

Chapter 11

Dental Age Assessment (DAA) of Children and Emerging Adults: A Practical Guide

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ABSTRACT

A variety of methods have been used to estimate dental age. Tooth development as a means of estimating age has been used for several centuries. The purpose of the chapter is to describe the method used at the Dental Paediatric Unit of King's College London Dental Institute and the UCL Eastman Dental Institute to carry out Dental Age Assessment (DAA). An important principle is the biological variability of growth of teeth, a factor inappropriately considered in many studies of DAA. This chapter serves to inform colleagues, lawyers, immigration workers, social workers and subjects of unknown date of birth of the way in which DAA is conducted.

INTRODUCTION

General Considerations

Tooth development as a means of estimating age has been used for several centuries. In the early

part of the Industrial Revolution in Great Britain children were required to work in underground coal mines on attaining six years of age. Evidence of the attainment of six years was adduced from the presence in the mouth of any of the permanent first molars (Saunders 1837). In general terms this was accepted but was harsh on those children

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whose first permanent molars erupted at under 6 years, sometimes as early as 5 years and 3 months (Ekstrand, Christiansen, & Christiansen 2003). This highlights an important principle, which is the essential biological variability of growth of teeth, a factor inappropriately considered in many studies of Dental Age Assessment (DAA).

Methods of age assessment are used on subjects whose date of birth is unknown either because records are lost or have never existed. The possible techniques are psychological development, height, weight (Demirjian, Buschang, Tenguay, & Patterson, 1985), hand-wrist skeletal development (Tanner, Healy, Goldstein, & Cameron, 2001), sterno-clavicular joint maturation (Kreitner, Schweden, Reipert, Nafe, & Thelen, 1998), tooth development (Bolanos, Manrique, Bolanos, & Briones, 2000; Liversidge, Lyons, & Hector, 2003), dental root canal width (Kvaal, Kolltveit, Thomsen, & Solheim, 1995), and/or tooth apical foramen width (Cameriere, Ferrante, & Cingolani, 2006). Occasionally dental age assessment is needed to assist in the identification process of cadaveric remains (Clark, 2008). Studies where different methods of age assessment are compared all indicate that tooth development correlates more closely with chronological age than any of the other techniques (Garn, Lewis, & Kerewsky, 1965; Lewis & Garn, 1960; Demirjian, et al., 1985).

The development of high quality radiographic images, especially the Dental Panoramic Tomograph (DPT), with which the whole of the dentition is viewed on a single image, has provided clinical investigators with a uniquely effective way of assessing dental maturation. This has led to the use of a number of different systems for generating quantitative data from defined stages of tooth development (Liversidge, Chaillet, Mornstad, Nystrom, Rowlings, & Taylor, 2006). The DPT (often referred to as an OPG or OrthoPantomograph) is widely used in clinical practice to assess dental disease in otherwise healthy children. This means that very large numbers of DPTs are available which are deemed to be representative of the

general population. Occasionally, other radiographic projections which have a limited number of teeth, for example the upper standard occlusal, are used to generate reference data. Thus many studies have been carried out accurately defining the age of attainment of tooth development using clearly defined stages (Demirjian & Goldstein, 1976; Olze, Bilang, Schmidt, Wemecke, Geserick, & Schmeling, 2005).

Careful scrutiny of the literature shows that none of the publications cited explains the detailed method of exactly *how* an individual of

Table 1. Tooth Morphology Types (TMTs) used in the Assessment of Dental Age. [8 Tooth Development Stages] British Dental Journal Nomenclature

Tooth Nomenclature [British Dental Journal Nomenclature]	Anatomical Description of TMTs
UL1	Upper Left Permanent Central Incisor
UL2	Upper Left Permanent Lateral Incisor
UL3	Upper Left Permanent Canine
UL4	Upper Left First Premolar
UL5	Upper Left Second Premolar
UL6	Upper Left Permanent First Molar
UL7	Upper Left Permanent Second Molar
UL8	Upper Left Third Molar
LL8	Lower Left Third Molar
LL7	Lower Left Permanent Second Molar
LL6	Lower Left Permanent First Molar
LL5	Lower Left Second Premolar
LL4	Lower Left First Premolar
LL3	Lower Left Permanent Canine
LL2	Lower Left Permanent Lateral Incisor
LL1	Lower Left Permanent Central Incisor
UR8	Upper Right Third Molar
LR8	Lower Right Third Molar

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