



Etiology of malocclusion

Part 2

(Local factors)

1. Anomalies of number
 - i) Supernumerary teeth
 - ii) Missing teeth
2. Anomalies of tooth size
3. Anomalies of tooth shape
4. Premature loss of deciduous teeth
5. Prolonged retention of deciduous teeth
6. Delayed eruption of permanent teeth
7. Abnormal labial frenum
8. Dental caries
9. Improper dental restorations
10. Ankylosis
11. Abnormal eruptive path

Anomalies of tooth number

Anomalies of tooth number include presence of extra teeth or absence of one or more teeth that can predispose to malocclusion.

Supernumerary Teeth

This anomaly occurs in the permanent dentition in approximately 2 % of the population and in the deciduous dentition in less than 1 %. The supernumerary teeth can be described according to their morphology or position in the arch. It may be supplement, conical, and tuberculate.

The most commonly seen supernumerary tooth is the “mesiodens”. It is usually situated between the maxillary central incisors and can vary considerably in shape. It can be seen erupted or impacted. Supernumerary teeth can cause;

1. Non-eruption of adjacent teeth.
2. Delayed eruption of adjacent teeth.
3. Malposition of adjacent teeth.
4. Crowding in the dental arch.



A) Congenitally Missing Teeth

The occurrence of congenitally missing teeth may be single or multiple, unilateral or bilateral and in one or both the jaws.

Anodontia or congenital absence of teeth may be of two types, total and partial. Total anodontia in which all teeth are missing may involve both deciduous and permanent teeth.

Total anodontia is quite rare and usually occurs in association with hereditary ectodermal dysplasia whereas, partial anodontia, involving one or more teeth is rather common.

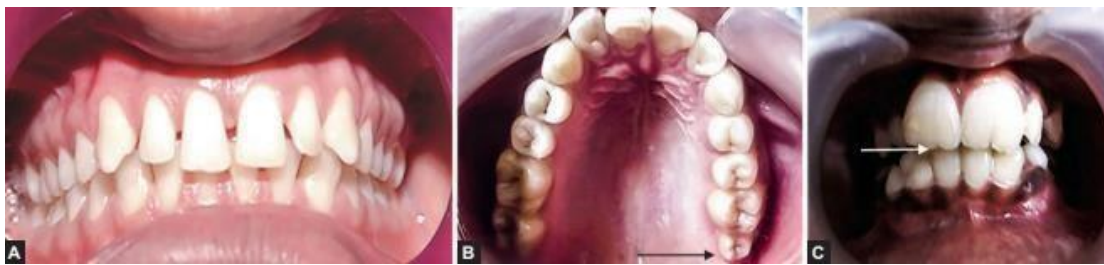
The term hypodontia is used for absence of only few teeth; oligodontia refers to the absence of many but not all teeth.



Anomalies of tooth size

Anomalies of tooth size may occur as two forms: microdontia or macrodontia:

1. Microdontia is used to describe teeth, which are smaller than normal. Microdontia can be generalized involving all the teeth in a dentition or localized involving a single tooth. The most commonly seen form of localized microdontia involves the maxillary lateral incisors. The tooth is called a “peg lateral”.
2. Macrodontia refers to teeth that are larger than normal. Macrodontia can also be generalized or localized.



Anomalies of tooth shape

Anomalies of tooth shape often occur in association with anomalies of tooth size. They may predispose to malocclusion.



Figs 10.4A and B: Talon's cusp seen on the maxillary lateral incisors



Figs 10.5A: Bilateral peg-shaped lateral incisors causing spacing in the arch. (i) Intraoral photographs and (ii) OPG of the same patient



Figs 10.5B i and ii: Leong's premolar/Dens evaginatus



Figs 10.6A and B: (A) Gemination of mandibular lateral incisor causing lingual eruption of canine; (B) Gemination of right maxillary central incisor

Premature loss of deciduous teeth

This is a condition where a primary tooth is lost before its permanent successor is ready to erupt. As the adjacent teeth get sufficient time to migrate into the created space, thereby delaying, preventing and deviating the path of eruption of the succeeding permanent tooth. Premature loss of deciduous teeth, if not



intercepted often lead to malocclusion. Deciduous teeth may be lost prematurely due to dental caries or trauma.

| Premature loss of | Possible consequences |
|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Deciduous anterior teeth | <ul style="list-style-type: none"> ▪ Spacing in the arch. ▪ A shift in the midline, if primary canine is lost from one side of the arch only |
| Deciduous molars | Premature loss of deciduous second molar ↓ Mesial migration of the permanent first molar ↓ Loss of arch length ↓ Lack of space for permanent second premolar to erupt (Fig. 10.8) ↓ Permanent second premolar forced to erupt lingually/buccally ↓ Crowding in the posterior segment |
| Premature loss of deciduous Maxillary second molar | Mesial migration of permanent molars ↓ Loss of arch length ↓ Maxillary canine, the last anterior tooth to erupt may cause changes its path of eruption and erupt labially ↓ Crowding in anterior segment |

Prolonged retention of deciduous teeth

This is a condition in which there is undue retention of deciduous teeth beyond the usual exception age of their permanent successor. There are number of causes for prolonged retention of deciduous teeth as listed below:

1. Absence of underlying permanent tooth.
2. Nonvital deciduous tooth, which fail to resorb.
3. Ankylosed deciduous tooth that do not resorb.
4. Endocrinal disturbances, for example hypothyroidism.

A retained deciduous tooth may be left untouched of its permanent successor in congenitally missing as evidenced by radiographic evaluation.

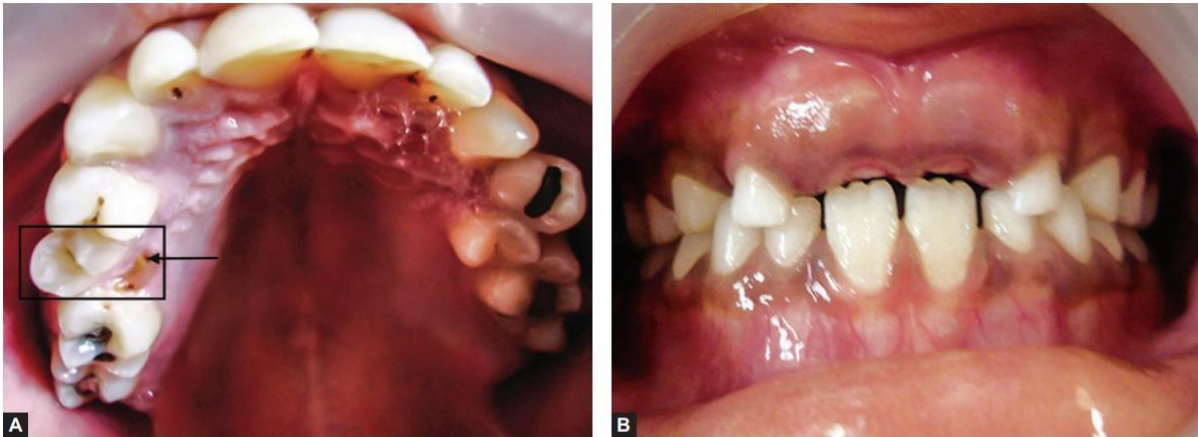


Fig. 10.9: Prolonged retention upper and lower second deciduous molars due to congenital missing second premolars

Delayed eruption of permanent teeth

Permanent teeth erupt in a preprogrammed sequential manner throughout mixed dentition period to occupy their respective places. A delay in the eruption of any of the permanent teeth, out of normal time to meet, however, can cause migration of adjacent teeth into the available space. This may result in facial/lingual eruption of the tooth involved or its complete impaction. Some of the common causes of delayed eruption of permanent teeth are listed below:

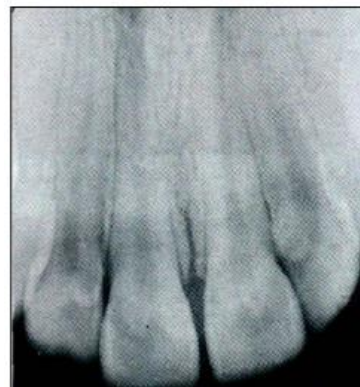
1. Presence of supernumerary teeth, for example mesiodens can delay eruption of maxillary centrals.
2. Retained deciduous root fragments in the jaw may delay or displace the erupting successor tooth
3. Presence of thick mucosal barrier overlying the erupting permanent tooth.
4. Premature loss of deciduous tooth can delay eruption of its successor due to formation of bony barrier.
5. Ankylosed deciduous tooth that do not resorb can delay eruption of its successor.
6. Endocrinal disturbances like hypothyroidism.



Figs 10.10A and B: (A) Delayed eruption of permanent teeth: Retained deciduous root fragments of second molar has resulted in disto-buccal rotation of left permanent second premolar; (B) Delayed eruption of permanent teeth: Presence of thick mucosal barrier overlying the erupting maxillary permanent central incisors

Abnormal labial frenum

At birth, the labial frenum is attached to the alveolar ridge, with fibers running into the lingual interdental papilla. As the teeth erupt and as alveolar bone is deposited, the frenum attachment migrates superiorly with respect to the alveolar ridge. In some cases, fibers may persist below the maxillary central incisors and in the “V” shaped intermaxillary suture. Abnormal labial frenum attachment can be diagnosed clinically (blanch test) and radiographically. It prevents the approximation of two central incisors leading to spacing between these two teeth called as midline diastema.



Notch in the interdental alveolar bone due to frenal insertion into the incisive papilla.

Dental caries

Dental caries is one of the most common local causes of malocclusions. Proximal caries or complete loss of affected tooth with dental caries may cause the following effects:

1. Premature loss of the affected tooth or proximal caries.
2. Proximal caries can cause drifting of adjacent teeth into space created with resultant loss of arch length
3. Premature loss of affected tooth can cause migration of adjacent teeth into the space.
4. Abnormal inclination of adjacent teeth.
5. Over eruption of antagonistic teeth.



Fig. 10.12: Proximal caries can cause drifting of adjacent teeth into the space created with resultant loss of arch length

Improper dental restorations

While restoring any tooth, it is important to restore the normal occlusal anatomy and proximal contours, so as to maintain normal intercuspation of the teeth and their mesiodistal dimension. Improper restoration of proximal contours may result in an increased arch length and occlusal irregularities.

| | |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Over contoured proximal restorations | <ul style="list-style-type: none"> • Too tight proximal contact leading to elongation of restored tooth or adjacent teeth • Overcontoured restoration in a segment can cause increase arch length |
| Under contoured proximal restoration | Loss of arch length due to drifting adjacent teeth into the space |
| Overfilled occlusal restoration | <ul style="list-style-type: none"> • Functional occlusal prematurities • Intrusion of antagonistic tooth—pseudo class III |
| Underfilled restoration | Supraeruption of antagonistic tooth Functional occlusal disturbances |

Ankylosis

The tooth is said to be ankylosed when a part or whole of its root surface is directly fused to the bone without intervening periodontal ligament. Deciduous second molars are most commonly affected. Ankylosis of deciduous teeth prevents their natural exfoliation and replacement by their successional permanent teeth. Once the adjacent permanent teeth erupt to their normal level, the ankylosed tooth appears to be below the level of occlusion.



Abnormal eruptive path

Malocclusions resulting from abnormal eruptive path of the teeth are not uncommon. Some of the factors, causing delayed eruption of permanent teeth may also deviate their path of eruption, such as:

1. Trauma to the tooth during development
2. Presence of supernumerary teeth
3. Prolonged retention of deciduous teeth
4. Retained deciduous root fragments
5. Deficiency of arch length and excess of tooth material.

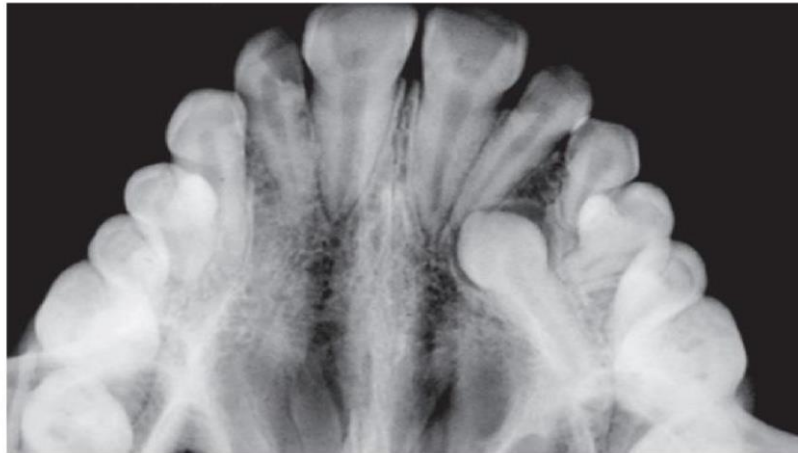


Fig. 10.14: Ectopically erupted maxillary left permanent canine causing crowding in the arch. Note distobuccal rotation of left second permanent premolar

Benefits of knowing the etiology of malocclusion

- For most patients, the differentiation between genetic and local environmental factors is of great importance when choosing the appropriate treatment and retention plans.
- Retention of a treated malocclusion is a challenge because the genetic and environmental etiologic factors responsible for the malocclusion may continue to draw the treated teeth back into malocclusion.
- Addressing known etiologic factors during treatment can produce more stable occlusions after treatment.
- Prevention of genetic causes for malocclusion is not possible at this time. In contrast, the prevention of environmental causes holds much promise.