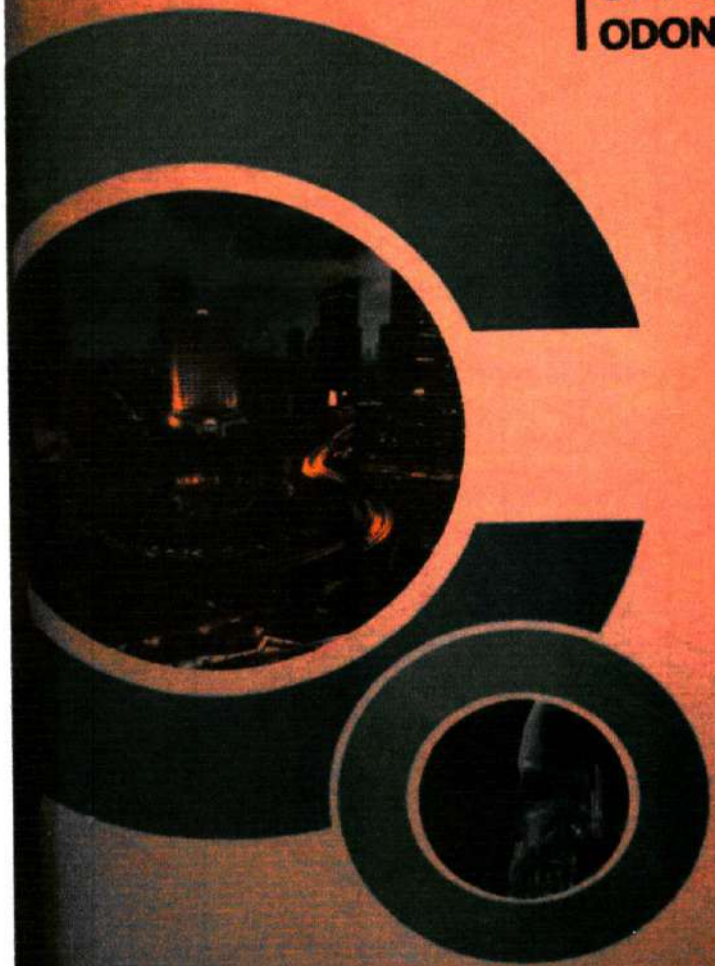


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3rd | **INDONESIAN INTERNATIONAL SYMPOSIUM OF FORENSIC ODONTOLOGY**



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**PROGRAM
BOOK**

The Use of Dental Radiography in Forensic Odontology

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Background: The basis of forensic dentistry is a comparison between ante-mortem and post-mortem data and findings that result in a match or exclusion. However, visual or written evidence are often inadequate, in fact not available so that positive identification is difficult to achieve. Therefore, a reliable way is required to confirm the findings, whether ante-mortem data is available or not. Generally, radiography plays a role in assisting the diagnosis of dental disease and treatment planning in dental practice. Besides, it can be used in forensics to overcome various problems. **Literature:** To achieve success in identifying deceased, ante-mortem data is compared to post-mortem data. This relies heavily on the dentist who keeps the dental records, including dental radiography. However, with various factors, ante-mortem data cannot be used as a comparison because it is not available. Therefore, other methods can be relied upon to forecast and even confirm the findings by utilizing radiographic imaging. Various case reports confirm successful identification with craniofacial superimposition techniques. Age, sex, and race estimation of the deceased can also be done. Beside as an identification tool, dental radiography can be used as evidence in reporting. The dentist must understand that their testimony may be necessary. If there is an oral injury such as a tooth fracture or laceration, the dentist should keep a complete dental record for review by the legal authorities. **Conclusion:** The various benefits of dental radiography indicate the importance of odontological analysis in forensics, either as an identification tool or evidence in reports of persecution.

Keywords: Odontology, Forensics, Radiography, Identification, Reports of Persecution

THE USE OF DENTAL RADIOGRAPHY IN FORENSIC ODONTOLOGY

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ABSTRACT

Background: The basis of forensic dentistry is a comparison between ante-mortem and post-mortem data and findings that result in a match or exclusion. However, visual or written evidence are often inadequate, in fact not available so that positive identification is difficult to achieve. Therefore, a reliable way is required to confirm the findings, whether ante-mortem data is available or not. Generally, radiography plays a role in assisting the diagnosis of dental disease and treatment planning in dental practice. Besides, it can be used in forensics to overcome various problems. **Literature:** To achieve success in identifying deceased, ante-mortem data is compared to post-mortem data. This relies heavily on the dentist who keeps the dental records, including dental radiography. However, with various factors, ante-mortem data cannot be used as a comparison because it is not available. Therefore, other methods can be relied upon to forecast and even confirm the findings by utilizing radiographic imaging. Various case reports confirm successful identification with craniofacial superimposition techniques. Age, sex, and race estimation of the deceased can also be done. Beside as an identification tool, dental radiography can be used as evidence in reporting. The dentist must understand that their testimony may be necessary. If there is an oral injury such as a tooth fracture or laceration, the dentist should keep a complete dental record for review by the legal authorities. **Conclusion:** The various benefits of dental

radiography indicate the importance of odontological analysis in forensics, either as an identification tool or evidence in reports of persecution.

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A. BACKGROUND

Basically, Forensic Odontology covers a wide range of topics that can be broadly classified into human identification, injury analysis, and also covers issues relating to child abuse and domestic violence, human rights protection, and professional ethics. To identify, a method that is recognized as a scientific method is fingerprint, DNA, and dental characteristics. The method varies in complexity, but has the same degree of certainty.

The diversity of dental characteristics makes each tooth unique. This strongest part of the human body can withstand high explosions and undamaged. Death incidents such as corruption, terrorism, natural disasters, and various incidents that cause the destruction of identification tools such as fingerprints and facial features make teeth one of the most important key identification tools. Not only that, the identification through the teeth can be done quickly and more economically.

Dental records used in dental forensics include dental charts, written medical records, and dental radiography. The dentistry forensic base is to comparing ante-mortem and post-mortem data or findings to obtain a match or exclusion. But not infrequently, visual identification is insufficient, even ante mortem data is not available due to various factors. So from that point, it takes a way to achieve a positive identification. In general, both extra oral and intra oral radiography play a role in helping to diagnose dental disease and treatment planning in dentistry practice. Not only that, radiography is also widely used in the field of forensics for various purposes.

B. OBJECTIVE

The objective of this literature is to know the use of dental radiography in forensic odontology.

C. LITERATURE

Dental Records: Ante Mortem Evidence

Identification of the deceased is most often achieved visually by someone who knows the person during his lifetime. This is done by looking at facial features, various features of the body and / or personal items. However, this method is unreliable when the body features are lost due to post-and peri-mortem changes (such as decomposition or incineration). Therefore, the tooth as one of the scientific identification tools can be relied upon to identify the victim. For that, ante mortem data needs to be available. It relies heavily on dentists who handle patients while living and keeps dental records, radiographs, study models, clinical photos, and so on.

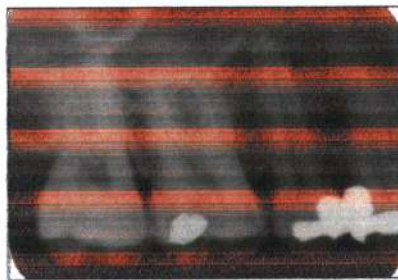


Figure 1a: Antemortem radiograph

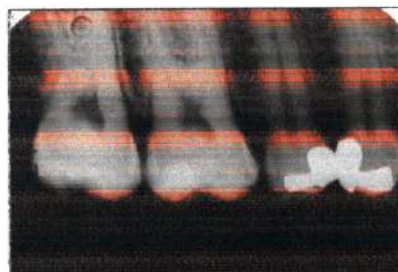


Figure 1b: Postmortem radiograph of the same person as in Fig. 1a.

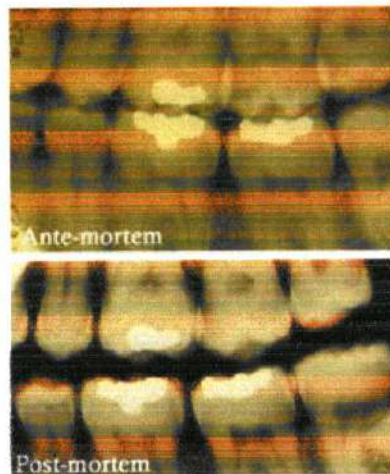


Figure 2. An ante mortem radiograph taken by the dentist and post-mortem radiography taken by Forensic Odontologist from an unknown deceased. There are many concordant points to build a positive identification.

Identification without Ante Mortem Medical Record

Age Estimation

Age estimation in forensic odontology is an important step for biological identification. Estimating age using dental development radiographs has been found to be a more accurate method because it is genetically influenced and is less likely to be influenced by nutritional and environmental factors. For age determination, two methods are commonly used: "Atlas Method" in which dental developmental radiographs are observed with published standards, and "scoring methods", where dental development is divided into different chronologies which are then scored and assessed by statistical analysis.

Race Estimation

The features, characteristics, and marks on the teeth give an idea of the cultural habits and ethnicities. Characteristics of teeth such as a long canine root, enamel pearl, taurodontism

(bulltooth), congenital abnormalities of the upper third molar are seen in mongoloid, incisors, Carabelli cups, hypocone, protostylid, peg shaping can be used to determine individual ethnicity. Aboriginal Australians, Melanesians and American Indians and Eskimos tend to be large-toothed races with wide crowns, while Lapps and Bushmen are small people with relatively smaller teeth.

Gender Estimation

The skull is the most dimorphic bone and allows for easy gender identification after the pelvis, even providing an accuracy of up to 92%. But if intact skull bones are not found, the mandible may play an important role in gender estimation because it is the most dimorphic, largest, and resistant skull from fracture and disintegration process. The dimensions of the mandible are reflected in their shape and size; Male bones are generally larger and stronger than women's bones. With significant results obtained from linear objects in the horizontal plane with digital panorama imaging, mandibular ramus measurements using orthopantomographs are reliable as parameters for gender estimation.

Craniofacial photo superimposition

Forensic odontology and anthropology is a good collaboration in identifying humans. In some cases, when soft tissue is destroyed, carbonized or absent for any reason, bones and teeth are the sole source of information about the identity of the deceased. In human identification, anything different, like variations of normality, becomes an important tool when trying to establish the identity of the deceased. One case report of a positive identification of a Brazilian girl obtained with the discovery of a dental position anomaly and confirmed by the craniofacial photo superimposition.



Figure 5a. An antemortem photo

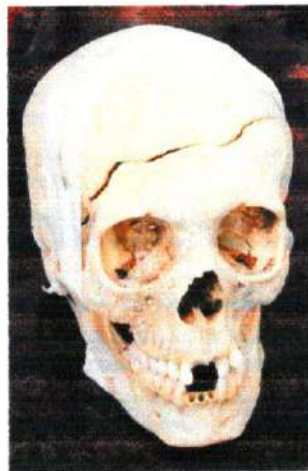


Figure 5b. The skull is articulated and placed to reproduce the angle of the photograph.



Figure 5c. Superimposition of cranial photo with two degrees of opacity

Forensic Odontologists have contributed to the resolution of many mass disasters. Tsunami in 2004 may be the best example to show the success of Forensic Odontologists in identifying large numbers of victims in a short time. Nearly half of Thai casualties were identified with only dental characteristics methods, and Forensic Odontologists contributed to the identification of the remaining half by assisting fingerprint, DNA and physical characteristics. Even the absence of dental records did not stop Forensic Odontologists from contributing to the identification of tsunami victims in Thailand. Victims without dental records are identified with photo superimposition.



Identify with photo-skull superimpositions. The skull of an unidentified child is superimposed onto the portrait of the missing person. The outline of the tooth and the anatomical similarity shows that the boy is in the portrait. The right central incisors in the circle disappear after death.

Domestic Violence and Child Abuse

Reports of abuse or persecution are mandatory, no exception for dentists. The dentist must understand that his testimony may be required for future legal proceedings. If there is an oral injury, the dentist should keep a complete dental record for examination by the legal authorities. Harassment injury may occur in the oro-facial area in various forms, including anterior teeth fracture, maxillary and mandible fracture, alveolar bone fracture, and others. One of the medical records that can be used as evidence in reporting is the result of radiographic images.

D. CONCLUSION

Dental radiography has various benefits in the field of forensic odontology, both as an identification tool and as evidence of domestic violence and child abused reports. Although, ante-mortem data sometimes is not available, but dental radiography can be used to aggregate age, gender, and race estimation. Even with superimposition techniques, positive identification can be achieved. This shows the importance of odontological analysis in forensics.

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