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Dental Methods Forage corpses Identification (Review)

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Introduction

Background

The identification of burnt corpses or in an advanced state of decomposition, becomes a situation that requires the help of forensic anthropology. Forensic Anthropology is a scientific discipline that applies methods of Physical Anthropology and Archeology, in the collection and analysis of evidence in legal contexts Burns [1]; Rodriguez [2]; Byers [3]. The most interesting data in a corpse studio (especially those cases where the main objective is not to determine the correct identity, but generic data of the group) are the sex and the age of the individual. The complete skeleton permits a reliable sex determination, and in cases that we only have some bones, the skull study permits establish a sexual determination with 80-92% of success. Krenzer U[4]; Buikstra and Ubelaker [5].

Children Age Determination

In individuals under the age of eighteen, the study of tooth growth is, for many authors, the most accurate procedure for determining age Dermijian [6]; Nolla [7]; Gustafson [8]; Cameriere [9] The estimation of the dental age can be reached assessing the different stages of mineralization. After the age of 14, after the formation of the premolars and canines, age estimation becomes more difficult since the majority of the dentition has already completed its development, except for the third molars, which continue to be the only useful indicator Landa [10]. Several methods have been proposed for the determination of dental age during this period of life:

a. Assessment by radiographs the state of mineralization of the dental germs in the permanent dentition.

b. Sequence of dental mineralization (different tables according to population).

c. Degree of growth of the crown and root elements of each of the human teeth: To determine the person age, we have to study each and every one tooth individually and then establish the average age, taking into account sexual and environmental variations Smith [11].

d. Study of the dental eruption: Using a radiological image we can use the Schour-Masller formula, described by Ubelaker [12], which facilitates the view of the degree of growth of the teeth and their roots.

Children Age Determination

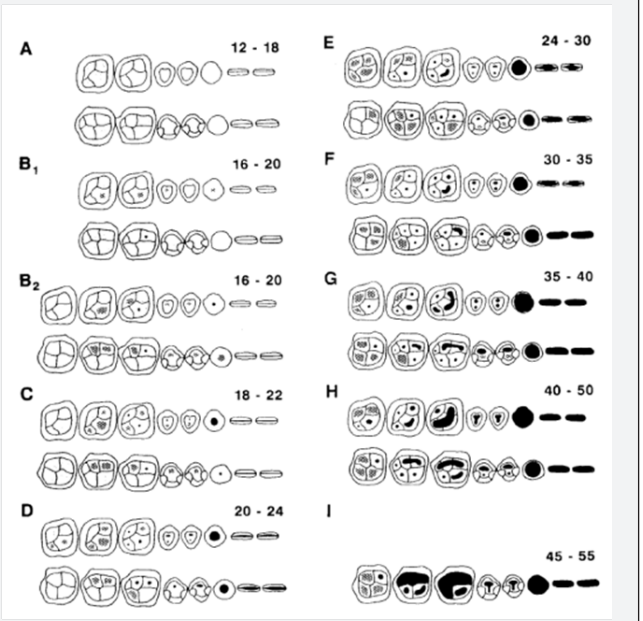

Figure 1. Dental Wearing and Age (Lovejoy, 1985).

Wearing Teeth: Studies realized by Miles [13]or by Brothwell [14]analyze the degree of tooth wear to determine age, focused on pre medieval samples. Brothwell, in his work, points out those results must always be observed with parallel studies in the pubic symphysis. C. O. Lovejoy [15] studied tooth wear in a population of 332 individuals. He performed a distribution on anterior teeth, premolars and molars wearing (Figure 1).

Root Translucency: Lamendin [16] studied 306 teeth from 208 patients (135 males and 73 females). 198 were caucasoids and the rest were negroides. Their age was between 22 and 90 years. He collected unirradicular teeth, free of cavities. In his work presented a formula that allowed concrete results in the studied ages (Figure 2).

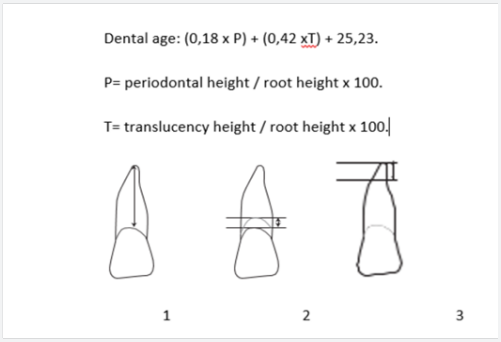

Figure 2: Root Translucency Evaluation (Lamendin, 1988).

Gustafson's Method for Determining Age: Gustafson determined the importance of dental studies in forensic anthropology. For this author, the analysis of periodontitis, secondary dentin apposition, cement formation, re absorption and radicular teeth transparency, are of interest as indicators. In Figure 3 and Tables 1 & 2 the grades of tooth wear with description of their values (from 0 to 3) are shown. Gustafson's method may be influenced by pathological causes. Teeth to be used are preferably anterior mono radicular. In premolars and molars the margin of error is large. The margin of error is 4 to 6 years.

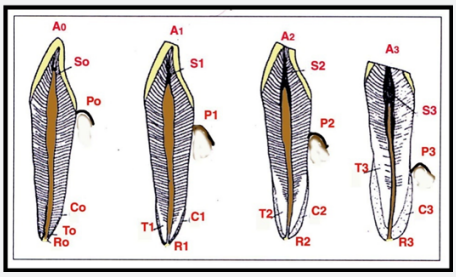

Figure 3: Dental Variation by Gustafson.

To determine age, the following formula is applied:

$$AGE = 11,43 + 4,56\ X$$

X is the sum of the degrees (0 to 3) of each of the indices studied: A+P+D+C+T+R

Table 1.

Age	26-29	30-39	40-49	50-59	60-69	70-79	80-89
Error+/-	24,8	15,5	9,9	7,3	6,3	11,6	18,9

Table 2: Age Indicators Grades by Gustafson.

	GRADE 0	GRADE 1	GRADE 2	GRADE 3
Atrittion (A)	Doesn't exist	Affects enamel	Affects dentin	Affects' pulp
Parodontosis (P)	Doesn't exist	Inicial recession	Affects the first third of the root	Affects' more tan two thirds
Secondary Dentin (S)	Doesn't exist	Upper area pulp cavity	Dentin in the middle of the cavity	Pulp Cavity completely full
Cement formation (C)	Doesn't exist	Some higher than normal	Large amount of cement	Cement high consistency
Root resorption (R)	Doesn't exist	In some isolated point	Greater loss of substance	Affectation on dentin and cement
Root transparency (T)	Doesn't exist	A Little	More than one third	More than two thirds

Discussion

The analysis of the teeth for determination of age can be very varied. Many authors have tried to establish parameters and formulas that help determine more accurately the age of a cadaver. Kvaal [17] attempted to analyze progressive variations to determine age, but did not find conclusive results to establish the ideal formula. Many authors have used the Gustafson method over the years in different populations and at different times. Vlcek [18] used it for the investigation of prehistoric remains. He used four parameters (abrasion, secondary dentin, cement apposition and root resorption). He also applied Gustafson's formula for the identification of three Czech princes, found in a Prague castle, 9 to 10 centuries old. In his studies he handled unirradicular teeth. Maples [19], used the Gustafson method, applying multiple regression formulas, to obtain a greater precision. Lampe and Roetzscher [20], also have used this method in a sample of 350 teeth belonging to men and women in the German city of Heidelberg.

However, we must keep in mind that as the age increases, the anthropometric procedures lose precision and it becomes necessary to use several procedures simultaneously. The determination of age through dental imaging has led to the

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development of sophisticated techniques, such as the use of image analyzers, with maximum errors of 4.8 to 5.4 years Xu [21]. The determination of age, especially in adults, maybe will be centered on finding markers that do not suffer degradation or undergo modification over time or with the processes that a decomposing body may present. Just as genetic analysis stands out because of its usefulness in determining the corpse's sex, we may have to appeal to accurate molecular tests that will one day allow us to identify age as well.

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