Lecture No.1

MANAGEMENT OF SPACE MAINTENANCE PROBLEM IN CHILDREN

By

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The premature loss of one or more of the primary teeth has a damaging effect on the dentition and the soft tissue (drifting of teeth and development of space problem) which differs greatly from one pt. to another. Sometimes a change in space may occur within days or weeks.

Factors affecting development of malocclusion when a tooth is extracted prematurely:

1. Abnormality of the oral musculature.
   An abnormally high tongue + strong mentalis muscle + loss of one of the mandibular primary molars = very damaging to the occlusion due to collapse of the dental arch and distal drifting of the anterior segment.

2. The presence of oral habits as thumb or finger habits.

3. The existence of malocclusion:
   - arch length inadequacy and class II, Division I become progressively more severe after the premature loss of mandibular primary teeth.

Indications of Space Maintainers:

1. The time factor:
   ✓ If space closure is to occur it will usually take place during the 6 months period following extraction.
If space closure has occurred, it is desirable to construct an active space maintainer [space regainer] to regain the lost space prior to holding it for the eruption of the permanent successor.

2. Age:
- The average eruption dates must not influence decisions regarding the construction of a space maintainer.
- There is too much variation in the eruption times of teeth.
- It is not uncommon to observe premolars erupting at age of 8 years, or retained primary molars till age 15 years.
- The dentist must depend upon x-ray to provide useful information to when the tooth is going to erupt instead of the eruption tables.

3. Amount of bone covering the unerupted tooth:
- Provides important information regarding the eruption time.
If there is an amount of bone covering the crown of the permanent successor, this indicates that still many months before this tooth is going to erupt.

But if bone is destroyed by, for example, alveolar abscess related to the primary predecessor, the tooth may erupt before of its eruption date written in the eruption table.

4-Degree of development of permanent successor:

- It has been proven that the developing tooth does not move in its crypt till the complete calcification of the crown and the beginning of root formation.
- At the time of extraction of the deciduous tooth, if the crown of the permanent successor is not fully formed, there might be a great chance of complete wound healing with bone formation, and thus delay the eruption of the permanent successor up to one year.
- On the other hand if the extraction of the deciduous tooth happened after root formation of the permanent successor the tooth might erupt earlier up to 6 months.

5-Sequence of the eruption of teeth:

- The dentist should observe the relationship of the developing teeth adjacent to the space created by the premature loss of primary tooth.
- For example, if a second primary molar has been lost prematurely and the second permanent molar is a head of the second molar in eruption, there is a possibility that the second permanent molar will exert a strong force on the first permanent molar causing it to drift mesially and occupy some of the space required by the second premolar.
6. Delayed eruption of the permanent tooth:
- It is not uncommon to observe partially impacted permanent teeth or a deviation in the eruption path that will result in abnormally delayed eruption. In case of this type, it is usually necessary to extract the primary tooth, construct a space maintainer, and allow the permanent tooth to erupt and assume its normal position.

**Determination of arch length adequacy prior to space maintenance procedure:**
- The dentist should concern about the development of the dental arches and the establishment of a functional occlusion.
- This is particularly important during the mixed dentition period.
- He should determine the size of the permanent teeth that are yet to erupt, specifically the teeth in the dental arch anterior to the first permanent molars.
- He should also determine the amount of mesial movement of the first permanent molars that will occur after the loss of the primary molars and the eruption of the second premolar.
1- Nance Analysis:

- Nance concluded that the length of the dental arch is always shortened during the transition from the mixed to the permanent dentition.
- In the average patient a leeway of 1.7mm unilaterally exists between the combined mesiodistal width of the C, D, E and the mesiodistal widths of the 3, 4, 5, (the primary teeth being the larger).
- The leeway space in upper arch is only 0.9mm unilaterally.
- For a mixed dentition arch length analysis similar to that advocated by Nance, the actual width of the erupted four mandibular permanent incisors is first measured, from the stone model.
- The individual measurements are recorded. The width of the unerupted mandibular canines and first and second premolars on the radiographs should next be measured.
- The estimated measurements are then recorded.
- This will give an indication of the space needed to accommodate all of the permanent teeth anterior to the first permanent molar.
- The next step is to determine the amount of space available for the permanent teeth, and may be accomplished in the following manner:- from the mesial surface of the first permanent molar on one side of the arch to the mesial surface of the first permanent molar on the opposite side passing over the buccal cusps of the posterior teeth and the incisal edge of the anterior teeth.

- From this measurement must be subtracted 3.4 mm which the arch length may be expected to decrease as a result of the mesial drifting of the first permanent molars.

- Thus by comparing the two measurements the dentist can predict with a fair degree of accuracy the adequacy of the arch circumference.

2- Ballard Wylie Analysis:

- This analysis was developed on the assumption that in a given individual, there is harmony between the size of the incisors and the canines and the premolars.
For example, if the incisors are somewhat larger than the average, the canines, premolars, and molars in that person would be correspondingly larger than the average for those teeth.

<table>
<thead>
<tr>
<th>incisors</th>
<th>3</th>
<th>4</th>
<th>5</th>
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<tbody>
<tr>
<td>22 mm</td>
<td>6</td>
<td>6.7</td>
<td>7</td>
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Ballard and Wylie developed a predictograph that may be used for predicting the width of the unerupted permanent canines and premolars. The error from the use of this graph has been estimated at slightly over 2%. The widths of the four mandibular permanent incisors are determined with the aid of sharp pointed divider and a study model of the mandibular arch.

The sum of the width of the four incisors is located on the left side of the chart, and the sum of the widths of unerupted canine and premolars will be found directly opposite on the right side of the scale.

This figure may then be compared with the space available on each side of the arch between the mesial surface of the first permanent molar and the distal surface of the permanent lateral incisors.

The dentist must take into consideration the probability of mesial drift of the first permanent molar of at least 1.7 mm on each side.