO/2022/231

CONE BEAM COMPUTED TOMOGRAPHY-A TOOL IN FORENSIC ODONTOLOGY

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Abstract

In 1972, Godfrey Hounsfield invented computed tomography. Maxillofacial Cone-beam computed tomography, a modification of Computed Tomography, was introduced into the clinical practise in the late 1990s.The generation of three-dimensional data with lower radiation exposure, lesser space occupation and low cost over providing a high spatial resolution of osseous structures when compared with conventional Computed Tomography, has made it superior. It has become a popular and frequently used imaging modality in daily clinical practice. Apart from that, the application of non-invasive Cone beam computed tomography is widely extending into the field of forensics in dentistry by serving as a reliable source of evidence for antemortem and post-mortem records by assisting in personal identification, age estimation using coronal tooth-pulp ratio, spheno-occipital synchondrosis, gender identification using anthropometric measurements of facial bones, and frontal sinus. Besides some limitations like, being more expensive than conventional radiographs, motion artifacts, limited field size and limited soft tissue contrast, inconsistent quality, Streaking and beam hardening artifacts, Cone beam computed tomography in future will prove to be a great tool and asset to the practice. This paper reviews the literature for the application of Cone beam computed tomography in forensic odontology.

FACIAL RECONSTRUCTION

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Abstract

Forensic facial reconstruction is a method used in the field of forensic science to reproduce the likeness of an individual from skeletal remains primarily used in cases of missing or unidentified persons. It is a combination of scientific methods and artistic skills. Sometimes a dead body cannot be identified as it's mangled face cannot be recognised due to destruction by animals, physical attacks or decay due to various environmental factors. Types of identification: 1. Circumstantial identification, 2. Positive identification. Methods used: 1. Two dimensional drawings, 2. Three dimensional clay models, 3. Superimposition. Two dimensional drawings: 1. CARES - Computer Assisted Recovery Enhancement System, 2. FACES - Forensic Anthropology Computer Enhancement System. Three dimensional methods: 1. Anthropometerical American Method / Tissue Depth Method, 2. Anatomical Russian Method, 3. Combination Manchester Method / British Method, 4. Computerised 3D Forensic Facial Reconstruction. Conclusion: Forensic facial reconstruction is a rapid, non invasive and efficient method where reconstruction can be repeated at any time as required. This is essential not only for legal purposes but also aids the family in overcoming their grief and bring a sense of closure to them. It is an alternative method in the identification process when there is little or no other evidence available. Through this presentation I intend to give you a glimpse of the various methodologies and technological advancements made in the field of forensic odontology utilising facial reconstruction as one of the modalities.

Registration No. - IAFO/2022/470

FORENSIC FACIAL RECONSTRUCTION

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Abstract

Forensic facial reconstruction (FFR) refers to any process that aims to recover the morphology of a face of individual from the observation of a skull. Reconstruction techniques usually based on the relationship between the underline hard tissue such as bone structure and soft tissues such as facial muscles and facial features. It is typically used to assist law enforcement agencies to identify missing (or) deceased persons. Facial reconstruction can be a feasible alternative to identify the person from decomposed or skeletonized corpse .It is important to remember that, though the outcomes are empirical in nature, the technique has been applied widely in many situations. Recent advancements in technology and computer based technique had increased the accuracy and validity of this forensic discipline. However the availability of the details regarding FFR in Indian literature is meagre. This paper is aimed to analyze the various international papers about FFR.

Registration No. - IAFO/2022/457

CHEILOSCOPY

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Abstract

Cheiloscopy is a forensic investigation technique which deals with identification of humans based on their lip traces. While using teeth as antemortem record, sometimes, we find loss of teeth and destruction of restoration may lead to difficulty in comparing the antemortem records and postmortem records. To overcome these difficulties, an immutable parameter should be used. Similar to the prints present in the finger, palm and foot, and lip prints are also unique and do not change during the life of a person. Lip prints provide sufficient information for forensic investigations as the lips also possess furrows and grooves. Lip prints can be obtained at the crime scene either directly from the lips of the deceased or from the clothing, cups, glasses, cigarettes, windows or doors. Lip prints have to be obtained within 24 hours of death to prevent erroneous data that would result from postmortem alterations of lip. Lip print pattern depends on whether mouth is open or closed. Lip prints can be a factor in different kinds of crimes, cheiloscopy is analogous to finger print analysis, and is a genuine sub specialty of forensic odontology.

Keywords: Cheiloscopy, Antemortem records, Analogous.

3D PRINTING

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Abstract

Three-dimensional (3D) printing is a technique used to produce a realistic physical 3D structure from a computer-aided design (CAD) model or a digital 3D model. The terminology behind 3D printing may be applied to several processes in which material is powdered, assembled or solidified under computer control to build-up a 3D object, with material usually attached together layer by layer. Three-dimensional(3D) scanning and printing technologies has proved to be a boon and revolutionized Indian society in recent years. 3D printing is slowly gaining popularity in the fields of forensics due to its capability to provide information in all three axis (x, y and z) when compared to 2D photographs. The technology is actively being used in the fields of forensic medicine, anthropology, ballistics and odontology.3D printing allows better visualisation, interpretation, preservation and analysis of the evidence.

Registration No. - IAFO/2022/340

AMELOGLYPHICS - NEW HORIZON

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Abstract

Introduction - Forensic Odontology involves the study of Dental evidences in deceased individuals, it's examination and evaluation in criminal matters. It is imperative in medico legal cases. Over the years the advancement of Forensic Odontology has paved way to newer avenues which are useful in the identification of an individual. Ameloglyphics is the term used for the study of patterns of Enamel rods. Ameloglyphics is also called tooth prints and they are considered hard tissue analog to fingerprints. Aim and Objectives - The aim of this study was to review the different studies which were done to evaluate and know how Amelolyphics or Tooth prints can be used to identify a person by exposing the teeth to various tests and methodologies. Conclusion - Teeth being the hardest substance in the body, have high resistance to severe environmental effects. They can be used as dental evidences in forensic. Ameloglyphics is an effectual tool in an individual's identification even in severe conditions such as burn and acid attack cases.

Keywords: Forensic Odontology, Ameloglyphics, Tooth Prints, Enamel Rod Pattern

Registration No. - IAFO/2022/258

BITE MARK PHOTOGRAPHY

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Abstract

One of the most cardinal parts of bite mark analysis is bite mark photography. Like fingerprints, bite marks are unique to each individual such as distances and angles between teeth, missing teeth, fillings and other dental work. Accurate photographic documentation of a crime scene is a crucial component in evidence collection during any investigation, especially when it applies to recording bite marks inflicted on humans during crimes of violence. The photographic documentation of a crime scene needs to be of the highest precision since in many instances the bite marks may be the only evidence linking the suspect to the crime. This precision of images is extremely critical since the analysis of the bite marks of potential suspects is entirely dependent on how competently the photographic images are catalogued. Therefore, the rationale for employing superior photographic techniques is obligatory for the investigation team. This paper will discuss current standards, best practices and armamentaria for digital photography of bite mark injuries on skin.

Keywords: Bite mark photography, digital photography, bite marks.

Registration No. - IAFO/2022/129

KNOWLEDGE, ATTITUDE AND AWARENESS OF THE NURSES TOWARDS FORENSIC ODONTOLOGY- A QUESTIONNAIRE-BASED SURVEY

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Abstract

Introduction and Background: The word forensic comes from the Latin word forensis, meaning 'of or before the forum.' Forensic odontology has an important role in crime investigation. Dentistry has much to offer law enforcement in the detection and solution of crime or in civil proceedings. Indeed, nursing is considered as a noble profession owing to the care and sympathy with greater understanding for all human beings regardless of any dissonances. They are being called the bulwark of healthcare profession becoming a significant connecting link between the victims and forensic odontologists. So, Forensic dental fieldwork requires an interdisciplinary knowledge of dental science. Aim: The main aim of this study is to analyse the knowledge and attitude towards forensic odontology among nursing students and nursing staff. Materials & Method: A questionnaire based cross-sectional survey using google forms will be conducted among nursing students and nursing staff. The questions will assess their knowledge and attitude towards forensic odontology. Results & Conclusion: Results will be analysed and evaluated statistically.

Registration No. - IAFO/2022/239

PALATOSCOPY &ORTHODONTIST ROLE IN FORENSIC ODONTOLOGY

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Abstract

Identification of individuals is a challenging task in forensic odontology. In circumstances where finger print record taking is difficult palatal rugae is considered as an alternative tool.

Palatal rugae is unchanged and stable throughout the life. It is stable pre and post orthodontic treatment. It is also useful for growth pattern prediction for orthodontist. So, by providing the pretreatment records orthodontist plays a major role in identification of victims. This paper reviews different classifications, techniques, advantages, limitations of palatoscopy, correlation of palatal rugae in different skeletal growth patterns.

Registration No. - IAFO/2022/213

SMART PHONE FORENSIC: INVESTIGATION SCHEME BY 3D SCANNERS

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Abstract

Forensic dentistry identification commonly involves using dental cast models in recent times especially by orthodontists as they plays an important role. 3D scanners mainly used in the view of reducing the space for cast model storage as well as 3D imaging for fabricating clear aligners. As sophisticated laptop or personal computers are generally required for data transmission and viewing has become more complicated, for more practical usage smart phones would be better option for viewing 3D data. There are many trending apps for 3D SCANNER visualization so far; IOS and Android base devices are preferable for forensic dentistry. This paper provides information about several application of 3D viewing in IOS and Android base devices such as CAD assistant, Exocad, Adobe photoshop mix for forensic dentistry needs.

Registration No. - IAFO/2022/650

CURRENT TRENDS IN FORENSIC ODONTOLOGY

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Abstract

Forensic odontology is an evolving science and has a greater scope of development. It has established as an indispensable science in medico legal matters and in the identification of the dead person. The dental tissues are often preserved even if the deceased person is skeletonized, decomposed, burnt, or dismembered. Various methods have been developed to determine age, sex, and ethnicity of the person, using dental tissues. Data collection methods and supplementary technologies used in forensic dental identification have undergone significant transformation. This article provides an overview of the evolving trends in conventional methods, and the recent concepts used in forensic odontology. Conclusion: Forensic odontology is an upcoming branch of dentistry with a lot of scope for development. At the crime scene, the forensic odontologists play a major role in investigating and interpreting the dental evidence. The unique nature of the dental anatomy and the custom restorations ensure accuracy when the techniques are appropriately employed. A consistent effort has to be made to computerize all the data available to facilitate comparison. Efforts have to be made to maintain the dental records which will serve as antemortem data. Each dental professional has a responsibility to understand the forensic involvements associated with their dental practice. The practicing dentists and the dental students should be made aware of the available technologies and its use in forensic dentistry. New researches have to be encouraged in the field of forensic dentistry which will pave way for incorporating newer technologies in establishing the human identity.

Registration No. - IAFO/2022/347

SIGNIFICANCE OF LIP PRINTS IN FORENSICS- A REVIEW

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Abstract

Any criminal investigation must focus heavily on identification. Similar to fingerprints, the lip wrinkle pattern is unique to each person. External surface of lip has many elevation and depression forms the lip prints. Cheiloscopy is a forensic analysis used to identify people based on the traces left on their lips. It plays a major role as a stomatological means of identification in addition to Bite marks, Tooth Morphology, Restorations and Palatal rugae patterns. Lip print investigations captured the interest of many scientists in previous decades. As a fresh method of identifying people in legal and criminal matters. The vermilion has the pattern of the lip crease. The lip's moveable outer border and its lip-prints can change in appearance depending on the pressure and direction and the process used to create the print. This review article emphasise history, different types of classification and analysis of lip prints to help the investigators.

Registration Number - IAFO/2022/362

ORTHOPANTOMOGRAPHIC STUDY ON MAXILLARY CENTRAL INCISOR FOR AGE ESTIMATION

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Abstract

Introduction: Age is one of the essential factors in establishing the identity of a person. With increasing age, the size of the dental pulp cavity shrinks as a result of secondary dentin deposits. This could be used as a measure of age. Aside from morphological approaches, radiological approaches might be used to analyse the age changes. Aim and objective: The purpose of the present study is to present a method for estimating the age based on the morphological parameters of maxillary central incisors. Materials and Methods: Fifty subjects of different age groups were selected randomly for the study. Only fully erupted maxillary central incisors in normal functional occlusion were considered. Teeth with radio-opaque fillings, crowns/prosthesis, associated pathologies, malalignment, rotation, impaction, and teeth with developmental anomalies were excluded from the study group. Orthopantomographic study for age estimation using morphological parameters of permanent right maxillary central incisors in adults using Kvaal's method was done. The following measurements were recorded: lengths of tooth, pulp, root and width of root and pulp at three different points. Regression formulas were used to calculate the dental age. Results: The results obtained are sent for the statistical analysis.

Registration Number - IAFO/2022/178

JUVENILE OFFENDER OR NOT? A CASE OF MISSING THIRD MOLARS

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Abstract

Prediction of age of majority i.e., whether an individual has reached the age of 18 or not, is of crucial importance in forensic age estimation. The age threshold of 18 years is relevant in criminal proceedings for the application of juvenile or adult penal law. Third molars are commonly used for prediction of 18 years, since their development extends in to early twenties. However due to the increased prevalence of third molar agenesis, it has become difficult for forensic experts to predict age of 18 years in their absence. We are presenting a case, where a juvenile delinquent with missing third molars was brought upon for dental age estimation. We intend to discuss the alternative methods applied in scenarios.

Registration Number - IAFO/2022/435

MORPHOMETRIC ANALYSIS OF MAXILLARY SINUS FOR GENDER DETERMINATION-A CEPHALOMETRIC STUDY

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Abstract

Introduction-The study of anthropometric characteristics is of fundamental importance to solve problems related to criminal cases, mass disasters, and in other forensic concerns. Maxillary sinuses are two air filled spaces located in the maxillary bone. Sinus radiography has been used for identification of skeletal remains and determination of gender. There are various imaging modalities varying from conventional techniques such as water's view and lateral cephalogram to advanced technologies including computed tomography and cone beam computed tomography. Aim and Objective-The aim and objective of the present study is to establish the reliability of maxillary sinus dimensions for gender determination using lateral cephalogram. Material and Methods-A total of 40 healthy subjects belonging to both genders (20 males and 20 females) of age group 15–30 years attending the outpatient department of Oral Medicine and Radiology Govt Dental College Srinagar were selected for the study by simple random sampling. All radiographs were interpreted and the maxillary sinus height and width were measured using Newtom software. The maxillary sinus index (MSI) was calculated as follows: MSI = maxillary sinus width/height. Results-The mean maxillary sinus height was found to be significantly higher in males, whereas the maxillary sinus index was significantly higher in females. The discriminant function analysis derived in the study was able to differentiate the sex groups with sensitivity of 90% and specificity of 75%. Conclusion-The morphometric analysis of maxillary sinus can be used as a reliable tool in gender determination.

Registration Number - IAFO/2022/383

INTERCANINE DISTANCE AND CHEILOSCOPY FOR GENDER DETERMINATION: A CORRELATIVE STUDY

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Abstract

Background: Lip prints and mandibular intercanine distance are unique to each individual and also help in sex determination. Aims & Objective: The aim of the study is to evaluate and correlate intercanine distance and cheiloscopy as parameters for gender determination. Materials & Methods: A total of 100 subjects were selected for the study. The lip prints were recorded and stained with Nile red. Mandibular impressions of all the subjects were taken with alginate impression material and casts were made. The intercanine distance was measured on these study models with vernier caliper scale. Results: The results obtained were sent for statistical analysis.

Registration Number - IAFO/2022/482

"HISTOPATHOLOGICAL ASSESSMENT OF VARIOUS ORAL MUCOSAL TISSUE SPECIMENS EXPOSED TO COMMON POISONS –AN EXPERIMENTAL STUDY."

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Abstract

Introduction: Deaths involving the consumption of poisons such as common pesticides and insecticides have shot up in both rural as well as urban areas. Poisoning is the third most common causative factor for deaths following vehicle accidents and fires. Ingestion of commonly available insecticides and pesticides in India such as organophosphates and aluminium phosphide is the most common mode of exposure to poisons, followed by inhalation, injection, and other cutaneous routes. As the oral cavity is the first domain to come in contact with these ingested poisons, histopathological changes in various oral mucosal tissues may disclose the cause of death of the deceased and can be an adjunct in forensic investigation. Aims & Objectives: To assess the histopathological changes occurring in tissue samples obtained from different sites of oral cavity exposed to commonly available poisons and to assess the histopathological changes in these tissue samples exposed to poisons for different time intervals. Method: Organophosphates and Aluminium phosphide poisons were obtained from the market and labeled as poisons Iand II. Tissue samples were collected from different sites of the oral cavity and were divided into 5 pieces. First part was control, second and third were exposed to poison I and II for 5 seconds, fourth and fifth parts were exposed to poison I and II for 10 seconds. Then the samples were processed and H&E sections were made and analyzed. Result: Awaited.

Registration Number - IAFO/2022/522

"EVALUATION OF TONGUE MORPHOLOGY AS A FORENSIC IDENTIFICATION TOOL- A PILOT STUDY"

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Abstract

Aim and Objectives: By means of the present study we intend to analyze lingual morphological aspects and demonstrate their importance and reliability as main criteria with force of evidence using forensic dentistry to identify a person. The purpose of direct examination of tongue was to emphasize morphological features: shape, type, characteristic of longitudinal medial septum and related grooves, as well as lingual apex type. Materials and Methods: A cross sectional study was carried out on 30 females between 18-25 years old. Direct examination of the tongue was performed after the thorough cleaning of the tongue for the shape, type, characteristics of the longitudinal medial septum and the related grooves, as well as the lingual apex type. The front and side view phogotagraphs of the tongue were also taken for the record. The pictures were taken under same environmental and lighting conditions and from a predetermined distance. The collected data was tabulated and a descriptive statistical analysis was carried out know the frequency of the parameters. Results: Each tongue was unique in exhibiting the morphological variations. The general shape is trapezoidal with a small anterior base and large base at level of the oral commissures. Tongue had either tip edge or septal edge or smoothly curved at the end. Longitudinal septa and the related tongue grooves showed specific location for different individuals. Conclusion: The morphological aspect of tongue dorsal surface is unique for each and every individual. The lingual photography, may constitute secure methods for forensic dentistry identification, in addition to rugoscopy and cheiloscopy.

Keywords: Tongue, forensic identification, tongue morphology

Registration Number - IAFO/2022/377

EVALUATION OF CONDYLAR MORPHOLOGY AND CONDYLAR CORTICATIONS IN AGE AND GENDER DETERMINATION BY CONE BEAM COMPUTED TOMOGRAPHY

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Abstract

Introduction: Temporomandibular joint is a ginglymo diarthroidial joint with fibroelastic cartilage. The chondrogenesis initiates from the 12th week of intrauterine life and the development of condyle is associated with growth. The condylar cortication shows distinct morphological variation for each individual in each stage of their life. The cortical bone around the condyle could be used as a factor for chronological age assessment and it can act as a tool in forensic medicine. Aim: To evaluate the age and gender related changes in variations of condylar morphology and mandibular condyle cortication, articular eminence cortication, mandibular cortical index on CBCT. Materials and Methods: A total of 30 CBCT images obtained using Planmeca Promax 3D Mid Pro Face machine, taken for the purpose of various dental treatments for the patients with the age group of 20–60 years. Images were retrospectively investigated to evaluate mandibular condyle cortication, articular eminence cortication in sagittal section and mandibular cortical index in panoramic reformatted image. Results: There was a significant difference between condyle morphology related to gender and there was a significant difference between mandibular condyle cortication, articular eminence cortication, mandibular cortical index in relation to chronological age. Conclusion: Thus the condylar morphology and cortication grading is a simple technique and can be used as a factor for gender and chronological age assessment.

Registration Number - IAFO/2022/292

INTERDISTANCE OF BILATERAL CRANIOMANDIBULAR STRUCTURES FOR AGE AND GENDER DETERMINATION USING CONE-BEAM COMPUTED TOMOGRAPHY- A RETROSPECTIVE STUDY

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Abstract

Background: The accurate identification of human remains is essential in forensic investigations and anthropological work, mainly during criminal cases and in the identification of accident or natural disaster victims. Among individual bones, skull plays important role in identification of gender and age of victim. Likewise, inter-distance of various prominent bilateral craniomandibular structures like zygoma, orbit, mastoid, mandibular condyle and coronoid process varies among age and gender. Aim and Objectives: To evaluate age and gender using inter-distance of bilateral craniomandibular structures using CBCT and to correlate all the parameters to find which is more accurate in determining age and gender. Methodology: In this study, CBCT images of 100 patients were collected from archives of department of Oral medicine and Radiology, Meenakshi Ammal Dental College. This study uses CBCT images of patient aged between 10-60 years of age and divided into 5 age groups from 10-20 yrs, 21-30yrs, 31-40yrs, 41-50yrs, and 51-60 yrs with 20 samples in each group including equal number of male and female. Images were assessed with PLANMECA ROMEXIS software to evaluate various parameters such as interorbital distance, bizygomatic width, inter mastoid distance, intercondylar distance and inter coronoid distance. The obtained results will be statistically analysed by discriminant analysis for correlating distance of these bilateral craniomadibular structures in different age groups and gender. Conclusion: Forensic studies based on the anthropometric measurements of skull showed highest accuracy in the literature. Correlating various parameters of skull in person identification increases the rate of accuracy.

SEX DETERMINATION IN LOCAL POPULATION USING FACIAL INDICES ON LATERAL CEPHALOGRAM AND ODONTOMETRIC VALUES ON DENTAL CASTS

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Abstract

Aim and objective: To analyze and correlate the facial indices on lateral cephalogram with which the gender can be estimated and odontometry on maxillary and mandibular casts, To measure and correlate the Gonial angle, Ramus height, Y-axis, Effective mandibular length, Cranial base length/ S-N plane, Frontal sinus height, Frontal sinus width, Maxillary sinus area, Maxillary sinus perimeter on lateral cephalogram for gender determination, To measure and correlate the mesiodistal width of all maxillary and mandibular teeth except third molar and buccolingual diameter of molars, To measure and correlate intercanine distance on mandibular cast. Material and Method: Samples includes 20 subjects within the age group of 20-40 years. A cross sectional observational study will be conducted using lateral cephalogram (DIGIMIZER software) and maxillary and mandibular cast measurements. Each parameter of lateral cephalogram and maxillary and mandibular dental cast will be analyzed, recorded and correlated and subjected to statistical analysis. Results: The study will be conducted by using SPSS v 20.1. Lateral cephalogram parameters (Gonial angle, Ramus height, Y-axis, Effective mandibular length, Cranial base length/S-N plane, Frontal sinus height, Frontal sinus width, Maxillary sinus area, Maxillary sinus perimeter) and maxillary and mandibular cast parameters (MD width, BL diameter and intercanine distance) will be subjected to statistics and results will be obtained. Conclusion: The results obtained will enable us to explore whether lateral cephalogram and odontometry would serve as useful tools for gender estimation of an individual.

Registration Number - IAFO/2022/487

MORPHOLOGICAL ANALYSIS OF PALATAL RUGAE PATTERN AND FORMS IN SOURASHTRA POPULATION

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Abstract

Introduction: Palatoscopy/rugoscopy is the study of rugae and their pattern and aids in forensic identification. This study is conducted on the Saurashtra population, whose ancestral origin is southern Gujarat, from where they migrated to south India in the 17th century and formed an ethnic population in Madurai. There are no similar forensic odontology studies available in the literature for this population. Aim: To study, analyze and report the differences in the morphological parameters of palatal rugae between the people of Saurashtra and Non-Saurashtra populations, who visit our hospital for routine checkups. Materials and methods: 200 participants including 100 Saurashtrians and 100 non-Saurashtrians with an age range of 18-60 years were selected for this study and their palatal impressions were obtained using alginate. The casts were traced using graphite pencil for obtaining the outlines of the palatal rugae and analyzed for number, length, shape, unification and direction of palatal rugae based on Martin et al. classification. Results: Overall, 1427 rugae were observed in this study. Curved shape followed by straight rugae pattern was seen predominantly in both populations. However circular rugae and trifurcation of rugae were more common in the Saurashtra population than in non-Saurashtra (1.5±0.98, 0.96±0.267 p-value 0.010 & 1.11±0.321, 0.22±0.12 p-value 0.020 respectively). Rugae travelling backwards from point of origin was common in Saurashtrians (5.98±2.13, 4.99±2.61, p-value 0.008). Majority of rugae converged in both populations but however divergent rugae were present in the Saurashtra population than in non-Saurashtrians (1.68±0.33, 1.40±0.497, p-value 0.08). Conclusion: The palatal rugae are exclusive for their population-specific configurations. Hence, in forensic odontology, palatal rugae can be used as an additional tool for differentiating the Saurashtrian people from other populations.

Registration Number - IAFO/2022/335

GENDER DETERMINATION BASED ON MANDIBULAR PARAMETERS USING CONE BEAM COMPUTED TOMOGRAPHY

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Abstract

Aim: To assess gender identification using osteometric mandibular measurements performed on cone beam computed tomography (CBCT) images. Materials and Methods: The sample consisted of 60 CBCT scans aged between 18- 45 years. The collected CBCT images were analyzed by two examiners to test the reliability of measurements. Three measurements were analyzed to be used for sexual prediction analysis as following: gonial angle, Coronoid-Gonion length (the distance between Gonion and the highest lateral point on the Coronoid process), and ramus length. Results: Males had statistically significantly higher mean ramus length, gonial angle, coronoid -gonion length than females. Conclusion: The present study suggested that the gender of mandible could be assessed using metrical and angular measurements which considered as an additional tool for gender identification.

FACIAL SOFT TISSUE THICKNESS EVALUATION USING CT SCAN IN CHHATTISGARH POPULATION

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Abstract

Facial soft tissue thickness (FSST) measurements play a vital role in facial reconstruction, which is an important part of forensic identification where recreation of the antemortem appearance of face of an unknown skull is done giving it the recognizable form to help in forensic investigations. The soft tissue thickness of face can be measured using invasive and non-invasive techniques. Previously soft tissue thickness was measured by probing needles into the face of the cadaver until they hit the bone surface and its penetration depth was measured. This was gradually overcome by several imaging modalities ranging from 2D lateral cephalometric radiography to ultrasound to 3D imaging modalities like CT scan, MRI and CBCT. In this study FSST was measured at 31 anatomical landmarks (10 midline and 11 bilateral) in the CT scan of subjects from the bony landmarks to soft tissue landmarks and comparison of the obtained values were done to identify the sex of the individual. These measurements will form an important part of human identification in forensic science where it is difficult to identify the remains of the deceased which is mostly in mutilated form in circumstances such as explosions, warfare, and mass disasters.

Keywords: Human identification, craniofacial reconstruction, facial soft tissue thickness, CT scan, anatomical landmarks.

CHILD LABOUR AND CERVICAL VERTBRAE MATURATION: IS IT A USEFUL TOOL IN FORENSIC AGE ESTIMATION

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Abstract

Introduction: Age estimation plays an important role in forensic dentistry for the individual identification to clarify criminal and civil liability issues. Age estimation is guided by the evaluation of events that happen during the processes of bone and dental development. Cervical vertebrae are characterized by the change from trapezoid towards a rectangular shape, by an increase in the height –width ratio and by the formation of the concavity at the inferior margin and these changes can be assessed through the morphometric analysis. Aim: To evaluate Cervical vertebrae maturation and to verify its usefulness in forensic age estimation. Materials and methods: The sample consist of lateral Cephalometric radiographs of 200 subjects (10-17) years. The following measurements to be performed on C3 and C4 cervical vertebrae in each lateral cephalogram i.e., Anterior Vertebrae Body Height (AH), Vertebral Body Height (H), Posterior Vertebral Height (PH) and Anteroposterior Vertebral Body Length (AP). ImageJ computer software will be used to perform linear measurements.

DNA FINGERPRINTING IN FORENSIC ODONTOLOGY

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Abstract

DNA fingerprinting or DNA profiling is a technique employed by forensic scientists to assist in the identification of individuals or samples by their respective DNA profiles .Though DNA extraction is not the initial choice in identification but can be the last resort wherein other investigation may fail due to lack of evidences or ante mortem. When other means of traditional identification become impossible following mass calamities or fire explosions, teeth provide a rich source of DNA as they have high physical as well as chemical resistance. The use of DNA profile test in forensic dentistry offers a new perspective in human identification. DNA is responsible for storing all the genetic material and is unique to each individual. The currently available DNA tests have high reliability and are accepted as legal proofs in courts. The recent evolution in the isolation of DNA and the ways of running a DNA fingerprint in forensic odontology are highlighted in this literature review.

Registration Number - IAFO/2022/485

LATENT LIP PRINT ANALYSIS IN CRIME INVESTIGATION

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Abstract

Identification of a person is of paramount importance in a medico-legal investigation. Cheiloscopy is a forensic investigation technique that deals with identification of humans based on lips traces. The pattern of wrinkles on the lips have individual characteristics as fingerprints. Collection of the visible as well as latent Lip Prints with a suitable transferring and recording media is important for its consideration as positive forensic evidence. There are various methods for collection of latent lip prints in crime scenes such as the powder method, dye method and fluorescent method. This presentation highlights various methods of recording and collection of the Lip prints at the crime scene with an emphasis on development of the latent lip Prints.

Registration Number - IAFO/2022/359

CYTOMORPHOMETRIC ANALYSIS: A POSSIBLE ADJUNCT FOR AGE ESTIMATION

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Abstract

Background: Age estimation plays an important role in determining the identity of an unknown individual in case of any crime or mass disaster. Exfoliative cytology, a non-invasive procedure, also has its potential implication in age assessment of an individual. Aim and Objective: The study was done to identify the age of an individual using the exfoliated cells of buccal mucosa by evaluating the cell diameter (CD), nuclear diameter (ND), and nuclear-cytoplasmic ratio (N:C) and their variation with age. Materials and Methods: Buccal smears were collected from 100 apparently normal healthy individuals of different age groups using a wet wooden spatula by gentle scraping motion, fixed using 95% ethanol, and stained using Ultrafast Papanicolaou stain. The CD and ND were measured using cytomorphometric analysis and nuclear-cytoplasmic (N:C) ratio was calculated for each case. Results: The results obtained are sent for statistical analysis.

Registration Number - IAFO/2022/512

VIRDENTOPSY - A BREAKTHROUGH OF DIGITAL DENTAL AUTOPSY

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Abstract

The word forensic is derived from the ancient Roman "forum" the home of the law courts and means "relating to the law." In forensic odontology individual identification is based on a traditional visual comparison of the ante mortem dental record and dental radiographs with those obtained by postmortem examinations. Digitalization in forensic odontology has become an evolutionary change over in the period of covid -19. A forensic team from the University of Turin, Italy is trying to make the procedure of autopsy as digital and remote, make it as an touch free digital dental autopsy called "VIRDENTOPSY". The term virdentopsy merges the terms "virtual" and "dental autopsy". This project combines research topics such as pathology, odontology, anthropology, archeology, under the human rights of the dead and humanitarian forensic odontology. The virdentopsy screening can reduce technical consultancy costs, as forensic odontologists do not need to be onsite, it can speed up the process of human forensic identification and respect forensic human identification protocols through the complete collection and evaluation of all dental evidence, optimizing the use of human resources involved in a mass disaster scenario or a single unidentified human remains.

ASSOCIATION BETWEEN ABO BLOOD GROUPING AND ODONTOMETRY: AN UNEXPLORED EVIDENCE IN FORENSICS

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Abstract

Background: Recent research has exhibited a strong association between ABO blood groups and susceptibility to diseases. Extraoral and intraoral hard tissue landmarks provide a stable and reliable record for odontological and anthropological analysis, forensic investigations and identification. The association between anthropometric indices and ABO blood grouping have been reported in the past, however, the association between ABO blood groups and odontometric indices is yet to be comprehensively explored. Aim: This study aims to establish the correlation of ABO blood groups with odontometric indices and extraoral hard tissue landmarks for personnel identification. Methodology: A total of 200 subjects were selected, aged between 18-25 years. Blood groups of the subjects were determined and dental parameters measured were incisal height, incisal width, inter-canine distance, inter-premolar distance and molar relation. The skeletal parameters recorded were facial divergence, facial height and bi-zygomatic width. The stature (height) and weight of each subject was also recorded. Appropriate tools of measurement like scales, dividers, ligature wires and measuring tapes were used to record these values. The recorded values will be tabulated and statistically analysed using SPSS software version 22, IBM Corporation, USA. Results: Awaited. Conclusion: A positive association of ABO blood groups with skeletal and odontometric parameters may be used as a valuable source of information in forensic odontology. As teeth dimensions and arch parameters are exclusive to each individual, association of population specific data and blood grouping would provide significant assistance to the forensic expertise in identification of individuals during ante-mortem and post-mortem analyses.

Keywords: ABO blood groups, anthropometry, odontometry

Registration Number - IAFO/2022/511

CARIES AND FINGERTIPS!! --- FORENSIC SIGNIFICANCE

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Abstract

Background: Dermatoglyphic is the study of fingerprints including dermal ridge patterns on hand and soles of feet. A fingerprint is a collection of patterns of ridges and furrows which differs from individual to individual. It is constant throughout life unless altered unintentionally or intentionally (surgically, burn etc.). It is a science which helps in the field of criminology and personal identification, as well as embryology, comparative anatomy, genetics, and medicine. As fingerprints are genetically determined it can be deciphered and hence considered for genetic correlation with dental caries. Factors affecting dental caries might cause differences in dermal ridge patterns and therefore recording fingerprints on first dental visit can be useful in predicting caries risk of the child. Aim: Evaluation of correlation between dermatoglyphic and dental caries by analyzing the digital photographs of fingerprint of subjects with or without dental caries. Result: Children with DMFT/dft score-0 showed more whorl and less ulnar loop fingerprint pattern, higher mean absolute finger ridge count (AFRC) a significantly higher mean total finger ridge count (TFRC) and also had significantly higher mean salivary saliva buffering capacity. In without caries population males in group I showed more whorl fingerprint pattern whereas females showed more radial loop fingerprint pattern. In groups with DMFT/dft score </>/= 5 showed more ulnar loop and arch fingerprint patterns whereas females showed more radial loop fingerprint pattern.Conclusion: This study was unique in a way that 3 important parameters, i.e., caries, dermatoglyphics and salivary characteristics were linked together, which can help us discover a new way of quantification of dental caries.

Registration Number - IAFO/2022/358

AMALGAMATION OF SOCIAL NETWORKING APPLICATION AND FORENSIC ODONTOLOGY IN HUMAN IDENTIFICATION- WILL SELFIE FORENSIC ID TURN THE TABLES AROUND?

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Abstract

Thirty-two teeth with five clinical surfaces offer 1.8 billion combinations, and thus linking forensic science and law with dentistry in the form of "Forensic Odontology". As early as 1972, International Organization for Forensic Odonto-Stomatology started off and by 2000 Indian Association of Forensic Odontology was established. Dental tissues are often used for individual identification and to determine the age, sex, and ethnicity of a person. Recent advances in the field of genetics and molecular biology have contributed to the rapid growth of forensic odontology including computer aided facial reconstruction. Despite being in 21st century which is the era of social media which can provide valuable investigative tool, no forensic odontology app exists with the aim of assisting the human identification process, through the search of antemortem data to be used as adjunct data in the comparison with postmortem data collected. Thus, the aim of this paper presentation is to create awareness about an upcoming application for smartphones called "Selfie Forensic ID" App. This app will employ selfie of lower third of face as an archive of dental data of the front teeth of missing persons sharing with social networks (available for free download from Android and Apple store). Numerous facial features such as diastema, malpositioned teeth, lip etc. could represent strong identifiers in the comparison of antemortem and postmortem data.

Registration Number - IAFO/2022/272

TONGUE PRINT

V S Monisha[1] Dr. Deepak Gowda[2]

Abstract

Tongue is an essential indeed a crucial internal organ present within the oral cavity. There is often less chance external factor influence therefore it can be great impact in forensic odontology other identification system. It can play a major tool in extremely clueless cases as it varies from person to person as in size, shape, colour, moisture, surface coating. Aim: To be used as a professional recognition database to case human identification. The study includes : Analysis of tongue features Variation with respect to gender Importance of tongue print in forensic odontology It has been assured promising bio metric identification and verification protect the privacy of a person involve better than other biometrics.

Registration Number - IAFO/2022/488

VIRTOPSY: EVASIVE AUTOPSY AS A TOOL IN DENTISTRY

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Abstract

The term "virtopsy" is a combination of the words "virtual" and "autopsy." The concept "autopsy" means "to see with one's own eyes." An autopsy is a thorough study of a corpse that includes documenting everything related to surface wounds, anatomization, histology and culture research. In the field of autopsy, Virtopsy employs imaging modalities that are often used in dentistry, such as IOPA, CBCT, CT, and MRI. It is quickly getting popular in the world of forensics. Human remains are identified by comparing post-mortem data collected during autopsies with ante-mortem data obtained through missing person's reports. Primary identifiers such as fingerprints, DNA and dental data are typically gathered throughout any human identification process. During the COVID-19 pandemic in 2020, the virdentopsy project was launched to allow the proper processing of human remains by collecting dental data from jaws and teeth, which was then transmitted remotely to forensic odontologists for expert opinion in order to achieve a generic profile of the unidentified human remains. The purpose of this paper is to provide a comprehensive assessment of the virtopsy process in the field of forensic odontology.

Registration Number - IAFO/2022/489

3D PRINTING & FACIAL RECONSTRUCTION: A NEW DIMENSION IN FORENSIC ODONTOLOGY

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Abstract

Forensic odontology is an evolving branch in the Dentistry. Since its inception into forensic science it has become an important forensic tool in solving many crime investigations by following the traditional methods. The use of digital technology has been increasing in today's technically driven world and the field of forensic odontology is also undergoing transformation from traditional to modern methodologies. 3D printing is a modern process of printing objects from a material using multiple stacking and computer aided design data or digital data that allows better visualisation, interpretation, preservation and analysis of the evidence. It has long been utilized in dentistry to create models for guided implant surgery and rehabilitation procedures. In forensic odontology same notion can be applied to determine age and gender using printed dental casts and teeth, and it also possible to study. Bitemarks, Lip prints, Tongue prints and Rugae pattern. The aim of this review article is to outline the use and possible benefits of 3D printing in forensic odontology.

PALATOSCOPY IN FORENSIC ODONTOLOGY- A REVIEW

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Abstract

Human identification is a mainstay of civilization, whether in living or dead, and the identification of unknown individual has always been of paramount importance to our society. Identification of an individual is a prerequisite for certification of death and for personal, social and legal reasons which will be done based on scientific principles mainly involving fingerprints, dental records and DNA analysis. Sometimes, it becomes necessary to apply other techniques like Palatal rugoscopy in situations where the hands are charred or mutilated and in identification of remains of individual with edentulous state. Palatal rugoscopy is the study of palatal rugae, and their uniqueness to individuals can provide a reliable source of identification. In the literature there is consensus opinion that palatal rugae remains fairly stable in number and do not undergo any change due to growth, ageing, tooth extraction and disease. Therefore objective of this review is to present numerous techniques for analyzing the rugae pattern and its use in forensic odontology.

Registration Number - IAFO/2022/361

MANDIBULAR PARAMETERS FOR AGE ESTIMATION: A DIGITAL ORTHOPANTOMOGRAPHIC STUDY IN HYDERABAD POPULATION

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Abstract

Introduction: Mandible is the strongest facial bone which can preserve its shape better than any other bone in the forensic field. The mandibular ramus and gonial angle are associated with the greatest morphological changes in size and remodelling during growth. Panoramic radiography is a routinely used, non-invasive technique that can be used to assess mandibular structures. Aims and objectives: The aim of this study is to assess the efficacy of linear mandibular measurements of condylar ramus height, coronoid ramus height and gonial angle in the estimation of age of the individual. Materials and methods: The study was conducted on 200 digital orthopantomograms of individuals of different chronological age groups. Linear measurements of condylar ramus height, coronoid ramus height and gonial angle measurements were performed on the digital orthopantomogram and the obtained data was tabulated. Results: The results obtained have been sent for statistical analysis.

Registration Number - IAFO/2022/198

FORENSIC RECONSTRUCTION OF FRAGMENTED MAXILLA USING 3D PRINTING TECHNOLOGY

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Abstract

Background: Forensic evidence and in particular those composed of organic substances and components are subject to deterioration and the law of change. In mass disasters, most of the skeletal remains recovered are fragmented due to the destructive nature of the disaster. Aim: The aim of this paper is to reconstruct a fragmented maxilla using only available fragments by Three- dimensional (3D) printing. Material and methodology: A Stereolithography (SLA) 3D printer using photocured resin material and Cone beam computed tomography (CBCT) were the hardware technologies required sourced from the research location itself. The shattered maxilla fragments were collected and bagged. The fragments were scanned using CBCT. The scanned files were assembled digitally using 3D manipulation software. After scaling and integrity check was done using the 3D printing software it was printed using photocured white colored resin. Result: In this method only partial reconstruction of the maxilla was done using anatomical knowledge and by approximately joining broken edges together. The maxilla was recreated to scale. Conclusion: Forensic reconstruction of fragmented facial bones is required for forensic facial reconstruction and in turn aid in person identification and further help maintain forensic record

Keywords: Fragmented skeletal remains, Forensic reconstruction, Maxilla, 3D Printing, Cone beam computed tomography, Stereolithography.

Registration Number - IAFO/2022/136

THE STUDY OF EVALUATING THE CORRELATION OF ODONTOMETRIC VALUES WITH HEAD CIRCUMFERENCE OF AN INDIVIDUAL

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Abstract

International organization declaration of human rights states that every freeborn person has the right to be identified even after death. Identity of an individual may be determined by sex, age, height, and ancestry background. This becomes necessary in many of the medicolegal cases where identity of the deceased has to be established. Craniometry is a vital tool in making a precise and systematic measurement of human skull, so as to deduce sex and head circumference of dead individuals. Teeth are also very important elements in the identification of skeletal remains which can be addressed by the forensic dentist by a process called dental profiling. The present study aims to evaluate the correlation of odontometric values with the head circumference of an individual. Once the correlation is noted, derive a correlation regression formula for profile of an individual in the local Indian population.

Registration Number - IAFO/2022/033

ASSOCIATION OF DERMATOGLYPHIC PATTERNS WITH DMFT SCORE (DECAYED, MISSING AND FILLED TEETH SCORE)

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Abstract

Introduction: The skin ridge system and teeth develop from the same embryonic layer during embryogenesis usually around the sixth week. . After death, decomposition of the skin is last to occur in the area of the dermatoglyphic configurations. The details of these ridges are permanent. Correlation between dermatoglyphics and dental caries is rationalized due to its similarity to the environment and genetic factors between teeth and skin during development. This cross-sectional study was executed to interpret the association of thumbprint pattern types and dental caries. Aim: The aim of this study is to evaluate the association of dermatoglyphics as a genetic predictor of the susceptibility of participants to acquire dental caries using Decayed, Missing and Filled Permanent (DMFT) Scores. Objective: To record the right thumb ridge pattern and evaluate DMFT scores, to record and analyze the caries prevalence. Methodology: The thumbprint pattern of the thumb of right hand was recorded for assessment using the Ink Method. The thumb was rolled on the ink pad and the side of the finger bulb was placed upon an A4 size white sheet paper and rolled to the other side until it faced the opposite direction. For each subject, the DMFT index was calculated according to the number of decayed (D), missing (M), and filled (F) permanent teeth using no.23 explorer

Keywords: Dental caries, Dermatoglyphics

SEX ESTIMATION EFFICACY ANALYSIS OF FEULGEN, GIEMSA AND ROUTINE STAINS FROM BUCCAL BARR BODIES

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Abstract

Introduction - Sex determination becomes first priority in process of identification of a person by a forensic investigator in case of mass disaster, crime investigations and ethnic studies. Demonstration of nuclear sex play a vital role in determining gender of an individual. Barr bodies (BB) are known to arise from inactivation of X chromosome in a female somatic cell. They are basophilic structures with varying morphology measuring 0.8×1.1 microns in nucleus during interphase. Various nuclear stains such as Thionine, Papanicolaou, Feulgen, Cresol-violet, Giemsa, Aceto-orcein and acridine orange & routine stain can validate Barr bodies. Aim - To evaluate efficacy of Feulgen, Giemsa and H&E stains in demonstration of Barr bodies. Material And Method- Buccal smears will be prepared from 25 male & 25 female. Buccal smears will be stained by Feulgen, Giemsa & Routine staining method. The Barr bodies' identification will be determined by presence of a darkly stained condensed area on nucleoplasm. The frequency of Barr body will be examined by observing 100 nuclei per specimen under binocular light microscope at 100 magnification. For all BB positive cases Barr Body Index (BBI) will be calculated using following formula. Barr Body Index = Total number of BB counted cells × 100/Total number of cells (Approx. 1000). Result - After obtaining BBI in all 3 stained buccal smears, results will be compared with each other and will be analyzed.

Registration Number - IAFO/2022/290

COMPARATIVE STUDY OF PULP VOLUMES OF FIRST MOLARS AND CANINE FOR AGE ESTIMATION USING CONE BEAM COMPUTED TOMOGRAPHY- A RETROSPECTIVE STUDY

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Abstract

BACKGROUND: The science of dentistry when related to the law is known as forensic dentistry or forensic odontology. The theory behind forensic dentistry is that "no two mouths are alike. It is widely used in both medical and dental fields of multiple sectors where scientific studies coincide. Age estimation plays an important role in Forensic Dentistry for identification of dead as well as alive persons to clarify criminal and civil liability issues. AIM AND OBJECTIVES: To analyse the volumetric data of canine and first molars in cone beam CT for estimating age among samples of various age groups and to compare between those values to evaluate which tooth indexed volumetric data gives more specificity in age estimation. METHODOLOGY: In this study, Cone beam CT images of 90 patients were collected from archives of department of oral medicine and radiology. This study uses CBCT images of patient aged between 20-65 years of age which was divided into 3 groups from [20-35], [36-50], [51-65] and 30 samples were collected from each group. From each patient 2 volumetric data's [canine and first molars] were obtained by using ITK-SNAP software. The obtained 180 volumetric data were statistically analysed by discriminant analysis to obtain which tooth indexed volumetric data gives more specificity in estimating age among individuals. Conclusion: Forensic studies based on the volumetric data remains with the highest sensitivity and specificity in the literature. The results of this study could aid in ahe estimation of unknown individuals with more accuracy.

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COMPARATIVE ANALYSIS OF THE FRONTAL AND MAXILLARY SINUS INDICES FOR SEX DETERMINATION - A PILOT STUDY

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Abstract

Background: Sexual dimorphism in forensic anthropology is studied with higher accuracy using mainly the pelvis and cranium and other postcranial bones. But in forensic scenarios when standard skeletal remains are not available or fragmented, unconventional means for sex determination are used. Frontal and maxillary sinus indices are one of them. Aim: Here we evaluated and compared the frontal and maxillary sinus indices on lateral cephalograms for sexual dimorphism. Methods: The two metric variables i.e., height and width of both sinuses were used on lateral cephalograms by tracing based on these variables frontal and maxillary indices were calculated. On the collected data discriminant function analysis was used to make the sex discriminating population specific functions which helped in sex estimation in unknown crania. Result: It is found after the comparative analysis that; Frontal Sinus Index is more effective in terms of accuracy and reliability for studying sexual dimorphism. Conclusion: Thus, we were able to analyze and compare the applicability of both indices in actual forensic cases involving unknown skeletal remains for sex determination.

Keywords: Lateral Cephalograms; Forensic radiology; Maxillary sinus; Frontal Sinus; discriminant function analysis; Unknown crania.

Registration Number - IAFO/2022/568

ASSESSMENT OF PALATAL RUGAE PATTERN TO COMPARE WITH GENDER IDENTIFICATION IN ANDHRA PRADESH POPULATION: AN INSTITUTIONAL STUDY

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Abstract

Introduction: Forensic odontology is a very important tool in racial profiling of the Indian population which can be done by analyzing intra oral structures such as teeth and soft tissue i.e palatal rugae. Palatal rugae are anatomically soft tissue folding which are transverse, irregular, asymmetrical, bilaterally present posterior to incisive papilla. The study of palatal rugae is called as Rugoscopy or palatal Rugoscopy. These rugae play a very important role in forensic odontology because these are the one of the identical factors for gender identification. Methodology: Sample size: 40. Impression making was done by alginate impression material. Impression was washed with water. Kalstone class III green color (Kalabhai, India) was mixed and poured on the impression. After setting of stone dental cast was obtained .The rugae was delineated using 3B HB graphite pencil markings. The rugae will be recorded based on Kapali et al., in 1997. Results: Straight, Curved, Convergent shaped rugae are more in males whereas wavy, Circular, Divergent shaped rugae are more in females. Conlcusion: Paltal rugaosacopy is one of the practical methods of human identification in the descend or missing person. The palate represents a suitable landmark for unique and identifying features with additional benefit of survival in most postmortem events that can disrupt or change other body parts. Key words: Forensic odontology, Palatal rugae, Rugoscopy, palatal Rugoscopy.

Registration Number - IAFO/2022/099

AGNIPARIKSHA: EFFECT OF TEMPERATURE ON RESTORATIVE MATERIALS

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Abstract

Background: Dental identification remains reliable and consistent mode for establishing identity in charred bodies during fire accidents. The uniqueness of dentition used for identity establishment involves factors like number of teeth present, their alignment, teeth missing, carious involvement and type of restoration. Dental restorative materials though stable to thermal changes of oral cavity will be affected by extreme temperatures during these accidents. Present study aims to evaluate changes in physical properties and their radiological expression of the routine restorative and prosthetic material when subjected to extreme temperatures. The results of the study will help and guide forensic odontologists to establish identity of charred bodies due to extreme temperature. Materials and methods: The study will be conducted on 12 extracted teeth which are divided into six groups of 2 teeth each as follows: group 1teeth restored with class I silver amalgam restoration, group 2 class I glass ionomer cement restoration, Group 3 flowable composite restoration, group 4 class I packable composite restoration, group 5all-ceramic crowns and group 6 pit and fissure sealant. All teeth will be subjected to extreme temperature changes. Changes in the physical characteristics and radiographic appearance will be noted. Changes occurring will be tabulated and compared.

Registration Number - IAFO/2022/343

DENTAL AGING IN ADULTS - AN OVERVIEW

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Abstract

Age estimation is one of the important factor in human identification. Teeth presented with features such as hardness and resilience to external factors such as chemicals, putrefaction, and fire explosions serve as a valuable source in age estimation. Obviously, they present with peculiar and comparable features of age associated regressive changes along with dental procedures, which make them a mirror reflection of age changes from birth to the grave of an individual. Age estimation in adults poses an enigma to the forensic dentists because as the age advances, the dentitions get influenced by numerous exogenous and endogenous factors which may lead to discrepancies between dental age and chronologic age. Since 1950, many authors have presented various methods for assessing age of individuals above 18 years. Here is an overview of the different methods with their application and limitations along with a mention of newer methods developed and tested with the formulation of population specific formulas by Indian authors.

Registration Number - IAFO/2022/042

TONGUE PRINT: A UNIQUE BIOMETRIC AND POTENTIAL FORENSIC TOOL

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Abstract

Forensic odontology is a branch of forensic sciences that uses the skill of a dentist in personal identification during mass calamities, sexual assault, child abuse etc. The tongue is a crucial organ very much encased inside the oral cavity and shielded from external environment. It is a unique structure that presents both geometric shape as well as physiological texture information that may be potentially useful in identity verification. The shape, colour and texture of tongue are different even in identical twins and hence it can be used as a new method for personal identification with further elaboration. The exposed portion of tongue contains information with visible differences from one individual to another therefore it is helpful in identification of suspect during forensic investigation. Tongue becomes the forensic evidence for establishing the cause of death. It is an evolving science in the field of forensic and there is greater scope for its further development. This paper is aimed at describing the distinctive features of tongue, application of tongue prints in personal identification in forensic dentistry.

Registration Number - IAFO/2022/041

SELFIE – AN INSTRUMENTAL SLICE OF IDENTIFICATION IN FORENSIC SCIENCE

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Abstract

The cornerstone of the dental identification process is understood through the comparison of ante-mortem and post-mortem data. Photographs, particularly non-clinical ones like selfies, are not regarded as such, despite the fact that dental charts and radiographs are frequently utilised as ante-mortem dental evidence. As a result, the use of photos to identify the deceased is rarely evaluated. In the absence of dental documentation, photographs of the smile play an important role in this comparison. In cases where there are no dental records, these images can serve as an alternative ante-mortem (AM) dental source, providing the forensic odontologist with a valuable opportunity for comparative dental analysis. In the comparison of AM and PM data, features such as diastema, rotated or incorrectly positioned teeth, lip anomalies, recognisable fixed prosthetics, dental crown discolorations, and dental or cutis piercing could be strong identifiers. This procedure is quick and has the added benefit of enabling extra oral dental inspection. This review encases some evidences of the usage of selfies in the identification of unknown identities, in addition to the brief discussion about this unusual methodology of human identification.

Registration Number - IAFO/2022/054

EXFOLIATIVE CYTOLOGY FOR AGE ESTIMATION IN FORENSIC ODONTOLOGY

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Abstract

Forensic age estimation requires expertise in forensics which aims to define in the most accurate way the chronological age of the person involved in judicial or legal proceedings. Age and sex determination of the individual person is very important in a crime investigation because the age of a person and sex of the individual can guide the investigators to correctly identify the large no of matches. But with the present available methods, it is difficult to estimate the age of the individual within a short period of time. Moreover, age estimation in children and adolescents is possible with various methods but in older' determination of exact age is difficult. So an alternative and unique method that can be used for quick age estimation is "Exfoliative cytology", as the oral cavity is an ideal site for the manifestations of aging which continuously undergoes changes due to its rapid turnover and it is also an easily accessible site. Exfoliative cytology is a painless, noninvasive method, usually used for screening oral premalignant and malignant lesions. But recently it is used for age estimation by the introduction of a quantitative method such as image analysis systems, especially in the assessment of cytomorphometric cellular alterations. This Paper reviews various parameters used in exfoliative cytology for age determination.

ORTHODONTIC TWO-DIMENSIONAL AND THREE-DIMENSIONAL FRONTAL SINUS IMAGING RECORDS: AN IMPORTANT ROLE IN HUMAN IDENTIFICATION

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Abstract:

Two-dimensional records are part of Orthodontic clinic routine; frontal sinus images are often present in these exams. Cone-beam computed tomography is an important diagnostic tool, more frequently used in orthodontics, which allows a three-dimensional approach and great precision in measurements. Both are of great value for human identification. Frontal sinuses are bilateral structures and like finger prints, they are unique in each individual. Due to their resistance to damage, they are very useful for human identification. The descriptors used were "forensic dentistry", "frontal sinus", "orthodontics", and "human identification". Initially, the search for descriptors was carried out individually and later crossings were made between them. Although three-dimensional analysis is not yet routine, its forensic use is undoubtedly an excellent tool provided by new technologies. It is important that the orthodontist knows this possibility by properly keeping the patients imaging.

Keywords: Forensic dentistry; Orthodontics; Three-dimensional imaging; Cone-beam computed tomography; frontal sinus; Forensic sciences.

Registration Number - IAFO/2022/059

WONDERS OF CONE BEAM COMPUTED TOMOGRAPHY IN FORENSIC DENTISTRY

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Abstract

Cone-beam computed tomography is a relatively new, advanced imaging modality which has applications in many fields of dentistry. It has special role in forensic dentistry as anatomy can be better demonstrated using 3-D imaging and hence, these serve as a valuable adjuvant in resolving medico-legal cases by aiding in the identification of the unidentified corpses. Moreover, CBCT allows obtainment of retrograde records which helps in antemortem and postmortem comparisons.It also provides a noninvasive alternative for age estimation which is an important facet of forensic dentistry. Age estimation can be done by measuring coronal tooth to pulp ratio and by assessing ossification of spheno-occipital synchondrosis. Sexual dimorphism serves as a unique feature and has always been an inherent part in cadaver identification of an unknown individual. Mandibular, foramen magnum, orbital, frontal and maxillary sinus and mastoid process measurements can be done by CBCT for gender determination. Nasal septum patterns and implant backtracking can lead to personal identification. Thus, CBCT is a powerful emerging tool serving as a right hand for forensic odontologists for identification of corpses and in medicolegal cases and it will definitely become a norm in forensic dentistry.

CURRENT TRENDS IN FORENSIC ODONTOLOGY: A REVIEW

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Abstract

Every human being has unique identity in life. Forensic odontology is an emerging branch of science which has a greatest scope of development. The most challenging feature of forensic dentistry includes the identification of dental remains, recovery, and analysis of evidence which match with the suspects. It has been established as an irreplaceable science in medico-legal matters and in the recognition of the deceased individuals. The dental tissues are often preserved even if the deceased person is skeletonized, decomposed, burnt, or dismembered. Various methods have been developed to determine age, sex, and ethnicity of the person, using dental tissues. Data collection methods and supplementary technologies used in forensic dental identification have undergone significant transformation. Forensic odontologists utilize the knowledge of dentistry in bite mark analysis, fixation of identity in mass disasters, and age estimation. Thus, the duty and responsibility of forensic odontologists has increased in recent years. Therefore, practicing dentists and dental students should be made aware of the available newer technologies and its use in forensic dentistry. This article provides an overview of the evolving trends in conventional methods, and the recent concepts used in forensic odontology.

Registration Number - IAFO/2022/244

DOG BITE MARKS ANALYSIS: ACKNOWLEDGE THE DEADLIEST ANIMAL

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Abstract

Annually, there are over 20,000 human deaths in India from rabies caused by dog bites. Under animal attacks category, statistics say that dog bites are causing leading deaths around the world which is second to mosquito bites followed by cat and rodent bites. Often in the newspapers, children and old aged individuals are showed to be fallen victims for the dog attacks. Interpretation of the dog bite marks on the victim body at the earliest phase would prevent rabies infection in individuals. In few of the forensic case reports, incidences of multiple dogs attacking a helpless human being were reported. Thus, knowing about the dog bite marks would help in solving the rare cases in forensic odontology. In this present study, dog bite marks of random 10 pet dogs would be analyzed prior to a questionnaire program conducted to the pet dog owners. After their acceptance of participation, dog owners are guided to take bite impression of their dog's teeth on rolex modeling wax; tracing papers are used to collect the imprints of incisal and cuspal tips of dog bite marks which are obtained from study models. Photographs, measuring scale, sand papers, saw blade, lead pencil and two needle compass will be used to measure the dog bite marks. A comparative study between random 10 human bite marks and random 10 dog bite marks analysis will be made. Finally, the importance of dog bite marks analysis in forensic odontology will also be evaluated.

Keywords: Dog bite, Rabies, Bite marks, mortality and Forensic odontology.

Registration Number - IAFO/2022/155

STANDARD PROCEDURES FOR COLLECTION AND PRESERVATION OF FORENSIC DENTAL EVIDENCE FROM A CRIME SCENE

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Abstract

Introduction: This article focuses on the importance and standard procedures for the collection and preservation of forensic dental evidence from a crime scene. Forensic dental evidence that are often found at crime scenes include saliva, lip prints, bite marks, dental hard tissues and dental prostheses. These dental evidences are of high evidentiary value as they can aid in age estimation, sex determination, and human identification. The standard methods for collecting and preserving each dental evidence is described in detail so as to serve as a guide or manual for easy reference and convenience to forensic odontologists and first responders to a crime scene. Improper and unprofessional handling can lead to contamination or destruction of the evidence, which would make it difficult to be analyzed for further investigations. Conclusion: Proper collection, handling, and preservation of dental evidences from a crime scene is required in order to prevent decontamination, destruction or loss of evidence and to present in the court of law for the delivery of justice.

Keywords: Forensic dental evidence, Evidence collection, Evidence preservation, Crime scene.

Registration Number - IAFO/2022/225

BITE MARK CHARACTERISTICS IN A DEAD VICTIM, HELPS TO NAB THE CULPRIT- REPORT OF A CASE

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Abstract

Bite mark is a mark caused by the teeth both alone or in combination with other mouth parts and are considered to be an expression of dominance, rage and animalistic behaviour. They constitute the physical evidence in cases of sexual assault, child abuse, murder and violence. Bite mark evidences are accepted in court of laws and can be a major factor leading to conviction and criminal prosecutions. A victim of an attempted temple robbery while being autopsied, the police surgeon noticed a single bite mark on the body. The skin which bore the bite marks was excised along with subcutaneous tissues and preserved in formalin. The police who remained clueless about the assailants for a long time finally rounded up three men based on circumstantial evidence and were bought to the Oral Pathology department of Government Dental College, Alleppey along with the preserved skin carrying the unidentified bite marks. A case is presented in which bite mark characteristics were used posthumously to nab the culprits and bring them to book resulting in a full proof conviction.

Registration Number - IAFO/2022/548

PIVOTAL ROLE OF SECOND-TO-FOURTH DIGIT RATIO (2D:4D) AND MANDIBULAR CANINE INDEX IN GENDER DETERMINATION

Dr. Humayun K Maner, Dr. Poonam Zanwar, Dr. Priyanka Pachpande

Abstract

Introduction: Teeth are special in cases of identification of deceased since they can resist the effect of time, are resistant to trauma and can also provide information on species, race, gender, age, height, and individual characteristics. Gender determination is a challenge for forensic experts during mass disasters. Mandibular canines can be used for gender determination in such situations. Similarly, second-to-fourth digit ratio (2D:4D) are sexually dimorphic and differ in both the genders. Mandibular canine index (MCI) and 2D:4D may be considered quick, easy, and reproducible methods for determining the gender of an individual. Aim: This study aimed to determine and correlate the combined role of Mandibular canine index (MCI) and second-to-fourth digit ratio (2D:4D) in denoting gender identity. Materials and Method: The present study will be comprised of 104 dental students of the institution. The subjects will be of Maharashtrian origin, aged 18–25 years, with specific inclusion and exclusion criteria. Plaster models of mandibular dental arch of each subject will be obtained from alginate impressions. The measurements will be done using a Vernier calliper and a ruler. MCI and 2D:4D will be calculated using their specific formulae as follows. MCI will be calculated using the formula = MCI=mesiodistal crown width of mandibular canine/intercanine distance (ICD). The calculated values of MCI and 2D:4D will subjected to statistical analysis. Results will be analysed and evaluated statistically.

Registration Number - IAFO/2022/507

SALIVA'S VALIDATION AS A DIAGNOSTIC TOOL FOR ABO BLOOD GROUPING

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Abstract

Aim: To evaluate the accuracy of ABO blood group determination salivary samples. Introduction: Blood grouping serves a variety of purposes and is an important aspect of standard medical examinations. Every person has a distinct blood group. Antigens from blood groups A, B, O are found to be present on the cell surfaces of red blood cells. Apart from blood, these substances are also found in other body fluids including saliva. Despite the fact that anti-A and anti-B hemagglutinins in saliva were studied in 1928, they were not used as proof in medico-legal proceedings due to the lack of techniques available at that time. Many studies have proven up to 100 percent accuracy in diagnosing ABO blood group from saliva in the last few years. Materials and methods: Blood grouping performed on the salivary samples obtained from the 24 subjects using the absorption-inhibition technique. This was then compared with the results obtained using extraction socket blood and evaluated. Results: The present study showed a 100% positive correlation for ABO blood grouping, between the salivary samples and the extraction socket blood. Conclusion: The outcome of the present study showed that saliva can be used as an aid in forensics for identification of ABO blood grouping of an individual. Further studies with larger study sample needed to confirm its accuracy.

GENDER DETERMINATION IN FORENSIC ODONTOLOGY- A REVIEW OF VARIOUS METHODS

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Abstract

Forensic odontology is the investigative part of dentistry that applies dental principles to legal issues that analyses dental evidence for human identification. Gender determination is an important part of forensic odontology especially when the information relating to the deceased is unavailable. The various methods used for gender determination in forensic odontology were broadly categorized into morphological and molecular analysis. Morphological analysis can be done on hard and soft tissues of oral and paraoral region by considering from size of the tooth to tooth size to lip prints, rugae pattern and tongue prints. Molecular analysis in gender determination is done by using barr bodies, f bodies, gender determining from the enamel protein amelogenin gene. The compilation and critical readings are necessary to understand the role of forensic odontology expert with regard to gender determination using dental records. Therefore the aim of the present review is to elicit the various methods used for gender determination and their significance in forensic odontology.

Keywords: Forensic odontology, Gender Determination, Investigations.

Registration Number - IAFO/2022/120

ESTIMATION OF POST MORTEM INTERVAL USING DENTAL TISSUES: A SYSTEMATIC REVIEW

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Abstract

Forensic odontology is defined, as that branch of forensic medicine which in the interest of justice deals with the proper handling and examination of dental evidence and with the proper evaluation and presentation of the dental findings. The post-mortem interval (PMI) aka time since death (TSD) is defined as the interval between death and time of examination of body or corpse discovery. The various dental tissues like dental pulp, dentin, periodontal ligament (PDL) and mitochondrial/nuclear DNA have been used in estimation of PMI. This article is a review of articles related to the estimation of the PMI using dental tissues. One study characterized the histomorphological changes in tooth pulp to assess post-mortem interval. Differences were also studied in morphological age-related changes between fresh extracted teeth and teeth from human skeletal remains in order to develop appropriate dental age estimation methods according to the time after death. DNA profiling was also done from teeth at various stages of decomposition. Most of the studies came across during the review were centered on PMI estimation through pulp tissue, although the review showed that the estimation of PMI is possible using various other structures of the tooth.

HUNTER–SCHREGER BANDS - AUTOMATED BIOMETRICS-BASED PERSONAL IDENTIFICATION – A REVIEW

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Abstract

Biometric-based identification and verification methodologies such as fingerprint verification, iris scanning and facial recognition have been steadily improved and refined in automated systems and softwares. The use of automated biometrics-based personal identification systems is a ubiquitous procedure in present times. These identification methods commonly fail or have certain limitations and may not be efficient when bodies are decomposed, burned, or in cases when only small fragments of calcified tissues are left. DNA testing is an example that has revolutionized human identification in forensic science. This method, however, is relatively expensive and time consuming, and the results take some time to generate. Dental enamel is the most mineralized tissue of organisms and resists post-mortem degradation. It is characterized by layers of prisms of regularly alternating directions, known as Hunter–Schreger bands (HSB). HSB appear as dark and light bands under low powered light microscopy and this phenomenon occurs because enamel prisms function like optic fibres when exposed to a directed source of light. When observed from outside, the dark and light lines of HSB in dental enamel closely resemble a fingerprint. This paper aims to review the use of HSB as a biometric-based parameter for personal identification in automated systems.

Keywords: forensic science; Hunter–Schreger bands; dental enamel.

Registration Number - IAFO/2022/469

NEONATAL LINES FOR CORRABORATING THE BYGONE AGE -A REVIEW

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Abstract

Dental development data are good predictors of age as they follow a very precise rhythmic pattern, particularly before and after birth .The physiological alteration in the cellular activity of ameloblasts at birth results in the formation of an accentuated incremental line known as the neonatal line. The sudden change from intrauterine to the extrauterine environment results in physiological stress, this, in turn, alters the dimension, direction, and degree of mineralization of the enamel prisms forming an optical phenomenon called the neonatal lines, separating the pre and post-natal enamel. The presence of neonatal line, provides a vital evidence, about the period of separate existence. This paper thus aims to review the employment of neonatal lines as a standalone substancial tool in forensic odontology.

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FORENSIC FACIAL RECONSTRUCTION – THE FINAL FRONTIER

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Abstract

Amalgamation of artistry with forensic science, osteology, anatomy and anthropology to recreate the face of an individual from its skeletal remains is known as Forensic Facial reconstruction. The first facial reconstruction was done by a German anatomist Wilheim His in 1895. It is a method used in the field of forensic science to reproduce the likeness of an individual from skeletal remains, primarily used in cases of missing or unidentified persons. This method is used in the identification of an individual where the conventional methods of identification are unsuccessful. There are several techniques of doing facial reconstruction, which vary from two dimensional drawings to three dimensional clay models. Over the past 25 years, many computer based systems have been developed, and with the recent rapid advances in medical imaging and computer technology, the current systems claim high levels of efficiency, objectivity, and flexibility. This presentation reviews the various methods and significance of facial reconstruction in forensic odontology.

Registration Number - IAFO/2022/226

BITE MARKS IN A SEXUAL ASSAULT VICTIM EXPOSES THE CULPRIT AT FAULT – A CASE REPORT

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Abstract

Human bite mark analysis is one of the most demanding and intricate part of forensic dentistry. With an increase in criminal cases, identifying a perpetrator apart from finger print and DNA, the use of human bite marks had become a unique registered trade mark in forensic odontology for truly nailing the culprits, for criminal justice. By matching bite marks found at the scene of a crime or on a victim's body with the dental impressions of suspects the perpetrator of a crime can be identified with a reasonable degree of accuracy. A 60 year old lady has brought to GDC Trivandrum along with assailant by the police. In an attempt to subdue her to this act the accused had bitten the victim on her arms. The suspect who declined all the allegations and proved innocent during court hearing, later convicted based on the dental evidence that he left on the poor and unfortunate victim. This case highlights importance of human bite mark evaluation, which was only base evidence for connecting assailant and victim of this crime.

Registration Number - IAFO/2022/260

CURRENT SCENARIO AND EMERGING FUTURE OF FORENSIC ODONTOLOGY

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Abstract

Forensic odontology is a challenging and fascinating branch of forensic science. Forensic odontology is an evolving science and has great scope of development. Forensic application of science and technology for the detection and investigation of crime and administration of justice is not new to us. Forensic odontology has been defined by the Federation Dentaire Internationale (FDI) as a branch of dentistry that deals with the proper handling and examination of dental evidence and with proper evaluation and preservation of dental findings. The human body becomes disfigured to a great extent in case of burns, accident and mass disasters like earthquake, in which identification of the individual becomes a challenge. However, dental remains can be used for identification as using them is cost effective, reliable and fast. Forensic odontology utilizes the knowledge and skills of dentist in personal identification during mass calamities, sexual assault, child abuse, bite mark analysis and age estimation. Recent advances in the field of genetics and molecular biology have contributed to the rapid growth of forensic odontology. Dental identification is an excellent method, as teeth are very stable over time, being resilient to high temperature, trauma, and variation in humidity and pressure. This paper will represent the importance of forensic odontology in identification of human dental remains and crime investigation and, emerging future of forensic odontology.

Registration Number - IAFO/2022/025

HUMAN SALIVA AS A DIAGNOSTIC MEASURE IN FORENSIC ODONTOLOGY

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Abstract

Saliva is a complex body fluid, which is emerging as a popular source of forensic evidence. It is the medium of choice among all body fluids in forensic and criminal investigations due to ease of availability and noninvasive cost effective collection methods. They act as a source of valuable deoxyribonucleic acid (DNA) samples. This, along with its ease of collection and handling, has increased its popularity as a forensic tool for crime detection, in cases of poisoning, animal bites, drug and alcohol abuse, and hormone identification. Analysis of saliva for serological testing and cellular content has proved to be of wide use in forensic cases. This review is aimed at highlighting the many uses of saliva in the practice of forensic odontology.

Registration Number - IAFO/2022/026

RECENT ADVANCES IN FORENSIC ODONTOLOGY- AN OVERVIEW

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Abstract

Every human being has unique identity in life. Forensic odontology is an emerging branch of science which has a greatest scope of development. The most challenging feature of forensic dentistry includes the identification of dental remains, recovery, and analysis of evidence which match with the suspects. An objective comparison using recent technology would strengthen the validity of evidence in forensic dentistry. It has been established as an irreplaceable science in medicolegal matters and in the recognition of the deceased individuals. The forensic odontologist makes use of the knowledge of dentistry in bite mark analysis, fixation of identity in mass disaster, age determination, domestic violence, and child abuse cases. Therefore, the duty and responsibility of forensic odontologist have enhanced in recent times in various medicolegal cases. This paper provides an overview of the trends that are evolving in recent times which are used in the field of forensic odontology.

Registration Number - IAFO/2022/053

RECENT ADVANCES IN FORENSIC ODONTOLOGY FOR ACCURATE IDENTIFICATION

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Abstract

Forensic odontology is concerned with the management, examination, evaluation, and presentation of dental evidence in criminal or civil proceedings, in the interest of justice. Forensic odontology plays a crucial role in circumstances where habitual methods of identification, such as fingerprinting and visual recognition, cannot be performed, in cases of decomposed, charred or skeletonized bodies. Other than the conventional methods such as dental record maintenance, dental imaging techniques, bite-mark analysis, various advancements in technology and computer based techniques such as DNA analysis, Facial reconstruction, Denture identification, tongue prints, comparison microscope, rugoscopy and palatoscopy have increased the accuracy and validity in the field of forensic dentistry. This paper will provide an overview of the evolving trends in the recent concepts used in forensic odontology.

Registration Number - IAFO/2022/222

"CONTROVERSIES REGARDING BITE MARK EVIDENCES: THROWING SOME LIGHT ON THE BITE"

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Abstract

Forensic odontology mainly includes identification of human remains, age estimation as well as bite mark evidences. Bite mark evidence is the process by which forensic odontologists attempt to match marks found at crime scenes with the dental impressions of suspects. Even though bite marks have been widely used for human identification to solve many medico legal cases, of late there have been many controversies in opinion concerning bite mark evidences. This is due to the fact that many earlier solved criminal investigations using bite mark evidences have later proved to be wrong which have led to many innocent people being imprisoned for no fault. This has resulted in intense scientific and legal scrutiny. The rise & impending fall of bite mark evidences point towards lack of scientific foundation, recording ability of skin, reliability & validity, but most importantly, the unfortunate but common belief that bite mark analysis is the same as bite mark comparison. Hence this review paper highlights the limitations and growing controversies regarding bite mark evidence as a tool of forensic odontology and also the other alternatives to bite marks that could be used.

SELF-INFLICTED BITE MARKS FOR LEVELLING AN ALLEGATION IN A CASE OF FICTITIOUS SEXUAL OFFENSE-REPORT OF A CASE

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Abstract

Bite mark analysis has been used by forensic odontologists on human skin to link it with an individual's teeth in case of murder, child abuse or sexual assault. This is based on the assumption that human teeth are unique and that skin can accurately record their impressions. Arms and hands are common sites for bite injuries in assaults and self-inflicted injuries. A 16 year old female was brought to department of Forensic odontology, GDC, Trivandrum along with three young men aged between 17 and 21 by the police. The girl had accused the men of abduction and gang rape after taking her to a haunted house, where they injected some drug into her arm. There were no eye witnesses to the incident and on examination a bitemark was present on the victim's arm. The standard medico –legal procedure was followed and in the end there was a major twist when the bite mark analysis and odontological examination of the victim conducted by the authors detected a self-inflicted bite mark that was presumed to be inflicted by one of the accused.

Registration Number - IAFO/2022/223

"POISONING AND ITS ORAL MANIFESTATIONS – BROADENING THE ORAL HORIZON WITH REGARD TO POISON"

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Abstract

Poisoning is the third most common causative factor for death following vehicle accidents and fire. Suicide attempts by consuming poisonous substances and murder attempts by delivering poisonous drugs have skyrocketed around the globe as these are one of the most instant and accessible methods. Accidental poisoning has also led to significant mortality and morbidity worldwide. Oral ingestion is the most common mode of poison exposure. As the oral cavity is the initial area to come into contact with these drugs, there are many specific clinical changes that become evident orally corresponding to the poisonous substance that has been consumed. Hence these changes, especially after a death can play a vital role in determining the cause of death and solve many criminal cases thereby making the medico legal proceedings associated with it much easier. Therefore from a dentist's point of view, it is imperative to immediately observe these oral changes corresponding to the substance that is ingested. This review paper highlights the major oral manifestations associated with the most common chemicals consumed that would help the forensic investigation team to lead to the final forensic diagnosis.

DENTAL IMPLANTS: ROLE IN FORENSIC IDENTIFICATION

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Abstract

Dental identification plays an important role in natural and man-made disaster situations and particular in the mass casualties associated with aviation disaster. Dental implants due to the physical properties of high corrosion resistance. High structural strength and high melting points, suggested to be retained intact even after following most physical assaults, these implants are most widely used in the most fields of developing dentistry. Hence they become a part and in some cases they become at most Informative about the victim. The wide use of implants for replacing of missing either fixed crowns or removable partial or complete dentures are common these days, and the designs of the implants are different for each individuals and are different according to different manufacturers. When an unidentified body is focused with one (or) more implants in jaws, clues can be generated from the type of implant retained in victim's body for investigation. The recent advancements like implant recognition software, radiographic recognition of dental implants and assessment of batch number, helps the forensic odontologist in identifying and comparing both victim's ante mortem and post-mortem reports.

Registration Number - IAFO/2022/206

ARTIFICIAL INTELLIGENCE: AN ODYSSEY IN FORENSIC ODONTOLOGY

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Abstract

Forensic odontology involves the examination, evaluation, management, and presentation of dental evidence in criminal or civil proceedings, all in the interest of justice. It is a vital part of forensic science that plays a fundamental role in the identification of individuals, alive or dead. Digital forensics has effectively and reliably replaced traditional forensic investigations in terms of acquiring, analyzing, and reporting evidence. Recently other dental exhibits, such as bite marks, chewing gum, dental prosthesis, restorations, and saliva stains have been used to answer difficult questions which often arise during investigations of serious or violent crimes. Electronic globalization with such a gigantic technological advancement during last few decades has made a huge impact on our everyday life. Globally, an advance of field of technology that is rapidly growing is Artificial intelligence (AI). It is a breakthrough in digital science and deals with several complex difficulties that currently exist. Thus, the purpose of this paper is to attempt at having an overview of the application of AI in forensic odontology.

Keywords: Artificial intelligence, Forensic odontology, Forensic science, Digitization

FORENSIC PHOTOGRAPHY IN BITE MARK ANALYSIS

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Abstract

Forensic photography is the art of producing an accurate reproduction of the scene of a crime or accident to aid in investigation and presentation of evidence during legal process. In most crimes where bite marks are discovered, taking photographs of the bite marks is the universal method to document and preserve evidence. So photographic accuracy is crucial to the investigative process since in many instances, bite marks may be the only evidence linking the particular suspect to the crime. Conventional visible light photography creates images of injuries as they appear at the time the photographs are taken and as seen by the unassisted eye. For documenting evidence under challenging situations, a variety of specialized techniques can be used to gain results that could not be obtained by photographing in the visible light spectrum. Ultraviolet photography captures the details of the damaged surface of the skin, while infrared photography captures the tissue injury at the deeper levels of the dermis and below. Alternate light imaging photography will record the difference between the uninjured skin adjacent to the injured skin using fluorescence. This paper discusses about different light sources and its use in different situations of bite marks photography.

CHEILOSCOPY - A REVIEW

Anza NS[1]

Abstract

Identification of an individual from human remnants is a challenging task for the forensic experts in accidents, mass disasters, suicides, in crimes etc, like fingerprints, DNA profiling and dental records, lip prints can also be used as an additional tool in   personal identification due to the uniqueness of the lip print pattern. The arrangement of furrows and wrinkles in the red part of lips is called sulci labiorum which is unique for each individual .These lip prints have seen to recover after trauma, infections ,inflammations and remain similar throughout the life time of an individual. Lip prints on the crime site will be either visible or latent. Identifying and recording these lip prints is challenging. Here in this review I will be discussing on various patterns of lip prints and different methods of recording of lip prints

Keywords: Cheiloscopy, Lip prints, Sulci labiorum

FORENSIC IDENTIFICATIONS TO PROVE CRIME AGAINST GIRL CHILD – INFANTICIDE

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Abstract

Forensic dentistry is the legal field of dentistry which analyses dental evidence in the interest of justice. Female infanticide is a widespread social problem in India. Majority of the cases of infanticide goes unreported, as there is a lack of proper evidence. Infanticide is defined as the killing of a child under the age of 1 year and the term neonaticide is used when the child is killed within 24 h of birth. Female infanticide is the intentional killing of baby girls due to the deep-rooted patriarchal customs. Neonatal line is a valuable tool to prove female infanticide. The various stages of growth, during the development of the dentition, follow a very precise pattern, particularly before and after birth. The sudden change from intrauterine to the extrauterine environment results in physiological stress, this, in turn, alters the dimension, direction, and degree of mineralization of the enamel prisms. The neonatal line is an optical phenomenon produced due to these alterations. The neonatal line separates prenatal enamel from postnatal enamel and also represent the rest enamel formed after birth. This review paper aims to discuss the forensic aspect of dental evidences to prove crime against girl child.

Registration Number - IAFO/2022/328

CHILD ABUSE AND NEGLECT - RECOGNIZE AND INTERVENE!

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Abstract

The World Health Organization (WHO) defines child maltreatment as "all forms of physical and emotional ill-treatment, sexual abuse, neglect, and exploitation that results in actual or potential harm to the child's health, development or dignity." All races, ethnicities, and socioeconomic groups are affected by child abuse with boys and adolescents more commonly affected. Infants tend to have increased morbidity and mortality with physical abuse. Multiple factors increase a child's risk of abuse. These include risks at an individual level (child's disability, unmarried mother, maternal smoking or parent's depression); risks at a familial level (domestic violence at home, more than two siblings at home); risks at a community level (lack of recreational facilities); and societal factors (poverty). A significant amount of child abuse cases are frequently missed by healthcare providers. For the diagnosis of child abuse to be made, there needs to be a high index of suspicion. Protecting children from abuse and neglect is a community responsibility. Most adults want to help, but are unsure of how to get involved. Remember to follow the three Rs – Recognize, Respond and Refer. This review focuses on signs, presentation, and diagnosis of child abuse and highlights the role of the interprofessional team in its management and prevention.

BITE MARKS IN CRIME SCENE

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Abstract

Teeth can be used as a weapon when an individual tries to harm another or it can be used by the victim attempts to protect themselves from an attacker. Bites have been found in cases of homicide, attempted suicide, sexual assault, and child abuse. Mac Donald in 1974 described bite mark as 'a mark caused by the teeth either alone or together with other mouthparts. Bite marks with high evidentiary value that can be used in comparisons with the suspects' teeth will include marks from specific teeth that accurately record distinct traits. Each person has a unique dental arrangement and that these unique features are sufficiently replicated in a bite mark to identify an individual to the exclusion of all others. Before examination, it is pertinent to separate the dental uniqueness used in dental identifications from the uniqueness of human bite marks. Such characteristics include fractures, rotations, attritional wear, malformations, etc. When these are recorded in the injury it may be possible to compare them to identify the specific teeth that caused the injury. So, it's important to address the forensic aspects of bite marks evidence from the crime scene.

Registration Number - IAFO/2022/100

PROSTHESIS LABELLING USING QR CODE: A SIMPLIFIED TECHNIQUE

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Abstract

Personal identification is inevitable in case of an accident, loss of memory, state of unconsciousness, and in hospitals. Dental identification serves as a primary means for the identification of victims when other means fail. The contribution of prosthodontics to forensic odontology is highly significant since the invention of denture labelling techniques. Labelled dentures can remarkably help identify the dead after disasters and accidents. Denture identification procedures have multiple benefits for denture wearers. These include the prevention of losing or misplacing dentures. In many cases of disaster where identifying the individual becomes difficult due to burns or severe destruction of the face, some denture materials survive, especially the posterior part of acrylic dentures and metal-based dentures. Thus, marked dental prostheses (full and partial dentures, mouthguards) would lead to rapid identification in such events. It can be also useful for elderly individuals who face problems like Alzheimer's and poor memory. This case series highlights an alternative technique of denture identification wherein a quick response code (QR code) is incorporated into the processed denture.

AN UNCUSTOMARY WAY OF SEX DETERMINATION UNFOLDED BY CBCT

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Abstract

Sex determination is a subdivision of forensic odontology that plays an indispensable role in human identification for the reconstruction of the biological profile of an unknown individual. The pelvis and skull are most commonly used for establishing sexual dimorphism. Most skeletal measures are based on general differences in size and structure. But the general size characterizations might not always yield accurate results as there are physiological, age-related, and dentition-associated changes. So, there is a need to use methods that are less age-dependent and give more consistent results if repeated over time. The mental and mandibular foramina have been used as a point of reference in morphometric analyses of the mandible, by virtue of its stable relation with the base of this bone. As the relative location of the channel associated with foramina of the lower jaw in adult's remains relatively constant with increasing age or sex, the lower alveolar channel and its foramina in adults can be used to estimate sexual dimorphism and age. In this review, we will be discussing the scope of using IAN for sexual dimorphism.

Keywords: Sex Determination, Gender Identity, CBCT, Inferior Alveolar Canal.

Registration Number - IAFO/2022/458

OCCLUSAL RADIOGRAPH IN GENDER DETERMINATION- A HIDDEN TOOL

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Abstract

Aim: To evaluate the reliability of dental arch linear and angular measurements on occlusal radiographs and to assess the usefulness of occlusal radiographs in sex determination. Materials and Methods: A prospective study was conducted on 50 patients (25 males and 25 females) using occlusal radiographs with age ranging from 20 to 25 years. Standard occlusal radiographs were taken without any errors by intraoral dental X-ray machine with required ideal exposure parameters after taking due radiation protection and safety measures. The radiographs were carefully processed and the images obtained were traced for angular and linear measurements, attributing capital letters to the maxillary arch and small letters to the mandibular arch. The obtained data were analysed by ANOVA using SPSS Software Version 22.0 for statistical analysis using discriminate methods. Results: All the linear variables analysed by t test showed higher values in males than in females that were found statistically highly significant ($P < 0.001$) for gender differentiation. Angular measurement values have shown highly significant differences ($P < 0.004$) between males and females only in "CIX" L, "MIZ" L, "CIX" R, and "MIZ" R. Conclusion: The present study building upon previous studies conducted, provides evidence regarding the significance of occlusal radiograph in gender determination. It is an economical, quick and a reliable method.

Registration Number - IAFO/2022/115

LARDER BEETLES AS PATHFINDERS TOWARDS THE EVIDENCE

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Abstract

Forensics science is the application of scientific knowledge and methodology to legal problems and criminal investigations. Forensic odontology involves proper handling, examination and evaluation of dental evidence and presentation of dental findings in the interest of justice. Forensic entomology deals with the examination of insects in, on and around human remains to assist in determination of time or location of death. It is also possible to determine if the body was moved after death. Forensic entomology is the application and study of insect and other arthropod biology to criminal matters. The present paper describes the role of insects found during the forensic investigations and elaborates in detail about larder beetles. Larder beetles are reported to be commonly found necrophagous insects who feed on vertebrate remains. Bone samples such as jaws need to be cleaned prior to analysis. It is reported to be DNA safe to use larder beetles compared to other techniques todeflesh or skeletionization bones in the forensic investigations.

Registration Number - IAFO/2022/393

WILL THERE BE ANY EFFECT OF THIRD MOLAR POSITION ON FORENSIC AGE ESTIMATION?

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Abstract

Introduction: In forensic odontology, age estimation stands as a foremost part. It guides us with identification of age of individuals, especially in children who were part of medico-legal investigations. Among various parameters used for age estimation, tooth maturity is considered to be important and most reliable. Third molars and their maturation plays a key role in forensic age estimation since they are the only developing tooth after 15 years. Therefore, it is important to understand the factors that could affect the maturation of third molars. One such possible factor to affect third molar maturation is, impaction. Aim: In the present investigation, we intend to study the differences between the chronological age and the dental age in impacted and non-impacted third molars of children and sub-adults of South-Indian population. Materials & Methods: A total of 400 orthopantamograms of male and female subjects of south Indian origin aged between 12 and 20 years were collected retrospectively. SB Balla et al (2019) will be used to estimate the dental age of the subjects. Statistical analysis will be performed to study the differences between the dental age and the chronological age. Results: Awaited

Registration Number - IAFO/2022/065

SALIVA FROM BITEMARK - AS A SOURCE OF DNA FOR GENDER DETERMINATION

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Abstract

Introduction: Bitemarks in themselves provide a kind of dental identification which is usually done by the measurement of size, shape and position of individual teeth. DNA is considered to be the most reliable source with high accuracy in sex determination when compared to other non-metric and metric measurements. Saliva can be considered as good and reliable source for DNA. Hence, this present study is aimed to determine the quality of isolated DNA and its accuracy in gender determination from the saliva of bitemark. Materials and Method: Bite mark will be created by biting on skin surface. Bitemark swab will be collected at different time intervals. DNA will be isolated from the saliva in bitemark swab and further it will be quantified and evaluated for the presence of SRY gene. Results: DNA isolation and quantification from saliva will be done and presence of SRY gene in male will be evaluated. Discussion: To the best of our knowledge this is the first study to be conducted, in which DNA isolated from the saliva in the bitemark swab will be used as a tool in gender identification.

BITE MARKS ANALYSIS – AN IMPORTANT TOOL

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Abstact

Forensic odontology or Forensic dentistry is a part of a forensic science that help in identification of an individual with residual evidence in the crime scene. This helps in identification of maxillo-facial or dental finding. Presence of physical evidences such as bite injuries in few cases like child and sexual abuse, murder etc., are considered as a habitual form of evidence in criminal court. As there is no identical fingerprints or DNA similarly, there is no identical dentition. Each bite mark has an eccentric tooth pattern. Bite marks are unique to an individual's such as angle between the teeth, missing teeth, fractured teeth restoration and other cosmetic or prosthetic dental works. Based on the bite injury, the individual's sex and age of the suspect can be determined. This helps in identification of the suspect by comparison of recorded dentition with examination of the bite mark residues on the victim's skin, and other food materials, chewing gums. Which lead to identification of the criminal and also helps in excluding the suspects. This presentation reviews the various methods of bite marks analysis in forensic dentistry.

Registration Number - IAFO/2022/493

DNA FINGERPRINTING IN FORENSIC ODONTOLOGY

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Abstract

DNA fingerprinting or DNA profiling is a technique employed by forensic scientists to assist in the identification of individuals or samples by their respective DNA profiles .Though DNA extraction is not the initial choice in identification but can be the last resort wherein other investigation may fail due to lack of evidences or ante mortem. When other means of traditional identification become impossible following mass calamities or fire explosions, teeth provide a rich source of DNA as they have high physical as well as chemical resistance. The use of DNA profile test in forensic dentistry offers a new perspective in human identification. DNA is responsible for storing all the genetic material and is unique to each individual. The currently available DNA tests have high reliability and are accepted as legal proofs in courts. The recent evolution in the isolation of DNA and the ways of running a DNA fingerprint in forensic odontology are highlighted in this literature review.

Keywords: DNA fingerprinting, Forensic Odontology, DNA Extraction

Registration Number - IAFO/2022/456

SIGNIFICANCE OF SOFTWARE IN FORENSIC ODONTOLOGY

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Abstract

Aim: To describe the role of software advancement in forensic odontology. Background: Forensic odontology deals with proper handling, and evaluation of dental records, which are then presented in the interest of law for justice.Digital forensics has revolutionized the traditional forensic investigations in terms of acquisition, analysis, and reporting of forensic evidence and its application is becoming common in the mass disasters, earthquakes, and terrorism. Sophistication of software and advent of digital technologies such as computers, computer-aided design computer-aided manufacturing systems, digital records, facial reconstruction, touch-free autopsy, and virtopsy has resulted in quick identification and extraction of a large amount of data with reduced sampling bias. Radiographs are one of the main sources of antemortem evidence, these are important in comparing consolidated antemortem with PM information, for example, the comparison of PM periapical radiographs of skeletal remains to antemortem panoramic radiographs of a missing person. Reason: This review undertaken since digitization can function as a key role in advancement of forensic odontology.

Keywords: Digital, software, forensics, human identification

UBIQUITY OF SALIVA IN FORENSIC ODONTOLOGY

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Abstract

Body fluids recovered at crime scene are among the most important types of evidence to forensic investigators. In recent years, saliva has been a high spot in forensic science and has shown its immense role in crime detection, drug abuse, hormone identification, case of poisoning and animal bites. It has been used as a primary diagnostic tool in forensic odontology in absence of other body fluids. Serological and cellular analysis of obtained saliva is of immense use in identification of the accused. Saliva is usually deposited in bite marks found in many homicides, assault and other criminal cases. Since many problems are encountered in bite mark analysis, primarily because of elastic and distortable nature of skin and lack of good impression medium, the saliva deposited during biting has received an important alternative focus in bite mark analysis. Various methods have been adapted for detection of dried saliva stains like chemicals, enzymes, lasers and UV light and fluorescent spectroscopy. Single wet cotton technique, double swab techniques are some methods of saliva recovery from skin. DNA from saliva and skin deposited saliva can be extracted by the phenol-chloroform method. Improved analytical techniques have made it possible to analyze a large number of drugs in small amount of oral fluid. The possibility of obtaining exfoliated buccal epithelial cells in saliva on bite marks has increased the possibility of sex determination of the perpetrator. Hence, the importance of saliva as an investigative body fluid is increasing steadily over the years in forensic laboratories. Thus this review is aimed at highlighting several uses of saliva in the practice of forensic odontology.

Keywords: saliva, forensic odontology, human identification

FORENSIC FACIAL RECONSTRUCTION

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Abstract

Forensic facial reconstruction is the process of modelling an individual's face using skeletal remains and soft tissues. It is a union of science and art, utilizing fields of anthropology, osteology and anatomy. It is a reliable method to identify unknown humans. It is also helpful in the field of criminology for investigations, and contributes great value for reconstruction of prehistoric hominids and humans. The purpose of this paper is to review the various methods used in 3D facial reconstruction and advancement in 3D technology.

FORENSIC HISTOPATHOLOGY – A REVIEW OF SPECIAL STAINS AND IMMUNOHISTOCHEMISTRY

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Abstract

Histological analysis of oral hard tissues for personal identification and crime investigation is well established in the field of forensic odontology whereas microscopic analysis of oral soft tissue remains is less sought after. Though, Special stains and immunohistochemistry have become the mainstay of diagnostic pathology and are well established in our routine histopathological practice, they have not yet found a definitive place in the field of forensic odontology. At autopsy, there is no need for prognostic markers which creates a reluctance for the usage of immunohistochemical markers. Hence this paper would provide a brief review of the role played by histopathological analysis in forensic odontology. Emphasizing the utilization of special stains and immunohistochemistry in sex determination, post-mortem time detection, and determination of cause of death and as an adjunct to substantiate the autopsy findings.

MORPHOMETRIC ASSESSMENT OF OCCIPITAL CONDYLE AND SPHENO-OCCIPITAL SYNCHONDROSIS IN AGE & GENDER DETERMINATION – A CBCT RETROSPECTIVE STUDY

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Abstract

Aim & Objectives: To assess the height, width, length and angle of right and left occipital condyle and score the closure of sheno-occipital synchondrosis in three decades with age groups ranging from – i) 20-35years ii) 36-50 years and iii) above 50 years and to gender. Materials and Method: 60 CBCT volumes acquired from the dental archives were used. In Romexis software, height, width & length of Occipital condyle was measured in coronal, axial and sagittal section respectively and condylar angle was assessed in sagittal section. In mid-sagittal plane assessing and scoring the spheno-occipital synchondrosis was done in coronal, axial & sagittal sections. Discussion: As the skull is considered to be the second-best marker for age and gender determination after the pelvic bone, in our present study we have attempted to measure occipital condyle for age & gender determination. Henceforth Occipital condyle partakes a role in Forensic Dentistry. Occipital condyles are functionally important because they articulate with the superior facets of the atlas. The joint functions as a hinge joint allowing flexion & extension of the head.

Conclusion: The variation in dimensions of Occipital Condyles aids in knowledge about functional disturbance of skull, in medico-legal cases and forensics.

Keywords: CBCT, Occipital condyle, Synchondrosis, forensics

Registration Number - IAFO/2022/534

TOOTH PULP RNA EXTRACTION TECHNIQUE FOR FORENSIC INVESTIGATION -A SYSTEMATIC REVIEW

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Abstract

Background: Teeth are fundamental structures in a forensic context due to their high strength and specificity. It is challenging to obtain high quality RNA from pulpal tissues. It has been described that pulp RNA degradation could be an indicator of post-mortem interval. Researchers have been in the quest to develop optimal techniques for tooth RNA extraction. Aim: To determine the most reliable method of RNA extraction from dental tooth pulp for forensic investigations. Methodology: Several databases including Google Scholar, PubMed, and Science Direct were searched from 2011 to 2021 December using various combinations of following key words: "Tooth Pulp RNA", "Dental RNA extraction" and "Pulp RNA extraction". Original experimental studies published in English were included. We excluded letters to the editors, historic reviews. The detailed of the chosen studies were tabulated and analyzed. Results: A total of 4 articles were found and finalized. The most reliable technique was found to be RN easy for RNA extraction from dental pulp tissue. However, assessment of RNA integrity needs to be performed additionally, and validation of this method is necessary on blinded samples. Conclusion: Personal identification is crucial during forensic investigation to identify the victim when other morphological indicators are destroyed. Tooth pulp RNA extraction plays a vital role in such cases. The use of RN easy technique for RNA extraction has proven to be the most reliable technique.

Keywords: Forensic investigations, post-mortem interval, tooth pulp RNA, RNA extraction

Registration Number - IAFO/2022/287

EXTRICATION OF DNA FROM BURNT TEETH

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Abstract

Disasters like fires, explosions, bombings, aviation accidents that require human identification should be initiated with an immediate response and thereby forensic dentistry plays a very significant role. These disasters can cause the human remains to be damaged excessively as they are exposed to very high temperatures of about 300 degree Celsius to more than 1000 degree Celsius. Teeth being a very good source of DNA can be used for DNA profiling even after such catastrophic events as they survive such high temperatures. Polymerase Chain Reaction (PCR) analysis is an important molecular biology tool in forensic odontology, requiring relatively low concentrations of target DNA for quantification. This review highlights on the quantification and identification of DNA from incinerated dental remains.

COMPARISON OF TWO DENTAL AGE ESTIMATION METHODS IN CHILDREN AND ADOLESCENTS: A PILOT STUDY

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Abstract

Aim: In the current study we compared dental age estimated using both Demirjian's comprehensive chart and London atlas methods for association with the known chronologic age in children and adolescent patients from a dental college in New Delhi. We also determine if sexual dimorphism existed in dental age estimated Demirjian's comprehensive chart and London atlas methods. Methods: Dental age estimation was performed by both Demirjian's comprehensive chart and London atlas methods on 100 orthopantomogram records (50 males and 50 females) of orthodontic patients. The results of estimated dental age by both the methods were compared and analysed using paired t-tests. The mean difference between both the methods was obtained to find the correlation and significance level. Results: There was an overestimation of dental age by Demirjian's comprehensive chart was +1.3 in males and +0.5 in females respectively. London Atlas overestimation was +1.4 years in males and +0.5 years in females. A statistically significant difference ($p<0.0001$) was found when mean chronological age of the participants was compared with dental age estimated using either Demirjian's comprehensive chart or London Atlas. Conclusions: Our results points towards more accuracy of London atlas compared to Demirjian's comprehensive chart for estimating dental age on population of New Delhi. Our results forms basis of future large sample sized studies with more observers for inter-observer reliability and reduced bias.

Keywords: Forensic dentistry, Demirjian's method, DAEcc, Dental age estimation, London atlas.

DENTAL AGE ESTIMATION USING CHAILLET'S METHOD

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Abstract

Background: Age estimation forms one of the most important sub disciplines of forensic sciences and is important for medico legal issues1. In forensic dentistry, there is a need to determine the age of unidentified skeletons or individuals .Age estimation is important in birth certificate is not available, especially in children. Morphological and radiological analysis of teeth helps in chronological age estimation. Several authors have tested the Demirjian's method against their population groups with varying success. However, results were less accurate if population of different ethnic origin were compared to Demirjian's standards. Hence they highlighted the necessity to create databases representative for each population As a result Indian specific regression formulae using the modified Demirjian's eight teeth method following the gender-specific French maturity scores were developed. Therefore, this study was aimed to investigate the relationship between chronological age and dental age using the Chaillet's Method Methodology: 37digital panoramic images of patients aged between 7-25 years were selected from the archives based on the inclusion criteria. The chronological age of each person was noted. Dental age was calculated as per Demirjian's scores for tooth development and using Chaillet's formula. Statistical analysis was performed with SPSS software (version 22). Results: The chronological age was 17.6years among females and 18.45 years among males. Dental age estimated by using Chaillet's method among females 13.9years and among females was 14.26 years. Chaillet's method of dental age estimation shows under estimation of 3.7 years as compared to chronological age.

Registration Number - IAFO/2022/312

"COMPARISON OF LATENT LIP PRINT DEVELOPMENT AND RETRIEVAL FROM INANIMATE SURFACES"

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Abstract

Introduction: Identification of a person is of paramount importance in a medico-legal investigation. At present more and more people use protecting lipsticks and permanent lipsticks. With these lipsticks a latent lip print is generated by contact with a surface and, like with the latent fingerprints occur, this latent lip print can be developed. Aims: This study aims to retrieve latent lip prints from various inanimate surfaces like thermocoal plate, bone china, and glass to compare the efficacy of developers i.e. fingerprint powder, Sudan III, Vermillion, and its comparison with standard lipstick prints. Current research assesses the effectiveness of particular surfaces in the retrieval of lip print in personnel identification. Methods and Material: This study included a total of 30 subjects. Latent lip print was developed on the different inanimate surfaces by pressing the lips against the different surfaces. After collecting samples, a camel hair brush was used to retrieve all three chemicals individually by simply tapping on all three surfaces. Application of chemicals was continued until the print became clearly visible for the study. Developed latent lip print was then compared with the visible lip print. Subsequently, a standard lipstick print was developed from the same subject. All the samples were coded and graded according to the patterns suggested in the literature. Statistical Analysis Used: Discrete data were summarized in number and percentage and compared by chi-square ($\chi2$) test. Analyses were performed on SPSS software (Windows version 17.0). Results: The overall outcome was found to be highest in Fingerprint powder (58.9%) followed by Sudan III (28.9%) and Vermilion (10.0%) the least (Vermilion < Sudan III < Fingerprint powder). Comparing the overall outcomes of three developers, $\chi2$ test showed significantly different and higher favourable outcome in Fingerprint powder as compared to both Sudan III and Vermilion ($\chi2=92.09$, $p<0.001$). Conclusions: It is concluded that the fingerprint powder act as the best developer and thermocol plate can act as the best inanimate surface for retrieval of lip print. The findings of this study may be beneficial for investigators in using best developer at crime scene and best inanimate surface for investigation.

Souvenir

Registration Number - IAFO/2022/058

ADOPTION OF 3D SCANNERS IN SCOURING FOR FORENSIC EVIDENCE

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Abstract

Crime scenes are unstable environments, which are often short lived and present difficult types of data to visualise easily and effectively to other individuals who were not present at a scene. Laser scanning technology is increasingly being used in forensic anthropological research to obtain virtual data for archival purposes and post hoc measurement collection. A 3D Scanner speeds up the process of crime scene investigation by creating an accurate three-dimensional representation of the scene of the crime. Advantages of the scanner over traditional means of documentation such as photography include the ability to obtain measurements in all dimensions, the ability to reconstruct missing elements, and the ease with which generated images can be interpreted. We can use the scanner to take measurements, inspect evidence, and analyse blood spatter or bullet trajectory. It allows analysts to collect precise dimensions, evidence and features to be recorded for later analysis.

Registration Number - IAFO/2022/062

RESEARCH ON PALATAL RUGAE IN FORENSIC ODONTOLOGY – WHERE DO WE STAND?

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Abstract

Palatal rugae are considered to be stable landmarks that can be of value in forensic odontology. There have been several studies in the last couple of decades that involve identification and comparison of palatal rugae in different races of people, in people with different types of occlusion, in families across generations, and also in different genders. This review is a consolidation of these results from the literature, and suggests future directions for research.

Souvenir

Registration Number - IAFO/2022/045

ASSESSMENT OF MORPHOLOGICAL CHARACTERISTICS OF TONGUE FOR PERSONAL IDENTIFICATION: A DIGITAL PHOTOGRAPHIC STUDY

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Abstract

Introduction: Tongue act as a real proof of life as it is an inimitable, well protected from the external environment and there are no two tongues with similar morphological features even between identical twins. This study aims to assess the morphological characteristics of tongue and its variations as observed on digital photographs for personal identification. Material and methods: Study sample included 200 participants above 18 years reported to Bharati Vidyapeeth Dental College and Hospital, Sangli. The subjects were screened and included according to the inclusion and exclusion criteria. Front view photographs were taken from a predetermined distance of 6 feet using a professional Nikon 90d micro lens camera. The obtained data was compared and statistically analyzed in terms of morphological features of tongue such as shape, border, and fissures with its variations. Results: The mean age of the subjects was 38.60 ± 15.58 years and included 61% of males and 39% of females. Overall, U shaped tongue was the most frequently observed (72%) followed by V shape (22%) & bifid type (6%). Gender-wise comparison of tongue characteristics revealed that mild form of fissure numbers (1-3) and shallow fissures were most common in males compared to females with statistical significance ($P= 0.016$ & $P= 0.045$ respectively). Conclusion: Tongue morphological characteristics and its variations are unique with respect to each individual. Hence, it can be adopted by dentists as a chair side technique on a routine basis. Inclusion of tongue features in dental records will aid in a more reliable and effective personal identification.

"POST MORTEM INTERVAL ESTIMATION USING THANATOMICROBIOME – LINKING DEATH TO THE MICROBIAL CLOCK"

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Abstract

Post mortem interval (PMI) refers to the time period between death and examination of a body and is vital in solving criminal and civil cases concerning medico legal investigations. Forensic studies rely on biochemical, anthropological and histopathological evidences to find the above. But in advanced cases of decomposition, the above methods are not reliable. Post three days of death, even entomological methods have limitations due to seasonal and geographic variation among insects. Thanatomicrobiome is the microbial community associated with host after death and has emerged as a novel method to estimate PMI in advanced stages of decomposition. Bacteria are of utmost importance here due to their role in decaying process and they spread throughout the body and consolidate in areas like oral cavity and intestine. The postmortem microbiome has shown much promise as bacterial succession changes in a predictable and clock-like manner across mammalian species within the same environment in response to changes in a decomposing source. Hence this review paper will emphasize on oral thanatomicrobial samples that can be collected and analyzed through various new methods to aid in PMI along with their pitfalls and limitations.

Registration Number - IAFO/2022/471

ESTIMATION OF INNER-CANTHAL DISTANCE OF AN INDIVIDUAL USING THE INCISAL WIDTH OF MAXILLARY CENTRAL INCISOR-A PILOT STUDY

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Abstract

Dental evidence is a valuable tool in identifying individuals in forensic odontology. This study is based on the fact that the ICD is attained by the age of 1 year, after which the growth in this area is slow in contrast to outer orbital dimension. This stable landmark can be identified, located and measured accurately. The aim of this study was to derive at a formula to calculate the ICD in Mangalore population by using the incisal width of maxillary central incisor. This study attempts to showcase the usefulness of deriving inner-canthal distance by using incisal width of maxillary central incisor which can be used as an adjuvant to support and aid in sketch analysis for person identification.30 subjects between the age group of 18 and 35 yrs were considered in this study. The data obtained was tabulated and analyzed using Statistical Package for Social Sciences, Version 16 (SPSS).Results showed a highly significant correlation between inner canthal distance and incisal width of maxillary central calculated from the wax bite.

Registration Number - IAFO/2022/472

GENDER DIMORPHISM OF MAXILLARY FIRST PERMANENT MOLAR – A FORENSIC RADIOGRAPHIC STUDY

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Abstract

Identification of an individual is based on characteristics like gender, age and racial background unique to that individual. Out of all the parameters, the determination of gender falls first in line. Teeth are the most rigid structure and can withstand adverse conditions and serves as excellent evidence in forensic and anthropological studies and investigations. Gender dimorphism has been studied with metric and non- metric features in different populations. The present study aims to determine the gender of an individual based on the mesiodistal dimensions of permanent maxillary first molar teeth from a panoramic radiograph and analyze sexual dimorphism exhibited by the tooth. Mesiodistal width of 100 permanent maxillary first molar teeth was measured from a panoramic radiograph of 50 male and 50 female patients between the age group of 18- 40 years. Investigators performed the Statistical analysis using SPSS software. Results showed no statistical significance in the mesiodistal width of permanent maxillary first molar between males and females. In conclusion, the mesiodistal width of maxillary molars measured from panoramic radiographs has not demonstrated significant sexual dimorphism

Registration Number - IAFO/2022/354

CONE - BEAM COMPUTED TOMOGRAPHY STUDY OF MENTAL FORAMEN CHARACTERISTICS IN AN URBAN EASTERN INDIAN POPULATION

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Abstract

Aim: Assessment of morphologic and morphometric characteristics of the mental foramen (MF) in an urban Eastern Indian population and the evaluation of gender differences on the same. Material and Methods: Cone-Beam Computed Tomography (CBCT) images of 100 adult males and 100 females, aged 18-60 years, were randomly selected from institutional records and examined for the MF position (horizontal and vertical), opening angle, shape and dimensional measurements; vertical distance from the superior border of the foramen to alveolar crest and inferior border of MF to base of the mandible. The prevalence and characteristics of the accessory mental foramen (AMF) were additionally evaluated. The effect of gender on characteristics of MF and AMF was assessed. Results: The horizontal position of MF was in between the roots of premolars in 48.0% and 44.0% of males and females, respectively. In a higher proportion of females (98.0%, p = 0.006), the vertical position of MF on the left-side was located apically to the apex. The vertical (3.64 mm; p<0.001) and horizontal (3.64 mm; p<0.001) diameters of MF and occurrence of AMF (16.0%, p = 0.046) on the left-side were higher in males. The opening angle of MF (right-side: 24.13 degrees, p = 0.001; left-side: 24.21 degrees, p<0.001) was higher in females. Conclusion: The study revealed significant gender variations in certain MF characteristics and noted prevalence of accessory structures in our study population which if validated in large scale studies may be of bearing in a forensic case scenario.

Registration Number - IAFO/2022/505

APPLYING ARTIFICIAL INTELLIGENCE TECHNOLOGY IN FORENSIC ODONTOLOGY: A PILOT STUDY OF AN AUTOMATED PERSONAL IDENTIFICATION PROCESS

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Abstract

Forensic odontology (FO) deals chiefly with the identification of the individual through the remains, which mainly includes teeth and jawbones. Artificial intelligence (AI) technology has proven to be a breakthrough in providing reliable information in decision making in forensic sciences. AI technology has been widely applied in FO for identifying bite-marks, predicting mandibular morphology, gender determination, and age estimation. Most of these AI models are based on either artificial neural networks (ANNs) or convolutional neural networks (CNNs). The aim of this study was to suggest an automatic detection of natural teeth and dental treatment patterns based on panoramic radiographs of jaw and teeth using deep learning to promote its applicability as human identifiers. This dataset consisted of natural teeth, prostheses, teeth with root canal treatment, and implants. The detection of natural teeth and dental treatment patterns including the identification of teeth number was done with a pre-trained object detection network which was a convolutional neural network. The results of the studies are promising, performance of convolutional neural network using dental panoramic radiographs in automatically identifying teeth number and detecting natural teeth, prostheses, treated root canals, and implants. This model can be a promising tool when identifying victims of mass disasters and as an additive aid in medico-legal situations.

Keywords: Artificial Intelligence, Machine Learning, Radiography, Forensic Odontology; Neural Networks, Computer, Forensic Anthropology

Student Poster Abstract

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Registration Number - IAFO/2022/310

TOOTH TRAITS IN FORENSICS

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Abstract

Our society faces challenges in every conceivable way. From increased crime rates to natural calamities to increase in child abuse cases. Forensic odontology, a branch of forensic science not as strange to many has been growing in its potential and its ability to bring the forlorn to justice where dental remains is the only evidence. Forensic odontology is an investigative aspect of dentistry as it assists other experts to determine the sex of remains using teeth traits. Teeth play a vital role in several such investigations as they highlight features such as morphology, crown size and root length are characteristics of male and female sexes. In cumbersome cases where coming to a conclusion is a task, bite mark analysis and DNA fingerprinting aid in investigation.

Registration Number - IAFO/2022/338

DNA PROFILING AN AID IN HUMAN IDENTIFICATION

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Abstract

Introduction: Forensic dentistry plays a vital role in detection and resolution of crimes, civil, procedings and personal identification. It deals with proper handling examination and evaluation of dental evidence which will be presented infront of justice. Teeth act as source of DNA because of its ability to withstand to undergo changes. Teeth are better source of DNA than skeleton bones; DNA found in vascular pulp, odontoblastic process ,accessory canals and cellular cementum. Several biological materials may be employed for isolation of DNA & accomplishment of laboratory test for human identification mainly when there as little remaining material to perform such identifications like fire explosions decomposing and skeletal bodies. Aim and Objectives: The present study is aim to determine the various methods to collect and extarct DNA for human identification. Materials and Methods: The present study systematic review of published scentific literature abut collection, isolation and extraction of DNA procedures will be presented. This Presentation provides a comprehensive review of the recent Concepts regarding DNA extraction isolation, amplification and DNA profiling system applicable to forensic dentistry.

ROLE OF TONGUE PRINTS IN FORENSIC ODONTOLOGY

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Abstract

AIM: To describe the distinctive features of tongue and application of tongue prints in Forensic odontology. OBJECTIVE: Uniqueness of tongue prints and its potential application in the field of forensic odontology. BACKGROUND: Human identification is one of the challenging areas that man has been confronted with. The forensic odontologist mainly deals with the identification based on recognition of unique features present in an individual's oral structures. The tongue is a crucial organ very much encased inside the oral cavity and shielded from nature. The morphology and surface highlights are attributes of each person, and these characteristics can be utilized for criminological distinguishing proof. It has unique shape and surface textures in each individual. The shape, colour and texture of tongue are different in identical twins. These unique features of tongue make it a valuable tool in forensic odontology. REASON: This review undertaken since tongue prints can function as a reliable means for personal identification in forensic odontology.

Keywords: Tongue prints, Forensic odontology, Human identification.

VOICE OF THE TEETH AFTER DEATH

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Abstract

The mouth has fittingly been identified as an organ system "where it all begins" yet when it all is said and done mouth and especially the teeth may turn out to be where it all ends.for in final forensic analysis it is the human dentition or the post-mortem records remains the roof which in legal terms may have the "last word". Teeth are the hardest substance of the body that can survive extreme heat, up to 1,600°C, and they do not mind being under water for a long time. After a person dies, the teeth will be there long after most other body parts have vanished. These special features of teeth can be useful in many areas of forensic odontology. Teeth can tell us about the age, sex, and health status, habits, identity of a person and also possible causes of death. Teeth may even be able to give the clues to the investigators that can be important keys to help in crime scene investigations. This review aimed to provide an overview of dental evidence, its use in forensic identification.

Keywords: Forensic odontology, human identification.

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ROLE OF FORENSIC ODONTOLOGY IN CRIME INVESTIGATION - AN INSIGHT

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Abstract

Aims & Objectives - Dental professional plays a major role in keeping accurate dental records and providing all necessary information, so that legal authorities may recognize malpractice, negligence, fraud or abuse & identify unknown humans, when no other effective evidences works out. In the crime investigation process odontology plays a key role in forensic science, as teeth being the hardest structure in body, usually preserved even after being exposed to extreme condition, with the help of ante mortem dental records one can compare the anatomy of tooth root canals present, any restoration if present with the post – mortem reports to see for positive findings for identification. As such dentistry has much to offer law enforcement in the detection and solution of crime or in civil proceedings. Forensic odontologist assists legal authorities by examining dental evidence in different situation. Today forensic odontological evidence in integral to criminal investigations & trails. Result: To brief out the role of dentist, oral radiologist plays a role in age, gender and person identification as well as in identifying the cause of death oral pathologist analysis dental evidence in interest of justices. Oral surgeon can be presented as a legal witness in legal hearing to provide expert advice in differentiating between accidental trauma & abuse related trauma. Conclusion: Thus, this paper will not only try to summarize the various roles of dental experts in forensic medicine but also highlights the challenges faced in forensic odontology & measures that can be taken for further development in crime scene proceedings.

FORENSIC TAPHONOMY OF HUMAN REMAINS- A LIVING INNOVATION

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Abstract

The term taphonomy is broadly defined as the laws of burial, derived from the Greek taphos, meaning burial and onomy, meaning law. Taphonomy is now understood to refer to the study of everything that happens to biological organisms from the time of death to the time of discovery. As a matter of fact, between the time of death and the time of recovery, a body undergoes certain changes that require a multidisciplinary approach for investigation. From the crime scene to the autopsy table, medical legal death investigations require a multidisciplinary approach. Using techniques and conceptual frameworks of forensic taphonomy, it is possible to combine scene-derived data with laboratory analysis of the biological tissues to build and test hypotheses regarding the events surrounding death and deposition. In forensic taphonomic interpretation, scientists estimate the postmortem interval, determine if and how remains were moved, removed, or altered, and ultimately determine whether human intervention was involved; even to distinguish between trauma caused by natural and human agents, a taphonomic analysis is also necessary. This poster shed light on detailed understanding of taphonomy and its sequential events (from antemortem and perimortem) which has forensic significance in solving death mysteries.

Keywords: Taphonomy, Death, Recovery

ROLE OF DENTISTS IN EXHUMATION

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Abstract

Natural teeth in vertebrates are the most important durable organs and the comprehension of evolution greatly depends upon the residue of dental evidence found in relics. Dental identification stands on the principal basis that no two oral cavities are alike and teeth are unique to an individual. The unique features of the human dentition aids in personal identification which is widely renowned in the field of forensics. In identifying the victims of violence, murder investigations, physical assault, disaster or mass tragedies, dental identification plays an important role. Moreover, the comparison between antemortem and post-mortem dental record is an important method of identification in criminal investigations, mass disasters, missing persons, grossly decomposed or bodies that have been traumatised, and in scenarios where visual identification is slender. Forensic odontologists can usually determine the age, sex, and race (at the time of death) from careful examination of the dentition with respect to their anatomical positioning and osteological features of the skull. A tooth is not only unique in its identification features but also withstands most post-mortem events.

AMELOGLYPHICS

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Abstract

It is the term used for the study of patterns of enamel rod ends and tooth prints is the term used for enamel rod ends. Dental enamel is the highly mineralized tissue in the human body and resists post mortem degradation. It also resists several environmental factors like acids exposure or fire. These enamel rod end patterns are specific and are different for each individual. The purpose of this paper is to review the use of ameloglyphics as a key tool in forensics.

CEMENTUM ANNULATION – DECODING

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Abstract   .

AIM: To determine the age of an individual using tooth cementum annulation. BACKGROUND: Cementum is a hard tissue in the root of human dentition and is able to resist decay and degradation, long after other tissues are lost. This resistance has made useful indicator for age estimation. Therefore tooth cementum annulation may be used more potentially than any other morphological or histological traits of an adult skeleton, for age estimation. METHODS: Teeth are extracted which are devoid of any pathological cases, such as attrition or hypercementosis were selected to study. Longitudinal ground sections of each tooth will be prepared and examined under light microscope. These are photographed using polarized microscope and counting was done using image analysis software. RESULT: The study shows correlation between the actual age of an individual and the estimated age of an individual which may differ from 2-3 years using tooth cementum annulations. CONCLUSION: Incremental lines found in tooth cementum are used to determine the age of an individual.

Keywords: Forensic Odontology, Age Estimation, Tooth Cementum Annulation.

EVOLUTION OF FORENSIC ODONTOLOGY

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Abstract

Forensic Odontology is a discipline that involves the amalgamation of dentistry with the law. The oldest recorded application of dental knowledge to the forensic field dates to Rome in 49 AD, where features of anterior teeth were used to identify the severed head of Lollia Paulina. From examining the unique features or teeth to employing techniques such as Palatal Rugoscopy and Ameloglyphics, the field has come a long way. The diverse nature of the cases being solved due to forensic odontology alludes to the immense potential the field has. The purpose of recording and studying the history of the field is to aid in taking further scientific leaps and preventing any setbacks. The poster allows a glimpse of forensic dentistry through a historical lens, shedding light on how far the human race has come.

NEONATAL LINE: A SIGNIFICANT EVIDENCE IN FORENSIC ODONTOLOGY

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Abstract

Foeticide is one of the evils that plagues our society to this day. Majority of the cases goes unreported due to lack of evidences because, by the time the mortal remains of the child are available for forensic examination, the bodies are decayed and putrefied; hence soft tissues are lost. In such a situation, the presence of neonatal line not only marks the line for prenatal and postnatal development, but also provides information regarding the period of survival of the fetus. Neonatal line also serves great importance in age estimation of a fetus. Thus, it provides evidence to prove the brutal act of foeticides.

Keywords: Neonatal Line, Foeticide, Forensic Odontology, Age Estimation, Infanticide.

TONGUE PRINTS: AN EMERGING BIOMETRIC TOOL

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Abstract

Biometrics is a real time identification system which is used in identification of a person using specific characteristics which are unique from person to person and can be used for comparison in a population. Different biometric tools used are face, iris, fingerprint, voice. Tongue is an organ of body which performs various functions such as speech, taste perception, mastication etc. Because of increasing identity fraud and fake biometrics, tongue prints is a new and emerging biometric authentication method which can be used. Tongue prints carries information present on exposed portion of the tongue, its shape and texture. Tongue prints are unique from person to person and this serves as a tool for identification.

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TONGUE PRINT AS A POTENTIAL BIOMETRIC TOOL IN FORENSIC INVESTIGATION- A SYSTEMATIC REVIEW

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Abstract

Introduction: Tongue print is a new biometric authentication tool that is unique and cannot be easily forged because no two tongue prints are similar. Tongue print is the information carried on the exposed portion of the tongue. The color, shape, and surface features are exclusive to every person and not affected by external factors as it is well protected. Aim: The aim was to identify the most efficient, feasible technique for recording tongue prints and to recognize the most reliable characteristics of tongue for personal identification. Materials and Methods: A systematic review was conducted from the year 2012-2022. Various search engines such as google scholar, EBSCO and PUBMED were used to search articles with the current topic. The key words used were 'tongue prints', 'forensic identification tools', 'unique identification tools in forensics', etc. Original research articles were selected based on inclusion and exclusion criteria. The studies were analyzed for various recording methods and classification of tongue based on the features such as textural variations, shape, tongue geometry features, longitudinal grooves and lingual apex. Results: Eleven original articles were analyzed. Digital analysis and the characteristic features such as shape of the tongue and texture were found to be most reliable. Conclusion: Tongue prints can be used as personal human identification in forensic sciences. Morphological aspect of tongue is unique for each and every individual. Tongue prints using digital analysis is most promising tool for data collection.

Keywords: Tongue Print, personal identification, Digital analysis.

THE ROLE OF FORENSIC ODONTOLOGY IN THE INDIAN ARMY: AN UNCHARTED TERRITORY

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Abstract

In the interest of justice, forensic odontology (FO), a subspecialty of forensic medicine, deals with the proper handling and evaluation of dental evidence. Since 1775, FO has not only become an integral part of the judicial systems of many countries but has also been used by their armed forces and agencies. FO awareness in India has been growing rapidly over the past ten years after the establishment of numerous organizations by the judicial system. The Indian Dental Council is also providing awareness by making it a part of the curriculum. The awareness and applicability of FO in the Indian Defense Forces will be quite beneficial for better and more accurate record keeping of the devoted and vigilant soldiers of our army. It will be very beneficial for recognizing defence personnel identities during disasters, wars, and other challenges. Additionally, it would be helpful in identifying terrorists who trespass within the country masquerading as defence personnel. This poster emphasises the role of forensic odontology in the identification of soldiers and terrorists.

AMELOGLYPHICS – A UNIQUE IDENTIFICATION AS TOOTH PRINTS

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Abstract

Forensic odontology has played a key role in identification of people in mass disasters, in crime investigation, in ethnic studies, and also identification of decomposed and disfigured bodies like drowned persons, fire victims and victims of motor vehicle accidents. Numerous techniques have been used for victim recognition in forensic dentistry, including rugoscopy, cheiloscopy, bite marks, radiographs, photographic samples, and biochemical approaches. One such in dental impression is Ameloglyphics. It is also known as tooth prints, they are the enamel rod end patterns on tooth surface and they are considered as a hard tissue analogs to fingerprints. Biometric analysis revealed that the enamel rod end pattern is unique for each tooth in an individual. It shows both intra- and inters individual variation. Teeth have the highest resistance to most environmental effects like fire, desiccation, and decomposition, and may be used as forensic evidence. Hence this poster reviews the methods and uses of ameloglyphics in forensic odontology.

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ROLE OF DENTIST IN DISASTER VICTIM IDENTIFICATION

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Abstract

Mass disasters, can be said as the catastrophic event, including manmade such as terrorist attacks, wars and earthquake and natural disasters such as floods, fires etc. Identifying the disaster victim becomes most important for the following reasons; first of all it enables us to know about the cause of the disaster that occurred, the number of victims encountered and their identification. With the fast-developing technology, various advanced methods are available in identifying disaster victims with the use of anthropological techniques, radioactive isotopic dating methods, comparative dental identification analysis, Fingerprints, DNA analysis etc. This poster explains the various procedures used during disaster victim identification and the implementation of forensic techniques so as to aid in identification.

Registration Number - IAFO/2022/280

FINDING THE FELON

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Abstracts

The Smithsonian Institution's Mammal species of the world in 1993 included the domestic dog as a subspecies of the wolf Canis lupus. Although some dogs are friendlier than others, any dog is capable of biting. According to 2016 survey, in India, there are 9 cases of dog bite every hour. In dog bite cases, the court may require the forensic expert to identify which specific dog caused the damage. Non-fatal human dog bites are commonplace amongst animal attacks on human beings and these present with mainly skin & soft tissue injuries. They can also present with life threatening head and neck injuries. Bite mark analysis and identification combine as the scientific link between a bite mark & potential biter. The lesions produced by bites are objects of forensic analysis & one of the first consideration is to determine their origin, whether they are produced by an animal or human. This is by far the most demanding and complicated part of forensic dentistry. The aim of the poster is to review the various studies done on bite pattern of dogs & humans in order to analyze and compare bite marks and to assess its usefulness and application in forensic odontology.

Registration Number - IAFO/2022/444

DISASTER VICTIM IDENTIFICATION SPECIALIST – A TRAINING EXPERIENCE

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Abstract

This e-poster is about my experience of attending a training program on "Disaster Victim Identification Specialist" conducted by the Section of Forensic Medicine, University of Turin, Italy. Disaster be it natural or man-made leads to numerous casualties, missing, and death. The identification of the deceased individual is a crucial duty of an integrated intersectional team i.e. the Disaster Victim Identification Team. The training included a theoretical and hands-on workshop on DVI procedures and also a visit to the Museum of Human Anatomy Luigi Rolando and museum of Criminal Anthropology. Deliberations and experience sharing by renowned Forensic Odontologists, Anthropologists, and DVI experts. From 1980-2010 India has experienced 431 natural disasters with which floods being the highest occurrence and 480 man-made disasters in the period 1990-2009. There is a pressing need to train professionals in disaster victim identification preparedness to speed up the recovery and identification processes, helping victim's families to begin the healing process and societies to rebuild.

Keywords: Disaster victim identification, Training, Humanitarian forensics, Forensic odontology.

Registration Number - IAFO/2022/283

3 D PRINTING IN FORENSIC ODONTOLOGY

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Abstract

In these digitized surroundings, we should not overlook the use of three-dimensional (3D) printing in forensic odontology, for investigative or court purposes, which is still comparatively new. Today, 3D printing is most commonly used in dentistry for the manufacture of drill guides for dental implants, study models for prosthodontics, orthodontics and surgery, the manufacture of dental, craniomaxillofacial and orthopaedic implants, and the fabrication of copings and frameworks for implant and dental restorations. However, we are yet to see forensic odontologists, lawyers, and expert witnesses appreciate embrace the advantages of 3D printing for its use in court of law. This may be due to a perception of it being complicated technology, high cost, or simply a lack of understanding of what can be done with 3D printing. 3D image capture devices minimize the amount of angular distortion, therefore such a system has the potential to create more robust forensic evidence for use in courts and medico-legal cases. The major application of 3D printing in forensic odontology includes bite mark analysis, 3D-computed tomography facial reconstruction, dental age estimation, sex determination, and physical models. Hence I conclude by highlighting the applications of 3D printing and presents current needs to develop and incorporate 3D printing technology in Indian forensics.

Registration Number - IAFO/2022/515

FORENSIC ODONTOLOGY AS A HUMANITARIAN TOOL. A REVIEW

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Abstract

Humanitarian action refers to a range of activities that seek to alleviate human suffering and protect the dignity of all victims from the catastrophic events that include manmade and natural disasters such as terrorist attacks, wars, earthquakes, floods, and fires, carried out free of charge and framed under International Humanitarian Law. Humanitarian forensics provides the necessary tools and expertise to manage this. Humanitarian forensic action is the application of skills of forensic science in disasters as a humanitarian action. Forensic odontology is a humanitarian forensic tool that deals with the handling, examination, and evaluation of dental evidence to identify victims of mass disasters, abuse, and organized crimes in the court of law. The INTERPOL has listed human identification methods that are mostly used in cases of disasters and must be scientifically trustworthy, solid, and applicable in field situations. These methods consisted of DNA Profiling, fingerprint, and forensic dentistry, also known as primary identification methods. It also stated that a positive match in dental identification can be trusted as a stand-alone identifier. Therefore this poster aims at promoting and educating the audience regarding the critical roles of Forensic odontology as a humanitarian tool.

Keywords: Forensic odontology, humanitarian forensics action, humanitarian tool

Registration Number - IAFO/2022/523

ROLE OF DENTIST AND ORAL PATHOLOGIST IN FORENSIC ODONTOLOGY: A REVIEW

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Abstract

Forensic odontology is deals with proper handling, examination and evaluation of dental evidence, which will be then presented in the interest of justice. The main important role in forensic odontology to dental identification, Gender and age estimation using hard tissues such as bone and teeth. Oral pathology is sub division of dentistry which deals with the pathology affecting oral and para oral structures. Oral pathologist can do comparative dental identification, forensic anthropology, palatoscopy and rugaoscopy, Bite marks identification and DNA methods for identification of gender. This review explains about importance role of dentist and oral pathologist in forensic odontology view.

Registration Number - IAFO/2022/524

FACIAL APPROXIMATION – A REVIEW

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Abstract

Forensic odontology is branch of dentistry deals with forensic identification and characteristic features; where the application of dental sciences is used in the identification of deceased individuals. Identification of the deceased with comparison of ante – and post mortem features. There are different methods to compare between ante – and post mortem features such as visual and radiographic and facial reconstructions. Facial reconstruction is very effective forensic technique to help in recreating the victim facial appearance on remaining parts such as skull. This technique mainly is based on the relationship between the underlying hard tissue such as facial bone and soft tissue thickness and features of face. It can be applied to identify the remains from decomposed tissues with remaining the bone only. Recent advances in facial reconstruction such as computer based technique, will give more accuracy then manual facial reconstruction method. This review presents the history along with techniques and recent advances of facial reconstruction.

Registration Number - IAFO/2022/553

DENTURE LABELLING AND MARKING –A NOVEL TOOL IN HUMAN IDENTIFICATION

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Abstract

Denture marking or labelling is accurate and fast method to identify the individual in forensic odontology For medicolegal purposes and social reasons like early detection of dead and injured people in major disasters such as earthquakes, floods, planecrashes, and accidents in which loss of visual or fingerprints there the denture labelling or marking is very important The identification of individuals is done by the presence or absence of dentition in forensic odontology The labelling or marking of denture makes it easy for tracing the owners The denture will be intact enen in violent conditions when it is made of good quality material Sometimes dentures get lossed or confusion in recognition of denture can occur during cleaning in lab or clinics because of this it is difficult for older patients to adapt to new denture The different methods of labelling of dentures are available like surface marking, inclusion technique, microlables and chips which are important in forensic odontology Thus the dentists have the appropriate knowledge on denture labelling and marking which is simple, permanent, inexpensive and esthetically good This paper intends to present the different types of dental labelling and marking.

Registration Number - IAFO/2022/345

ROLE OF SALIVA IN FORENSICS

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Abstract

Forensic science is a branch that deals with wide plethora of areas such as Anthropology, migration and criminology. Various biological samples have been utilized to assist scientists. So, Saliva is an easily available source from victim as well as accused one in crime. This body fluid is gaining popularity due to its ease of collection and close relationship with plasma. This poster updates uses of saliva in practice of forensic odontology.

Keywords: Forensic odontology, investigating tool, saliva.

Souvenir

Registration Number - IAFO/2022/270

AMELOGLYPHICS

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Abstract

The term 'forensic' implies 'court of law'. Forensic odontologyhas been defined as that branch of dentistry, which, in the interest of justice, deals with the proper handling and examination of dental evidence and with the proper evaluation, and presentation of dental findings. Ameloglyphics or tooth prints has been gaining more attention recently. Enamel rod-end patterns are studied using ameloglyphics (amelo: enamel; glyphics: carvings). The term "ameloglyphics" was coined by Manjunath et al similar to the term dermatoglyphics. Amelogenesis is an extremely controlled secretory process, wherein the ameloblast secretes enamel in an undulating and interlacing path. This is reflected on the enamel surface as a series of patterns described as tooth prints. These tooth prints are unique, variations exhibit both between teeth of unlike individuals and of the same individual, and between males and females. Enamel rods/prisms: Enamel is a product of ectoderm derived cells called ameloblasts. The basic structural unit of enamel is the enamel rods (enamel prisms). Enamel does not remodel nor does it remain in close contact with the cells which synthesize it, rather the ameloblasts retract away from the enamel surface once it has matured and the tooth has erupted. Enamel prisms morphology reflects the morphology of ameloblasts in a species-specific manner. Alterations to the matrix are reflected as defects in the structural organization of enamel. These enamel rods end on the tooth surface at different levels and in different directions, resulting in specific patterns on the tooth surface. The study of these enamel rod end patterns is known as ameloglyphics. The shape of the enamel prisms approximates to one of the three main patterns: • Pattern I: Prisms are circular. • Pattern II: Prisms are aligned in parallel rows. • Pattern III: Prisms are arranged in staggered rows such that the tail of prism lies between two heads in the next row, giving a key whole appearance Materials used in recording enamel rod patterns on tooth surface: Ameloglyphics is generally preceded by Acid etching and acetate peel technique and automated biometrics for reproducing exact enamel rod end patterns [10]. The acid etching on the surface enamel results in the removal of the surface mineral component in the rod and rod sheath. As the rods and rod sheaths have a different mineral density, the etching results in an uneven dissolution of the surface enamel along with the removal of the smear layer. 10% orthophosphoric acid in gel form is the most commonly used acid for etching. Three types of etch patterns can be obtained: 1. Predominant dissolution of prism cores. 2. Predominant dissolution of prism peripheries. 3. No prism structure is evident. The enamel rod end patterns could be duplicated by various methods such as using cellulose acetate paper, rubber base impression materials, and cellophane tape. The purpose of this paper is to review ameloglyphics as a hard tissue analog to fingerprint and mey be used as forensic evidence.

USE OF SOFTWARE'S IN FORENSIC ODONTOLOGY

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Abstract

The use of Technology has become a very essential aspect of the 21st century. Use of A.I systems to have ease of access, solve problems and display human-like capabilities has been a massive success. The vast field of Forensic Odontology is also transforming from traditional to modern methodologies. Different hardware devices and computer software's are simultaneously being used in forensics. Computer software's are used to investigate & analyse crimes & cases involving bite marks, unidentified remains and missing person's cases. It is also being used for identification of victims of mass disasters & natural calamities. In such unfortunate events, the dental forensic team plays a very important role.

Keywords: Software's, A.I systems, bite marks, Crimes, mass disasters, natural calamities Forensic Odontology.

DENTISTRY IN QUEST OF TRUTH AND JUSTICE

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Abstract

Forensic dentistry is a branch of dentistry which deals with the proper handling and examination of dental evidence and the proper evaluation and presentation of dental findings in the interest of justice. Forensic science, forensic odontology has become an integral part of large international forensic educational organiztions and it is high time to realize that this branch is no longer an abstraction but is closely woven in to the fabrics of the law and enforcement agencies. Forensic odontology deals with the application of dental sciences to the enforcement of law and the furtharance of justice.This is mainly due to the fact that every tooth possesses a set of unique charecteristics which form the basis of identification. The other features which help in identification are dental pathology, restoration, dental anomalies etc. Skill of the dentist in personal identification during mass calamites, sexual assaults and child abuse.

Registration Number - IAFO/2022/034, IAFO/2022/035

DNA IN TEETH AS A FORENSIC TOOL

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Abstract

Forensic dentistry is an important sub-speciality of forensic medicine which helps majorly in solving various criminal cases and identifying individuals in mass disaster. During compromised availability of ante mortem data, DNA profiling system becomes the only method for exact identification of the person. Teeth and bones are frequently the only sources of DNA available for identification as they are most likely to resist decomposition. The unique composition of teeth and their location in the jawbone provide additional protection to DNA. The best teeth for DNA extraction are molar teeth. Protocol for extracting DNA from teeth includes the Decontamination technique, sampling methods and DNA extraction methods. Decontamination of teeth includes physical removal of the outer tooth surface, exposure to UV light, and immersion in sodium hypochlorite (bleach). Sampling is done by sectioning, endodontic access followed by scraping, crushing, grinding, bone mill, blender, tissue grinder or cryogenic grinder. Finally, DNA extraction is done by phenol-chloroform, chelex, silica or magnetic bead systems. Commercial DNA extraction kits like PrepFiler Forensic DNA extraction kit is also available. This presentation explains various techniques of extracting DNA from the teeth.

THE RIGHT OF IDENTIFICATION

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Abstract

Everyone has the right to be recognized as a person before law, Article 6 of the Universal declaration on Human Rights states Everyone has right to recognition everywhere regardless of whether they are citizens or immigrants, students or tourists, workers or refugees or any other group. The basic fundamental duty of Forensic odontologist is to aid in Identification based on the dental expertise one may possess. The Interpol General Assembly of 1996 on DVI stipulated that human beings have the right not to lose their identity even after death. There is no specific law in India protecting the dignity of dead. However the court have time to time reiterated to uphold the dignity and protect the rights of the dead. The National Human Rights Commission, The Constitution of India has been formulated to work for these basic rights. The present poster would aim to highlight the importance of identification and role of forensic odontologist in various dental parameters- Denture markers in prosthesis, dental associated structures, various primary and secondary identifiers etc.

Keywords: Identification, Interpol, Forensic Odontologist, Forensic Dentist, NHRC, United Nations.

Registration Number - IAFO/2022/419

AGE AND GENDER ASSESSMENT THROUGH 3D MORPHOMETRIC ANALYSIS OF MAXILLARY SINUS

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Abstract

Introduction: Age and sex determinations are important tools in forensic odontology which help in the identification of an individual and plays a major role in medico legal investigation of demise. Maxillary sinus can prove a special aid for personal identification as the dimensions of the maxillary sinuses are reliable indicators in forensics as Maxillary sinuses remain intact even in explosions, warfare, and other mass disasters such as aircraft crashes, the skull, and other bones are badly disfigured. Various radiological modalities can be used to study maxillary sinus in the form of CT, CBCT, CECT AND MRI. AIM: Aim of this poster is to elaborate the various radiographic modalities which can be used to estimate Age and Gender of any individual/ population using maxillary sinus. DISCUSSION: Regarding age grouping, the four variables (volume, width, depth, and height) showed a significant difference, where all of them found to decrease with the age. It is found that the maxillary sinuses in males were larger in volume and wider in width than that of females, as well as the depth and height are higher in males than that of females. So, overall maxillary sinus proves a reliable indicator for age and gender assessment.

Registration Number - IAFO/2022/366

NEONATAL LINE: BIRTH DYNAMIC & AN EVIDENCE TO BRUTAL ACT

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Abstract

The transition from an intra to extra uterine environment leavés its mark in the deciduous teeth and first permanent molar, as accentuated enamel incremental lines called as Neonatal Line. It is a histological landmark in primary tooth enamel corresponding to event of birth. It marks the stress, trauma & metabolic changes experienced during birth. The presence of this neonatal line indicates live birth and it is possible to estimate the exact period of survival of the infants in days by measuring the amount of postnatal hard tissue formation and can be evidence to prove female infanticide. Female infanticide is a widespread social problem in India. To prove a case of infanticide, it is very essential to distinguish between live bith and stillbirth. However, by the time the mortal remains of the child are available for forensic examination, the body is decayed and putrefied; hence, soft-tissue evidence is lost. Although the chronological age of the child can be estimated by skeletal parameters, they cannot differentiate live birth and stillbirth. Thus, in such cases, the neonatal line is a valuable tool to prove female infanticide. Thus this poster provides information between still and live birth which plays a paramount role in dejecting cases of infanticide.

Registration Number - IAFO/2022/197

SIGNIFICANCE OF DENTIN IN FORENSIC ODONTOLOGY

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Abstract

Introduction: Dentin forms the major bulk of the tooth, reinforces the tooth's enamel, and supports the structure of the tooth. Dentin has a major role in forensics, aiding in age estimation as it develops uniformly from infancy to adolescence. As age advances, the dentin undergoes physiological changes such as deposition of sclerotic dentin which can be used in dental age estimation. Other dentinal parameters that can aid in age estimation are color changes in dentin, DNA and mitochondrial DNA extraction, dentin translucency, and changes in the pulp chamber due to deposition of secondary dentin. Aspartic acid racemization uses root dentin for age estimation, as it forms early in life and undergoes little biochemical turnover during life. Gender determination can be done through the amelogenin gene. The formation of Incremental lines in dentin determines the time since the death of neonates. Neonatal lines in dentin, are used to distinguish foeticide from stillborn. Conclusion: Dentin is a hard tissue that forms throughout one's life, so it can be used as a significant tool for age estimation, gender identification, neonatal death, and estimating time since death.

Keywords: dentin, forensic application, age estimation, gender determination

Registration Number - IAFO/2022/190

ARTIFICIAL INTELLIGENCE IN FORENSIC ODONTOLOGY: AN UPDATE

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Abstract

Forensic Odontology mainly deals with the identification of the victims of mass disasters, by assessing the unique structures of the oral cavity. Artificial intelligence (AI) is a branch of computer science concerned with performing tasks that typically require human intelligence using capable smart machines. The smart mathematical technological advancements which mimic the human brains are the artificial intelligent models used in forensic odontology displaying accuracy and precision equivalent to that of trained examiners, with added advantage of overcoming human errors and being non-invasive. The models can identify an individual through dental records, oral radiographs, and dental casts and are designed and developed to overcome the variability in allocation caused by the human eye and mind. In Forensic Odontology, Artificial Intelligence technology has been widely applied for identifying bite-marks, mandibular morphology, gender determination, age estimation, studying of the soft tissues of the diseased, which mainly include palatal rugae pattern (palatoscopy) and the pattern of the lip prints (cheiloscopy).The use of AI modalities in actual real-life incidences like criminal cases, mass disasters are recommended for future directions which enables the real translational value of Artificial Intelligence in Forensic Odontology. This poster highlights the role of Artificial Intelligence in Forensic Odontology.

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BITE MARK: A DOUBLE-EDGED SWORD

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Abstract

Background: Teeth are the soul of dentistry, similarly bite mark can be said as the heart of forensic odontology; but has this heart always been beaten in serving justice!!? Bitemark are a form of pattern injury, which means the configuration is caused by the impact of oral and para-oral structures. Bitemark analysis is an imperative area of forensic odontology and considered the commonest form of dental evidence presented in the criminal courts. However as simple and perspicuous this science seems to researchers cannot stop themselves from comparing it with 'Rocket Science'. This is due to the fact that bitemarks are not DNA and can very rarely be used for definitive conviction. To possibly identify the biter; class and individual tooth characteristics such as malformations, missing tooth, rotations, diastemas, Occlusal & incisal anatomy should be present and at the same time skin being the terrible medium of recording medium, these parameters become questionable. For a fact, bitemark ages and gets visual changes with time progression. Moreover, these changes will lead to an intra-observer error. The healing dynamics of the bite wounds has been insufficiently studied, thus making the job more cumbersome. Though the field of bitemark analysis seems quick, accurate and effortless, the technique and expertise for it is hard, laborious and inaccurate. So, through this poster presentation we will try to explore and highlight the two opposite sides of bitemark analysis.

Keywords: Bitemarks; Forensic Odontology; Wrongful Convictions; Evidence Value

THE ROLE OF FORENSIC ODONTOLOGY IN THE IDENTIFICATION OF MASS DISASTER VICTIMS

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Abstract

Mass disasters may arise due to natural or manmade circumstances that are usually associated with many casualties. When human remains are tremendously damaged and degraded in forensic cases and the identification becomes challenging, in those cases teeth and bones are often the only reliable sources of DNA for identification. Teeth is particularly resistant to incineration, decomposition, humidity, high temperature, microbial action and hence is an excellent source to collect DNA. Keeping in mind that DNA analysis is expensive. Forensic Odontology is one of the most reliable and economical scientific methods for victim identification in mass disasters. DNA obtained from tooth of victims can be compared with samples obtained from the victims' personal objects such as toothbrushes or from stored blood/biopsy specimen/cervical smear or from immediate family members. Forensic odontology-based identification relies heavily on the availability of ante-mortem records from general dental practitioners. Hence, general dental practitioners must be knowledgeable about forensic odontology and maintain appropriate dental records. The purpose of the poster is to provide a better understanding of the role of forensic odontology as an important tool in identifying victims following mass disasters.

COMPUTER ASSISTED DENTAL IDENTIFICATION AND DENTAL RECORDS MANAGEMENT

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Abstract

After large tragedies or crimes, forensic dentistry is crucial in identifying the deceased who cannot be identified visually or by other means. In terms of the collection, analysis, and reporting of forensic evidence, digital forensics has transformed conventional forensic investigations, and its use in terrorism, earthquakes, and large-scale disasters is on the rise. Software advancements and the development of digital technologies, including computers, computer-aided design and manufacturing systems, digital records, touch-free autopsies, and virtopsy, have made it possible to quickly identify individuals and extract large amounts of data with little sampling bias. In situations involving large-scale disasters and undetected, decomposing bodies, they might be helpful for identifying specific people. In medical-legal and criminal investigations, dental records may be used to identify suspects. Most European and American nations have laws requiring the up keep of dental records. Unfortunately, India's legal system is not very clear, and there is very little awareness of it. The main goal is to gauge dentists' awareness of the importance of entering data digitally, maintaining dental records, determine the standard of the records they typically maintain, and assess the potential application of those data in forensic or medicolegal situations.

Registration Number - IAFO/2022/417

CERVICAL VERTEBRAE: A TOOL FOR AGE ESTIMATION

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Abstract

INTRODUCTION: Reliable indicators of individual skeletal maturity are three: increase in statural height, skeletal maturation of the hand and wrist and changes in morphology of the cervical vertebrae. Modifications in size and shape of the cervical vertebrae in growing subjects have gained increasing interest during the past few decades as a biological indicator of individual skeletal maturity. The cervical vertebral maturation (CVM) method has become popular because the analysis of cervical vertebrae is performed on the lateral cephalogram, a type of radiograph routinely available for orthodontic diagnosis. Anterior vertebral body height (AH), vertebral body height (H), posterior vertebral body height (PH), and anteroposterior vertebral body length (AP) on the third and fourth cervical vertebrae can also be used as a tool for age estimation. AIM: The Aim of this poster is to emphasize on the various methods of age estimation using cervical vertebrae. DISCUSSION: Several systematic reviews of the CVM method and its reliability have been published previously. Perinetti et al. demonstrated that when specific training is provided for the visual assessment of the stages, the CVM method proves to be repeatable to a satisfactory level. Positive results were reached by researchers in a study at the University of Liverpool.

Registration Number - IAFO/2022/295

PROSTHODONTICS - AN ARSENAL IN FORENSIC   ODONTOLOGY

Dr. V Theja Priya[1]

Abstract

Forensic odontology plays an important and often decisive role in the identification of disaster victims. From the prosthodontist view this difficulty can be prevented by delivering a prosthesis that carries patient identification. Forensic identification based on assessment of prosthodontics appliances is assuming greater significance, as labeling of dentures and other prosthetic appliances could provide vital clues for victim identification.The wide use of dental implants in all fields of dentistry , will increase the frequency of implants becoming a part and, in some circumstances, most of the recorded antemortem information for an individual. Recent advances like implant recognition software, radiographic recognition of dental implants and assessment of batch numbers help the forensic odontologist in identifying the victims by comparing with the antemortem records of the affected victims, know the geophraphical area and socio economic status of the victim. Other sources such as salivary sample collection from the prosthesis can provide a rich source of DNA collection. This poster gazes on the nutshell view of how prosthodontist serves as a weapon against the increasing crime rates by unification of prosthodontics and forensic odontology for the ease in forensic investigations.

Registration Number - IAFO/2022/199

COGENCY OF ENDODONTICS IN FORENSICS

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Abstract

Dental identification of a deceased individual is a core task in forensic odontology. The accurate recording of clinical dental procedures has become more imperative over time because of the growing trend of medicolegal issues worldwide. Advances in endodontic imaging, root and root canal anatomy, and biomaterials have been steadily emerging in endodontic research and practice. From a forensic scope, endodontics plays a fastidious role in providing solid antemortem radiographic evidence for comparison with postmortem findings in human identifications. Even the status of a person's teeth changes throughout life and the combination of decayed, missing, and filled teeth are analogous and comparable at any fixed point in time. This poster provides an update on the interrelatedness between endodontics and forensic personal identification & how the potential of this science and art can be further disseminated for the benefit of society.

APPLICATION OF VARIOUS RADIOGRAPHIC MODALITIES IN FORENSIC ODONTOLOGY

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Abstract

Imaging techniques are an indispensable tool for the forensic science and forensic odontology. With the advent of radiographs in forensic odontology, identification became easier and authentic as studying internal structures and documenting them became possible. Radiographs can be used as legal evidences in court cases due to their standardization. From conventional 2D technologies like Intraoral Periapical Radiographs (IOPA) which are used in comparing ante mortem and post mortem records in evaluation of dental restorations for personal identification, occlusal radiographs and extraoral radiographs like orthopantomogram (OPG) and cephalometric radiographs in various techniques of age estimation and personal identification; to newer and highly precise technology like Cone Beam Computed Tomography (CBCT), Computerized Tomography (CT) and Magnetic Resonance Imaging (MRI) which are used in various arenas of forensic odontology like sex determination, assessment of bite marks and recent advances like virtopsy, radiographs play a major role in the evaluation. This poster is a review of all the radiographic modalities used to assess and inspect the evidence to take dentistry further towards delivering Truth and Justice.

Keywords: Bite mark assessment, Forensic odontology, Personal identification, Radiographic modalities

DIGITAL REVOLUTIONS IN FORENSIC ODONTOLOGY: A BOON TO FORENSIC INVESTIGATORS

Dr. Manasa Mariyam Babu[1], Dr. Jayanthi P[2]

Abstract

Forensic odontology has inevitable role in forensic investigations and anthropological studies. It can be utilised for the identification of deceased individuals who cannot be identified by any other means after natural calamities or terrorist attacks, or murders. Identification is a very difficult task associated with mysterious deaths. Digitization of forensic odontology is actually a boon to forensic investigators to reach a proper conclusion in medico legal cases. Digital forensics has made drastic changes in acquisition, analysis, and reporting of forensic evidences. Evolution in the forensics with digitization have opened up new directions to solve criminal and civil cases. This poster aims at discussing the role and application of various technologies used vividly in the field of forensic odontology.

VIRTOPSY: NO CUTS - NO SEWS

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Abstract

The word autopsy is from the Greek word autopsia, meaning "to see with one's own eye. This treatment results in considerable mutilation, which causes concern among the bereaved relatives. To address this flaw, virtopsy has branched out into the field of forensic science. The term virtopsy is made up of two words: virtual and autopsy. It uses imaging tools that are commonly used in clinical medicine, such as computed tomography and magnetic resonance imaging, to determine the cause of death. It's a multidisciplinary technique that incorporates forensic medicine, computer graphics, and biomechanics, etc. It is a new-age complementary documentation method for locating and analysing data, recently inaugurated even in AIIMS, Delhi. It can be an efficient way to deliver justice to the deceased without any invasion into their bodies. This paper emphasizes various aspects, merits, and demerits and examples of various criminal cases justified using.

CURRENT TRENDS IN FORENSIC ODONTOLOGY

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Abstract

Forensic odontology is one such branch of dentistry, which serves in the interest of justice through dental evidence. In conditions such as mass disasters & criminal analysis for determination of human individual through age estimation, racial identification and ethnicity, health conditions like pregnancy and so on, tooth is considered as the best identification tool, as it has unique enamel prints (alike fingerprints) and is highly resistant to destruction in the most un-favourable environmental conditions. Various methods are in vogue currently, like DNA analysis for identity confirmation, biomarkers for identification of body fluids, 3D image technology for reconstructing teeth and bitemark analysis, determining thickness of facial soft tissue for facial reconstruction, CBCT scanning for dental age assessment, digital imaging and so on. Forensic odontology is fast evolving with a very promising scope as it helps in identification of individuals which seems less plausible by other means. The objective of this presentation is to get a telescopic view of the currently available methods and technologies in forensic odontology.

ROLE OF CBCT IN FORENSIC ODONTOLOGY

Dr. Ruwena Eliz Salins[1], Dr. G. Roopashri[2]

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Abstract

Forensic odontology is an emerging branch in forensic sciences wherein the dentist is aware of different techniques and resources to incorporate the technology in order to achieve success in human identification. Cone-beam computed tomography is a relatively new, advanced imaging modality that has driven the interest in its applications in the field of forensic dentistry. Radiographs carry great evidence to act as ante mortem records and also assists in identifying the person's age, gender, race, etc. Identification using radiography has proficiency and advantages the ease of technique, the retrograde records obtainment of both the living and the dead and the cost-effectiveness in comparison to the DNA technology. This poster reveals the importance of CBCT in forensic odontology.

DIGITAL PHOTOGRAPHY IN FORENSIC ODONTOLOGY: MODERN AID

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Abstract

Forensic digital photography is an essential technique used in forensic odontology which aids in the investigation, record purposes, crime and medico legal issues. The role of the forensic photography is crucial, as a good skill in photography with updated knowledge of the mechanics and techniques is required for proper documentation of evidence. To produce consistent and accurate results forensic dentists must have the background knowledge of photographic theory and must accomplish how to use the equipment. Photographs are more accurate, graphic, objective and verifiable than written, verbal and sketches as they capture perishable or transient evidence. If the depiction are precise, the photographs will play a vital role and will be readily accepted as evidence. The aim of this review is to emphasize the role of well skilled and digital photography in forensic odontology. Which will serve to corroborate and strengthen the written record.

Registration Number - IAFO/2022/491

ROLE OF FORENSIC ODONTOLOGY IN FOETICIDE

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Abstract

In India, female infanticide is a widespread social issue. Because of a lack of proper evidence, the vast majority of infanticide cases go unreported. To prove infanticide, it is critical to distinguish between live birth and stillbirth. However, by the time the child's mortal remains are available for forensic examination, the body may be decayed and putrefied, resulting in the loss of soft-tissue evidence. Skeletal parameters can estimate a child's chronological age but cannot differentiate between live and stillbirth. An infanticide forensic investigation's primary goal is to provide evidence against the claim of stillbirth. Differentiating between live and stillbirth would be compelling evidence of "infanticide." The neonatal line can be used to prove female infanticide in such cases. The neonatal line separates prenatal enamel from postnatal enamel and is formed shortly after birth. The presence of a neonatal line and a significant amount of enamel formed beyond it in the newborn infant's developing tooth germs, as demonstrated by light, polarised, and scanning electron microscopy, indicated that the baby was born alive and had survived for several days before death. The cross striations on the enamel rod represent the daily incremental deposition of enamel under light and polarised microscope. This poster presentation highlights the different facts about the role of forensic odontology in foeticide.

DNA PROFILING: TRACKING THE MINISCULE

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Abstract

Forensic Odontology is an integral part of identification of suspects during forensic criminology and it combines aspects of dentistry, law and detection. In the identification of suspects, DNA acts as powerful evidence as it is responsible for storing all the genetic material and is unique to each individual. It is the language of life that yields information beyond our imagination, both in health and disease. To uncover all the mysteries linked with the oral cavity and its manifestations during diseased conditions, DNA profiling is the most appropriate tool. DNA profiling mainly focuses on nuclear DNA but apart from nuclear DNA, mitochondrial DNA analysis plays an important role in forensic. DNA has been isolated and characterized from teeth, saliva, blood, epithelial cells, hair and bone. DNA profile tests give details about an individual's physical characteristics, ethnicity, place of origin and gender. With the development of newer instruments and technique for DNA profiling, the future in this field is promising. So, this poster intends to unveil all the methods used in DNA profiling used in forensic science.

RUGOSCOPY- A TOOL IN FORENSIC ODONTOLOGY

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Abstract

Forensic odontology is the branch of dentistry which in the interest of justice deals with proper handling and examination of dental evidences by proper evaluation and presentation of dental finding. One of the methods used in forensic odontology is analysis of palatal rugae pattern. Palatal rugae are ridges on anterior part of palatal mucosa on each side of mid palatine raphae. Palatal rugae are considered to be unique to an individual and they seldom change their shape with age and reappear after trauma and surgery. So, these properties make it reliable guide to forensic identification. This poster shows various classification, methods of recording and clinical implication of rugoscopy in the forensic dentistry.

Registration Number - IAFO/2022/207

SEXUAL DIMORPHISM – HARD TISSUE AND SOFT TISSUE BASED FORENSIC IDENTIFICATION

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Abstract

Sex determination is the first step of personal identification in the field of forensics and is essential for reconstructive profiling. Both oral hard and soft tissues are used by forensic odontologist for sex determination. The most reliable source for sex determination among skull is mandible which plays an important role by virtue of its being the strongest, largest and most dimorphic bone of the skull. Various parameters in the mandible can be considered as a valuable tool in gender determination since it possesses resistance to damage and disintegration process. Among soft tissues of oral cavity, oral mucosa, palate, lips, and tongue can be used for forensic identification. The Tongue is very unique vital organ which can easily be uncovered for investigation purposes in forensic odontology. It is the only part of oral cavity that can be stuck out of mouth and is difficult to forge. The shape and surface texture of tongue varies among individuals. It is an evolving science in the field of forensic and there is greater scope for its further development. This poster aims to throw light on hard and soft tissue parameters useful for gender determination.

Registration Number - IAFO/2022/229

RELEVANCE OF PALATAL DEPTH AND ARCH LENGTH TO FORENSIC SCIENCE

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Abstract

Forensic odontology has established itself as an important and often indispensable science in medicolegal matters and in particular in identification of the dead. Morphological variations in the dental arch measurements in primary dentition, mixed dentition, and permanent dentition are of great concern to a forensic odontologist. One of the older and widely used methods of gender and age determination is the morphological analysis of skeletal and dental remains. Palatal and dental structures are protected within the oral cavity which makes them resistant to damage by massive trauma and thermal insults. The arch length and palatal depth measurements have considerable importance in sex and age determination of an individual, thus, making it reliable tool for forensic investigation. This poster aims to discuss the correlation between arch length and palatal depth of mixed dentition individuals with permanent dentition so that clue for sexual dimorphism and age estimation can be significantly predicted.

Registration Number - IAFO/2022/344

ESTIMATION USING CANINE PULPAL AREA IN ADULTS: A CBCT IMAGE ANALYSIS IN SOUTH TAMILNADU POPULATION-A PILOT STUDY

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Abstract

Determination of age of a subject is one of the most important aspects of medico-legal cases and anthropological research. Age is one of the essential factors in establishing the identity of the person. Teeth are preferred in age estimation method because they are less influenced by nutritional, hormonal and environmental factors than bone. Permanent canines have large pulp dimensions, subject to less wear from diet and demonstrate high level of survival compared with other teeth in dentitions. Secondary dentin deposition is responsible for the decrease in the volume of the pulp cavity with age. Therefore, the area of the pulp cavity can be considered as a predictor for estimating age. Therefore, the aim of the present study to determine the age estimation using canine pulpal area in adults-A cbct image analysis in south Tamilnadu populations.

FORENSIC GENOMICS

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Abstract

This Article brings about applications in Forensic genomics in the field of forensic Odontology. Toxic spills, hypoxia, disease outbreak and toxin producing algae blooms are all possible causes of mass mortality events but in many cases it can be difficult to pinpoint the cause of death. Here we represent a new approach that we name Forensic Genomics. Forensic Genomics addresses the advancement in genetic testing and genomic analysis. It can enable investigators to breakthrough previously impenetrable forensic barriers.

MICROBIOLOGY IN FORENSICS – AN UPCOMING DISCIPLINE

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Abstract

Forensic microbiology, like other areas of forensic science, deals with determining the cause of death and the identification of people who have committed crimes. It is a newer area of forensic science that gained importance after the Bacillus anthracis attacks launched through the United States Postal Service in 2001. Forensic microbiology goes beyond testing performed by clinical microbiology and public health laboratories. This field of study relies upon classic microbiology techniques, such as cultures and biochemical identification, but also incorporates molecular biology assays, genetics, and phylogenetics. With a threat of bioterror and biocrime, the rapid identification and subtyping of infectious agents is of upmost importance. Microbial genetic analysis is a valuable tool in this arena. The cost to sequence a microbial genome has fallen dramatically in recent years making this method more widely available. This presentation aims to shed some light on this upcoming discipline.

Registration Number - IAFO/2022/259

DENTAL IDENTIFICATION AND FORENSIC ODONTOLOGY

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Abstract

Forensic odontology is primarily concerned with the use of teeth and oral structures for identification in a legal context. Various forensic odontology techniques help in the identification of the human remains in incidents such as terrorists' attacks, airplane, train and road accidents, fires, mass murders, and natural disasters such as tsunamis, earth quakes and floods, etc. (Disaster Victim Identification-DVI). Dental structures are the hardest and well protected structures in the body. These structures resist decomposition and high temperatures and are among the last ones to disintegrate after death. The principal basis of the dental identification lies in the fact that no two oral cavities are alike and the teeth are unique to an individual. The dental evidence of the deceased recovered from the scene of crime/occurrence is compared with the ante-mortem records for identification. Dental features such as tooth morphology, variations in shape and size, restorations, pathologies, missing tooth, wear patterns, crowding of the teeth, colour and position of the tooth, rotations and other peculiar dental anomalies give every individual a unique identity. In absence of ante-mortem dental records for comparison, the teeth can help in the determination of age, sex, race/ethnicity, habits, occupations, etc. which can give further clues regarding the identity of the individuals. The dental identification process must be carefully undertaken and relies upon the comparison of information from the antemortem record with findings from the post-mortem examination, and the efficiency of this process is dependent on the quality and availability of the dental record. Automated dental identification system is computer-aided software for the post-mortem identification of deceased individuals based on dental characteristics specifically radiographs. This system is receiving increased attention because of the large number of victims encountered in the mass disasters and it is 90% more time saving and accurate than the conventional radiographic methods. This technique is based on the intensity of the overall region of tooth image and therefore it does not necessitate the presence of sharp boundary between the teeth. It provides automated search and matching capabilities for digitized radiographs and photographic dental images and compares the teeth present in multiple digitized dental records in order to access their similarity. As dental team members it is our responsibility to keep and maintain accurate records of our patients. The resilience of the dental structures to post-mortem assault, denture labelling, and teeth as a source of DNA, all contribute to making identification successful. Aim of paper is to give the greater understanding of role of forensic odontologist in the identification of human remains and emphasise the importance of keeping good quality, accurate and comprehensive dental records.

Registration Number - IAFO/2022/450

CHEILOSCOPY

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Abstract

Identification plays a major role in any crime investigation. The pattern of wrinkles on the lips has individual characteristics as fingerprints. The wrinkles and grooves on the lip form a characteristic pattern called lip prints, the study of which is referred to as Cheiloscopy. Lip prints being uniform throughout the life can be used to verify the presence or absence of an individual from the crime scene. Differentiating the sex of a person using cheiloscopy can help in screening a large number of suspects. Lip prints may be left at a crime scene provided there has been consumption of beverages, drinks, presence of lipstick marks, usage of cloth, tissues or napkins and it would lead to the direct identity of the suspect. The materials used to obtain lip prints are lipsticks, cellophane tape, bond paper, magnifying lens, and brush. Invisible or latent lip prints can be developed and visualized using agents such as aluminum powder and magnetic powder. Therefore, cheiloscopy plays an important role in the identification of living as well as deceased person. Lip prints are unique and behold the potential for recognition of the sex of an individual.

EVALUATION OF MAXILLARY AND SPHENOIDAL SINUSES' VOLUME AND BIZYGOMATIC WIDTH USING CBCT – A PROMISING TOOL FOR SEX DETERMINATION

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Abstract

Skeletal remains play a vital role in forensics for identification. When skull is present for the examination, accuracy of sex determination increases upto 98%. There are numerous parameters used for sex determination using the skull remains. Radiographically, paranasal sinuses including frontal, ethmoidal, sphenoidal and maxillary sinus show difference among the sex groups. Bizygomatic width is also a useful parameter in sex determination. This study is aimed for sex determination by evaluating maxillary and sphenoidal sinuses' volume using CBCT scans. Using ITK-SNAP software, the right and left maxillary sinus will be selected as region of interests individually. The selected region will be segmented three dimensionally. With clustering mode, the sinus will be shaded for volume measurement in all three dimensions. Same will be done for right and left sphenoidal sinus. The relevant difference in both the gender will be compared in relation to Bizygomatic width. This study shall find out the relevance of bizygomatic width, maxillary and sphenoidal sinuses' volume in sexual dimorphism which will be useful in sex determination in the field of forensic science.

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THE OBSCURE FORENSIC TASTE

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Abstract

Background: Tongue is a vital internal organ, unaffected by the external environment as it is well encased within the oral cavity. The human tongue promises to deliver a level of uniqueness in shape, texture and depth of fissures in each person. It provides both static and dynamic features for authentication. Tongue prints, as a new biometric authentication method has been found beneficial for identification. The distinctiveness of the tongue print is that no two tongues are the same, and the tongue of identical twins also does not resemble each other. As the tongue is well protected, so the tongue prints are immune to forgery. Tongue prints can also aid in sexual dimorphism. Tongue prints have eminent advantages over other biometric systems. In India, the identification with the help of tongue prints is still at grass-root level and needs more amount of research so that it can be used as a widely available and accepted tool in future.

Objective: The objective of the literature review is to showcase the potential of tongue prints as a helpful forensic tool for individual identification.

Keywords: Tongue prints, forensic tool, authentication, forgery, sexual dimorphism.

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DENTAL IMPLANTS IN FORENSIC ODONTOLOGY: A REVIEW

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Abstract

Forensic odontology (FO) is recognized as one of the primary methods for forensic identification. Although teeth are structures resistant to high temperatures, particular conditions can make them very fragile. Dental treatment has witnessed a revolution with the extensive use of dental implants worldwide. In the last years, dental implants have been increasingly and more often used, making them an important addition to dental identification. The effect of extreme heat on dental tissues and on bones frequently makes DNA recovery very difficult above 300°C although dental therapeutic features, such as medical implants and dental restorations, can survive cremation and be useful for identification. Implants are known to resist mechanical and thermal insult. In cases of severe incineration, implant bodies and abutments may be the only dental remains as titanium implants have a high melting point (>1600°C). This presentation presents a review of available literature highlighting the fact of how an implant can play a key role in the identification of a deceased individual.

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NEONATAL LINES: A POTENT TOOL TO AUTHENTICATE FEMALE INFANTICIDE

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Abstract

BACKGROUND: Females in India have faced gender bias since time immemorial. This manifests itself as female infanticide or female foeticide. While foeticide may be defined as killing of the female embryo in the mother's womb, infanticide is killing of the new born female child. The greatest challenge is to differentiate a live birth from a still birth and is often required to be determined in criminal forensic investigations. Neonatal lines may be one of the solution in this arena. OBJECTIVE- To conduct a literature search to differentiate a live birth from a still birth using neonatal lines. MATERIALS AND METHOD: The review of literature was done electronically as well as manually. For electronic search, various scientific journals and web-based search engine - Medline and Pubmed, Google Scholar were searched for literature using search terms " live birth", " still birth", "neonatal lines". RESULTS: Five studies were identified, of which three studies indicated that the ground sections of all the developing tooth germs showed the presence of neonatal line suggesting live birth. Fourth study found no evidence of neonatal lines in tooth germs of a still born baby.Another study suggested neonatal lines are formed as a result of physiological stresses and trauma during the time of birth. DISCUSSION: Neonatal lines live birth can be detected by changes observed in the shape of the chest, position of the diaphragm, changes in the morphology of the lungs, stomach and intestine. These may be used to provide evidence of live birth. CONCLUSION: Neonatal lines indicate live birth and serve as vital tools for forensic investigations related to infanticide or feticide.

DENTAL ANTHROPOLOGY: USE IN FORENSICS

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Abstract

Teeth are integral to forensics just as they are to other fields of study. In addition to being the most durable substance in the human skeleton, the tests are highly genetically influenced and with specific developmental characteristics,Human teeth are also easily distinguished from other animals including living apes. It also helps in: 1) Estimating age from dentition. 2) Determining sex from the adult dentition. 3) Assessing ancestry or race form the dentition.

TOOTH LEADING TO TRUTH

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Abstract

Forensic odontology is a valuable part of forensic medicinal science. It plays a pivotal role in identifying the human remains of victims through dental evidences. Teeth appear to be vital piece of evidence in crime investigations, identity identification in mass disaster and many such investigations. Teeth as part of human body is naturally preserved as it resides in the closed cavities of the mouth and are generally resistant to the threatening environmental conditions, making them very useful in post-mortem analysis. Teeth being a vital structure help in age estimation, bite mark analysis, sexual dimorphism, dental DNA fingerprinting etc. Teeth, in particular, are helpful in the age and gender and ethnicity determination where an individual's identity remains doubtful. It also helps in assessment of abuse by analysis of bite mark pattern, identification of weapon of assault etc. Thus, teeth prove to be an important adjunct in forensics and its scope is increasing day by day because of increase in the number of crimes, unidentified cadavers and human remains and for living individuals with no valid age proof. So herewith, this poster is being presented which depicts the uses of teeth in forensic odontology and various means by which a tooth can lead to truth.

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ADVANCED ARTIFICIAL INTELLIGENCE IN FORENSIC MEDICINE - "MIRACLE OF SCIENCE"

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Abstract

Conventional forensic analysis is based on forensic expert's manual extraction of Information. Forensic expert provides opinions established on medical and other fields Of current knowledge combined with personal work experience which is not only time consuming, albeit frequently affected by subjective factors that are tough to overcome. Artificial intelligence has brought new vigour to forensic medicine with some challenges. AI and forensic medicine are developing collaboratively and extensive interdisciplinary cooperation is required for advanced AI implementation. A new trend in forensic medicine is the application of artificial intelligence (AI) and a possible watershed moment for the whole forensic field. Three-dimensional convolutional neural networks (3D CNN) of artificial intelligence (AI) uses deep learning to perform generative and descriptive tasks and are potent in image processing and recognition with many features such as simple structure, less training parameters and adaptability. Advantage of CNN is that it automatically detects the important features without any human supervision. 3D CNN is used to extract features in three Dimensions where input is a 3D volume or a sequence of 2D pictures, e.g., slices in a cone-beam computer tomography scan (CBCT). Perspectives of 3D CNN application methods for particular forensic research is (1) sex determination, (2) biological age estimation, (3) 3D cephalometric landmark annotation, (4) growth vectors prediction, (5) facial soft-tissue estimation from the skull and vice versa. 3D CNN first clinical applications have shown that the algorithms can be successfully used in CT analysis and identifications of specific diseases such as Alzheimer or COVID19 as these have a specific representation on the X-ray.

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VIRTUAL AUTOPSY: A MILESTONE OR A SPEEDBUMP?

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Abstract

An autopsy is an examination of a body after death to determine the cause of death or the character and extent of changes produced by disease. Over years, Forensic experts have preferred photography and X rays as efficient techniques. But a revolutionary change was brought in 1973 when they used Computed Topography. To avoid the standard invasive procedure, an alternative 'virtopsy' was introduced in the year 1999. The term means virtual autopsy, a scalpel free procedure that is a combination of various 3D body surface imaging methods. These include merged CT/MRI. Virtobot system, photogrammetery and surface scanning, post mortem computed tomography angiography are a part of it. The help in forensics is huge by the mentioned techniques. Although, virtual autopsy has a good reliability, there are a few grey areas to be covered that include AM/PM wounds and a few pathological conditions. However, there is no doubt that virtual autopsy is a new development in forensics and has a greater role to play in dentistry.