IJFO Abstract

POSTER PRESENTATIONS

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Fifty Shades of Decay – Why Visual Descriptors Matter in Accurate Postmortem Interval Estimations

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Decomposition is a holistic process where the entire necrobiome needs to be studied. Taphonomic research is limited by methodological approaches of small sample sizes and tendencies to focus on one variable. This study provides an overview of taphonomic descriptors used in body scoring techniques as a tool for determining the postmortem interval (PMI) in predepositional freezing and removal/delay of insect access. A generalized additive model (GAM) was utilized to model the interaction of variables and provide comparative significance on decomposition. If the adjusted R^2 value of 0.80+ was achieved, the taphonomic observations and applicability of the total body score (TBS) system were considered reasonable. Prefrozen subjects had a similar rate of decomposition to the expected (control) with a mean TBS of 23.17 and 23.42, respectively. Insect-proof subjects demonstrated a delayed rate of decomposition with a mean TBS of 19.58. The GAM showed that the TBS in insect-proof subjects was significantly slower ($P = 0$) from the expected sequence and the pattern of decomposition in prefrozen subjects was not significantly different ($P = 0.584$). The GAM showed that the PBS in insect-proof subjects was significantly slower in the head ($P = 0$), trunk ($P = 0$), and limbs ($P = 0$) from the expected and the PBS in prefrozen subjects was not significantly different in the head ($P = 0.566$), trunk ($P = 0.897$), and limbs ($P = 0.471$) from the expected sequence. This implies that the overall rate and pattern of decomposition are different in subjects with no/delayed insect access, and the use of visual descriptors to predict a PMI may be ineffective and not applicable to similar conditions.

Key Words: *Decomposition, necrobiome, postmortem interval, taphonomic*

Primary Identifiers – An Investigative Tool in Disaster Victim Identification

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The catastrophic events include manmade and natural disasters such as terrorist attacks, wars, earthquakes, floods, and fires. Numerous causalities occur as a result of these mass disasters and require proper management. There is a need for dignified management of dead bodies and to facilitate their identification in disaster victim identification management. INTERPOL has listed human identification methods that are mostly used in cases of disasters and must be scientifically trustworthy, solid, and applicable in field situations. These methods consisted of DNA, fingerprint, and forensic dentistry, also known as primary identification methods. With the advances in technology, DNA profiling is 100% reliable in making an exclusion, i.e., the victim is not a particular missing person. Human fingerprints are detailed, unique, difficult to alter, and durable over the life of an individual which makes them suitable for human identification. Teeth and bones are highly durable, and most individuals have dental records that are considered reliable in antemortem and postmortem comparison for dental analysis as a part of forensic odontology.

Key Words: *Disaster victim identification, DNA, fingerprints, forensic odontology, human identification, INTERPOL*

Forensic Odontology as a Humanitarian Tool

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Humanitarian action refers to a range of activities that seek to alleviate human suffering and protect the dignity of all victims of armed conflict and catastrophes, carried out free of charge and framed under International Humanitarian Law. Humanitarian forensics provides the necessary tools and expertise to manage this. Humanitarian forensic action is the application of skills of forensic science in disasters as a humanitarian action. Forensic odontology is a humanitarian forensic tool that deals with the handling, examination, and evaluation of dental evidence to identify victims of mass disasters, abuse, and organized crimes in the court of law. The INTERPOL has stated that a positive match in dental identification can be trusted as a stand-alone identifier. This poster aims at promoting and educating the audience regarding the critical roles of Forensic odontology as a humanitarian tool.

Key Words: *Dental identification, forensic odontology, human rights, humanitarian forensics action, humanitarian tool*

Rights of the Unborn

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Life starts with a heartbeat. There are unfortunate lives whose right to live is seized even before their first cry. According to WHO, between 2015 and 2019, an average of 73.3 million abortions occurred worldwide each year. In India and many other developing countries, there are no exclusive rights for the protection of the fetus, although illegal abortions are condemned. Forensic odontology has key roles in detecting and identifying a still versus live birth in cases of illegal abortion and neonaticide. Female fetuses are more prone to abortion owing to sociocultural practices and preference for male children prevailing among various indigenous and socioeconomically backward communities globally. This poster aims at promoting and educating the masses about the rights and laws protecting the fetus and also highlights the role of forensic odontologists in investigations pertaining to illegal abortions as there is widespread ignorance and neglect in this matter.

Key Words: *Fetus, forensic odontology, human rights, humanitarian forensics, illegal abortions*

Virtopsy in Forensic Odontology: A Touchless Innovation in Disaster Victim Identification

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Virtopsy is a multidisciplinary technique that integrates forensic medicine and pathology, radiology, and computer graphics for examination of the dead body. It utilizes modern radiological technology which allows the examination of deceased without actually touching or mutilating the body. Moreover, in case of a mass disaster, when the body is burnt, putrefied, or severely damaged which does not allow the proper examination of oral cavity, these techniques can be implemented for dental identification. This poster is a simple review of different evidences of virtopsy utilized for dental identification which reflects their potentials in the field of disaster victim identification (DVI) in forensic odontology. This poster basically highlights the prospect of use of cone-beam computed tomography (CT) and cranial CT in DVI. Thus, virtopsy though being a complementary tool for cadaveric examination can be implemented in the field of forensic odontology for DVI.

Key Words: *Computed tomography, cone-beam computed tomography, disaster victim identification, forensic odontology, virtopsy*

Dental Biometrics

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The word biometrics is derived from the Greek word's bio and metric, where bio means life and metric means to measure. In forensic dentistry, the experts look for similarities by performing manual comparisons of antemortem and postmortem dental records. During this manual approach, the key characteristics used to compare dental records are the presence or absence of a specific tooth, the morphology and dental restoration of the teeth, periodontal tissue characteristics and pathologies, and other anatomical features. Dental biometrics utilizes the evidence revealed by dental radiographs for human identification. This evidence includes the tooth contours, the relative positions of neighboring teeth, and the shapes of the dental work (e.g., crowns, fillings, and bridges). Dental biometrics have three stages: preprocessing and segmentation of radiographs, contour extraction or dental work extraction, and atlas registration and matching. The feature extraction stage uses anisotropic diffusion to enhance the images and a mixture of Gaussians model to segment the dental work. The matching stage has three sequential steps: shape registration, computation of image similarity, and subject identification. A refined segmentation is obtained by using a snake (active contour) algorithm. The dental code incorporates information about the position (upper or lower jaw) and size of the dental works, and the distance between neighboring dental work. Atlas registration is the method used for labeling teeth, which will help in the matching stage.

Key Words: *Antemortem, contour extraction, dental code, dental radiographs, postmortem*

3D Printing in Forensic Odontology

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The use of digital technology has been increasing in today's technically driven world. The field of forensic odontology is also undergoing a transformation from traditional to modern methodologies. 3D printing is a modern process for printing objects from a material using multiple stacking and computer-aided design data or digital data. It has long been utilized in dentistry to create models for guided implant surgery, oral maxillofacial surgery, and rehabilitation procedures. In forensic odontology, the same notion can be applied to casework and practise. Forensic facial reconstruction, human identification, and disaster victim identification can all improve via 3D printing. Bite marks, lip prints, tongue prints, and rugae pattern can all be studied with it. It is possible to determine age and gender using printed dental casts and teeth. Anatomically produced 3D models can be used to study dental anthropology and morphology. It is also valuable in anthropology and bone pattern injury investigation. With such a broad range of application, 3D printing should be further explored and validated for use in courtroom presentations. A few studies have been done on this, but there is still a lot of need for more research. This poster discusses the process, benefits, drawbacks, and applications of 3D printing in forensic odontology.

Key Words: *3D models, 3D printing, dentistry, digital technology, forensic odontology*

Role of Forensic Odontologist in a District Child Protection Unit

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District Child Protection Unit (DCPU) is the government organization directly under the control of District Collector and Superintendent of Police. DCPU plays an important role in protecting the crime against the children and raising them in a socially acceptable path without any psychological and emotional issues. The head of DCPU is a District Child Protection Officer who has certain discrete powers to appoint an expert based on their need for consultation. They mainly take up cases on child abuse which is a preplanned harming and frightening to harm a child mostly by an adult and sometimes by older child. Therefore, here comes the role of forensic odontologist in the DCPU playing a vital role in the arena of child abuse. Child abuse now exists in this civilized world, creating a nonaccidental injury which is insulated beyond territory, ancestry, and enlightened people of this sphere. This makes the understanding of child abuse cardinal since most of the physical injuries during the child mistreat happen in face and head regions which are frequently accessed by a dentist than any other medical personnel. This puts a forensic odontologist in a deliberate position to acknowledge and record children who are abused. The child abuse thus gives a red alert to the world citizens which otherwise overlooked creates a larger impact on the future society. Thus, a forensic odontologist finds his place in the DCPU with a concern of providing educational awareness, prevention and identification of physical abuse, sexual abuse, neglect, documentation, intervention, reporting the suspicious, and sometimes as a translater in child abuse cases. Wherefore, it has to be clearly emphasized to the human fraternity to give the children a welfare and not a farewell.

Key Words: *Child abuse, District Child Protection Unit, forensic odontologist, physical abuse, sexual abuse*

Various Techniques of DNA Extraction from Teeth and Its Associated Structures

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Teeth resist extreme temperature and conditions, they are better source of DNA when compared to skeletal bones and soft tissues when decomposed. DNA is present in the odontoblastic processes, accessory canals, cellular cementum, etc. Though DNA extraction is not the initial choice in identification but can be the last resort wherein other investigation may fail due to lack of evidences or antemortem records. The various methods for the extraction of DNA from teeth are conservative approach which includes injection of solutions, access opening, use of endodontic files, and nonconservative approach such as sectioning and grinding. The quantitative and qualitative results obtained from DNA depend on the methods selected based on criteria such as the teeth used, the age of the deceased, and time elapsed since the death. The article would aim at determining the most appropriate method suitable for a specific tooth and obtaining maximum amount of DNA from it and the advancements in recent times and in the near future regarding the same.

Key Words: *Dental DNA, DNA profiling, forensic dentistry, forensic odontology, teeth*