eConference Proceedings

29th-30th
May 2021
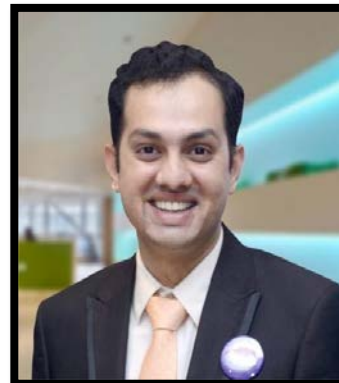
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INTERNATIONAL ASSOCIATION
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5th INTERNATIONAL eCONFERENCE-2021

Forensic Odontology

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GREETINGS FROM THE ORGANIZING DESK

The new era post the global pandemic has affected academics, establishments, and individuals' preparedness worldwide. Forensic Science has an interdisciplinary approach and its true essence can be proved meaningful with collaborative efforts of people present around the globe functioning together as a team. With a vision to bring all the academicians, students, and professionals and share their valuable contemplations, the 5th International eConference is structured to lead the way through endeavors focused to take Forensic to greater heights. We welcome every science enthusiast to become a part of this revolutionizing effort and explore the technological advancements, scientific researches, and opportunities for everyone to flourish.

Dr. Ranjeet Kr. Singh

President

International Association Of Scientists and Researchers

Dr. Emilio Nuzzolese, PhD

President

Association Forensic Odontology for Human Rights

Phaneendar B N

Forensic Expert, CEO

Clue4 Evidence Foundation

THE ORGANIZER

INTERNATIONAL ASSOCIATION OF SCIENTISTS AND RESEARCHERS (IASR)

IASR is a non-profit organization focused to deliver the updated literature and research work to not only the global scientific and research society, but also to everyone. Providing open access to critically reviewed high-quality research papers and literature, it works with a mission of providing a user- friendly global platforms for researchers, scientists for sharing information, and dissemination of recent ground breaking researches and advancements in various fields working together for the betterment of the world.

About the eConference

Forensic Science has proffered techniques that have leveled up the competence of humankind and are staying up with the trend. At the outset, the International Association of Scientists and Researchers (IASR) in association with the Sherlock Institute of Forensic Science (SIFS) India organizing the 5th International eConference on "Forensic Odontology", 2021. With utmost enthusiasm, the organizing committee invites the young minds and professionals of various disciplines of forensic science and become a part of the first-ever convention organized with the motto of bringing the unrecognized talents, present globally. The program would follow talks by eminent national and international experts accompanied by e-paper presentations, ePoster presentations, discussions, and scientific excellence awards.

Mission Statement

"Committing towards the fact of being a lead-follower of technology with a bold spirit of risk-taking, helping us make our presence noticeable worldwide".

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SPEAKER'S PROFILE

DR. HEMLATA PANDEY

### Seth GS Medical College and KEM Hospital, Mumbai

Dr. Hemlata Pandey is Assistant Professor, Odontology Consultant at Department of Forensic Medicine at the prestigious Institute of Seth GS Medical College and KEM Hospital, Mumbai. After studying dentistry in India, she has trained extensively with renowned experts in United Kingdom (Wales, UK) during her MSc. in Forensic Odontology. She Besides having provided expertise for State Police and CBI (Central Bureau of Investigation) in cases of Sexual Assaults, Homicides, Child abuse, Domestic Violence, Identification of unknown Human Remains, Exhumation of graves, Serial killings and Gang-rapes, and also provides expert testimonies in various Courts in India. She also has a Certification in International Humanitarian Law (India), Post Graduate Diploma in Criminal Justice (India) and a Diploma in Forensic Human Identification (London, UK). She is Professor (Visiting) at University of Turin (Italy) for the course "Legal Medicine - Dental anthropology, paleodontology and forensic odontology". She is a Faculty and Mentor in Fellowship Courses conducted by Indian Board of Forensic Odontology (IBFO, IAFO), Indian Dental Association (IDA) and DY Patil School of Dentistry in India. She is Faculty to the State Police Academy, Maharashtra and Police Training School, Lonavala. She has also been a guest speaker at various National and International conferences and CDE Programmes and workshops. She is the President Elect (2019-21) of Association of Forensic Odontology for Human Rights.

DR. EDDY DE VALCK

Academy of Forensic Medical Sciences, London

Dr. Eddy De Valck is a Forensic Odontologist since 1979 and participated in 20 major disasters since 1987 (train- plane – boat disasters, Tsunami 2004 Phuket, 2014 MH 17, 2016 Brussels Terrorist attacks). He is a Lecturer/ Examinator at the Academy of Forensic Medical Sciences, London, UK, and also managing the Odontology section of DVI Federal Police Belgium as Chief Forensic Odontologist. He has given various lectures on DVI management for Georgetown University's International Executive Emergency and Disaster Management Program in Paris (USA), on "Forensic Odontology and Human Identification" for DVI in Specialization Course in University di Torino (Italy). He delivered his talk as a keynote speaker on forensic odontology at different international congresses in Asia, Europe, the USA, and Africa as well as worked as a trainer in various DVI management programs (Malta Police, South Africa Police, Cameroun Police, Interpol). He appeared as a Court expert for civil and penal courts on litigation cases and dental damage evaluation. Dr. Eddy De Valck was an Editor (from 1993 to 1996) as well as President (from 1999 to 2002) of IOFOS (International Association Forensic Odonto-Stomatology). He was a Founding Member and President of Flemish Association of Dental Experts. He is a published author and co-author of several textbooks concerning forensic odontology and legal medicine in languages such as French, English, and Dutch.
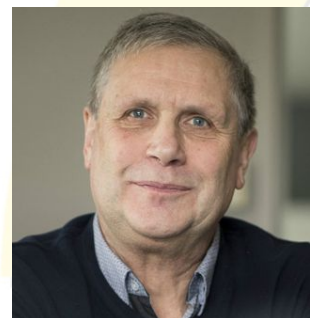
SPEAKER'S PROFILE

DR. EMILIO NUZZOLESE, PhD

University of Turin, Italy

Prof. Emilio Nuzzolese is a forensic odontologist, currently serving as a Researcher and Professor in Legal Medicine at the University of Turin (Italy) and HOD of Forensic Odontology, Medico-legal Institute of Turin. He was graduated in dentistry from the University of Bari (Italy) in 1994. He holds post-graduate degrees in Legal Medicine, Forensic Sciences and Forensic Odontology, plus a Research Doctorate degree (Ph.D.) on Analytic Morphometry. He served as an Expert witness in Civil and Penal Court for dental disputes and professional liability, and Expert before the International Penal Court. He is associative involvements, which include participating as an odontologist in the INTERPOL DVI Forensic Odontology Sub-Working Group, since 2010. He is also President and Founder of the Civil Protection Association Dental Team DVI Europe. Prof. Emilio is a co-founder of Forensic Odontology for Human Rights. He is a Fellow of the Odontology Section of the American Academy of Forensic Sciences, since 2011. He presented over 100 papers in national and international forensic science meetings and journals and has been invited as a speaker in several congresses in Italy and abroad (Canada, Indonesia, India, Hungary, Nepal, Romania, USA, UK), among which the forensic dentistry session of the 2006 FDI World Dental Congress in Shenzen (Republic of China).

DR. DANILO L. MAGTANONG

University of the Philippines, Manila

Dr. Danilo L. Magtanong is currently an Associate Professor in Prosthodontics and the Dean of the College of Dentistry, University of the Philippines Manila. He have been in the academe for 31 years. He finished his Doctor of Dental Medicine (DDM) at the same University in 1986 and was recruited as a member of the faculty at the Section of Prosthodontics immediately after graduation. He took-up and completed his Masters in Health Profession Education (MHPEd) at the National Teachers Training Center for the Health Professions (NTTCHP) in UP Manila, in 2004. In 2010, he took up and finished a dental implant training program in Seoul, South Korea. He is currently the President-Elect of the Philippine Prosthodontic Society (2017-2019) and a Fellow of the same specialty society accredited by the Professional Regulation Commission (PRC) of the Philippines. Throughout his teaching career, he was able to do numerous scholarly and creative works in Prosthodontics for training and education of Dentistry students, as well as, for dental practitioners, including researches and manuals which were published locally and internationally. He is also frequently invited for public awareness programs and fora regarding dentures and denture wearing, including radio and television interviews in the country.

SPEAKER'S PROFILE

DR. CRISTIANA PALMELA PEREIRA

University of Lisbon, Portugal

Dr. Cristiana Palmela Pereira received her DDS degree in Dental Medicine from Dental Faculty, Lisbon University in 2000, and M.Sc. as well as a Ph.D. degree in Legal Medicine and Forensic Sciences from Medical Faculty, Lisbon University, Portugal, respectively in 2005 and 2010. She is Assistant Professor at the Dental Faculty, University of Lisbon. During this period, she also worked as a Forensic Advisor (Forensic Consultant of Forensic Dentistry) at the Portuguese Institute of Legal Medicine and Forensic Sciences, South Branch in Lisbon, until present. Also, she is a Principal Investigator of the research group FORENSEMED from the research unit UICOB since 2019. She is Integrate Researcher in Investigation Center CEAUL, Forensic Analysis Group. She is Forensic Odontologist of the DVI (Disaster Victim Identification) Portuguese Team. She is a co-author of the textbook of the manual proceedings of criminal investigation from the Portuguese Judicial Police. She has been invited as Ad Hoc Review of several others journals, such as Journal of Comparative Human Biology, International Journal of Clinical Pathology and Forensic Medicine, and the Bulletin of the International Association for Palaeontology. She was awarded with national and international awards, such as the IOFOS highest award, the Ferdinand STRÖM.

DR. EVI UNTORO

Forensic Pathologist, Indonesia

Dr. Evi Untoro, a Forensic Pathologist, also learning in Forensic Anthropology, Forensic Genetics/ DNA, Forensic Radiology. A member of INDONESIAN National DVI Team (since 2007), INDONESIAN BANTEN Province DVI Team (since 2016), The Advisory Team in Forensic Pathology and Forensic Anthropology SubWorkingGroup in INTERPOL DVI Team (since 2017). Right now, she has the position of the Vice President Indonesian Region on INPALMS (Indo Pacific Associations of Law, Medicine, and Science) since 2013, the Member of APMLA (Asia Pacific Medico-Legal Agency) since 2013, and IALM (International Academy of Legal Medicine) since 2011, AFOHR (Association of Forensic Odontology for Human Rights) Board Member 2019. She has 5 years' experience (2005-2010) in Identification of the Japanese Soldiers Human Remains of World War II victims of MIA (Missing in Action) in Papua and Makassar, Indonesia from the permission and invitation of the Japanese Government and Japanese Embassy in Indonesia, which added more knowledge, and skills of performance in forensic works. Involved in many Disasters in Indonesia (Natural and Un-Natural) and took the joint training on DVI at several abroad countries using the DVI INTERPOL Guide as International Standards. She will share the knowledge and experiences in the DVI Workshop 2021 in Kyoto, JAPAN.
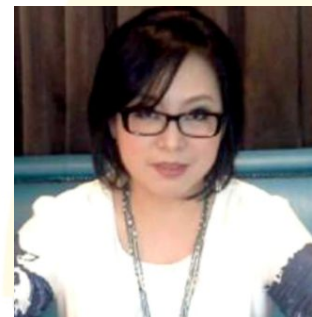
SPEAKER'S PROFILE

DR. JOHN BERKETA

University of Adelaide, Australia

Dr. John Berketa is a lecturer, postgraduate supervisor, and researcher and has a Ph.D. in Forensic Dentistry at the University of Adelaide. As well as conducting regular forensic casework, he is the scene team leader in Disaster Victim Identification in South Australia with specialized skills in maximizing the information gathered for identification of severely incinerated victims. He has published various articles in national journals, international journals, and book chapters with over 200 citations. He is a member of many forensic societies and regularly presents to both national and international organizations including Interpol, the American Academy of Forensic Science (AAFS) and the International Organisation of Forensic Odonto-Stomatology (IOFOS). He is a member of the scientific committee of IOFOS, a peer reviewer of a dozen forensic journals and his work has been recognized with various awards

DR. KHALID KHALID

Nile University, Sudan

Dr. Khalid Khalid is a lecturer at the Faculty of Dentistry, Nile University and is head of the Forensic Dentistry department. Earlier, he worked as a lecturer at the Faculty of Dentistry, University of Science and Technology, Omdurman Sudan. He had obtained Postgraduate Diploma in Research Methodology and Biostatistics, University of Medical Sciences and Technology, Khartoum, Sudan and Postgraduate Diploma in Epidemiology and Biostatistics, University of Medical Sciences and Technology, Khartoum, Sudan. He teaches undergraduate students' forensic dentistry course, oral histology course, tooth morphology course and supervises undergraduate students' researches. He is also Head of the Continuous education unit in the faculty of Dentistry. He is vice president of the criminal age estimation committee in the National Medical Commission, Khartoum North, Sudan. (November 2013 up to date). He is responsible for the Estimation of the age of minors under 18 years old before sending them to the court and is On-call forensic dentist in Omdurman Mortuary – Forensic Medicine Corporation – Ministry of Health – Khartoum State (November 2014 up to date). He has gained much experience in forensic odontology and participated in numerous Workshops and Courses on forensic odontology.

SPEAKER'S PROFILE

DR. SELINA LEOW

NSW Forensic Odontology Unit, Australia

Dr Selina Leow received her undergraduate Dental degree from the University of Sydney and her subsequent post graduate Forensic Odontology qualifications from the University of Adelaide. She has her own private practice in General Dentistry and is a very experienced general dental practitioner. Most recently, she is the Deputy Chairperson (Elect), INTERPOL DVI Forensic Odontology Sub-Working group and regularly attends the INTERPOL DVI meetings each year as an Australian delegate. She has been a part of the NSW Forensic Odontology Team in Australia for many years which is the largest Forensic medicine facility in Australia. She has been involved in DVI teams locally and participated in multiple DVI training exercises and is a member of the NSW and SA DVI teams. She is the Forensic Odontology Co-ordinator for the National DNA Program for Missing and Unidentified Persons overseen by the Australian Federal Police. She is one of the most experienced forensic odontology practitioners familiar with the software system (also known as DVISys or PlassData). She is the NSW Forensic Odontology registrar with the Royal College of Pathologists Australasia and the State of NSW representative (Forensic Odontology) to the National Institute of Forensic Science that provides advice to the Australian and New Zealand Policing Advisory Agency. She is the Vice-President of the Australian Society of Forensic Odontology Inc. (AuSFO) and has membership and participates in many societies and organizations.

DR. ADEMIR FRANCO

Dundee University, United Kingdom

Dr. Ademir Franco is a Forensic Odontologist. In Brazil, he became a dentist and later specialist in Forensic Odontology by the Brazilian Dental Association (ABO-GO). Over the last decade, he studied at Master (MSc), Doctoral (Ph.D.), and postdoctoral levels at the Katholieke Universiteit Leuven, Belgium. Between 2011 and 2021, he has published 150 scientific articles and four book chapters. Currently he reviews for over 40 scientific journals and is a member of seven editorial boards (two with a leading position). He participates within international forensic associations worldwide and dedicates his time to forensic dental practice, research and teaching. After working in public and private Brazilian universities, he became a Lecturer of Forensic Dentistry at the University of Dundee. His activities in the field are focused in human identification, dental age estimation, bite mark analysis and malpractice.

Day 1: 29th May 2021

Time	Topic	Keynote Speaker
10:30 to 11:00 AM IST	Challenges in Identification of Human Remains: A Forensic Odontology Perspective	Dr. Hemlata Pandey
11:00 to 11:30 AM IST	New Technologies in Forensic Odontology as an Emerging field	Dr. Eddy De Valck
11:30 to 12:00 PM IST	Introducing 'Virdentopsy' (TM): Virtual and Remote Dental Autopsy	Prof. Emilio Nuzzolese
12:00 to 12:30 PM IST	The Science of Dentistry and its Technology	Dr. Danilo L. Magtanong
12:30 to 01:00 PM IST	Dental Age Assessment and Age Estimation: United Nations Sustainable Development Goals for 2030	Dr. Cristiana Palmela Pereira

Day 2: 30th May 2021

Time	Topic	Keynote Speaker
10:30 to 11:00 AM IST	Obtaining collaboration on Dentist and Odontologist within Forensic Caseworks	Dr. Evi Untoro
11:00 to 11:30 AM IST	Stabilizing severely incinerated dental remains for Human Identification.	Dr. John Berketa
11:30 to 12:00 PM IST	Dental Identification possibilities in the absence of dental records	Dr. Khalid Khalid
12:00 to 12:30 PM IST	PMCT and Identification – The changing Landscape of Forensic Odontology	Dr. Selina Leow
12:30 to 01:00 PM IST	The importance of research in Forensic Odontology – Practicing with Evidence-based Tools	Dr Ademir Franco

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Dr. AMAN CHOWDHRY
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Chairperson
Dr. SHALINI GUPTA
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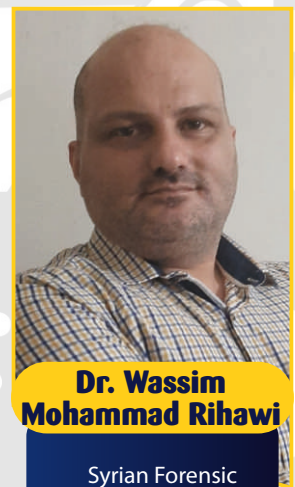Seema Dental College & Hospital, Rishikesh

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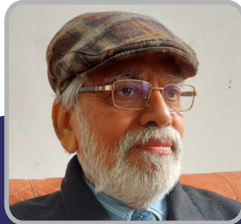**Prof. EMILIO NUZZOLESE**
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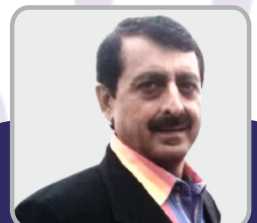ADGP Police Training & Research, Bhopal, M.P.

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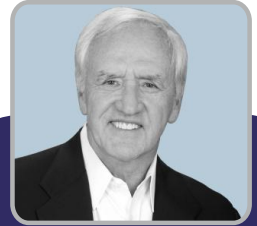
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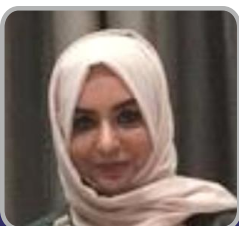
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Paper Category

2D GEOMORPHOMETRIC SHAPE ANALYSIS OF MAXILLARY FIRST PREMOLAR: AN INDICATOR OF SEXUAL DIMORPHISM

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Abstract

Sexual dimorphism in teeth is well documented in terms of linear odontometric measurements. Literature also reviews the subjective shape variation existing between sexes. However, objectively measured, sexual dimorphism of shape of the teeth is less explored. Geometric morphometry is a statistical tool used to assess shape irrespective of the size of the biological entity. The present study was carried out on the standardized photographs of right Maxillary first premolar from 55 dental casts (33 male and 22 females). Nineteen landmarks (based on geometric and anatomic evidence) were marked on the tooth using TPSdig software and analysed using Morpho J using Procrustes analysis and discriminant function analysis. The results showed similar centroid sizes in both gender (p = 0.606). Procrustes ANOVA for shape analysis showed a greater variation with an f value of 1.4 and p value of 0.0624, indicating an increased variation in shape of the teeth among gender when compared to size. Discriminant function analysis based on the procrustes coordinates showed an overall accuracy of 90.91 % classification of gender based on the landmark coordinates (20/22 (90.99%) among females and 30/33 (90.91) among males). Shape of a biological entity has been an integral part of Forensic Anthropology. Tooth is a biological stable structure of the body and is the body's hardest structure and resists climatic, physical and chemical insults sufficiently to retain its structure and shape. Tooth is made of enamel, dentin, cementum which are resistant hard tissues. The enamel is derived from ectoderm and once formed does not change during the life. The tooth's structure and shape are determined by the sex chromosomes, which is well represented as sexual dimorphism.

Keywords: Sexual dimorphism, Geometric morphometry, Procrustes analysis, Maxillary first premolar

ESTIMATION OF SEXUAL DIMORPHISM USING FACIAL SOFT TISSUE THICKNESS USING CONE BEAM COMPUTED TOMOGRAPHY AMONG KARNATAKA POPULATION

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Abstract: As crimes are committed with highly sophisticated methods and procedures, newer techniques need to be developed and improved in Forensic as well as crime scene investigations by applying the benefits of newly emergent and appropriate technological resources. Facial approximations, developed using 3D sculpting technique, need to be enhanced by the availability of modern, well-defined, consistent, and statistically robust population-specific Facial Soft Tissue Thickness data. In such scenario Cone Beam Computed Tomography offers distinct advantages over other technology in developing facial approximations for forensic identification utility as it is non-invasive and economical. The measurement of facial soft tissue thickness relies directly on the relationships between the facial features like the profile, thickness of subcutaneous soft tissues and the underlying bony shape and skull structure. The soft tissue thickness values vary significantly in different geographical areas due to the unique facial features of the individuals in that particular location. This study was carried out by measuring the Facial Soft Tissue Thickness using craniometric and capulometric landmarks that covers anatomical landmarks of the skull, among 56 subjects, aged between 18 to 30 years belonging to Karnataka population. The results revealed set of unique Facial Soft Tissue Thickness measurements of the Karnataka population that might be useful for facial reconstruction purposes and also to establish sexual dimorphism in relation to Facial Soft Tissue Thicknesses. The study results also implies that 3-Dimensional imaging with Cone Beam Computed Tomography may be positively used to analyse facial soft tissue thickness measurements for forensic utility and applied for facial reconstruction and forensic sex estimation.

Keywords: Facial soft tissue thickness, Sexual dimorphism, Forensic Facial Reconstruction, morphometric measurements, Cone Beam Computed Tomography.

THE ADVANTAGES OF VIRTOPSY DURING THE COVID-19 PANDEMIC

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Abstract

During the Covid-19 pandemic, health care workers are at increased risk of acquiring SARS-CoV-2 infection. This could have far-reaching effects on their health as well as the health of their relatives, patients and colleagues and can even lead to the collapse of the health service. Health care workers involved in forensic medicine services are at risk, especially those carrying out autopsies and in resource-limited settings and every effort should be made to keep them as safe as possible. 'Virtopsy' has been suggested as an effective alternative to high-risk traditional autopsy procedure. The term 'Virtopsy' is derived from the words 'virtual' and 'autopsy', and it uses radiological imaging techniques including computed tomography (CT) and magnetic resonance imaging (MRI) in post-mortem examination, essentially to ascertain the cause of death. Virtopsy can be employed independently in forensic examination of the dead or as an addition to conventional autopsy. Whole body imaging in virtopsy is especially useful in detecting smaller lesions as well as lesions from areas that are difficult to approach by conventional autopsy. Virtopsy has a promising role in examination of burnt/charred bodies where the fractures can be detected more easily than in the routine autopsy. A noteworthy advantage is that the images are available for re-evaluation and re-interpretation as more evidence is gathered during the investigation. They can also be used for future references as well as for an expert consultation at a later date. Virtual autopsy, thus, can be an invaluable tool in post-mortem examinations at present. In the absence of virtopsy facilities for post-mortem examination, portable X-ray and ultrasonography machines can be used. Besides, it may be possible to arrange for the use of CT and MRI facilities that are available in the hospital. In Forensic Odontology too Virtopsy is an invaluable tool. On routine basis this safe & scientifically approved technology should be used in Dentistry.

Keywords: Covid-19 pandemic, forensic medicine services, Virtopsy, post-mortem examination, Forensic Odontology.

NATO AND MILITARY DENTISTRY: FROM DENTAL FITNESS TO FORENSIC DENTAL IDENTIFICATION

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Abstract

NATO (North Atlantic Treaty Organization) standardization agreements (STANAG) have been established to allow interoperability among armed forces of the nationalities involved, through the homogenization of logistics, procedures and chain of command. According to NATO, military personnel must undergo medical examination regularly and are required to assess their health and dental status before a deployment abroad. Dental disorders when on duty can reduce the operational capability and affect health services provided inside the military base, which could be limited to a Role 1 or 2 without dental services or without access to a civilian hospital. STANAG2466 "Dental Fitness" is the referral guide to assess the eligibility of military personnel to be deployed. It refers to four oral health conditions, categorized into 4 scores: Score 1, no dental treatment required; Score 2, may require dental treatment but whose existing condition are unlikely to result in a dental emergency within 12 months; Score 3, there is the need of dental treatment to amend conditions likely to cause oral discomfort within 12 months; Score 4, there is the need of a deeper periodontal examination, due to an undetermined dental status or lack or incomplete dental records. Dental examination and charting of military personnel undergoing a "dental fitness" evaluation allows the creation of an archive of the dental data (odontogram, dental impressions, and panoramic X-ray images) which can represent a tool for identification, as ante-mortem (AM) data. Dental records are used in the identification process of human remains as one of the primary identifiers in the tragic death of a military officer. To this regards STANAG2464 "Military Forensic Dental Identification" provides guidelines on the process of recording AM data, post-mortem (PM) data collected through a dental autopsy and the final reconciliation process to achieve a possible identification. The collecting of dental data during the routine dental check-up of military personnel is useful to record the dental formula converted into Interpol style odontogram, and could include radiographs, study models and photographs. Dental data should be archived into a digital and electronic format in order to be accessible from remote and periodically updated.

Keywords: Military dentistry, Armed Forces, Dental Fitness, Dental Records, Ante-Mortem Data, Post-Mortem Data, Dental identification, Forensic Odontology

ISOTOPES IN TEETH- A NOVEL FORENSIC TOOL FOR IDENTIFICATION

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Abstract

Forensic anthropologists and medico legal experts face a huge challenge in terms of missing person searches in cases of serious crimes or mass disasters. The traditional tools of personal identification methods in the form of comparative analysis of fingerprints, DNA profiles, dentition and radiograph though highly effective in identification of the unknown decedents rely on having ante mortem records with which to compare the post-mortem data. For longstanding unidentified remains cases, investigators have started to explore a newer scientific tool for forensic human identification that is isotope analysis. The term isotope means "same place" and refers to the fact that all isotopes of a particular element share the same number of protons and thus appear at the same position in the periodic table. The stable isotope forms of an element typically include one common isotope and one or more rare isotope(s). Stable isotopes do not decay over time. Isoscapes can be generated for multiple materials e.g. (water & soil) and tissues(e.g. teeth , bone, hair and nails)for a number of isotope systems(e.g. C,N,O,S,Sr& Pb).predictive isotope maps are useful for multi isotope applications where overlapping isotopes profiles can aid in narrowing regions of origin. C and N isotopes are used to reconstruct diet, while O2 and Sr isotopes are used to determine geographic origin. Sr and Pb isotope in teeth and bone can also be used to reconstruct migration in human populations and cultural affinity. The lack of remodelling and miniature archival quality of teeth makes them one of the most often chosen bio-materials for elemental isotopic analysis. Although no skeletal tissue is immune to digenetic processes, the dense and highly mineralised structure of tooth enamel affords it a measure of protection in comparison to bone tissue. Crystallites from enamel being the most stable would give precise information about the environment during the period of crown formation in teeth. This paper focuses on the various isotopic analysis of teeth pertaining to identification of the deceased that will provide adequate clues for forensic investigators in establishing identity of individual, since teeth preserve a record of our birth place for the rest of our lives.

Keywords: Isotopes, Forensic analysis, Identification, Skeletal remains, Tooth enamel

AWARENESS REGARDING KNOWLEDGE OF DENTAL RECORDS IN FORENSIC DENTISTRY AMONG UNDERGRADUATE DENTAL STUDENTS OF MADHYA PRADESH

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Abstract

To assess the awareness of patients dental record maintenance among BDS students and to evaluate their knowledge regarding appropriate use of maintained records in forensic identification. Online survey is to be conducted by means Google forms of a self-administered questionnaire consisting of 24 closed ended questions, addressed on awareness about patients' dental record maintenance and its importance in forensic needs among 3th, 4th year BDS students and interns of private and government dental college of Madhya Pradesh. To be prepared after completion of survey for the same.

Keywords: Aadhar number, denture markers, forensic odontology, dental records, dental students.

CURRENT TOOLS AND TECHNIQUES UTILIZED IN FORENSIC ODONTOLOGY

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Abstract

Teeth are the foremost hardest and strong tissues of the human body. They are often stable, safe and resistant to decomposition indeed in major mishaps, crime, burial, or other extreme environmental conditions. The dental designs are one of a kind for every individual. This uniqueness is additionally due to the assortment of treatments and medicines prescribed by the dentist. Subsequently, the dentition of an individual is valuable for the personal identification and comparison, if records exist for the purpose. Forensic dental identification plays an essential role in the identification of remains when post-mortem changes, or traditional methods of Identification invaluable for identification. In courts and legal proceeding forensic Odontology has been used for the past many years. The tools and techniques utilized in forensic Odontology has been advanced through the advancement of the humankind. Thus this review research provides the findings of new emerged tools and techniques utilized in Forensic Odontology and also the comparison of best techniques utilized in Forensic Odontology.

Keywords: Forensic Odontology, Individual Identification, Tools and Techniques, Crime, dental records.

FORENSIC FACIAL RECONSTRUCTION USING CBCT –A SYSTEMATIC REVIEW

Dr. Jijin MJ[1]

Abstract

This systematic review evaluated whether CBCT is a better diagnostic tool in facial forensic reconstruction. Forensic facial reconstruction is a technique to reconstruct human face from unidentified face from skull remains for human identification and facial recognition. PubMed, ProQuest, Google scholar, Science direct and Scopus were screened for studies. Article selection and data extraction was done by one investigator and other investigator confirmed its accuracy. Three hundred and thirty-nine articles were initially identified from which seven articles were full-text reviewed and included in the review. All the articles suggest that CBCT images can be used reliably for the purpose of facial reconstruction. The computerized 3D modeling method produces reliable facial reconstructions with admissible levels of resemblance involving both the combination method and the images scanned from CBCT.

Keywords: Cone beam combuted tomography, Facial reconstruction, facial soft tissuethickness, Forensic Odontology

BITE MARKS – A MIRROR INTO THE CRIME

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Abstract

In the forensic science, criminals are caught with the evidences they leave behind. Human bite analysis is one of the methods used in forensic science to hold on to the criminals. For human bite analysis, forensic dentists play an important role. From human bites we can get the pattern of human dentition of the accused on the victim's body and the saliva which we get from bite marks could be used to extract DNA. So with the process of studying human bites many conclusive results can be derived. Forensic dentists should follow all protocol for collection, management, preservation of sample derived from bite marks and do proper analysis of evidences achieved. We can infer so many important conclusions from human bite marks if handled carefully. So this paper discusses important aspects of collecting evidences according to the protocol and deriving results and their clinical implications.

Keywords: Stereoscopic photographs, PVS impression material, Confocal reflex, Metric Analysis, Odontometric triangle.

DO TOOTH PRINTS OF A HARD TISSUE HAS EQUIVALENCE OF FINGER PRINT - FACT OR FICTION

Dr. Jagdish Guru[1]

Abstract

Personal identification methods may not be effective, in case of decomposed, severely burned & in mass disasters bodies. When soft tissues are not reliable & cannot produce sufficient information or been lost, various other adjunctive methods are currently employed in forensic dentistry/ odontology for personal identification. It includes, comparison of ante & post mortem dental data's such as charts, rugoscopy, denture labelling, DNA analysis from human dental pulp, bite mark analysis, etc., Upcoming area of interest shows study of enamel rod end patterns. These are termed as Tooth print" and the study of the same is called as "Ameloglyphics". This paper briefly reviews about its utilization, procedures and further suggests its uniqueness as finger print in personal identification.

Keywords: Rugoscopy, Ameloglyphics, DNA Analysis, Bitemark Analysis, Personal Identification

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Forensic Odontology

FORENSIC: THIRD EYE IN PANDEMIC COVID-19: *NEW CHALLENGE FOR FORENSIC ODONTOLOGISTS*

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Abstract

COVID-19 is the deadliest pandemic disease of the century. Currently, it is being well known for its higher vulnerability, fatality. An increase in crime rate & violence is expected in near future. To assess awareness of biosafety infection control measures amongst forensic odontologists during COVID-19 pandemic. A Questionnaire based cross-sectional study was conducted amongst 120 Forensic Odontologists based on 5-point Likert Scale with response options A=Strongly Disagree, B= Disagree, C=Neither Disagree/nor Agree, D= Agree, E= Strongly Agree. The questionnaire was divided into two categories. Category I comprising if 6 questions based on general information and category II comprising of 9 questions regarding role of Forensic Odontologists. Data entry and statistical analysis were performed with the Statistical Package for Social Science software program for Windows (version 20.0) and ANOVA test was done. The f-ratio value is 93.08121. The p-value is $< .00001$. The result is significant at $p < .05$. The responses were collected from forensic odontologists having clinical experience of about 5-10 years. They strongly agreed about forensic odontologists should consider every case as potential positive case of COVID-19(55.8%) therefore electronic records should be available for antemortem and should be promoted in Forensic Odontology (50.8%). The current spread of COVID-19 must assume human remains are potentially infected. Therefore, Forensic odontologist involved in autopsic procedures must be well trained in infection prevention control practices.

Keywords*:* Biosafety, COVID-19, Crime, Forensic Odontologists, Pandemic.

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HUMAN IDENTIFICATION USING SMILE PHOTOGRAPHS- A REVIEW

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Abstract

"Life is short. Smile while you still have teeth". While this quote may commonly be seen in a dental clinic, there is something more to this than meets the eye. A smile not only helps you enhance your looks while you live, it also gives you an identity when you die! In today's world of rapidly evolving technological advancements, it is of utmost importance that forensic odontology keeps pace and comes up with newer methods of identification especially when conventional methods like ante-mortem (AM) data comparison is unavailable. With the advent of electronic devices that facilitate photography, (economically feasible mobile phones in particular) and the ubiquity of social media and selfies, it is but natural to try and utilize these to the advantage of forensic science. In the recent past, several researchers have sought to smile photography for identification purposes and claim to be successful with regard to the same. This review provides an overview about the use of various methodologies that have been employed in smile photography in order to obtain an identification. The review highlights the advantages, feasibility and utilization of smile photographs for the purpose of identification in the field of forensic odontology.

Keywords: Ante-Mortem, Researchers, Photography, Forensic Odontology, Smile Photographs

MISSING THE MISSING PEOPLE: A NEED FOR NATIONAL DENTAL REGISTRY (DATABASE) IN INDIA

Dr. S Praveen[1]

Abstract

Missing people phenomena is of prominent treat to the society with health, emotional and financial issues. In this phenomena lies also the recovered unidentified human remains, which should be processed also considering "Forensic Odontology", a branch of dentistry and forensic sciences, which deals, in the interest of justice, with handling, examination and evaluation of dental evidence and dental findings. Civil, criminal and research are the triad of forensic odontology. Forensic odontology deals also with identification of unknown bodies who are referred as "missing persons and nameless bodies". The main issue in the identification of human remains and the collection of identifying data is the availability of dental data of the missing persons. Dental data could be collected, interpreted, updated and organised by forensic odontologist, whose role in missing person investigation is neglected in India. This can result in a delay in the identification process. Also, the authorities in India usually dispose unknown bodies not claimed up to 72 hours: a silent mass disaster. Identification of unidentified human remains are essential for justice and humanitarian reasons. Identification is not only needed for missing person but also required in fire accidents, air crash, natural and manmade disasters. If the body remains nameless, case remains unsolved and suspects may escape. A timely identification gives lawfulness and restfulness to family members, relatives and friends of deceased. Interpol standing committee also recognises these issues for legal, cultural and other reasons. Humans have rights not to lose their identity after death and identification of a victim may be of vital importance to police investigation. Interpol further states that dental data is a primary identifier, along with fingerprint and DNA analysis. For all these reasons dental records should be collected regularly in dental clinics and the implementation a national dental database could overcome this concern. A National Dental Registry (NDR) should be formed by the Indian government incorporating within it the INDD. This paper highlights a protocol for the collection of dental records, structure of Indian Dental Database and proposes a method for identification of unidentified human remains which has many hidden benefits to our society.

Keywords: Forensic odontology, missing people, dental record, identification, India.

ROLE OF MACHINE LEARNING IN FORENSIC ODONTOLOGY: A SYSTEMATIC REVIEW

Dr. Anubhooti Sood[1]

Abstract

Novel techniques attempting to replicate human thinking with increased accuracy and reduction of error rates are the demand of current times. Machine Learning is the art and science of getting computers to learn and act like humans do, and improve their learning over time in autonomous fashion, by feeding them data and information in the form of observations and real-world interactions. The field of forensics has lately encountered the changing dynamics triggered by inculcation of machine learning. In forensic odontology, age estimation via radiographic techniques have been under investigation for improved learning via machine learning. Though literature exists in describing individual efforts in this area, the current systematic review is attempts to identify the areas of its utilization within the field of forensic odontology and evaluation of its advantages and limitations.

Keywords: Machine learning, Artificial intelligence, Forensic Odontology, Deep learning, Neural networks.

FORENSIC ODONTOLOGY IN AYURVEDA

Dr. Garima[1]

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Abstract

Ayurveda is science of living, deals with many living and non-living things. In Ayurveda Acharya Kashyap describes dentition in *dantajanmika* chapter. According to *Acharya vagbhatta* and *acharya kshyapa*, the eruption of teeth is between 4 to 8 months in babies after birth. These helpful in case of month wise description children as well as adult. This condition is useful for identification, in case of any death of a child we calculate the months that have been died. Dental formula is different in children as well as adult's teeth. Forensic odontology helpful for identification of children as well adult that are age, occupation, socio-economic status (carries gold and silver metal in their teeth) and any addiction (smoking and tobacco chewing). In children it is known as deciduous teeth or milk teeth or temporary teeth while in adult is called as permanent teeth which having different characteristic. In Ayurveda Male teeth are larger and heavier than female's teeth. Examination for presence of Barr bodies in the cells of the pulp tissue may help to determine the gender of the person. Identifying Y-chromosomes in dental pulp tissues using quinacrine, fluorescent microscopy. Cobblers and tailors usually show notched in upper incisor from wear and tear. From general cleanliness, dentures and dental filling by gold, silver and other metal. Unknown identification of body through individual features such as gap between teeth, no. of teeth and missing teeth, depression and elevation on the teeth are said to be individualistic, suspicious death of a person due to artificial denture can lead to death from choking. Some unsolved cases are solved with the help of dental structure and a particular filling of the teeth and missing teeth. E.g. bite mark identifies sexual assault, presence of saliva also helpful to detect the DNA from particular individual, presence of Burtonian lines identifies person is working in metal industries and continue contact with metals, presence of brownish blackish line identifies that person having smoking habit, in mass disaster cases presence of teeth can identifies that particular person with DNA samples.

Keywords: Ayurveda, Odontology, DNA, *Vagbhatt*, *Kashyapa,* Identification

IDENTIFICATION OF SUSPECT BY BITE MARK ANALYSIS: CASE REPORTS

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Abstract

Bite marks as evidence of a crime cases are commonly found in cases such as sexual assault, struggle, and homicide and child abuse. Bite marks are thought to help uncover the biter because human teeth are individualistic and have different shapes, sizes and patterns for each individual, even identical twins. Bite mark value in forensic dentistry relies mainly on uniqueness of human dentition and this asserted oneness is reproduced and recorded in the injury. When analysing a bite mark, a very important step is to compare dental features between a subject dentition and the bite injury. In this paper, 2 case reports will be discussed which includes evidence collection, preservation, methods employed to analyse, reporting and presenting the case in the court of law; the judgement of one case will also be discussed. This paper also covers the complete techniques involved in bite mark evaluation.

KeyWords: Bite Marks, Sexual Assault, Forensic Odontology, Human Identification

CHILD ABUSE AND NEGLECT: A DESCRIPTIVE ANALYSIS OF REPORTS DURING THE COVID-19 PANDEMIC

Dr. Ankita Tandon[1]

Abstract

COVID-19 is altering family dynamics in ways that threaten to put already vulnerable children at increased risk of abuse and neglect. This analysis focuses to emphasize the most empirical evidence charting how a decline in child care availability and employment can affect the handling of children during the ongoing pandemic. All the available data pertaining to child abuse and neglect published in English literature will be explored between 1/1.2020 to 15/5/2021. The detailed information about the abuse, signs and symptoms, reasons and recommendations will be recorded. The findings will be interpreted through descriptive analysis and will be statistically evaluated. The study is in progress and this can conlude that although lockdowns, school closures and movement restrictions have left far too many children stuck with their abusers, without the safe space that school would normally offer. It is therefore urgent to scale up efforts to protect children during these times and beyond. There must be strict formulation of strict recommendations in this regard. Social and health care providers should therefore integrate children's welfare in future risk reduction and preparedness in order to prevent such outcomes.

Keywords: child care, covid-19, health care providers, child welfare.

SEX DETERMINATION FROM PULP-TOOTH AREA RATIO OF INCISORS AND CANINES USING CONE BEAM COMPUTED TOMOGRAPHY IMAGES

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Abstract

Forensic odontology is an investigative aspect of dentistry that analyses dental evidence for human identification. Gender identification is part of it and it becomes important in case of severely decomposed body because tooth resist most of the taphonomic changes after death. In teeth canines and incisors are usually used in anthropological and forensic sciences for sex determination. The aim of this study is to test the reliability of pulp-tooth ratio obtained from the CBCT images of incisors and canines in determining the sex of an individual. The study carried out on a total of 100 subjects which includes 43 female, 57 males, CBCT images used in this study were taken for the purpose of clinical evaluation and routine therapeutic treatment in our institute. Teeth with caries, filling or crown restorations, periapical pathologies or pulps were excluded. The pulp area and the tooth area of each tooth was measured in AutoCAD computer-aided drafting program (student version, Autodesk Inc., San Rafael, CA, USA) and then the pulp area/ tooth area ratio was calculated. The presentation will highlight the aims and objectives of study with a detailed description of methods and outcome of the study.

Keywords: Forensic odontology, Gender identification, pulp-to-tooth ratio, CBCT, AutoCAD.

ACCURACY OF CHAILLET AND DEMIRJIAN'S 8-TEETH DENTAL AGE ESTIMATION METHOD AND THE INDIA SPECIFIC FORMULA IN GUJARATI (WESTERN INDIAN) POPULATION: A COMPARATIVE ANALYSIS

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Abstract

Age estimation is one of the important domains of Forensic Odontology. The radiographic age estimation methods using the developmental stages of the teeth are considered to be a reliable, comparable and reproducible technique of age estimation. Among the radiographic methods, the method designed by Demirjian et al is the widely followed methods of dental age estimation. The original Demirjian's method was designed based on the developmental stages of seven mandibular teeth in the French-Canadian population in 1973. In 2004, Chaillet and Demirjian revisited the method for 8 teeth that incorporated the developmental stage of third molars. This method was later remodeled by several investigations and this lead to the population of country specific regression models. In 2011, a regression equation based on the developmental scores of the original Demirjian's method was published by Acharya. The research on age estimation using the Demirjian's original 8 teeth regression model and the Indian population specific model revealed a significant difference in the estimated age. The latter was found to be more accurate than the former. However, the Indian specific formulae led to varied results when applied on different sub-populations. The present study was designed to test the accuracy of both the formulae on Gujarati population using nearly 400 digital Orthopantomograms of the patients in the age range of 4 to 25 years and who were undergoing dental treatment at GDCH Ahmedabad. The presentation will highlight the aims and objectives of the study with a detailed description of the methods and the outcome of the study. The method which gives the least error of estimate shall be considered as the most accurate method of dental age estimation in Gujarati population and will be applied on a large sample study in future.

Keywords: Demirjian methods, dental age estimation, forensic odontology, Orthopantomograms, Linear Regression.

PREPARATION OF MOUTHWASH USING CENTELLA ASIATICA NANOPARTICLES - AN IN VITRO STUDY

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Abstract

The use of natural products in the field of medicine has a great influence as they have low risk of side effects. Traditional approaches to the treatment for various diseases have yielded a better result in the terms of treatment. It belongs to the family of Apiaceae. This species is generally known for their phytochemicals, as they contain special alkaloids such as the terpenes and diterpenes. Metal silver plays a vital role in the field of medicine as it acts as a potent antimicrobial, catalytic and biological metabolism. The use of silver nanoparticles other than other metallic green synthesis is preferred as they show less antibiotic resistance than other metallic compounds. Mouth washes have an effective role in prevention of chemically formed plaque than mechanical removal such as brushing and flossing. The aim of this study is to determine the antimicrobial and the cytotoxicity activity of the Centella asiatica mediated silver nanoparticles. Antimicrobial activity and cytotoxicity of the formulated mouthwash was assessed by using deep well agar method on four different microorganisms. The results show that the mouthwash showed a good antimicrobial activity and hence it can be further formulated in the form of mouthwash. These results are an indication of the potent antimicrobial activity against bacterial strains proving that silver nanoparticles synthesized by Centella asiatica and its based chitosan can be used as a very good mouthwash

Keywords: Centella asiatica, antimicrobial,cytotoxicity, silver nanoparticles.

Supported by

ASSESSMENT OF THE MINERALIZATION STAGES OF THIRD MOLARS AND VALIDATION OF THE MINCER ET AL'S AGE ESTIMATION METHOD IN GUJARATI POPULATION

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Abstract

In Dental age estimation, the radiographic method gains much importance as the technique involves the assessment of the developmental stages of the teeth. The developmental scores and the regression equations are used to estimate the age. It is generally agreed that when the root of mandibular second molar is completely formed or its apex closed, then the subject under query has attained an age of 14 years. Thus beyond 14 years of age the mineralization of most teeth except third molars are completed. In most of the countries, the age 18 has got legal implications as it's development decides the status of majority and eligibility of marriage and even criminal liability. The third molar is the only teeth in the entire dentition that is still developing at the age of 18 years. There are several age estimation methods which concentrate only of the third molar development to estimate the age. Few methods have also given the empherical probability of a person being <18 or >18 years based on the development of third molars. The average age of the initial mineralization of the third molars was 8.57 years, and the average age at apex closure was 21.96 years. Though the third molar development is considered as a reliable method to estimate age, there are studies that revealed a poor correlation and less accuracy with actual age when the age is estimated using the third molar development. Hence the present study was designed to test the accuracy of the third molar development in age estimation in Western India population. An observational cross sectional study was conducted on a sample of nearly 150 digital orthopantomograms of patients in the age range of 8 to 24 years. The third molars in all the four quadrants were assessed using the Demirjian's mineralization stages A-H (1973) as well as the 0-9 stages (2004). The Mincer et al's ABFO age estimation method was applied to estimate the age. The presentation will highlight the aim, objective and the detailed methodology and the outcome of the study.

Keywords: Dental age estimation, Third molar, Digital Orthopantomogram, Demirjian method, Tooth mineralisation, legal age.

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DENTAL AUTOPSY: AN ADJUNCT IN IDENTIFICATION OF MISSING PERSON

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Abstract

Forensic Dentistry deals with identifying human remains after homicides, accidents, wars or natural calamities. The forensic odontologist is critical in making the identification of unknown remains. The odontological process is fast, accurate, and inexpensive compared to all other methods. An autopsy is a highly specialized surgical procedure that consists of a thorough examination of a corpse to determine the cause and manner of death and to evaluate any disease or injury that may be present. It primarily helps to register the teeth present in the oral cavity, the ante mortem dental treatments received, the study of dental malpositioning, and the type of occlusion. For conducting dental autopsy, a setup is required like high-intensity light, double-packet x-ray film and portable X- Ray machines which are more convenient as they can be carried to the site. Instruments are important elements for examination and a simple tray setup ranging from basic mirror and explorer, tweezers to x-ray sensor holders, cheek and lip retractors, ratchet jaw openers, Single Lens Reflex (SLR) camera with film or digital camera with digital memory card plays a pivotal part. Various studies have been conducted and cases have been reported where Dental autopsy was suggested to be the most reliable method for identification of diseased or missing individuals. The dental structures retrieved from a corpse during autopsy can be used in determination of age, gender and community placement. Accessibility to the oral cavity is essential for recording the postmortem data. Hence oral autopsy may help; in difficult cases where oral examination cannot be completed due to accessibility, for proper visualization of teeth and its structure. Oral autopsy helps to make a proper postmortem dental record. Postmortem assessment, evidence, and data collection of any unidentified human remains of unknown nationality should follow Interpol DVI principles, and forensic odontologists should be involved not only in the PM data collection but also in the AM dental data input, comparison, and reconciliation.

Keywords: Autopsy, Dental Autopsy, Forensic Odontology, Dental record, Postmortem

CONE BEAM CT IN DENTAL AGE ESTIMATION: A SYSTEMATIC REVIEW

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Abstract

This systematic review aims to revisit studies in CBCT for dental age estimation and verify which dental age estimation method(s) in CBCT imaging produces a high correlation between the chronological age (CA) and the estimated dental age (DA). In this preliminary systematic review, five scientific databases (PubMed, Scopus, LILACS, SciELO, and Web of Science) were used, and one grey literature database (Open Access Theses and Dissertation) with their respective search strategy. Studies reporting in vivo examination of human tooth to estimate chronological age from dental age using CBCT imaging were included. The outcome of interest is the correlation coefficient (r) between the dental parameter and chronological age and the method reproducibility. After the title, abstract, and full-text reading, the data were extracted. The PRISMA guidelines were followed. Among 671 studies, 38 fulfilled the inclusion criteria, with one study reported two different methods and results in the manuscript. The methods used in the studies can be divided into metric (n =17), volumetric (n = 20), and staging (n = 2). The most common parameters used in both metric (n = 8) and volumetric studies (n = 13) are Pulp to Tooth Ratio. Reported r varies between studies ranging from -0.094 to -0.853, -0.24 to -0985, and 0.44 to 0.62 for metric, volumetric, and staging studies, respectively. The method reproducibility provided with Intra-Inter Class Correlation Coefficient was found in high agreement for metric (Intra-class 0.592 – 0.981; inter-class 0.798-0.93) and volumetric (Intra-class 0.856 – 0.998; Inter-class 0.63 – 1). The preliminary result reveals promising capability of the CBCT in dental age estimations. CBCT methods provides a consistent high correlation between CA and DA among different age groups, especially in adults where the standard deviation is usually high in the other techniques. Meta-Analysis needs to be conducted to examine the effect size of the extracted data.

Keywords: Cone-Beam CT; Dental Age Estimation; Forensic Dentistry; Systematic Review; Correlation Coefficient; Observer Agreement

DENTIST AND BIOTERRORISM PREPAREDNESS: A NEED OF EMERGING BIOWAR

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Abstract

Bioterrorism is a strategic and intentional use of microorganism or their toxins to extend life threatening disease on a mass scale to destroy humankind in particular area. Agents used in Biowar can be found in nature, but little alteration in genotype would result in the ability to cause more severe disease which is resistant to multiple medications. These kinds of bioterrorist attack are critical to prevent and manage because our health care system is not fully prepared. Due to lack of knowledge of biotoxic agents, lack of equipment's it takes time to identify the cause of bioterrorism till than it causes mass destruction, thus it is necessary to be aware of different diseases and its systematic and oral manifestations. Dental health care professions play an important role like- providing education, risk communication, diagnosis, surveillance and notification, treatment, distribution of medications, decontamination, sample collection and forensic dentistry. Dentists in armed services are trained to treat causalities, readiness training program in extreme cases it is advisable to general dentist to gather knowledge and respond to the bioterrorist attacks and public health emergencies. Work with DMORTs so that they can detect, collect the data, and identify the specific pathogen its source. The current scenario needs to develop biodefence and implementation of strategic plan for coping with civilian bioterrorism.

Keywords: bioterrorism, DMORTs, biotoxic agents, Dentists, health care system.

AMELOGLYPHICS IN FORENSIC DENTISTRY: A SYSTEMATIC REVIEW

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Abstract

Ameloglyphics is an adjunctive for human identification which are unique just like finger prints. During adverse conditions like acid attack or mass disasters when the identification becomes intricate task, Ameloglyphics is a possible substitute to other methods because teeth being the hardest tissue of the body are not distorted easily. The aim of the current systematic review was to assess the feasibility of different methods of taking toothprints, reliability and the progress of ameloglyphics in person identification. A search in Google scholar, PubMed and Europe PMC electronic databases in English language up to April 2021 was conducted to include studies according to the PRISMA guidelines with keywords like Ameloglyphics, tooth prints, enamel rod pattern, etc. The published articles mostly showed that Ameloglyphics presented to be a beneficial tool in personal identification as no two individuals showed the same tooth prints which were reproducible after being subjected to adverse conditions.

Keywords: Ameloglyphics, Enamel Rod Pattern, Tooth Prints, Forensic Dentistry, Personal Identification.

A REVIEW STUDY OF MEDICO LEGAL ASPECTS OF FORENSIC ODONTOLOGY IN DENTAL PRACTICE

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Abstract

Forensic odontology can be defined as a branch of dentistry / dental science which deals with the proper handling, examination, application of dental evidences in the administration of law and justice. Dental charting had been used in the identification of individuals in many forensic Investigations. Dental charting is done with the help of Dentist who has a thorough knowledge about dentistry including anatomy, oral autopsy and laws to the legal implications. Each permanent dentition consists of 32 teeths and in temporary of 20teeths of which some may be missing or malformed .Dental autopsy is carried out by getting an access into the oral cavity and resection of jaw. Proper care has to be taken to avoid damage, fracture and disfiguration of the face. Positive identification using dental chart can be made in civil, criminal cases and research areas like missing, dead, murder, mutilated, mummified, skeletal remains, mass disaster/ natural calamities, burns and crush injuries. It is as unique as any other identification marks on the body of an individual. The physical characteristics can give a clue regarding age, race and sex of the individual. Sex determination can be done by PCR amplification method using the AMEL which is a major protein having specific size and pattern of the nucleotide sequences in the human enamel. Age estimation can be done using clinical methods, radiographic examination, histological and biochemical methods. Costly restoration like crowns, bridges, route canal therapy will help to know the socio economic status of the individual. Ante mortem records can be obtained from the dentist who has treated the victim. Photographs are of great help to analyze morphology and alignment of the teeth. Major problem arises when antemortem dental records evidence are not properly preserved. Medico- Legal Importance is Age estimation, Sex determination, Child abuse, Sexual assault, Partial/ complete identification, Cause of death- heavy metal poisoning, sulphuric and nitric acid poisoning, Identification through bite marks left in human tissues/ food stuff and Grievous hurt.

Keywords: Bite Marks,Forensic Odontology,Identification,Justice

TITLE: FORENSIC DENTISTRY: A PEEK INTO THE MIND OF DENTISTS

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Abstract

Dental identification has been a vital tool for identifying deceased individuals since 66 AD. Ever since, this science has developed in leaps and bounds. The field of forensic odontology sees evolving trends in identification of human dental remains as we speak. Nevertheless, all the advancements are futile if not utilised in the right manner by the right people in the right situations. Currently, the dearth of trained personnel, paucity of training facilities, inadequate introduction to the subject during undergraduate years, are the major hurdles in the expansion of the use of forensic odontology for the day-to-day benefit of society. A systematic review of recent cross-sectional studies regarding the levels of knowledge, awareness, and practical application of forensic odontology among dentists in India revealed incommensurate and considerable variation in the practice of forensic odontology among dentists. Various other studies have been conducted over the last decade on knowledge and awareness of forensic odontology using validated questionnaires in Indian cities such as Chennai, Pune, Kanpur, Ghaziabad, Kashmir, and the Delhi National Capital Region. Most of these studies provided evidence that there were inadequate levels of knowledge and awareness of forensic odontology among the respondents. No study, to the best of our understanding has been conducted in the state of Uttarakhand to assess the knowledge of dental professionals about forensic dentistry and its applications in practice. Accordingly, considering the importance of the topic, our aim to conduct this survey is to peek into the minds of dental professionals with regards to their awareness on the topic as well as to find and provide suggestions to make the most of the tools available in the country to bring this field into mainstream practice.Results: Awaited

Keywords: Forensic odontology, Dental professionals, Knowledge, Awareness, Uttarakhand

STEREO MICROSCOPY - A USEFUL METHOD FOR DENTAL PROFILING

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Abstract

Forensic odontology is 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. An odontologist is frequently involved with the identification of unknown human remains and dental evidences from crime scene and mass disasters. The study of teeth and its surrounding structures for the purpose of establishing the identity of victim is called as dental profiling. Using dental profiling we can estimate age, sex, ethnicity of an individual. Apart from this it can also help in determination of some anthropological characteristics like personal and dietary habits, oral and dental health and socio-economic status. Dental profiling can be done using invasive or non-invasive methods. Stereo microscopy is one of the methods that can be useful in it, by analyzing and examining solid samples with complex surface topography for macro details. Such a tool can be useful for both invasive and non-invasive techniques. Stereomicroscopy refers to a microscope equipped for stereoscopic viewing i.e. for three dimensional imaging with perception of depth and contrast; critical to the interpretation of specimen structure. A stereo or dissecting microscope is a device designed for low magnification and observation of a sample typically using light reflected from the surface of an object rather than transmitted through it. This paper gives a review about uses, application and advantages of stereomicroscopy in dental profiling.

Keywords: Forensic Odontology, Dental profiling, Stereo microscope, Identification, Anthropology

FORENSIC FRAUDS – A REVIEW

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Abstract

In today's era of forensic investigations, hard copies of forensic data have been replaced by digital records. However, wide availability of image processing software makes digital image manipulation an easy and low-cost way to distort or conceal facts. This review article aims to understand fraudulence in the digital records in forensic odontology and the various ways to detect the same. This review article attempts to focus on this pestering issue. Anticipatory measures should be done to avert their malicious reuse. Until there is an integrated response from the research community as to what constitutes appropriate image manipulation, the problem of "data beautification" will continue to plague science.

Keywords: forensic investigations, digital records, fraudulence, anticipatory measures, malicious use, data beautification.

THE UNEXPLORED DIAGNOSTIC AID IN THE INDIAN ARMED FORCES- FORENSIC ODONTOLOGY

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Abstract

Forensic odontology is a branch of dental sciences which deals with handling of forensic evidence for presenting it in the court of law. Military personnel are exposed to a wide range of adversities during their course of service ranging from natural calamities to wars and anti-terrorism operations. Identification of our army men in such cases is thus imperative. Teeth are supposed to withstand extremes of temperatures and conditions where general identifying features are damaged beyond recognition and is thus of great help to establish the identity of not only our army men but also of terrorists escaping in disguise. In disasters such as aircraft wrecks, natural calamities forensic odontology can be of great succour by establishing the Disaster Victim Identification (DVI).If dental records of the recruits are also kept along with other biometric records, it may prove to be beneficial in identification of bodies even after a lag of time. Dental features and their countless combinations can be unique to an individual, a proper database of the ante mortem records can be maintained for comparing it with the post mortem records as and when needed. Impression of dental arches, prepared dental casts and orthopantogram (OPG) can be used to view the dentition, alveolar bone & other adjacent structures. Dental pulps are an excellent source of high molecular weight genomic DNA it can thus be used for identification from even incinerated remains of victim. Digital dental record would hasten up the process of identification and would even have less human based errors. Forensic odontology is greatly used by the armed forces of many countries and would prove to be extremely beneficial if harnessed by the Indian armed forces properly.

Keywords: Military Personnel, Anti-terrorism operations, Disaster Victim Identification, Ante and Post-mortem data, Digital dental record keeping

GENDER ASCERTAINMENT BY OBSERVING SMILES

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Abstract

The identification of individuals and their unique characteristics have been of paramount importance to human society.. MacKenna (1986) said "What can be done with fewer assumptions is done in vain with more". Therefore, experts in the practice of human identification currently search for information from alternative sources, such as facial photographs, video recording or smile photographs that show specific characteristics of each individual. This makes important the analysis of photographs present in family albums or produce in social events in which the victim had participated. The justification for this alternative investigation is based on the search of data on shape, dimensions and alignment of the teeth of a person, which can comprise a unique and specific set. Moreover, there is a tendency towards using digital cameras that allowed the production of either photographic shots or shootings, in which is possible to executed the image zoom or search for a central focus on the face of the subjects, more specifically the smile. The determination of gender is central to the process of establishing personal identification from human skeletal remains. An accurate sex diagnosis effectively reduces the number of possible matches by half. In some of the cases, the only available structure for determining gender is the measurement of the permanent dentition. Considering the importance of searching for new parameters of human identification using odontologic characteristics, the aim of the present work is the identification of gender by observing smile, mainly hard tissue, by various dental professionals according to their designation and work experience and the importance of the forensic odontology analysis of smile photographs in human identification. Results: Awaited

Keywords: human identification, smile photograph, forensic odontology

HOW FORENSIC ODONTOLOGY HELP IN SEX DETERMINATION IN FORENSIC SCIENCE?

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Abstract

Forensic odontology/forensic dentistry is one the most unexplored and intriguing branches of forensic sciences. forensic odontology primarily deals with the identification based on recognition of unique features present in an individual's dental structures. the theory behind forensic dentistry is "no two mouths are alike". The main attributes of biological identity are sex, age, stature and ethnic background of individual which are also called the "big four" in forensic context. determination of sex of human remains is frequently immediate even in severely decomposed cadevers. Tooth is the most valuable source to extract DNA since it is sealed box preserving DNA from extreme environmental conditions, except its apical closure. pulp tissue is the most widely used option, since it is normally abundant, less vulnerable to contamination by non-human DNA. Methods of sex determination used are teeth (Mandibular canine index, Maxillary molar arch width, Tooth morphology), pulp (Amelogenin gene, Barr bodies, SRY gene), craniofacial bones (Frontal sinus dimension, Mandibular gonial angle, Maxillary sinus, Mastoid process, Superior orbital ridge), Advanced method like PCR, Soft tissue method (Rugoscopy, Cheiloscopy) and Labeled prosthesis. Determining sex using skeletal remains presents a great problem to forensic investigators, especially when only fragments of the body has recovered. forensic odontologist can assist other experts to determine the sex of remains by using teeth, skull or by labeled prosthesis. The contents were electronically searched using keywords like "sex determination", "forensic dentistry", "and sex determination in forensic dentistry", "sex dimorphism". Purpose of this paper presentation is to show role of a forensic odontology for sex determination in forensic science.

Keywords: forensic odontology, forensic science, sex determination, sex dimorphism, forensic odontologist

ALVEOLAR BONE - AS A VALUABLE EVIDENCE IN FORENSIC INVESTIGATIONS

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Abstract

Personal identification of an unknown deceased is essential for both legal as well as on humanitarian grounds. Teeth are most common diagnostic tool for dentist to complete such investigations. But when teeth aren't available, bones can be used as a vital forensic evidence. Through the study of bones, an array of information can be discovered concerning the human remains. Alveolar bone plays a very important role in various spectrums of forensic identification such as radiology, histology, molecular biology and digital identification technique. Alveolar bone can be an efficacious diagnostic tool in the absence of teeth. This review aims to study the role of alveolar bone in forensic diagnosis of an unidentified deceased individual using various features of forensic personal identification.

Keywords- alveolar bone, radiology, histology, forensic odontology, molecular biology, time of death.

KNOWLEDGE, AWARENESS AND PRACTICE OF FORENSIC ODONTOLOGY AMONG DENTIST IN INDIA: A SYSTEMATIC REVIEW

Veenu Dahiya[1]

Abstract

Forensic dental identification is considered as one of the most accurate and reliable method of identification of human remains. Forensic dentistry involves the processing, evaluation, and presentation of dental evidence for contributing scientific and objective data to legal processes. The present, systematic review was conducted to assess knowledge and awareness and practice of forensic odontology among dentists in India. A systematic review of relevant cross-sectional studies was conducted regarding the level of knowledge, awareness, and practical application of forensic odontology among dentists in India. Six out of 190 studies were finally included in the present review after conducting a search of both electronic and manual scientific databases. Potential biases were addressed and the relevant data were extracted. Almost all the subjects were familiar with the subject of forensic odontology in one of the study reports. Only 12% of dentists were maintaining complete dental records in the findings of another study. Only 3% of dentists reported to have contributed to the identification of victims in a mass disaster in yet another study. The findings of another study revealed that 40% of dental practitioners did not have the expertise to identify child abuse. 7.2% of subjects were trained and confident in handling forensic related cases. The results of the present review showed that the knowledge and awareness level of subjects was inadequate and that there is considerable variation in the practice of forensic odontology among dentists. It is necessary to expose dentists to the basic principles and techniques of the subject.

Keywords: Awareness; dentists; forensic odontology; knowledge; practice.

Supported by

THE SEX OF THE DEAD

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Abstract

Sex determination is a subdivision of forensic odontology and it is very important especially when information relating to the deceased is unavailable. Sex determination becomes the first priority in the process of identification of a person by a forensic investigator in the case of mishaps, chemical and nuclear bomb explosions, natural disasters crime investigations, and ethnic studies. Various methods have been used for the identification of sex. Sex determination can be done either by Morphological analysis (of the tooth, skull and other soft tissues of oral and para-oral region) or molecular analysis. In molecular analysis the sex is determined by taking autopsy of the oral region. DNA is the most reliable source in sex determination. The molecular indicators in DNA for forensic identification is based on PCR analysis. The aim of this paper is to discuss the various methods for extraction of the sample source for DNA and the methods and the procedure used to determine sex.

Keywords: DNA, forensic identification, crime scene investigation, sex determination, forensic iinvestigator.

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ePoster Category

GENDER AND RACE PREDICTION USING LIP MORPHOLOGY AND SCAR PATTERN: MULTIVARIABLE LOGISTIC REGRESSION ANALYSIS

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Abstract

Establishing a suspect's gender and other social traits could be very beneficial in the course of a crime scene investigation, primarily because in conjunction with other circumstantial evidence they could prove to be useful in identifying suspects. The aim of this research was to evaluate the sexual dimorphism exhibited by lip vermillion morphology and scar pattern and derive logistic equation for gender classification. A total of 160 participant have been recruited for this study, high resolution lip images acquired and analysed by using a systematic classification of the lip vermillion morphology along with detailed recording of the scar morphology and pattern. Data was analysed by using SPSS version 25. Independent t-tests and chi-square analysis on the height of lips and vermillion/scar morphology, respectively revealed prominent difference among racial groups in comparison to the gender. Simple logistic regression identified 12 and 22 variables for multivariable regression in gender and race prediction, respectively. Scar morphology and pattern was identified to be the major contributor for prediction of gender or race as compared to vermillion morphology. The final prediction model was constructed using forward likelihood ratio, backward likelihood ratio and enter method. The model explains 20% variation in gender prediction using lip morphology, with a moderate effect meanwhile model of race prediction using lip morphology explains 50% with a good fit. Gender correlation to lip morphology may help to narrow down targeted suspects in an investigation.

Keywords: Cheiloscopy, Lip print pattern, Binary logistic regression, Sexual dimorphism, Forensic Odontology

COMMINGLED AND DISARTICULATED HUMAN REMAINS RELATED TO 1755 LISBON EARTHQUAKE: WHO WERE THEM? SECULAR DENTAL NONMETRIC TRAITS CHARACTERIZATION OF LISBON POPULATION IN 18TH CENTURY

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Abstract The present investigation comprises the characterization of skeletal remains recovered from the 2004 archaeological excavations carried out in the Cloister's Southwest Wing of the Academy of Sciences of Lisbon, attributed to the 1755 earthquake. Among the disarticulated remains, many teeth were found and these are the focus of this study. Our goal is to use dental morphological characteristics to assess the geographic ancestry of the combined sample using the methods of bio distance and rASUDAS2. The crown and root traits of the Arizona State University Dental Anthropology System were scored in a sample of 1068 disarticulated teeth, 65 skulls, 138 adult jaws and 42 sub-adult jaws. The minimum number of individuals (MNI) is 180. Eight characteristics of 34 specimens (7 skulls and 27 jaws) were analyzed to assess individual ancestry using the web-based ASUDAS application. Results show that 73,5% of this 18th century sample can most likely be assigned to Western Eurasian ancestry, with the remaining 26,5% divided between Sub-Saharan Africa, non-Arctic American, American Arctic, and East Asia. For this Portuguese sample, Euclidean distance values indicate it is closest to India, with a value of 0.721, followed by Western Europe and Eastern Europe. The Bray-Curtis distance matrix follows the same pattern. The most distant Bray-Curtis value is with Native Americans of the Northwest Coast. For Euclidean values, the population furthest from the sample is South America. From the Bray-Curtis and Euclidean distance matrixes, cluster analyses were used to generate dendrograms. Based on Bray-Curtis values, Portugal is closest to Western Europe, followed by India and Eastern Europe. For the tree based on Euclidean distances, India is the first to join Portugal, followed by Eastern Europe and Western Europe. Therefore, on both an individual and group level, the Portuguese sample is most closely tied to Western Eurasia. However, there may be other ancestries in the sample, such as Sub-Saharan Africa, due to non-European migrants in Portugal along with the African slave trade to Brazil that reached its peak in 18th century Lisbon.

Keywords: Forensic Dental Anthropology, Dental Morphology, ASUDAS, rASUDAS2, 1755 Lisbon Earthquake, Human Remains.

AGE ESTIMATION USING COMPREHENSIVE CHART FOR DENTAL AGE ESTIMATION IN HARYANA POPULATION: A PILOT STUDY

Dr. Cheena Singh[1]

Abstract

Dental age estimation by radiographic methods for forensic rationale is routinely applied to serve the judicial system. Of these, Demirjian system is most widely used, but its applicability in the Indian population, specifically Haryana population, is still lacking. This is a pilot study to evaluate Demirjian method in Haryana population using a comprehensive chart for dental age estimation (DAEcc) and establish a correlation between the chronological age (CA) and estimated age. Sample comprised 100 subjects (49 males and 51 females) 7–16 years of age. Orthopantomograms of these patients were traced and evaluated for Demirjian dental age computation using DAEcc and compared with CA. Results: A positive correlation was observed between CA and estimated age ($R^2 = 0.82$ in males, $R^2 = 0.78$ in females, and $R^2 = 0.80$ in combined population). The paired t-test between CA and estimated age demonstrated that Demirjian method underestimates the dental age by 5.1 months, that is, 153 days in males ($P = 0.04$) and by 7.9 months, that is, 237 days in females ($P = 0.01$). There was an overall underestimation by 6.3 months ($P = 0.001$) in the entire study population. This pilot study supports the applicability of Demirjian method for age estimation in Haryana population and paves way for further studies in a larger sample in the same population to accurately establish the association between CA and dental age.

Keywords: Age estimation, chronological age, Demirjian method, dental age

Supported by

EFFECTIVENESS OF MEASURING ROOT DENTIN TRANSPARENCY IN AGE ESTIMATION OF PERUVIAN POPULATION

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Abstract:

Age estimation is an important forensic resource in human identification. Teeth are not affected by the environment or pathological factors and they remain well preserved in cases where the body of the deceased person is decomposed, skeletonized, or burnt. Root dentin transparency (RDT) is considered a stable parameter and an indicator of chronological age at death in adult human remains. The aim of this study was to estimate the age of individuals by the assessment of RDT using the Bang and Ramm method and to derive a formula suitable for age estimation in Peruvian population. The sample consisted in 248 teeth, only lateral and central lower incisors (left and right) were collected from 124 deceased individuals between 30 and 70 years. In the current investigation, the age was provided by the Peruvian Institute of Forensic Thanatology and treated as an accurate indication of chronological age at death. RDT length was digitally measured from sectioned and photographed teeth. For statistical analysis, lineal and quadratic regression function were performed using SPSS 15 software. Results showed a significant correlation $(p<0.01)$ between chronological age and RDT (Pearson´s correlation=0.775). Linear and quadratic regressions for obtaining Peruvian formula showed a significant correlation among chronological age and RDT; however, quadratic regression expressed a higher relationship (r=0.800). Estimated age using the Peruvian formula had an accuracy of ±7 years (69.8%) and ±10 years (18.5%). Results suggest that digital RDT measurements may be used as a reliable alternative in forensic age estimation.

Keywords: Age estimation, Bang and Ramm method, root dentin transparency, regression analysis, digital measurement.

DENTAL HYGIENISTS: PULLING THEIR WEIGHT IN FORENSIC ODONTOLOGY

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Abstract

The university education of a dental hygienist covers the medicolegal aspects of the profession, liabilities and ethical issues. In the forensic field however, very little is introduced to the undergraduate, but there are several postgraduate opportunities open to RDHs which allow training and education in forensics. This training does not widen the professional competences of a dental hygienist but allows for the acquisition of forensic capabilities which are applicable, when employed in conjunction with one or more forensic odontologists, in a Disaster Mortuary Operational Response Team or other forensic assessments. In fact, while carrying out the forensic examination a Forensic Dentist could be assisted by a dental hygienist as an auxiliary asset in a forensic investigation. It is important therefore to attend classes in forensic sciences and forensic odontology in order to develop forensic skills. In this presentation we review the literature concerning the role and involvement of dental hygienists in forensic activities, highlighting areas where a more extensive training is required such as: Collection and recording of Ante-mortem and Post-mortem data; Collection of all available dental-related information from relatives and next of kin; Assist in Post-mortem dental X-ray collection; Take and assist in extraoral and intraoral photographs; Cleaning of the teeth and jaws recovered from the disaster scene; Help in the search for and interaction with family members; Capabilities in bite mark recognition. The results of our review allow us to conclude that the dental hygienist can be considered a resource in forensic odontological assessments - especially in the field of Disaster Victim Identification - while avoiding encroaching into the areas of expertise of Forensic Odontologists. We therefore encourage Associations and Universities to deliver more training in forensic odontology in order to expand the professional skills of dental hygienists in the assistance of Forensic Odontologists. A warning must be issued to all dental hygienists however, that in order to avoid the misinterpretation of competences and professional misrepresentation. For example, the use self-styled titles such as "*Forensic Dental Consultant*" must be avoided as such titles would represent unlawful practice. It would, furthermore, be considered an offense to Forensic Odontologists.

Keywords
Forensic Odontology, Dental Hygienist, DVI, Personal Identification, Bite Marks, Dental Data.

SALIVA-BASED RAPID ANTIGEN TEST FOR SARS-CoV-2 DETECTION – A CRITICAL EVALUATION

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Abstract

A record number of new cases have been reported in India during the second wave of COVID-19 infection. This has led to the healthcare system crippling under the pressure. The effective reproductive number (R number) at present in India is 1.5 which means that every two people in India infected with the SARS-CoV-2 virus, on average, pass on the coronavirus to at least three more people. The emergence of mutant variants of the SARS-CoV-2 virus has also led to faster spread of the disease throughout the country. Hence, there is an urgent need to develop non-invasive diagnostic tests which give quick results that can be used not only in health care centres as well as in places where public gatherings occur. Studies on saliva-based Rapid Antigen Test (RAT) for detection of SARS-CoV-2 virus have shown that this test is less expensive, faster and safer than the RT-PCR tests which are widely used in the country. But, nasopharyngeal specimens are still considered the gold standard for COVID-19 testing for use with RT-PCR and rapid antigen diagnostic tests. Currently, saliva-based rapid antigen tests are approved in the United States of America and in India this test is undergoing trails and has not been validated yet by the Indian Council of Medical Research (ICMR). As these tests are more economical and non-invasive, they will be very effective for screening programmes, community testing in schools, old age homes, and remote villages or in clinics before treating any patient.

Keywords: COVID-19, SARS-CoV-2, Rapid Antigen Test, Rapid Saliva Test, Diagnostic Test.

THE PRINTED PROOF – A TECHNOID VIEW

Dr. Niveditha M.[1]

Abstract

The amalgamation of science and technology has conquered the world for many years now. The application of technology to science have created a space for new range of inventions which are manufactured, procured and tested for adaptation into the modern usage for standardisation and ease of use for various operations. The face of Forensics has seen a paradigm shift of its own modus operandi of identification by adapting to the rapid tech-phase due to the increased demand in the process of identification as crimes, disasters or the world population has shown a steady hike. From stabilizing to increase the longevity of the fragile dental evidence, the reconstruction of the dental hard tissues by the Three-Dimensional printing has transformed the phase of secure evidence storage. It is a process of non-invasive recreation of the precise anatomy of the desired structures with incredible accuracy. The Three-dimensional model serves as the investigative tool for as long as possible due to the durability of the material with comparison to its counterpart, the degradable human remains. Though the history of Three-Dimensional printing dates back to 1980, it was mainly used in the field of engineering for the production of various functional or aesthetic prototypes. The main advantage of a Three-Dimensional printer is its ability to produce very complex structures with the concentration in the intricate details which is impossible for any human to create. The versatility of this fascinating advancement has increased its scope of usage in the Field of Dentistry and Forensics after thorough researches and experiments by renowned experts. The synonyms of Three-Dimensional printing include the additive manufacturing and rapid prototyping. The poster will elaborate on the history, technology and the recent uses of Three-Dimensional printers in the field of Forensic Odontology.

Keywords: Technology, Three-Dimensional printing, Additive Manufacturing, Rapid prototyping, Accuracy and Forensic Odontology.

DENTAL I.D. – A COMPLETE ANTE-MORTEM DATA

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Abstract

The identity of a person is every individual's primary right, irrespective of whether they are alive or dead. Importance is given to identification, which is accomplished by comparative data analysis, i.e. post and ante mortem comparison; but we do not get complete dental details or records in a single place which can make the identification process more genuine or easier. At times, data kept by some of the dentists are sketchy and when being used for identification, it lacks uniformity and comprehensiveness. Hence it is advisable to include the patient's intra oral and extra oral photographs, lip prints, palatal rugae patterns, and radiographs so that in disasters, more the number of points of verification, the better the chances of identification. This study addresses the gap in collection, classification, compilation, storage and retrieval when asked to provide dental data for identification, for disaster related deaths. So, the need of the hour is to have every individual's detailed dental records with essential photographs and x-rays and to have all the details stored safely, which could be used any time in the future by the patients or their family members, after producing a legal official request letter.

Keywords: Dental ID, Identity, Rugae, Lip-print, Photographs

AGE ESTIMATION AND ITS DIMENSIONS

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Abstract

Age determination is always an important criterion for any individual and its applicability is very broad be it for any individual's rights , any legal procedure ,for insurance purposes ,for identification of dead bodies ,asylum seekers refugees, mass disasters like air plane crash ,tsunamis ,earthquakes, bomb explosion and many more. So age estimation can be done with the help of teeth, bones, secondary sexual characters and old age .These are conventional methods but if age is not able to be estimated then Biological samples can be used for age determination. Age estimation in young age is quite reliable with the help of different methods but in age bracket after 25 years , age assessing accurately is quite challenging . In the literature there are various methods discussed for living or dead of any age group for age estimation. For living individuals we can use Morphologic and Radiographic methods and for dead mainly Histological and Biochemical methods are used. But the validity of these methods for every population is quite questionable. We are still in search of a method which gives more accurate and efficient results. In this e poster I will discuss various age estimation for each age bracket whether living or dead.

Keywords - Age estimation , Teeth, DNA Methylation, Telomere shortening, Biochemical methods.

UNDERSTANDING THE BITEMARKS

Dr. S. Praveen[1]

Abstract

Mac Donald defines bitemark as a mark or representative pattern made by teeth, either alone or in combination with other mouth parts. The bitemark evidence can be found on the skin of living persons, on a dead body, objects or on some kind of food stuffs which are of great importance in criminal investigations. The scientific basis on bitemark is based on two postulates: first human dentition has class characteristics of shape, size and pattern as well as individual character within arch alignment that makes it unique and secondly the skin records those characteristics with sufficient resolution to identify whether to include or exclude the suspect. Therefore bitemark analysis attracts a significant amount of interest in judicial system. In forensic science Daubert ruling is always required by judges to accept a expert testimony with forensic values. Forensic odontologist are responsible for their testimony particularly in bitemark which has serious consequence if it goes wrong. Therefore bitemarks are always subjected to disputes which again was further increased by Innocence Project. However bitemark cannot be avoided because it can be sometimes the only evidence available or it can direct the path of investigation to include or exclude a person. Hence a proper understanding of bitemarks becomes inevitable and this understanding is based on methods of bitemark analysis, uniqueness of human dentition and human skin as bite registration material. The other adjoining factors for understand bitemarks are those influenced by victim and biter, variability of skin on bitemark, mechanism of bite on skin, pathway of teeth in to the skin during bite, viscoelastic nature of skin to stress, histochemical changes of collagen fibres and secondary distortion. Forensic odontologist should also remember the questions asked by court whether dental uniqueness to six upper and lower front teeth is confined in bitemark injuries as well as appearance and replication of dental features by dental experts on injured skin are reliable. Judiciary must also understand the burden of proving bitemark validity is on limited available data. Finally appearance, anatomical location, distortion, posture and forces strongly be considered before starting a bitemark analysis.

Keywords: Forensic odontology, bitemarks, skin, uniqueness, distortion.

NON - DESTRUCTIVE DENTAL PULP EXTRACTION FOR DNA FINGERPRINTING

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Abstract

Teeth are highly mineralized, making them very resistant to damage. Owing to this high resistance, teeth maintain their integrity and have always been considered to be a good source of material for human identifification and forensic analysis. They are often the only components containing any DNA likely to help identify decomposed bodies or to study ancient populations. The literature chosen for the poster presentation is "A comparative study of two methods of dental pulp extraction for genetic fingerprinting" by Francoise Tilotta and others. The aim of the study was to compare the quantity and quality of DNA obtained by two pulpal DNA extraction methods.The study was conducted on 32 pairs of teeth. Each pair was made up of the same type of tooth extracted from the same patient at the same time. Teeth from pairs were randomly assigned to one of two groups according to how DNA would be collected: Group A: complete crushing of the tooth and Group B: standard endodontic access. The quantities of DNA obtained by crushing the tooth and by removing pulp by standard endodontic access by trepanation of the occlusal surface and amplifified DNA micro-satellites were compared. In the series of crushed teeth, insufficient material for amplifification was obtained in 78% of cases and a complete profile was obtained in only 9% of cases. Conversely, for the teeth prepared by trepanation, the profile was complete in 75% of cases and the DNA quantity was insufficient in only 3% of cases. Extracting dental DNA for identifification purposes is usually performed after crushing the tooth. The main disadvantage of this method is complete tooth destruction, so further radiographic, anatomical or biochemical studies are no longer possible. Trepanation thus produced superior results in terms of quantity of DNA and the quality of the genetic profifiles. Furthermore, a conservative procedure allowed further analyses on the tooth.

Keywords: Forensic, DNA Sampling, Pulpal DNA, Non-destructive DNA Extraction, Trepenation

AGE ESTIMATION USING WILLEMS METHOD IN MANDIBULAR RIGHT THIRD MOLAR (48) IN SOUTH INDIAN POPULATION

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Abstract

Dental age estimation is used in various disciplines like forensic dentistry, archaeology, orthodontics and several methods are proposed for assessing dental developmental stages. To get the most accurate age estimation, Demirjian's method and Willem's method are used, where tooth development is divided into eight stages. Willem's method measures the dental age more accurately than Demirjian's method and is in accordance with chronological age. Willem's method shows lesser overestimation of age when compared to the other methods and shows correlation between BMI and difference between dental and chronological age. To find the age estimation for mandibular right third molar (48) by Willem's method. The study sample consists of digital orthopantogram from 100 randomly selected subjects (50 male and 50 female) of age ranging from 10 to 20 yrs of age from South Indian population were divided into 10 groups such as 10-10.9, 11-11.9, 12-12.9, 13-13.9 till 19-19.9 years of age. The tooth staging used was Willem's tooth developmental staging and the stages were changed from A→H to 1→8 for convenience and easy accessibility. The statistical tests used were descriptive analysis. From the results analysed, the mean of tooth staging for males is 5.80 and for females is 5.92 and the standard deviation of tooth staging is found to be 1.927 for males and 1.523 for females. The standard error of mean of tooth stage was found to be 0.273 for males, 0.215 for females which infers that the age estimation for both gender would be more accurate. The study also found that there is no significant difference between males and females for tooth staging (p= 0.116). The females have higher tooth developmental stage accuracy than males between 13-15.9 years and males have the stage accuracy closer to females but not higher than them between 16-18.9 years. The modified Willem's method utilised in the present study gives accurate age estimation for both males and females between 10-20 years of age group. It can be useful in many fields like forensics, archaeology, criminalistics, etc.

Keywords: Age estimation, mandibular right molar, Willem's method, tooth developmental stage, orthopantogram.

MORPHOMETRIC ANALYSIS OF ANTILINGULA AND ITS RELATION TO LINGULA OF MANDIBLE

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Abstract

Morphometric analysis of mandibles is clinically important. Due to the close relationship of lingula with the neurovascular structures, lingula is considered as a bony landmark during maxillofacial and oral surgical approach. The antilingula is a bony prominence present on the lateral surface of the mandibular ramus. It is helpful to identify the position of mandibular foramen during oral surgery. The aim of the study is to determine the morphometric analysis of position of antilingula and its relation to lingula of mandible. This study was done in the Department of Anatomy, Saveetha Dental College and Hospitals. Thirty dried mandibles of unknown age and sex were used. Using digital vernier calliper measurements from lingula and antilingula to the anterior, posterior, superior and inferior border of ramus of mandible were taken. For accuracy, three measurements were taken and the average were used for the study. All the measurements were collected and tabulated and Mean and Standard Deviation were calculated. From our study, Lingula to Superior border was 17.57 ± 2.86 mm and Antilingula to Superior border was 15.06 ± 3.22 mm; Lingula to Inferior border 27.42 ± 2.58 mm and Antilingula to Inferior border was 26.93 ± 3.53 mm; Lingula to Anterior border was 16.36 ± 1.73 mm and Antilingula to Anterior border was 15.31 ± 2.97 mm; Lingula to Posterior border was 16.15 ± 2.32 mm and Antilingula to Posterior border was 14.86 ± 2.29 mm. Friedman's two -way analysis of variance by ranks test was done. p-value 0.00 ($p<0.05$). So, it was found to be statistically significant. The morphometric analysis of antilingula and its relation to the lingula of mandible is correlated and it is referred as an important reference point for surgeons in the surgical field to localise the mandibular foramen with respect to the variation in lingula.

Keywords: Lingula, Antilingula, ramus of mandible, mandibular foramen and morphometric analysis.

ORAL MICROBIOME: NEW ADJUVANT IN FORENSICS

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Abstract

Throughout human history, several techniques are evolving in the field of forensics that have changed the methodology of a criminal investigation. In modern Bioforensic investigations, oral microbiomes of the human body have shown their real value in criminology. Oral microbiomes are potentially unique to every person. After the gut, the mouth has the second largest and diverse microbiota. After the death, these microbes undergo gradual changes due to changing environmental conditions and by evaluating these changes in the microbiome, forensic experts can estimate the Postmortem Interval. "Microbial clock" could also be used to establish place and cause of death, Person's lifestyle, and even age. Therefore, traces of the microbes collected at crime scenes prove to be very valuable in criminal and civil cases. In many cases, we don't find any DNA samples or physical evidence at the crime spot. In those cases, the genotype of the microbes can be used as a strong biological marker. After sample collection, sequencing of the 16s rRNA gene or Shotgun metagenome is done. Then through analysis, we get results that are used by forensic experts. In several previous studies, researchers concluded that salivary "Microbial Fingerprints" traces address various forensically relevant questions that cannot be answered through classical forensic genetics. Due to some limitations in sampling and analysis, this field is still under development and requires a more standardized approach so that we can solve the cases more accurately. So this narrative concludes that the oral microbiome can be used as an individual signature to draw conclusions about the characteristics and qualities of potential perpetrators.

Keywords: Oral Microbiome, Postmortem Intervals, Forensic, Microbial Fingerprint, Microbial Clock.

DENTISTRY IN DISASTER VICTIM IDENTIFICATION

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Abstract

Prevention of life must be a primary priority during any major incident. Most of the disaster response plans do not cater for the need for disaster victim identification issue. The task of establishing the identity of victims of a mass disaster is termed disaster victim identification (DVI). The identification is done predominantly by factors like visual appearances and fingerprints, but this use may be restricted in case of mass disasters, burials, etc. where the human remains are destroyed beyond counts. Following the mass disaster, identification of individual victims by dental evidence is one of the utmost reliable methods of identification in such situations, especially in mass casualties associated with flood and earthquake disasters, the recurrence of which has been very high in the last few years in India. Individuals with loss of all teeth can also be potentially identified based on the anatomy of the jawbone or dentures with different shapes, sizes, manufacturers, and compositions. Moreover, dental data can also be used to determine individual's data such as age, race, and gender. Dental anomalies like missing teeth, supernumerary teeth and the presence of extra cusp can also form an important basis of identification of an individual. Dental remains are fast, reliable and relatively inexpensive means of personal identification during disasters. Dental professionals are compelled by law to produce and maintain adequate patient records, which provides valuable information about patients. Lei Wang *et al* said that the role of dentists has been reported in treating facial injuries sustained during the earthquake that struck China in 2008 in their study 'Dentists' role in treating facial injuries sustained in the 2008 earthquake in China: how dental professionals can contribute to emergency response'. Dentists are well experienced in infection control procedures, taking and using information from medical histories to guide their actions, taking and interpreting radiographs, and making diagnosis on the basis of clinical signs and symptoms. These skills are applicable directly to catastrophic response. Along with a forensic odontologist, a general dentist can also be helpful during disaster victim identification.

Keywords*: Dentistry, Disaster victim identification, dental evidence, forensic odontology, dental identification.

VIRTOPSY: NEW DEVELOPING SCIENCE IN FORENSIC ODONTOLOGY

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Abstract

"Autopsy" is a process that includes a thorough examination of a corpse noting everything related to anatomization, surface wounds, histological and culture study. "Virtopsy" is a term extracted from two words 'virtual' and 'autopsy'. It is a virtual alternative to a traditional autopsy, conducted with scanning and imaging technology. It is a multi-disciplinary technology that combines forensic medicine and pathology, roentgenology (radiology), computer graphics, biomechanics and physics. It is rapidly gaining importance in field of forensics because it is non-invasive and provides permanent observation of body parts. Dental identification is the most valuable method to identify human remains in single cases with major post-mortem alterations as well as in mass causalities because dental tissues usually do not get much affected by natural or man-made disasters. Virtual autopsy of dental structure can be used as a new developing tool in forensic odontology for human identification. CT scans can be done for individuals who are admitted to coronial services centre for medico-legal investigation purpose. Forensic odontologist can utilize ability of this imaging modality to separate individuals based upon dental development. Whilst CT is not yet able to adequately discriminate between differing restoration types and shades, and therefore cannot be used for dental identification in classic sense, the ability of this imaging modality to assess dental and skeletal development for purpose of age estimation and sex determination is valid. Virtopsy is able to provide information to investigators without need for physically invasive autopsy in certain circumstances.

Keywords: Virtual Autopsy, Forensic Odontology, Dental identification, Computed Tomography, medico-legal documentation.

NOLLA'S METHOD - AGE ESTIMATION USING MANDIBULAR LEFT THIRD MOLAR (38)

Vishaka. S[1]

Abstract

Teeth and dental restorations are resistant to destruction by fire and the elements are therefore useful in identification.This permits identification of a missing child or remains.Age estimation is useful in general dentistry and in forensic dentistry. It is also used in the area of anthropology to estimate the age of past populations from immature skeletal remains.Dental age estimation in living individuals is done by mainly non-invasive methods such as general physical examination,intraoral examination and a panoramic radiograph. Aim of the study is to estimate the age by Nolla's method using the mandibular left third molar (38). Fifty Orthopantomographs [25 male and 25 female] were used to study for the estimation of age determination of children using Nolla's method.The OPGs belonged to children of the age group 10-15 years old. The results of the study has shown that there was a strong correlation between gender and 38 staging.Gender with 38 staging was found to be statistically significant [p value<0.05].There was no correlation or association between gender and actual age of the children in the present study.Actual age is not statistically significant for gender [p value>0.05].The standard deviation values for age of males and females involved in this study are 1.48313 and 1.33601. The standard deviation values for 38 staging of males and females involved in this study are 2.432 and 2.318. The assessment of age is useful in planning treatment of orthodontic and pedodontic patients. Age estimation using the age group 10 to 15 years is useful in investigating cases of child abuse, child marraige, child labour etc. It's use is increasing in both civil and criminal affairs. Helps in the identification of age at death of a dead individual in mass disasters and natural calamities. The present study concludes by saying that further studies involving larger sample size and population specific data needs to be developed.

Keywords: Forensic science, Nolla's method of age estimation, Mandibular left third molar, Orthopantomographs

STERIOLITHOGRAPHIC PRINTING – A NOVELITY IN FORENSIC ODONTOLOGY

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Abstract

Forensic odontology is a challenging branch of forensic science that involves the application of dental sciences in the identification of deceased individuals. Stereolithography is an emerging tool in the field of forensic odontology for the identification of victims and the deceased individuals. Stereolithography is a form of 3D printing technology which is used for creating models, patterns, etc, by using a photochemical process in which the light causes the formation of polymers. This poster highlights the principle, technology, application and the cases proven with the help of stereolithographic printing in the field of forensic odontology.

Key words: Forensic odontology, stereolithography, 3D printing, victim identification, facial reconstruction.

GENDER DETERMINATION USING ODONTOMETRIC MAXILLARY PREMOLAR MEASUREMENTS

Medha Rajiv Ranjan[1], Yuvaraj Babu.K[1]

Abstract

Gender pertains to characteristics that differentiate masculine from feminine. There are various physiological differences that distinguish females from males. A number of researches have been conducted to determine gender by calculating femoral length, inter-acromial distance and so on. Forensic odontology is a branch of dentistry which focuses on the identification of deceased individuals, it is significant in determining the gender with the application of dental principals. With the application of forensic odontology, age estimations of both living and deceased individuals can be assited, analysis of bite marks found on victims or identification of bite marks on substances can be carried out. In this study, the odontometric measurements of inter distance between maxillary second premolar was used in order to determine the gender of individuals. A total of 60 individuals participated in this study, who included 30 males and 30 females. The maxillary second interpremolar distance was measured between the buccal sides using a digital vernier caliper after getting informed consent from the participants. The results of the study revealed that the mean value of odontometric measurements of interpremolar distance in males was greater than that of females. From this study it can be concluded that odontometric measurements of maxillary interpremolar distance was a reliable parameter for analysing the gender of individuals, showing statistical significance using Wilcoxon signed rank test hence sexual dimorphism was determined.

Keywords: gender determination, interpremolar distance, odontometric measruremets, sexual dimorphism.

ANALYSIS OF ANTHROPOMETRIC MEASUREMENT OF MANDIBLE FOR AGE AND SEX DETERMINATION USING ORTHOPANTOMAGRAM

Tahoora Taskeen L[1], Abhirami Arthanari[1], Lavanya Prathap[1]

Abstract

Mandible constitutes the lower jaw in the oral cavity, which hold the lower teeth. It is the largest bone in human skull. It is appreciably viewed in Orthopantomagram (OPG). Evidences indicate that it has varied anthropometric measurements, which helps in determination of age and sex. Thus the aim of the systematic review is to analyse anthropometric measurements of mandible in determination of age and gender. We conducted a qualitative systematic review using the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. The database used for literature searches was Pubmed ranging from 2010-2020. The Medical Subject Headings (MeSH) used for search include 'Morphometry of mandible' 'age' 'morphology of mandible' 'Orthopantomagram' 'Sex determination' 'Mandibular measurements'. After exclusion of irrelevant records 4 full text articles were selected for the study. The selected articles were checked for quality which was found to be at low risk and the findings of the review suggests that mental index, ramus height and bigonial width were higher in males whereas right and left gonial angles were higher in females and Mental index was significantly higher for 41-60 years. The results suggests the anthropometric measurements of mandible such as bigonial width, gonial angle, ramus height and mental index helps is determining age and sex with the use of panoramic radiographs.

Keywords: Mandibular measurements, morphometry of mandible, age, Orthopantomagram, sex determination

DIGITAL DENTAL FORENSICS: A BREAKTHROUGH IN FORENSIC ODONTOLOGY

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Abstract

Forensic odontology is a sub discipline of dental science which involves a multidisciplinary approach for handling forensic dental evidence and presenting it to the Court of Law. It mainly deals with human identification, dental profiling, facial reconstructions, dental autopsies and analysis of trauma and pattern injuries. The field of forensic odontology has recently seen a steady shift from conventional to new approaches due to advancements in emerging technology. Today's technology, applications, and artificial intelligence (AI) have assisted experts in making smarter decisions by reducing time and making activities easier. It has also aided in better human bias regulation with lower error rates. It has increased the ability and productivity of specialists by generating more reliable and detailed data. Digital software's thorough quantity and consistency appraisal has resulted in a better yield of good effects. The paradigm change toward new approaches and techniques has created vast opportunities for learning, creativity, study, and implementation in the field of FO. The poster emphasises certain key emerging technology topics of forensic odontology. For better forensic investigations, there is a need for practice and implementation of the software in an effective and legal way. In coming years, digital forensics will become an integral part of forensic investigative process .Thus, we should learn, accept and utilise digital advancements to their fullest to enhance our work potentials.

Keywords: Forensic odontology, digitalization, identification, digital software, research

BITEMARK INJURY: AN OVERVIEW OF THE HEALING MECHANISMS

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Abstract

The appearance of bite marks on the human skin is influenced by both the mechanism and forces that produce them and also by the mechanical properties of the skin / subcutaneous tissue. The integrity of healthy skin plays a crucial role in maintaining physiological homeostasis of the human body. With increase in criminal cases like rapes the use of bite-marks as forensic odontological evidence in linking the perpetrator of crime to the victim or crime scene. Thus bitemark evidence may be used as a corroborative evidence in the court of law. However, this comparative analysis is often very difficult, especially since human skin is curved, elastic, distortable and undergoing oedema. In this context, the transition from the inflammatory to the proliferative stage of wound repair is a topic of intensive current research. The tissue response to bitemark injuries may provide crucial information about the time of injury and also to differentiate the ante-mortem and the post-mortem injuries. Physiological regulation of wound healing of bite marks is a complex process, which is dependent on many cell types and mediators interacting in a highly sophisticated temporal sequence. Although some interactions during the healing process are crucial, redundancy is high and other cells or mediators can adopt functions or signalling without major complications. The present poster presentation will highlight the tissue response and the cascade of histological events that occur following a bitemark injury and also will address the need to develop a colorimetric scale for the Indian skin colour. In addition, the basic injury patterns in bitemark injury will also be discussed.

Keywords: bite marks, cellular changes, wound healing, forensic odontology, colour changes, inflammation.

IDENTIFICATION OF HUMAN BY ANALYSIS OF SMILE PHOTOGRAPHS

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Abstract

Forensic Odontolgy provides valuable secondary support for human identification.In some cases when some of the hard and soft tissues are destroyed, carbonised, charred or absent, other bones and teeth become the only source of identification.Every individual person smile has unique characteristics and it has found wide acceptance all over the world. Identification of human through smile is a time saving, less tedious and economical way.During autopsy the photographs of smile are used for comparison of post mortem and anti morterm images.The objective of this poster is to analyze the aspect of smile photographs in forensic odontology field, it's significant use and the possible advancements of the same In near future.

Keywords: Forensic Odontolgy, Smile Photographs, Selfie, Human Identification, Skull Photo Superimposition.

BURNT DENTAL EVIDENCE -HOW TO MAKE THE MOST FROM IT!

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Abstract

Forensic odontology is a highly technical branch that plays an important role in the legal proceedings. This branch has been utilized for many years to identify victims and suspects in abuse, criminal, civil cases involving malpractice as well as in mass disasters. Forensic odontologists are professionally qualified and specially trained dentists who identify unknown human remains. It can be difficult for an odontologist to recognize a burned corpse based on burnt dental evidence. Mishandling of evidence from a burned corpse also hinders the identification process. The objective of this poster is to review the morphological, microscopic and elemental alterations of burnt teeth and profiling them and also the handling of burnt dental evidences in a systemic and procedural manner.

Keywords: Forensic Odontology, Burnt teeth, Dental evidence, Mass disasters, Identification

IMPORTANCE OF NEONATAL LINES AS DENTAL EVIDENCE OF LIVE BIRTH

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Abstract

Neonatal line is an optical phenomenon produced due to alteration in the dimension, degree and mineralization of enamel prisms caused due to sudden change from intra uterine to extra uterine environment. It is stated that in 90% of all primary teeth, this line may be seen corresponding to the time of birth. Neonatal lines are independent of gestational age or size at birth. In primary enamel, rate of enamel formation is 2.5 - 4.5μ/day. In particular, enamel tissue, which encompasses the dental tissues, is the hardest and the most resistant tissue of the human body, which resists post-mortem alterations that is why the neonatal line (NL) is an important issue in forensic odontology. The presence of neonatal line indicates live birth and it is possible to estimate the exact period of post-natal survival of the infant in days by measuring the amount of daily incremental deposition of enamel, Neonatal lines can be used to differentiate between live birth and still birth and thus can be an evidence to differentiate between infanticide and foeticide cases. The NL can be examined by histological method in vertical or horizontal tooth sections with use of light microscopy, scanning electron microscopy (SEM), X-ray micro analysis (XRMA) and micro-radiography. Accurate detection of neonatal line with advanced techniques could rewrite this supplementary evidence of infanticide into substantial evidence. The main limitation of using neonatal line for estimation is that a couple of days of survival are necessary for the neonatal line to develop. However, the absence of the neonatal line is not always an indicator of still birth.

Keywords: neonatal lines, forensic odontology, live birth, still birth infanticide, post-natal survival

FORENSIC DENTAL KIT

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Abstract

Forensic odontology is subdiscipline of dental science which involves a multidisciplinary approach while handling forensic dental evidence and presenting the report to the court of law. The importance and the application of dental science and forensic odontology in the legal system are gradually increasing. Forensic dentist are important in crime scene investigation and there is a need for a specialized forensic kit in forensic casework of human identification, age estimation, and sexual assault cases with patterned injury, by the legal and forensic authorities. The forensic kit contents should be in accordance of the crime scene whether indoor or outdoor. To handle the evidence, a set of armamentarium/equipment related to forensic odontology are needed for a specific purpose based on the place of application. This poster is an attempt to give a comprehensive review of the essential equipments needed in a Forensic Dental Kit at the crime scene for investigation by a forensic odontologist, which will aid in collection of evidence, transfer and maintenance of records and also be helpful in identifying the culprit.

Keywords: Forensic Odontology, Forensic Dentist, Crime Scene, Evidence Collection, Dental Investigation Kit.

ROLE OF DNA IN GENDER IDENTIFICATION

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Abstract

Forensic Odontology is defined by FDI as "that branch of dentistry which in the interest of justice, deals with proper handling and examination of dental evidence and with the proper evaluation and presentation of dental finding.Teeth are the strongest structure present in the body and are resistant to post mortem decomposition. Most of the restorative matertials used are also resistant to postmortem decomposition. Thus dental evidence is of choice in identification of burnt, traumatized, decomposed and skeletonized remains. Teeth are an excellent source of DNA. The polymerase chain reaction (PCR) allows amplification of even highly degraded DNA. This facilitates comparsion with known biological antemortem sample of the decedent, such as hair from hairbrush, epithelial cells from tooth brush or a biopsy specimen.The DNA pattern may be compared to a parent or to a sibling thus allowing identification in case decedent's antemortem sample is unavailable. Various methods are used in forensic odontology in both gender and personal identification is by using either genomic DNA or mitochondrial DNA.

Keywords: Forsensic odontology, DNA, PCR , Gender identification , Genes , Chromosome

3D- PRINTING - A NEWFANGLED VIEW IN FORENSIC ODONTOLOGY

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Abstract

In this digitalized world the rapid development in 3d printing (i.e. Additive manufacturing and rapid prototyping), plays a crucial role in various fields such as engineering, medical and dentistry. 3D printing are habitually used in dentistry for the manufacturing of drill guides for dental implants, study models for prosthodontics, orthodontics and surgery, the manufacturing of dental, craniomaxillofacial and orthopedic implants, and for the fabrication of copings and frameworks for implant and other dental restorations. Like any other overlapping disciplines of dentistry, 3d printing also proves to be a useful and adjuvant technology in the field of forensic odontology. The foremost applications of rapid prototyping include bite mark analysis, facial reconstruction, physical models and in age and sex determination. In general, additive manufacturing technique utilizes the 2-dimensional data and converts it into a 3d product, which has the potential to produce robust evidence in courts and medico-legal cases. However, while the application of rapid prototyping to forensic science is advantageous, currently there is limited research demonstrated in the literature this may be due to a perception that it is a complicated technology, high cost and a lack of reporting skewing the visibility of the applications. Therefore, this poster presentation highlights basics of rapid prototyping, which includes the process of 3d printing, different technologies and the different materials. It also highlights the requirements to create sound practice for 3D printing across the forensic science practice, the need to develop accurate and admissible 3D printed models while exploring the techniques, precision and preconception within the courtroom, and calls for the alignment of future research and agendas perhaps in the form of a specialist-working group.

Keywords: 3D printing, rapid prototyping, forensic odontology, medico legal cases, determination of age and sex.

METHODS FOR GENDER IDENTIFICATION IN FORENSIC ODONTOLOGY

Gauri Ranjan[1]

Abstract

Forensic odontology is a scientific discipline that has been created by the integration of criminal sciences into the division of dentistry, for professionals and experts to be able to better investigate and resolve any questions regarding the identity of people involved in cases of criminal justice, natural or man-made disasters, mishappenings, and research. Trained professionals are often presented with complicated cases where they get access to barely enough remains of a body for the purpose of identification and hence have to make use of forensic odontology and its methods, which can be employed even within cases wherein a limited body fragments such as the teeth and skull have been recovered. Since the first and most important aspect of a person's identity generally includes their gender, there are various methods available at the disposal of forensic odontologists and investigators that can effectively determine whether the individual was male or female. The knowledge and information derived from such methods can be offered as assistance to other experts involved in forensic sciences in order to compile different data regarding the gender, age, racial and genetic dispositions of the body and establish a complete or approximate identity of the person. A detailed and in-depth morphological and molecular analysis is generally conducted in the field of forensic dentistry in order to fulfil the purpose of positive identification wherein the various topographies of oral cavity are examined. Dimensions of teeth including the crown size and shape, root length, canine dimorphism and diameter, dental index, odontometric differences and other such factors are explored and scrutinized along with the conduction of examinations on the features of the oral regions through procedures such as cheiloscopy and rugoscopy. The genetic traits, on the other hand, are inspected by carrying forward complicated studies on molecular aspects of the fragments such as regulating investigations regarding the presence of amelogenin, F-bodies, Barr bodies, etc. Therefore, a wide range of odontometric parameters can be employed for the purpose of gender identification, out of which some are known to give the best of results.

Keywords: Forensic odontology, investigation, gender identification, morphological analysis, molecular analysis, odontometric parameters.

GEOGRAPHICAL VARIATIONS IN THE PALATAL RUGAE PATTERNS IN INDIAN POPULATION

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Abstract

Palatal rugae are irregular and nonidentical mucosal elevations seen on the anterior third of the palate. The study of palatal rugae is termed "Rugoscopy" or "Palatoscopy". By determining the length of all rugae, three categories are identified: Primary rugae (5-10 mm), Secondary rugae (3-5 mm), fragmentary rugae (less than 3 mm). The shape of individual rugae is classified into four major types. Straight – Runs directly from origin to termination, Curvy – Simple crescent shape that was curved gently. Circular – Definite, continuous ring formation, diameter from origin to termination is considered; Wavy– Serpentile form. Their number and patterns are not uniform in all the individuals, and they appear to vary in different population subsets. The palatal rugae patterns are definitely associated with regional variation and can aid as an additional tool in forensic identification procedures. Both the quantitative and qualitative variations occur in the expression of the palatal rugae among population subsets. Gender based variations in palatal rugae is also reported in the literature. The length and the shape parameters of palatal rugae have yielded 73% accuracy result in discriminating sexes. There are studies on palatal rugae done on different populations in the Indian subcontinent. In some parts of India, the population showed predominance of wavy and curved patterns while in other parts, the straight pattern was predominant. Because of the diversity in the patterns among the Indian population groups, the palatal rugae may be considered as an important oral parameter for forensic human identification. The aim of this present poster presentation is to review and highlight the geographic variations that exist in the rugae patterns in Indian population subsets using the results of the scientific literatures.

Keywords: Palatal rugae, Rugoscopy, Geographic Variation, Indian population

ANTE-MORTEM AND POST-MORTEM CHARTING AMONG MEDICAL AND DENTAL EXPERTS IN HUMAN IDENTIFICATION - A SURVEY

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Abstract

Using "preserved dental records" or "ante-mortem records" available from general dental practitioners, forensic odontology plays a critical role in identifying patients in mass disasters. Identification of a deceased individual by comparing antemortem and postmortem charting is more reliable and easier as compared to other methods. However, in India, the practice of maintaining dental case records requires additional emphasis. The aim of the study is to evaluate the awareness about ante mortem and postmortem charting among medical and dental experts in human identification. Self-administered questionnaire was designed based on awareness .The questionnaire was distributed through a google docs link to the study population which included medical and dental experts.The participants were explained about the purpose of study in detail . The current study was a pilot study involving 100 medical and dental experts. This survey was conducted in the month of February, 2021. Once after the results of the survey were obtained, bar graphs and pie charts with a frequency table were prepared.The statistics done using SPSS software version 22.0, chi square test was done to check the association and a p value of 0.05 was said to be statistically significant. From the survey that was conducted, 74 % of the medical and dental experts are aware about ante mortem and post mortem chartings are there and are used by the forensic odontologist and the purpose for what ante mortem and post mortem chartings. To increase the awareness on ante mortem and post mortem chartings, classes should be taken based on forensic odontology. All the medical and dental experts should know the significance of forensic science in human identification.

Keywords: forensic science, identification, dental and medical experts, antemortem, post mortem.

AMELOGLYPHICS- THE UNIQUE IDENTIFICATION OF TOOTH PRINT

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Abstract

Ameloglyphics also known as tooth prints are the enamel rod end patterns on tooth surface and they are considered as a hard tissue analog to fingerprints. Teeth have the highest resistance to environmental effects like fire, desiccation, and decomposition, and may be used as forensic evidence. The tooth prints are unique, the variation exhibits both between teeth of unlike individuals and of the same individual, and between males and females. The fundamental unit of enamel is the enamel rod (enamel prism). In ameloglyphics, the enamel rod-end pattern on the outer surface can be studied by using acid etching, recording patterns, cellulose acetate peel technique and automated biometrics as sequential steps for personal identification. Each time when a tooth print was subjected to Biometric Analysis using Verifinger, the software obtain the pattern and sub pattern of enamel rod endings and stored the patterns in data base. The study shows that Verifinger is reliable software for analyzing enamel rod end. Ameloglyphics is a tool using for the unique identification by studying individual tooth print. Since teeth can withstand extreme temperatures, dental evidence is the technique of choice in creating an identity from the manmade or natural disasters. Biometric analysis reveals that the enamel rod-end patterns are distinctive for each tooth in an individual. Though there are some limitations that this study fails where we don't have ante mortem records and the record need to updated timely due to wear and tear of enamel. Even though The reproducibility and reliability of these enamel rod- end patterns suggest that ameloglyphics could be used as a reliable technique. Hence, the concept of tooth print is not a myth but a reality which will come true in near future if research is carried out in right manner in the right direction. Also, it is recommended that a fibro-optic laser scanner that can scan the complete teeth should be developed with software dedicated to study Enamel rod endings.

Keywords: Tooth prints, Ameloglyphics, Enamel rod patterns, Biometric Analysis