

Pathology and Abnormalities of the Teeth as a Biographical Profile in Uncovering the Identity of Unknown Skeletal Remains

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Abstract: Proper identification of personal identity is essential in the investigation because mistakes can be fatal in the judicial process. Identification is based on the peculiar characteristics of the person. The possibility of positive identification will be increased when considering individualization factors as biographical profile material. The purpose of this paper is to describe the pathological conditions and abnormalities of teeth and jaws that can be utilized to increase the completeness of the biographical profile of a person. We use collections of human skeletons remains in Universitas Airlangga. For this preliminary study, we used 5 crania for observations. The assessment was based on macroscopic observational methods on the teeth and the alveolar bone. The results show that there are several pathological conditions and disorders that along with other peculiar characteristics of the individual will add to the individualization of the cranium. Several dental diseases that are found and can be used for positive identifications are periodontitis, dental caries, tooth fracture, dental impaction, excessive teeth, malposition and malrotation; and dental stain. Those characteristics altogether give the uniqueness of the individual. The characteristics should be compared to images of the person during his living years, and to his known habit-such as smoking and or drinking coffee/tea. Individualization is needed to enrich biographical profile data in identifying unknown human skeletal remains, through disease detection and projection of lifelong habit.

1 INTRODUCTION

Proper identification of personal identity is very important in the investigation because mistakes can be fatal in the judicial process. Identification is the determination of the identity of the living or the dead, based on the typical characteristics of the person. If any bones and adult skulls are found, there will be identification of several things. First, race determination, gender determination, age identification, height measurement, and facial reconstruction of the skull also can be done (Byers, 2010).

Dental anthropology is part of the natural sciences, because this science is part of physical anthropology. In the process of personal identification using the tooth many things can be used as a guide. Each individual has a different shape or morphology in his teeth. In addition, the condition of the pathology and abnormalities of teeth and jaws in each individual is different and can be a

special feature for personal identification (Artaria, 2009).

In this paper the author to describe and explain the pathological and abnormalities of the teeth and jaws that can be utilized to increase the completeness of the biographical profile of a person. There are not many identification processes that consider individualization factors as biographical profile material in terms of uncovering identities of unidentified skeletal remains. Therefore, the authors are interested to make a paper that discusses about it.

2 MATERIAL AND METHOD

Materials for this writing is a collection of remaining human skeletons in Universitas Airlangga. For this preliminary study, we used 5 cranes for observation. This assessment is based on macroscopic observational methods on the teeth and alveolar bone.



Figure 1: One of the pathological cranium from the rest of the human skeleton as an object of observation.

3 RESULT AND DISCUSSION

The results show that there are several pathological groups that signalled dental diseases and disorders in a person, as well as a person's habit during his lifetime.

Pathological groups found in cranium, ie; Periodontitis, Dental caries, Enamel hypoplasia, Excision. Dental abnormalities found in cranium include; Fractures on the incisal edge (upper central incisors), Suspect dental agenesis or impaction of the upper left canine teeth, Supernumerary teeth or excess teeth (Parapremolar), Malposition and malrotation of the supernumerary teeth. Typical features of specific habits found in cranium are; Tooth discoloration or tooth staining because of the bad habit of smoking.

By knowing a pathological state and abnormalities in the teeth seen in the rest of the human skeleton we can provide more information as an attempt to complete the data in order to identify a person. Moreover, with the discovery of pathological state and abnormalities in our teeth we can describe a person's lifetime condition, especially if the skeletal remains are found in large quantities and have the same pathological features (Byers, 2010).

3.1 Periodontitis

Periodontitis is a multifactorial disease that causes infections and inflammation of dental support tissues, usually resulting in loss of bone and periodontal ligaments and usually is the cause of adult tooth loss and edentulousness (Newman et al., 2018; Ireland, 2006).

Periodontal inflammation has many causes (eg, bacteria, trauma). However, most of periodontitis cases are resulted from the accumulation of microorganisms on the teeth. Risk factors in chronic periodontitis include the presence of certain subgingival bacteria, tobacco use, diabetes, age, and sex. In addition, there is evidence that other factors may contribute to the pathogenesis of periodontal disease: environmental, genetic, and systemic (eg, diabetes) (Gafan et al., 2004; Ireland, 2006).



Figure 2: Alveolar bone resorption and exposed tooth root that can be seen on the rest of the skeleton, indicating the occurrence of periodontitis. Alveolar bone resorption is thorough in all alveolar bone supporting tooth.

3.2 Dental Caries

Caries is the destruction of the crown derived from bacterial infection. Bacterial metabolic activity causes acid products that damage the enamel (tooth enamel). Dental crown caries is caused by aerobic bacteria. Meanwhile, caries in tooth root is caused by anaerobic bacteria (Artaria, 2009).

In the remaining skeleton, it can be seen the presence of caries on the surface of the occlusal, pit and fissure.



Figure 3: Dental caries can be found on the rest of the frame. Occurs on occlusal surfaces, pits and tooth fissures.

3.3 Enamel Hypoplasia

Hypoplasia is a dental development disorder that can occur as a result of trauma or infection prior to dental eruption in the oral cavity. It is usually characterized by disturbances on the formation of enamel matrices. If Turners of hypoplasia is found in the anterior region of the tooth, the most likely cause is trauma to the tooth bud. The clinical characteristics of enamel hypoplasia are highly unfavorable for aesthetic, dentin sensitivity become higher, it may lead to malocclusion and dental caries (Nayak et al., 2016).



Figure 4: Clinical features of enamel hypoplasia are seen on the labial surfaces of the central incisors.

3.4 Excision

Tooth excision is a physiological change seen in the morphology of the occlusal anatomy and incisal tooth due to dental function. Such morphological changes are characterized by loss of incisal mamelon

or crown cusp on posterior teeth. Tooth excision occurs because it is widely used for mastication and Bruxism. The existence of bad habits such as eating hard foods, eating grains and grinding teeth can also cause morphological changes in the teeth (attrition) (Tamril, 2014).



Figure 5: Visible the entire occlusal surface of the posterior tooth experienced attrition.

3.5 Fracture

Tooth fracture is one of the main causes of tooth decay after caries and periodontal tissue disease. Tooth fracture is a condition of the teeth showing the loss or fragmentation of the fragment of a complete tooth. This condition is usually caused by trauma to the face or teeth such as sports that make physical contact or engage in car accidents (da Silva Mendonca DH et al., 2012; DiAngelis AJ et al., 2012).



Figure 6: Fractures on the incisal edge found on the remaining skeleton.

3.6 Dental Agenesis and Impaction

Dental agenesis on one or more of the tooth elements is the most common anomaly found in human teeth. Every tooth, either permanent or deciduous teeth, has the possibility of having an agenesis. In the permanent tooth, the third molar is the most common tooth of the agenesis, followed by the incisors of both the maxilla and the mandibular second premolar. Other teeth that are also often having an agenesis are the mandibular first incisors and the maxillary second premolar teeth (Jimenez et al., 2005). A permanent dental agenesis is the absence of development of one or more permanent dental elements because they are not formed or may be due to the non-growth of permanent dental seed (Vastardis, 2000).

Etiology of impaction teeth can be caused by local obstruction of hard tissue, local pathology, impairment of normal development of incisors, and genetic or hereditary factors. With the exception of the third molar teeth, the maxillary permanent canine is the common tooth impaction. Recent research on maxillary canine impaction frequency shows a prevalence of 0.27% to 2.4% where women are more often than men (Becker and Chaushu, 2015).

3.7 Supernumerary Teeth (Parapremolar)

Supernumerary teeth or extra teeth is a disorder in which the number of teeth is more than normal. These additional teeth usually have an abnormal morphology and shape. Supernumerary teeth that resemble normal teeth are called supplemental teeth, whereas more teeth that do not resemble normal teeth are called accessory. Supernumerary teeth can be single, multiple, and unilateral or bilateral eruptions and may be present in one or both jaws. Supernumerary teeth are more common in the upper jaw than in the lower jaw. These excess teeth can also formed in different parts of the jaw, ie in the area of the upper incisive incisor (also called mesiodens), next to the molar teeth (also called paramolars), at the very back of the last molar teeth (also called disto-molars) or next to premolar teeth (also called parapremolars). The most common supernumerary teeth are mesiodens. This disorder is more common in permanent teeth than in deciduous teeth (Parolia et al., 2011).



Figure 7: There are excess teeth (Parapremolar) on the rest of the skeleton. Excessive teeth experience malposition and malrotation.

3.8 Malposition and Malrotation of Supernumerary Teeth

Malposition could be teeth crowded, teeth overlapping, tilted, shifted, and rarely. Malrotation could be a tooth rotation. The malposition and malrotation state are often not recorded on the daily examination (antemortem), so to overcome the malposition and malrotation conditions, it can be examined the postmortem data from the mold model or from roentgen photographs (Harty and Ogston, 1993).

3.9 Tooth Discoloration or Tooth Staining

Tooth stains can be caused by smoking. Smoking is an easy thing to meet everyday in the community. The number of cigarettes greatly affects the rapid progress of the formation of dental stains. Duration of smoking can cause thickening of tooth staining (Sinaga et al., 2014).

Nicotine with decomposition products especially pyridine is a substance in producing dental stains which can often be seen in teeth of smokers. This element will form pigmented deposits attached to the surface of the teeth and range the colour in brown to black. Thickened stain deposits can make tooth surface become rough which will lead to plaque build up to irritate nearby gums (Sinaga et al., 2014).

The use and consumption of tobacco and coffee can cause tooth stains. The use of tea, certain mouthwashes and pigments in the diet can also cause the formation of tooth stains and tobacco also usually cause stains on the enamel surface. Tooth stains can enter the tooth layer in people who smoke during their lifetime and are difficult to remove (Sinaga et al., 2014).



Figure 8: Stains on the tooth surface due to smoking can be found on the remaining skeleton.

4 CONCLUSIONS

Individualization is needed to enrich biographical profile data in identifying unknown human skeletal remains. It should be considered that identification of pathological conditions and abnormalities in teeth cannot be determined arbitrarily because macroscopic determination alone is not sufficient. In addition to disease detection, individualization can project lifestyle habits in the form of stress markers, as in the object of this writing is likely to have a lifetime smoking habit as clearly visible the typical features found on the surface of teeth, smoking can also be a predisposing factor in periodontitis disease as well as age.

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