Premature Loss Of Deciduous Teeth

Loss Of Primary Incisors

The main concern is based on esthetics, speech and function

1 .Loss of mandibular primary incisors

Early loss of lower primary incisors is generally due to ectopic eruption of the permanent incisors in reflecting excessive incisor liability .

The loss of lower incisors in other circumstances, such as trauma, advanced caries, or extraction of a neonatal tooth, may result in anterior space loss if it occurs before primary canine stabilization is realized .

2.Loss of maxillary primary incisors

Premature loss of maxillary primary incisors does not generally result in decreased upper intra canine dimensions if the incisor loss occurs after the primary canines have erupted into occlusion at approximately 2 years of age .

The major consequence of early loss of maxillary primary incisors is :

1 .Delayed eruption timing of the permanent successors as reparative bone and dense connective tissue cover the site .

2 .Unattractive appearance

3 .Potential development of deleterious habits (e.g., tongue-thrust swallow, forward resting posture of the tongue)

4 .Improper pronunciation of fricative sounds such as(s and f) may be of concern following premature loss of primary maxillary incisors .

Management :

a) Removable appliance

An anterior appliance incorporating artificial primary teeth may be considered to satisfy aesthetic and functional needs. Acrylic partial dentures have been successful in the replacement of single and multiple maxillary primary incisors .

b) Fixed appliance

A fixed option may be considered using primary incisor denture teeth secured from a rigid stainless steel wire (0.036- or 0.040-inch) extended to bands or stainless steel crowns on the primary molars, a so-called Hollywood" bridge .

3. Premature Loss Of Primary Canines

A. Mandibular primary canine

Most often due to ectopic eruption of permanent lateral incisors, early loss of a mandibular primary canine is a significant indicator of a tooth size-arch size discrepancy .

The consequences of early loss of lower primary canines are :

a) Unilateral loss of a lower primary canine :

This is frequently followed by :

1. A shift in the dental midline toward the side of loss
2. Lingual collapse of the incisor segment
3. Possibly deepening of the bite

The asymmetric disruption in arch integrity complicates normal eruption of the permanent canines and premolars toward the affected side .

b) If ectopic eruption involves bilateral loss of both lower primary canines, this is followed by :

1. Pronounced lingual inclination and distal drifting of the permanent incisors .
2. Deepening of the overbite
3. Increased overjet
4. Significant loss of arch perimeter

B. Maxillary primary canine

The ectopic loss of maxillary primary canines occurs less frequently than does mandibular loss. When it occurs, ectopic loss of a maxillary primary canine typically reflects a very distal eruptive displacement of the permanent lateral incisor and not necessarily a significant tooth mass problem. The following may occur .

a) Atypical upper anterior alignment
b) Resultant crowding and blockage of the permanent canine because it erupts so late in normal transition

Early loss of maxillary primary canines is an indicator for early orthodontic treatment with an understanding that the child is a definite candidate for comprehensive orthodontic intervention

Management :

a) If one primary canine is lost during incisor eruption, it may be desirable to extract the contralateral primary canine to help maintain arch symmetry. Although extraction of the contralateral primary canine may improve the appearance of incisor alignment and midline integrity, crowding problem requiring such intervention strongly indicate a significant arch length deficiency that will likely become grossly evident upon permanent canine and premolar eruption

b) A lingual holding arch may be used with spur attachments to control incisor positioning and prevent encroachment on permanent canine eruption positions when primary canines are lost prematurely .

4. Premature Loss Of First Primary Molar

The effect of premature loss of first primary molars in both arches is mostly dependent on the state of eruption of the first permanent molars .

1. If the primary first molar is lost during the primary dentition from ages 3 to 5 years, there should be little or no space loss associated with mesial movement of the second primary molar .
2. If the primary first molar is lost as the first permanent molars erupt at ages 5 to 7 years, this will cause :

a) A strong force is exerted that pushes the second primary molar forward into the first primary molar space .

b) A loss of posterior arch length within the quadrant that can lead to crowding as the canines and premolars erupt in later stages .

c) Mandibular arch length may be further compromised by distal and lingual shifting of anterior teeth toward the side of first primary molar tooth loss .

Therefore the loss of a first primary molar in either arch, approximating eruption of first permanent molars, indicates that the use of a space maintainer is generally desirable to stabilize second primary molar and canine positioning ,

3. If the first primary molar is lost after first permanent molars have erupted into occlusion and the second primary molar is still in position, minimal space loss should be evidenced in either arch .

Management :

a) For unilateral loss of primary first molar a unilateral band or crown and loop is usually the appliance of choice. The appliance incorporates a band or crown on the second primary molar with a soldered wire-loop extension extending forward to come into contact with the distal-cervical surface of the primary canine in the quadrant .

b) If first primary molars are lost bilaterally within a lower arch and the second primary molars are retained, two separate unilateral loop appliances are generally indicated until first permanent molar and incisor eruption is complete. Lingual holding arch designs should not be placed before eruption of the permanent incisors because the lingual wire may interfere with incisor positioning during eruption

Additionally, primary incisors as anterior stops do not offer sufficient anchorage to prevent loss of arch length in most cases .

5.Premature Loss Of Second Primary Molar

The effect of the loss of the second primary molars also depends on the state of eruption of the first permanent molars .

1. If a second primary molar is lost in a child 2 to 5 years of age, no space loss should occur while the first permanent molar is in basal bone. The options for managing such early loss are very limited due to lack of retention elements for fixed appliances and difficulties with patient cooperation in the use of appliances at this age .
2. If the first permanent molars erupt considerable loss in arch length can occur if no second primary molar is present as an eruptive guide . The upper first permanent molar displaces forward through bodily crown-root movement and mesiolingual rotation around the palatal root. While the lower first permanent molars move forward by pronounced mesial tipping of the crown in addition to the distal movement and retroclination of teeth anterior to the space .
3. If the loss of the second primary molar occurs after the first permanent molars have fully erupted and normal cuspal interdigitation has been established, the degree of space loss should be less dramatic than earlier during molar transition, regardless of the arch involved .

Management :

a) If the loss occurs just before eruption of the first permanent molar, that is, when the first molar crown is still covered with oral mucosa and a thin partial covering of bone, a space maintainer to guide the positioning of the first permanent molar into normal occlusion is desirable. The appliance of choice is a distal shoe for both the maxillary and mandibular arches .

b) If the first permanent molars are erupting the classic bilateral mixed dentition space maintainer in the mandibular arch is the passive lingual arch with bands fitted to the first permanent molars, a 0.036- or 0.040 -inch stainless steel wire is contoured to the arch and extended forward to make contact with the cingulum area of the incisors .

As stated earlier, lower lingual arches should not be placed before the eruption of the permanent incisors because of their frequent lingual eruption path. The lingual wire may interfere with normal incisor positioning if the appliance is in position before lateral incisor eruption Additionally, abutting against primary incisors as anterior stops does not offer sufficient anchorage to prevent significant loss of arch length .

c) While in the maxillary arch the bilateral mixed dentition space maintainer, to stabilize molar positions bilaterally, is Nance appliance . The Nance appliance uses a contoured rigid wire with an acrylic

button" in contact with the palatal shelf as an anterior stop for bilateral molar stabilization in the maxillary arch. Providing the same molar rotation and bodily movement control as transpalatal bars, the added bracing of the acrylic button against the anterior palatal vault offers some additional resistance against forward tipping movements of the molars .

6. Areas Of Multiple Primary Molar Loss

Loss of multiple primary molars may lead to mutilation of the developing dentition unless an appliance is constructed to maintain relationships of the remaining teeth and to guide eruption of the developing teeth. The types to be used are :

1. Removable acrylic partial dentures have been used successfully in either arch after the loss of multiple teeth .
2. The passive lingual arch or (Nance appliance)
3. Transpalatal-bar appliance
4. It is occasionally necessary to recommend extraction of all the primary teeth in a preschool child and wear complete dentures before the eruption of permanent teeth .

7. Loss Of First Permanent Molars

The first permanent molar is unquestionably the most important unit of mastication and is essential in the development of a functionally desirable occlusion. A carious lesion may develop rapidly in the first permanent molar and occasionally progress from an incipient lesion to a pulp exposure in a 6-month period. The loss of a first permanent molar in a child can lead to changes in the dental arches that can be traced throughout the child's life. Unless appropriate corrective measures are instituted, these changes include

l. Diminished local function

2 .Drifting of teeth

3 .Continued eruption of opposing teeth .

4 .The second molars, even if unerupted, start to drift mesially after the loss of the first permanent molar. A greater degree of forward bodily movement will occur with loss of the first permanent molar in 8- to 12-year-old children .

5 .In older children, if the loss occurs after eruption of the second permanent molar, more exaggerated mesial tipping of the second molar can be the expected outcome .

6 .Although the premolars undergo the greatest amount of distal drifting, all the teeth anterior to the space, including the central and lateral incisors on the side where the loss occurred, may show evidence of movement .

7 .Contacts open and the premolars, in particular, rotate as they fall distally. There is a tendency for the maxillary premolars to move distally in unison, whereas those in the lower arch may move separately .

8 .When the maxillary first permanent molar loses its opponent, it erupts at a faster rate than the adjacent teeth. The alveolar process is also carried along with the molars and causes problems when prosthetic replacements are needed .

Management :

The treatment of patients with the loss of first permanent molars must be approached on an individual basis .

1. If the first permanent molars are removed several years before eruption of the second permanent molars, there is an excellent chance that the second molars will erupt in an acceptable position .

However, the axial inclination of the second molars, particularly in the lower arch, may be greater than normal. The decision whether to allow the second molar to drift mesially or to guide it forward in an upright position may be influenced by the presence of a third molar of normal size .

2. When the first permanent molar is lost after the eruption of the second permanent molar, orthodontic evaluation is indicated, and

the following points should be considered :

a) Is the child in need of corrective treatment other than in the first permanent molar area ?
b) Should the space be maintained for a replacement prosthesis
c) Should the second molar be moved forward into the area formerly occupied by the first molar

The latter choice is often the more satisfactory, even though there will be a difference in the number of molars in the opposing arch. A third molar can often be removed to compensate for the difference .Without treatment, the second molar will tip forward within a matter of weeks .

3 .Another option to consider is auto transplantation of a third molar into the first molar position

Development Of Dental Arch And Occlusion

At birth, the alveolar ridges are plain firm tissue with no teeth on them . As the child grows steady changes are seen both on and within the ridge. The alveolar ridge grows and enlarges while the teeth develop to attain their final shape and size within the jaws .

Development of occlusion can be divided into the following developmental periods :

l. Pre-dental/dentate period: This is the period after birth during which the neonate does not have any teeth It usually lasts for 6 months after birth The characteristic feature is the alveolar ridge that are called gum pads .

2 .The deciduous dentition period: The initiation of primary tooth buds occurs during the first six weeks of intrauterine life. The primary teeth begin to erupt at the age of about 6 months. The eruption of all primary teeth is completed around 3 years of age when the second deciduous molars come into occlusion and their roots complete development .
3 .The mixed dentition period: The mixed dentition period begins at approximately 6 years of age with the eruption of the first permanent molars. During the mixed dentition period, the deciduous teeth along with some permanent teeth are present in the oral cavity .
4 .The permanent dentition period: This period is characterized by the presence of all permanent teeth

Deciduous Dentition Period

The characteristic features of deciduous dentition period are as follows :
1 .Spacing in deciduous dentition
It is very common to find physiological spaces in the primary dentition , with the most prevalent spaces mesial to the primary canine in maxilla and distal to the primary canine in mandible. These spaces are called the "primate spaces" or "anthropoid spaces" which are helpful in canine positioning and relationship with opposing arches .
The other spaces in primary dentition are called the developmental spaces which play an important role in the development of permanent dentition. Some children do not have such physiological spaces thereby referred to as closed space or non-spaced dentition. Such dentition is highly prone to malocclusion during the development of permanent dentition .
2 .Shape of dental arch
In deciduous dentition, the dental arch are wider and almost in wide 'U shape with spaces visible between teeth
3 .Terminal plane relation of the deciduous molars
4 .Deep bite
5 .F1at curve of Spee
6 .Shallow cuspal interdigitation
7 .Incisors are more vertically placed

Mixed Dentition Period

The mixed dentition period can be divided into three phases :

1 .First transitional period

2 .Inter transitional period

3 .Second transitional period

1 .First transitional period

The first transitional period is characterized by the emergence of the first permanent molars and the exchange of the deciduous incisors with the permanent incisors .

a) Eruption and occlusion of first permanent molar

The mandibular first molar is the first permanent tooth to erupt at around 6 years of age. The location and relationship of the first permanent molar depends much upon the distal surface relationship between the upper and lower second deciduous molars. The first permanent molars are guided into the dental arch by the distal surface of the second deciduous molars .The deciduous molar relation determines the permanent molar relation as the later During erupts into occlusion .

this process, any unusual spaces created by the carious/traumatic destruction of the tooth crown and/or premature loss of the primary teeth will result in the mesial shift of the first molar in various ways due to presence of physiological spaces in primary dentition

b) Exchange of incisors

During the first transitional period the deciduous incisors are replaced by the permanent incisors. The mandibular central incisors are usually the first to erupt. The permanent incisors are considerably larger than the deciduous teeth they replace. This difference between the amount of space needed for the accommodation of the incisors and the amount of space available for this is called incisal liability. The incisal liability is roughly about 7 mm in the maxillary arch and about 5 mm in the mandibular arch .

The regulatory factors controlling the arrangement of the four permanent incisors is as follows :

1. Utilization of the physiologic spaces that exists in the primary Dentition
2. Increase in the intercanine width
3. Increase of anterior length in the dental arch will provide space to accommodate the larger permanent incisors .
4. Both maxillary and mandibular permanent incisors show labial inclination much more than primary incisors making the permanent dental arch circumference wider for the arrangement of larger permanent incisor .

2.Intertransitional period .

It is a relatively lag phase with no active tooth movements to occur. The dental arches are comprised of both primary and permanent teeth

3 .Second transitional period

The second transitional period is characterized by

a. Exchange of canines and premolar .

The replacement and alignment of the deciduous molars and canines by the premolars and permanent cuspids occurs in this phase. The space available for the canine and premolars is limited as the mesial surface of the first permanent molar fonns its distal limit and the distal surface of the permanent lateral incisor fonns its mesial limit. The factors to be considered during this period are :

1. Leeway space of Nance
2. Ugly duckling stage .

1. Leeway space of Nance

The combined mesiodistal width of the permanent canines and premolars is usually less than that of the deciduous canines and molars . The surplus space is called Leeway space of Nance. The amount of leeway space is greater in the mandibular arch than in the maxillary arch It is about 1.8 mm (0.9 mm on each side of the arch) in the maxillary arch and about 3.4 mm (1.7 mm on each side of the arch) in the mandibular arch

This excess space available after the exchange of the deciduous molars and canines is utilized for mesial drift of the mandibular molars to establish class I molar relation .

2. Ugly duckling stage .

It is a transient or self -correcting malocclusion seen in the maxillary incisor region between 8-9 years of age, seen during the eruption of the permanent canines. As the developing permanent canines erupt, they displace the roots of the lateral incisors mesially. This results in transmitting of the force onto the roots of the central incisors which also get displaced mesially. A resultant distal divergence of the crowns of the incisors occurs leading to creation of diastema in the incisor region . Broadbent named this as the ugly duckling stage as children tend to look ugly during this phase of development. Parents are often apprehensive during this stage and consult the dentist. This condition usually corrects by itself when canines erupt as the pressure is transferred from the roots to the crown of the incisors .

b. Eruption of the Second Permanent Molar

After the exchange of lateral teeth is completed and the dental arch up to the first molar is established, the second permanent molars begin to erupt. With the eruption of second permanent molar, the arch circumference may become shorter than that of the primary arch by utilization of the Leeway space.

Arch Length Analysis

1. To estimate the space adequacy for the succedaneous tooth
2. Predict how much space will be required for eruption and proper alignment in the dental arch.

Analysis used for estimating space adequacy:

1.Nance Analysis

1 .The length of the dental arch from the mesial surface of one mandibular first permanent molar to the mesial surface of the corresponding tooth on the opposite side is always shortened during the transition from the mixed to the permanent dentition .

2 .In the mandibular arch leeway of 1.7 mm per side exists

3. In the maxillary arch leeway space is o.9 mm per side.

Limitations of Nance arch-length analysis :

The Nance arch-length analysis is seldom used, partly because the involved procedures for this analysis require a complete set of periapical radiographs. The clinical reliability of other analyses that do not use radiographs is sufficient for determining major arch-length inadequacies.

2.Moyer's Mix ed Dentition Analysis

There is high co-relation between sizes of different teeth in the same individual, thus making it possible to predict the size of unerupted tooth by looking at the teeth present in oral cavity .

Advantage

a. It has minimal error and the range of possible error is precisely known .

b. It can be done with equal reliability either by a beginner or by an expert .

c. It is not time consuming .

d. It requires no special equipment .

e. It can he completed in the mouth as well as on casts .

f. It may be used for both arches .

g. The analysis is based on a correlation of tooth size

h. The mandibular incisors have been chosen for measurement to predict the size of the upper, as well as the lower, posterior teeth.

3.The Tanaka and Johnston analysis

The Tanaka and Johnston method of arch length analysis is a variation of Moyer's analysis except that a prediction table is not needed .

Method

To obtain the total estimated widths of the canines and premolars .

I. The sum of the widths of the mandibular permanent incisors is measured and divided by 2 .

For the lower arch, 10.5 mm is added to the result

For the upper arch, 11 mm is added to the result

For example

If the width of the lower incisors = 23 mm

23/2+10.5= 22 mm

The result is 22 mm compared with 22.2 mm obtained from Moyer's table. One can then take these tooth mass predictions and compare them with the total measured arch length and obtain any inadequacies in the arch length ,

a. The technique involves simple, easily repeated procedures and minimal material needs .

b. It does not use prediction charts .

c. This method does not require additional radiographs, but it tends to over predict slightly the widths of the unerupted premolar " .

Also called as Bolton's tooth size ratio analysis .According to Bolton, a ratio exists between the mesiodistal widths of maxillary and mandibular teeth. This analysis addresses tooth mass discrepancies between the maxillary and mandibular arches .

Method

It can be used to compare the sum of the mesiodistal widths of the 12 maxillary teeth with that of the 12 mandibular teeth, first molar to first molar, and to compare the 6 maxillary teeth with the 6 mandibular teeth, canine to canine .

- The Bolton analysis ratio is as follows :

(Sum mandibular/ (Sum maxillary) x 100 = Tooth_ mass ratio .

For the overall ratio (12 teeth versus 12 teeth) ,

the mean is 91.3.%

For the anterior ratio

(6 teeth versus 6 teeth)

the mean is 77.2 .%

When a significant discrepancy with these ratio is noted, the clinician must assess where the tooth mass problem is located and decided on the best method to resolve it.