

Anomalies of the Developing Dentition

A Clinical Guide to Diagnosis
and Management

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Patrice Barsamian Wunsch
Christel M. Haberland

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Preface

Once writing began, with photographs and radiographs of the various anomalies being gathered, a heightened awareness resulted in a realization of the frequency of occurrence and combinations of dental anomalies. Thoroughness of the examination is confirmed as clinicians identify an anomaly. Patients and caregivers may have previously noticed the anomaly and appreciate our knowledge of the etiology and its management. During an oral examination, this discussion typically peaks more interest than oral hygiene, caries, or other issues and provides an opportunity for improved interaction.

Developmental anomalies may occur simultaneously and in different combinations. Patterns of association occur with a spectrum of dental anomalies. Because dental anomalies may be associated with many syndromes, awareness of the phenotypic expression of certain anomalies may alert clinicians to the possibility of a genetic trait not yet expressed in a medical history or clinically apparent. The mission of this handbook is to provide a succinct and informative means for healthcare professionals to identify, discuss, and appropriately manage the more common developmental dental anomalies.

Allison Park, PA, USA

Jane Ann Soxman

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1.1 Introduction

Anomalies of the developing dentition occur due to absence or interruption of normal tooth development along with genetic and/or environment influences. Size, shape, number, eruption, formation, and the composition of enamel and dentin are reflected in an aberration of development. The genetic control of dental development represents a complex series of events that include both the type, size, and position of the enamel organ and the processes of formation of enamel and dentin [1]. The developmental stages and physiologic processes of odontogenesis provide the knowledge for the time line and origins of the various anomalies.

Dental anomalies may occur independently and often are associated with other anomalies (Figs. 1.1, 1.2, 1.3, and 1.4) and particularly with syndromes (Fig. 1.5) [2]. Each dental anomaly has beginnings during specific stages of tooth development.

Fig. 1.1 Talon cusps on maxillary right and left permanent lateral incisors





Fig. 1.2 Panoramic radiograph revealing multiple anomalies with agenesi of maxillary right and left permanent lateral incisors, mandibular right second premolar, and left third molar

Fig. 1.3 Clinical photograph showing shovel maxillary permanent central incisors and large talon cusp maxillary permanent left lateral incisor



Fig. 1.4 Panoramic radiograph revealing agenesi of all four third molars, microdontia maxillary right and left permanent lateral incisors, and pyramidal maxillary right and left permanent first molars



Fig. 1.5 Panoramic radiograph revealing multiple anomalies in Down syndrome with microdontia of maxillary right third molar, agenesis of multiple permanent teeth, ectopic eruption of maxillary right and left permanent canines, and developing taurodontism mandibular right and left permanent second molars

Table 1.1 Stages in tooth growth showing overlap of the various physiologic processes and morphologic stages of tooth development with the exception of the initiation stage
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Morphologic stages	Physiologic processes
Dental lamina	Initiation
Bud stage	Proliferation Histodifferentiation Morphodifferentiation Apposition
Cap stage	
Bell stage (early)	
Bell stage (advanced)	
Formation of enamel and dentin matrix	

Physiologic processes include Initiation, Proliferation, Histodifferentiation, Morphodifferentiation, and Apposition [3]. Central features of dental development are the formation of the epithelial placode, the budding of the epithelium, the condensation of mesenchyme around the bud, and the folding and growth of the epithelium generating the shape of the tooth crown [4]. The developmental stages of Bud, Cap, Bell, and Advanced Bell Stage are termed as the Morphologic stages of tooth growth. With the exception of initiation, physiologic processes of development overlap during the morphologic stages of tooth growth as shown in Table 1.1. Teeth form from the surface ectoderm of the first branchial arch and the frontonasal prominence as well as from the underlying mesenchyme that is derived from the neural crest. Therefore, the first branchial arch epithelium is necessary for tooth development, and multiple genes are involved in tooth formation [1, 4]. The genes that regulate tooth development have been researched extensively and to date over 300 genes have been associated with the patterning and morphogenesis as well as with cell differentiation in teeth [4].