Use of space maintainers in the developing dentition

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Course Objectives

- Improve understanding of the indications and contraindications to space maintainer usage
- Improve knowledge of the various types of space maintainers
- Understanding of clinical application and significance of space maintainers
Introduction

- Children may experience premature tooth loss which can create space shortage in the developing arch

Local causes
- Caries
- Trauma
- Ectopic eruption

Systemic causes
- Premature birth
- Cerebral palsy
- Syndromes/Disorders
Introduction

+ Loss in arch length can provide detrimental effects on the developing dentition
  + Crowding
  + Ectopic eruption and rotated teeth
  + Unfavorable molar relationships

+ A space maintainer is an appliance designed to prevent or reduce the severity of malocclusion following premature tooth loss
Functions of a space maintainer include:

- Maintain arch length, width, and perimeter
- Provide masticatory function
- Prevent over-eruption of opposing teeth
- Improve esthetics (anterior segment)
- Assist in speech (anterior segment)
- Aid in management of oral habits
Ideal characteristics of a space maintainer

- Simple
- Durable, strong and stable
- Passive and not causing orthodontic changes to other teeth
- Cleansable and not increasing risk for caries development
When to use space maintainers?

- Consideration for use of space maintainers is dependent on several clinical findings
  - Specific tooth lost prematurely
  - Period of time passed since the tooth loss
  - Occlusion
  - Space analysis
When to use space maintainers?

- Presence of permanent successor tooth
- Alveolar bone covering permanent successor
- Patient’s health and cooperation
- Oral hygiene
Information for parents

- Space maintainer it to be monitored and assessed at regular recall intervals
- Patient is expected to maintain good oral hygiene
- Appliance may dislodge and require repair and/or re-cementation
- Broken appliances can not be left in the mouth and require replacement
- Properly planned and maintained appliances may still fail to preserve the space
Types of space maintainers

- Unilateral
  - Band and loop/Crown and loop
  - Distal shoe
Types of space maintainers

- Bilateral
  - Lower lingual holding arch (LLHA)
  - Transpalatal arch
  - Nance appliance

- Removable
  - Hawley appliance
Band and Loop

When to use?
- Loss of the first primary molar prior to or during eruption of first permanent molar
- Loss of the second primary molar with presence of the first permanent molar

Advantages
- Allows for eruption of permanent tooth
- Easy to construct and adjust
- Inexpensive
- Non-invasive or painful
Distal shoe

+ When to use?
  + Loss of primary second molar prior to the eruption of the first permanent molar
  + The gingival extension should extend 1 mm below the marginal ridge of the permanent molar
  + Prior to cementation should be evaluated with a radiograph to confirm its position
+ Replaced with another space maintainer following the eruption of the first permanent molar
Lower lingual holding arch

**When to use?**
- Bilateral premature loss of mandibular primary posterior teeth
- Used as a base for aesthetic restoration of lost primary anterior teeth
- Used as a base for a habit appliance

**Advantages**
- Maintains arch form and allows eruption of permanent teeth
- Not easily displaced
- Can be modified and is comfortable for patient
Nance appliance

Indications:
- Bilateral premature loss of maxillary primary posterior teeth

Advantages
- Allows for eruption of permanent teeth
- Good durability
- Decreased effect on oral hygiene
Types of space maintainers

+ **Lab fabricated**
  + Requires alginate impression with fitted bands on abutment teeth
  + Cooperation required for impression
  + Gag reflex

+ **Cementation has a few steps**
  + The abutment tooth has to be dry
  + Confirm adequate seating of the appliance and check the occlusion
  + Remove the excess cement with a gauze and DO NOT rinse with water as this may remove a film of cement from the seated appliance
  + It may take up to 2 minutes for the cement to set
Chair-side space maintainer

- Prefabricated chair-side (Denovo)
  - No impression needed, can be adjusted and delivered the same appointment as the extraction(s)
  - Bilateral space maintainers are not available
Premature loss of Primary Incisors

+ Is a space maintainer required?
  + Space loss is not expected if primary canines are present and in occlusion
  + Esthetic concerns however may require management of missing teeth (placement of pontic)
  + Mostly done on parental request
Premature loss of Primary Canines

- Most commonly due to ectopic eruption of permanent lateral incisors
  - May result in midline shift and space loss
- Consider placement of band and loop or elective extraction of contralateral primary canine
Premature loss of first primary molars

- Space maintenance indicated if the first permanent molar is not erupted or actively erupting
  - Preventing mesial drift of molar and distal drift of canine
- Most commonly unilateral fixed appliances from the second primary molar to primary canines are recommended
  - With the eruption of the first permanent molars in occlusion (age 7 approx.) space loss is negligible and the appliance can be removed
Premature loss of first primary molars

- Bilateral early loss of the first primary molars requires bilateral space management
  - Lower lingual holding arch (LLHA; concerns regarding ectopic eruption of permanent incisors)
  - Nance appliance, transpalatal arch
Premature loss of second primary molar

- Space maintenance generally indicated regardless of the timing of tooth loss
  - Space loss will occur in the primary and mixed dentition

- Dimensional changes are greater in the maxilla than mandible
  - Maxillary first permanent molars move forward bodily and rotate around the palatal root
  - Mandibular first permanent molars show mesial and lingual crown tipping
Premature loss of second primary molar

- Type of space maintainer to be used is dependent on the eruption of the first permanent molar
  - Not erupted or in active eruption, distal shoe from the first primary molar to guide eruption of the first permanent molar
  - With the eruption of the first permanent molar replacement of distal shoe is required with an appliance using the first permanent molar as an abutment
    - Allowing for eruption of posterior teeth and preventing potential loss of abutment
Premature loss of multiple posterior teeth

Following appliances are indicated:

a) Transpalatal arch
b) Nance appliance
c) Lower Lingual Holding arch
d) Removable
When are space maintainers not indicated?

+ Successor tooth expected to erupt within 6 months
  + Succedaneous tooth actively erupts with 2/3 root development
  + Less than 1mm alveolar bone covering erupting tooth
  + Significant alveolar bone loss following primary tooth loss
  + Patient is in late mixed dentition
When are space maintainers not indicated?

- Inadequate space present for successor tooth
  - Possible future orthodontic work

- Excessive time elapsed since the extraction of the primary tooth
  - Primary molar missing for 6 months or longer has experienced the majority of space shortage
When are space maintainers not indicated?

- Generalized spacing present in the dentition
  - The expected 1 or 2mm space reduction will not compromise the eruption of the permanent tooth

- Patient compliance concerns
  - Cooperation for impression and cementation of appliance
  - Oral hygiene practices at home
Space maintainer adverse effects

- Dislodged, broken and lost
- Increase in plaque levels
- Caries
- Interference of eruption of successor tooth
- Undesired tooth movement
- Disruption of alveolar bone growth
- Soft tissue irritation
- Pain
Clinical scenario

A 4 year old requires removal of tooth # 85

What is the space maintainer of choice?
Clinical scenario

- A 5 year old requires removal of tooth # 54
- What is the space maintainer of choice?
Clinical scenario

- A 10 year old requires bilateral removal of mandibular second primary molars
- What is the space maintainer of choice?
Clinical scenario

- Patient 5 years old requires removal of teeth # 54 and # 64
- What is the space maintainer of choice?
Conclusion

- Premature primary tooth loss can provide several detrimental effects on the developing primary and/or mixed dentition
  - Crowding and ectopic eruption of permanent successor teeth
- Correct timely application of a space maintainer is critical in maintaining a normal functioning dentition still undergoing development.
  - There are several types of space maintainers with specific clinical indications for their usage


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THANK YOU!