Etiology of Malocclusion/Local factors

Abnormal labial frenum

At birth the labial frenum is attached to the alveolar ridge with some fibers crossing over and attaching with the lingual dental papilla. As the teeth erupt, bone is deposited and the frenal attachment migrates superiorly with respect to the alveolar ridge.





Some fibers may persist between the maxillary central incisors. These fibers which persist between these teeth are capable of preventing the two contralateral central incisors from coming into close approximation.



This space called a midline diastema which may occur due to various causes:

1. Deciduous dentition
2. Ugly duckling stage
3. Racial predisposition, Negroids
4. Microdontia
5. Congenital absence of lateral incisors
6. Supernumerary tooth in the midline
7. Abnormal frenal attachment
8. Abnormal pressure habits (digit sucking and tongue thrust habit)
9. Trauma
10. Impacted tooth in the midline

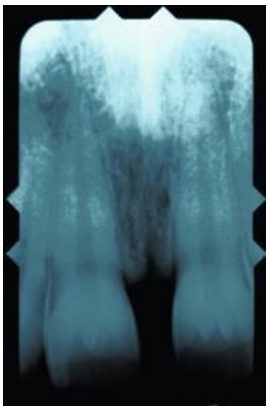
A specific test used to determine the role of frenum as a causative factor called the ‘blanch test’ which can be done as follow:

Step 1: The lip is pulled superiorly and anteriorly

Step 2: Any blanching in the interdental region is indicative of the fibers of the frenum crossing the alveolar ridge

Step 3: The blanch test can be collaborated with an IOPA of the region which shows a slight radiolucent wedging/notching in the interdental alveolar ridge region





Premature loss of deciduous teeth

The premature loss of a deciduous tooth can lead to malocclusion only if the succedaneous tooth is not close enough to the point of eruption.

When the permanent tooth does not erupt following the loss of the deciduous tooth, the adjacent teeth get time to migrate in its space. This can lead to the mesial migration of the posterior teeth result in a decrease in the overall arch length. This might cause the permanent successor to erupt malpositioned or get impacted or cause a shift in the midline (in case of anterior teeth).

In case of an anterior deciduous tooth is lost prematurely; there is a tendency for spacing to occur between the erupted anterior teeth. It might also lead to a shift in the midline, towards the side where the deciduous tooth has been lost.

If one of the posterior deciduous teeth is lost, especially the deciduous second molars, the first permanent molars erupt mesially. This might lead to a loss in the arch length. This is seemed most commonly in the maxillary arch where there is lesser space for the canine to erupt; therefore it may erupt labially.

Mesially tilting of the erupted mandibular first molars may cause the second premolars to remain impacted





Prolonged retention of deciduous teeth

Any deciduous tooth may be retained beyond the usual eruption age of their permanent successor, this may cause:

a. Buccal/labial or palatal/lingual deflection in its path of eruption;

b. Impaction of the permanent tooth.





Most commonly impacted tooth is the maxillary canine (third molars not taken into account). The reasons for this include:

I. It is the last anterior tooth to erupt.

II. Space occupied by the deciduous canine is less than the mesiodistal width of the permanent canines.

III. The premolars might migrate mesially leaving limited space for the canines to erupt.

IV. It has the longest path of eruption.

V. Controversially, as it may seem, it is the only tooth to erupt after root completion.



Delayed eruption of permanent teeth

The sequence of eruption has a certain amount of flexibility; but if one of the teeth does not occupy its designated place in this sequence there is a likelihood of migration of other teeth into the available space. As a result, the tooth whose eruption has been delayed might get displaced or impacted.

Various reasons have been attributed for the delay eruption of the permanent teeth:

1. Early loss adjacent primary teeth with a consequential flaring or spacing between erupted permanent teeth. This may lead to decreased space availability for eruption of the succedaneous teeth.

2. Early loss of primary tooth leading to mucosal thickening over the succedaneous tooth. The mucosa might need to be incised to accelerate eruption.



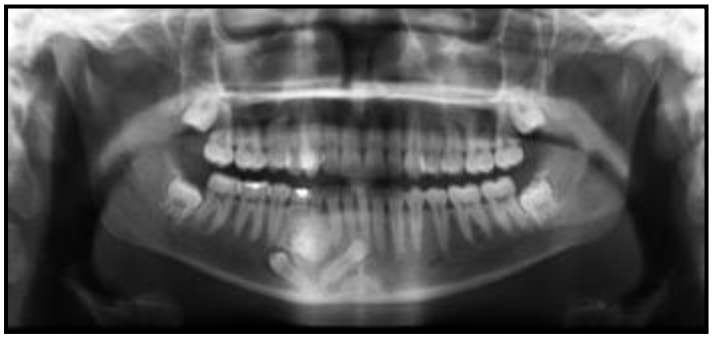
3. Early loss of the primary tooth might cause excessive bone deposition over the succedaneous tooth.

4. Hereditary, in certain children teeth erupt much later than established norms.

5. Presence of supernumerary tooth can block the erupting permanent tooth.



6. Presence of odontomas or other cysts and tumors (in the path of eruption) might prevent the permanent tooth from erupting



7. Presence of deciduous root fragment that are not absorbed can block the erupting tooth or may deflect it preventing its eruption in an ideal location.

8. Presence of ankylosed deciduous teeth. These might not get absorbed causing a delay in the eruption of the permanent tooth.

9. The succedaneous tooth might be congenitally missing, delaying the loss of the primary tooth.

10. In certain endocrine disorders the eruption of permanent teeth might be delayed, e.g. hypothyroidism.

Whatever the reasons for the delay in eruption, it is important to maintain and if required to create space for its eruption. Proper knowledge of preventive and interceptive orthodontics can definitely reduce the occurrence of malocclusions,

if prevent them from occurring; this can significantly reduce the severity of the malocclusion.

Abnormal eruptive path

Each tooth travels on a distinct path from its inception to the location at whichit erupts. It can deviate from this eruption path because of many reasons:

1. Tooth bud facing and/or placed or displaced from its ideal location.
2. Presence of a supernumerary tooth may divert a tooth from its eruptive path.
3. Presence of odontomas or a cyst may divert it if not altogether prevent its eruption.
4. Unresorbed or retained deciduous teeth might force a tooth to erupt along a path of least resistance rather than in place of the deciduous tooth.
5. Retained root fragments (especially of deciduous molars) may deflect an erupting permanent tooth.
6. A true arch length deficiencies or excess of tooth material may cause one or more teeth to deviate from their eruptive path.

The tooth that most frequently erupts in an abnormal location is the maximally canine. Various reasons have been attributed for this behavior. These include:

a. It travels the longest distance, from near the floor of the orbit to the arch.
b. It is the last anterior tooth to erupt and loss in arch length-anterior or posterior may impinge on the space required for its eruption.
c. Abnormal position of the tooth bud. Ideally it should slide along the distal aspect of the root of the lateral incisor. Any problem in the position of the lateral incisor may divert the erupting canine.

Ankylosis

Ankylosis is a condition which involves the union of the root or part of a root directly to the bone, i.e. without the intervening periodontal membrane. Ankylosis of teeth is seen more commonly associated with certain infection, endocrine disorders and congenital disorders, e.g. Cleidocranial dysostosis, but these are rare occurrences. It should be suspected in cases where there is a past history of trauma, or a mobile tooth has regained stability.



Dental caries

Proximal caries is specially to blame for the reduction in arch length. This might be brought about by migration of adjacent teeth and/or tilting of adjacent teeth into the space available and/or supra-eruption of the teeth in the opposing arch. A clear reduction in arch length can be expected if several adjacent teeth involved by proximal caries are left unrestored. This is especially true for deciduous molars. Also caries can lead to the premature loss of deciduous or permanent teeth which can by themselves cause malocclusion.



Improper dental restorations

Improper dental restorations can cause malocclusion, how?

- Under contoured proximal restoration can lead to a significant decrease in the arch length especially in the deciduous molars.
- Over contoured proximal restorations might bulge into the space to be occupied by a succedaneous tooth and result in a reduction of this space.
- Overhang or poor proximal contacts may predispose to periodontal breakdown around these teeth.
- Premature contacts on over contoured occlusal restoration can cause a functional shift of the mandible during jaw closure,
- Under-contoured occlusal restorations can lead to the supra-eruption ofthe opposing dentition.

Abnormal pressure habits and functional aberrations

These are possibly the most frequently encountered causes of malocclusion, these include:

a. Abnormal sucking like thumb and finger sucking.
b. Tongue thrust.
c. Lip and nail biting.
d. Abnormal swallowing habits (improper deglutition).
e. Speech defects.
f. Respiratory abnormalities (mouth breathing, etc.).
g. Psychogenic habits and bruxism.

All of these habits are functional abrasions which produce forces that are abnormal. Since these forces are produced repeatedly over time they are capable of bringing about a permanent deformity in the developing musculoskeletal unit.

The deformity produced depends upon the intensity, duration and frequency of the habit. The effect of habits basically follows the functional matrix theory of growth as proposed by Moss-in its simplest form it says that- “function creates form and normal function creates normal form”.