G6 Forensic Age Estimation (FAE) By Third Molar Mineralization Using Digital Orthopantomography (OPG)

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After attending this presentation, attendees will better understand the principles of FAE, how assessment of third molar mineralization can increase the accuracy of FAE, and how the use of digital OPG can increase the precision of third molar mineralization estimates.

This presentation will impact the forensic science community by providing information about the role of third molar mineralization in FAE and will highlight the role of digital OPG in FAE.

Age estimation is of paramount importance in assisting law enforcement in some cases.[1] In many countries, the relevant age in regard to liability for criminal responsibility is 18 years. Maturation of sexual characteristics, as well as tooth and skeletal development, have been used to estimate age.[2] Dental techniques that use progressive morphologic changes have proven to be the most accurate methods for estimating the ages of infants, children, and adolescents when compared to other methods of age estimation.[1] Several studies have revealed a strong correlation between third molar development and chronological age.[3-5] The focus of these methods is on the stage of maturity of the wisdom teeth because these are the only teeth to continue root mineralization after the age of 16 years. The present study is designed to judge the reliability of third molar mineralization in age estimation of adolescents by using digital OPG.

A retrospective study analyzing 167 OPGs (85 males and 82 females) aged between 14 and 25 years was performed to assess the degree of maturity of third molars. Demirjian's staging system, which subdivides development of the third molar into eight stages, was used. The assessed mineralization stage for each third molar was recorded separately for each quadrant. The mineralization stage and chronological age were subjected to statistical analysis.

This study revealed there was no statistically significant difference between males and females attaining each stage of mineralization. There was no significant difference between the upper and lower third molars in their mineralization. There was no statistically significant difference between the two genders with respect to the distribution of developmental stage H over the age of 18 years. The predictive percentage is 96.59% for stage H over the age of 18 years for both males and females. Based on Demirjian et al.'s stage H, the likelihood of an individual being at least 18 years of age with at least one fully developed mandibular wisdom teeth of the four amounts to 100% for both males and females.

The present study concludes that, in the case of completed mineralization for at least one third molar (Demirjian et al.'s stage H) out of four, the probability of the individual being at least 18 years old is 100% certain for both males and females. The method may, therefore, be considered a valid aid in estimating legal adulthood. The advantages of digital OPG for dental analysis must be acknowledged.

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