

Development of occlusion

Mixed Dentition period

(Around 6 years- 13 years) The mixed dentition period can be divided into:

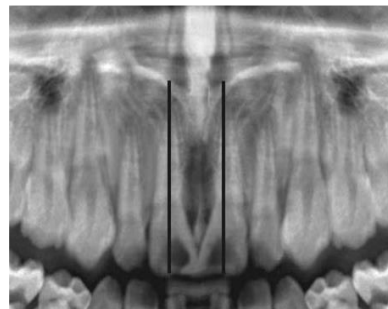
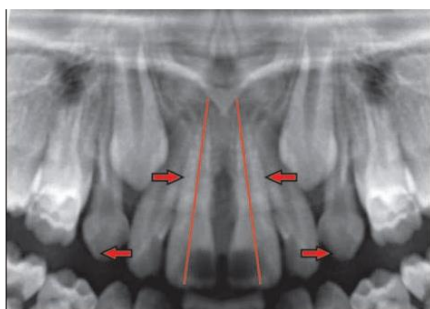
1. First transitional period.
- 2- Inter-transitional period.
- 3- Second transitional period.

Inter-Transitional Period

Inter-Transitional Period: the root formation of emerged incisors, and molars continues, along with concomitant increase in alveolar process height, resorption of roots of deciduous canines and molars, no exchange of teeth take place, it is a silent period extend from 8.5 years of age to 10 years of age, this period is called (Lull period) In this period, the teeth present are

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Ugly Duckling Stage (Broadbent's phenomenon): Around the age of 8 - 9 years, a midline diastema is commonly seen in the upper arch, which is usually misinterpreted by the parents as a malocclusion. Its typical features are: Flaring of the lateral incisors. Maxillary midline diastema, crowns of canines on young jaws impinge on developing lateral incisor roots, thus driving the roots medially and causing the crowns to flare laterally, the roots of the central incisors are also forced together, thus causing maxillary midline diastema, With the eruption of the canines, the impingement from the roots shift incisally thus driving the incisor crowns medially, resulting in closure of the diastema as well as the correction of the flared lateral incisors



Second Transitional Period

This period is marked by the eruption of the four permanent second molar, establishment of proper occlusion, replacement of deciduous canines and molars by permolars and permanent cuspid respectively

The following events take place:

1. Exfoliation of primary molars and canines At around 10 years of age, the first deciduous tooth in the posterior region, usually the mandibular canine sheds and marks the beginning of the second transitional period. Usually no crowding is seen before emergence except maybe between the maxillary first premolar and canine.

2. Eruption of permanent canines and premolars These teeth erupt after a pause of 1-2 years following incisor eruption. The first posterior teeth to erupt are the mandibular canine and first premolar (9-10 years) followed by maxillary premolars and canine around 11-12 years. Most common eruption sequence is 4-5-3 in the maxilla and 3-4-5 in the mandible. Favorable occlusion in this region is largely dependent on:

- Favorable eruption sequence.
- Satisfactory tooth size- available space ratio.
- Attainment of normal molar relation with minimum diminution of space available for bicuspid.

3. Eruption of permanent second molars: the eruption of second permanent molars(upper&lower) they erupt at the age of 12 years

old, and they occupy the same position of the permanent first molars and they usually developed below the maxillary antrum and situated in a high level in the maxillary tuberosity, and it takes along path of eruption, but less than the path of eruption of canine, so, they subjected to less amount of crowding, usually when the maxillary second molar erupt they directed distally, occlusally and buccally, while for the lower second molars, they have a short path of eruption in spite of they developed at the anterior border of the ramus, but they directed mesially and occlusally, therefore they subjected to less amount of crowding, the malocclusion of second molars is very rare, and their impaction very rare, but sometimes the lower second molars may be impacted. Before emergence second molars are oriented in a mesial and lingual direction. These teeth are formed palatally and are guided into occlusion by the Cone Funnel mechanism (the upper palatal cusp/cone slides into the lower occlusal fossa/funnel). The arch length is reduced prior to second molar eruption by the mesial eruptive forces. Therefore, crowding if present is accentuated

The Permanent Dentition

Permanent teeth or adult teeth are the second set of teeth formed in mammals. In humans, there are thirty-two permanent teeth, consisting of six maxillary and six mandibular molars, four maxillary and four mandibular premolars, two maxillary and two mandibular canines, four maxillary and four mandibular incisors.

The first permanent tooth usually appears in the mouth at around six years of age, and the mouth will then be in a transition time with both primary (or deciduous dentition) teeth and permanent teeth during the mixed dentition period until the last primary tooth is lost or shed.

The first of the permanent teeth to erupt are the permanent first molars, right behind the last 'milk' molars of the primary dentition. These first permanent molars are important for the correct development of a permanent dentition. Up to the age of thirteen years, twenty-eight of the thirty-two permanent teeth will appear.

The full permanent dentition is completed much later during the permanent dentition period. The four last permanent teeth, the third molars, usually appear between the ages of 17 and 25 years; they are considered wisdom teeth.

Calcification of permanent begins at birth with the calcification of the cusps of the first permanent molar and extends as late as the 25th year of life. Complete calcification of incisor crowns take place by 4 – 5 years and of the other permanent teeth by 6 – 8 years except for third molars, at approximately 13 years of age all permanent teeth except third molars are fully erupted

The sequence of Permanent teeth emergence:

There is wide variability in the sequence of arrival of teeth in the mouth.

Maxilla 6-1-2-4-3-5-7 or 6-1-2-4-5-3-7 (most common)

Mandible 6-1-2-4-5-3-7 or 6-1-2-3-4-5-7 (most common)

The third molars erupt at 18-24 years of age, Their path of eruption is nearly similar to the path of eruption of the second molars. The upper molars developed at the posteroinferior position of the maxillary tuberosity, so, these teeth are subjected to a high amount of crowding in comparison with the first or second molars due to the lack of space available for them. The lower third molars may be subjected to impaction due to lack of space, these teeth may be absent or congenitally missing.

Features of the permanent dentition:

- Coinciding midline.
- Class I molar relationship of the permanent first molar.
- Vertical overbite of about one-third the clinical crown height of the mandibular central incisors

	Calsification commences(months)	Eruption(years)
Maxillary teeth		
Central incisor	3-4	7-8
Lateral incisor	10-12	8-9
canine	4-5	11-12
First premolar	18-21	10-11
Second premolar	24-27	10-12
First molar	Around birth	5-6
Second molar	30-36	12-13
Third molar	84-108	17-25
Mandibular teeth		
Central incisor	3-4	6-7
Lateral incisor	3-4	7-8
canine	4-5	9-10
First premolar	21-24	10-12
Second premolar	27-30	11-12
First molar	Around birth	5-6
Second molar	30-36	12-13
Third molar	96-120	17-25

Root development complete 2–3 years after eruption

Abnormalities of eruption and exfolation

1-Eruption cyst

An eruption cyst is caused by an accumulation of fluid or blood in the follicular space overlying the crown of an erupting tooth. They usually rupture spontaneously, but very occasionally marsupialization may be necessary.



2-Failure of/delayed eruption

There is a wide individual variation in eruption times, Where there is a generalized tardiness in tooth eruption in an otherwise fit child, a period of observation is indicated. However, the following may be indicators of some abnormality and therefore warrant further investigation:

1-A disruption in the normal sequence of eruption.

2-An asymmetry in eruption pattern between contralateral teeth. If a tooth on one side of the arch has erupted and 6 months later there is still no sign of its equivalent on the other side, radiographic examination is indicated. Localized failure of eruption is usually due to mechanical obstruction – this is advantageous as if the obstruction is removed then the affected tooth/teeth has the potential to erupt. More rarely, there is an abnormality of the eruption mechanism, which results in primary failure of eruption (the tooth does not erupt into the mouth) or arrest of eruption (the tooth erupts, but then fails to keep up with eruption/ development).

This problem usually affects molar teeth and unfortunately for the individuals concerned, commonly affects more than one molar tooth in a quadrant. Extraction of the affected teeth is often necessary.

Causes of delayed eruption

Generalized causes

- Hereditary gingival fibromatosis
- Down syndrome
- Cleidocranial dysostosis

- Cleft lip and palate
- Rickets

Localized causes

- Congenital absence
- Crowding
- Delayed exfoliation of primary predecessor
- Supernumerary tooth
- Dilaceration
- Abnormal position of crypt
- Primary failure of eruption



