F5 Morphological Analysis of Root Development of the Third Molar by the Study of Digital Ortopantomography

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The goal of this presentation is to test the possibilities offered by ortopantomography executed by means of digital technology.

At present there is a large immigrant population in Italy and young foreign criminals sometimes have false passports bearing a later birth date with the goal of evading punishment. This presentation will impact the forensic community and/or humanity by providing a method of age deter- mination, which is becoming a significant forensic issue.

Accurate timing of the eruption of first and permanent teeth is an important parameter in forensic odontology to establish the age of dead or live individuals.

Determination of adulthood may determine, for example, whether an individual convicted of a crime is sentenced as an adult and incarcerated in a state penal institution or as a juvenile and sent to a juvenile camp. At present there is a large immigrant population in Italy and young foreign criminals sometimes have false passports bearing a later birth date with the aim of evading punishment. In such circumstances age determination is becoming a significant forensic issue.

Late in adolescence, after formation of the premolars and canines, only the third molars continue to develop. According to several studies, although the third molars are the most variable teeth in the dentition, they remain the most reliable biological indicator available for estimation of age during the middle teens and early twenties.

In this study the authors test the possibilities offered by ortopanto- mography executed by means of digital technology, with the aim of exploiting the advantages of the computerized digital technique compared with the conventional technique, to determine adult age on the basis of root development of the third molar.

Digital x-ray technology is currently applied for dental identification of dead individuals, in particular in mass-disaster cases. Digital radiog- raphy is simple to use, quick and effective, allowing superimposition and enlargement; the images can be electronically stored and transported.

In comparison with traditional opt, the digital technique features greater diagnostic accuracy of some anatomic structures: upper and lower front teeth, root apexes, floor of the nasal fossa and maxillary sinus, nasal septum, and mandibular condylus. Moreover, digital ortopantomography suffers less from artefacts.

The digital ortopantomographies of 51 subjects (33 females and 18 males) aged between 16 and 22 years were analysed in standard conditions, assessing the degree of maturation of the upper and lower third molars.

A standardized computer procedure was used to acquire the x-ray images, recording three per plate: the overall ortopantomography and two enlargements of optical type of the left and right sides, to reveal the third molars while maintaining unaltered the image resolution.

For the analysis the authors adopted Demirjian's staging system that classifies development of the third molar in eight stages (A, B, C, D, E, F, G, H) on the basis of morphological criteria. This has been statistically proved to feature notable precision and high predictive ability.

To assess any sex-related variations in mineralization speed, the series was subdivided by gender. The study demonstrated that such differences are more evident under the age of 18 years.

Overall, the observation of 181 third molars showed faster devel- opment of the upper than the lower third molars, a prevalence of stages D to G in the age range between 16 and 18 years, and a clear predominance of stage H in individuals over 18 years of age. Finally, an intermediate stage between G and H was demonstrated in subjects aged between 17 and 21 years.

Forensic Odontology, Digital Radiology, Third Molar

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