

PEDIATRIC DENTISTRY

Space maintainers



BACKGROUND

Space maintainers have been used when there is premature loss of primary teeth to avoid undesirable tooth movements and loss of arch length. Such devices retain the space so that the permanent dentition, when it erupts, will not suffer crowding, impaction, or ectopic eruption; over-eruption of unopposed teeth; or center line discrepancies. The factors to be considered in selecting space maintainers, the types of maintainers, and specific indications for the use of these devices were considered.

FACTORS TO CONSIDER

Patient Factors

Before considering the use of space maintainers, the dentist should ensure that the patient is well prepared to handle them. This includes a thorough examination to determine his or her oral health status, hygiene, and caries risk. Patients must be dentally fit, have stable caries status, and be motivated to maintain their devices appropriately. The final point includes not just meticulous oral hygiene but also adherence to non-cariogenic dietary plans. Any child for whom a space maintainer is being considered must also be able to cooperate with its placement.

Clinical Considerations

Space maintainers will have differing outcomes depending on a number of clinical situations. The dentist should consider the tooth or teeth lost in the arch, the time period since the tooth loss, the presence and continued development of the permanent dentition, any malocclusion that is present, and the amount of alveolar bone overlying any permanent successor. Dentists should conduct an individual arch space analysis to ensure that problems can be avoided or managed.

If primary molars are lost, there is an increased risk of the arch length being reduced and any crowding or malocclusion tends to be more severe. Thus every effort should be made in these situations to maintain space, avoid center line discrepancies, and limit mesial migration of the buccal segments.

In general, primary upper incisors do not require space maintainers to be placed. Space maintainers are contraindicated if there is insufficient space for successor teeth, since these cases may require future orthodontic treatment.

TYPES OF MAINTAINERS

Space maintainers can be fixed or removable and unilateral or bilateral (Table 1). Unilateral fixed space maintainers include a

rigid component that spans the edentulous space and abutment teeth on either side. The efficacy of these types is directly related to their longevity of use.

If tooth loss has occurred in different quadrants, multiple fixed unilateral space maintainers can be used, but each should be limited to single-span edentulous areas to minimize the risk of breakage and failure. Band and loop space maintainers are used most often, but concerns about their longevity have led to a recommendation for the use of crown and loop space maintainers for primary first molars as well as glass fiber reinforced resin (GFRCR) space maintainers to address the loss of primary second molars.

Among the removable appliances available are wire stops mesial and distal to an edentulous space and orthodontic appliances such as the Hawley retainer. Patient compliance, loss of the appliance, or exfoliation and/or eruption of teeth can compromise the usefulness of these appliances. If compliance is lacking for a period of time, the appliance may no longer fit and the space may be lost.

USES

Space maintainers are used to preserve the space so that permanent teeth can be accommodated and arch length remains intact. Generally, premature loss of primary teeth is the initiating event in deciding to use a space maintainer. The primary teeth most often needing space retention when they are lost too early are the first and second molars, the canines, and the incisors. The specific indications for space maintenance differ according to the tooth lost.

Primary Second Molars

With the unilateral loss of primary second molars, the choice of space maintainer depends largely on the dental health and restorative needs of abutment teeth. If they are noncarious or minimally restored, GFRCR or simple wire direct bonded space maintainers will suffice. Band and loop space maintainers can be used in both permanent and primary dentitions with loss of a single molar tooth. Space maintenance is indicated with second premolar loss if the first permanent molars have already erupted; they can then be incorporated into the space maintainer appliance. If the first permanent molars remain unerupted, second primary molar space maintenance may help to guide the path of eruption of the first permanent molars. A transpalatal arch in the maxilla or lingual arch in the mandible is appropriate with bilateral loss of multiple primary teeth or failed fixed unilateral

Table 1. Different Types of Space Maintainers

Fixed unilateral	Fixed bilateral
Band and loop (B&L)	Nance
Crown and loop (C&L)	Transpalatal arch (TPA)
Distal end shoe (DES)	Lower lingual arch (LLA)
Direct bonded (DB)	
Glass fibre reinforced composite resin (GFRCR)	
Removable (with wire stops)	
Hawley appliance	
Removable partial dentures (RPD)	
Pressure formed retainers (PFR)	

(Courtesy of Watt E, Ahmad A, Adamji R, et al: Space maintainers in the primary and mixed dentition – a clinical guide. *Br Dent J* 225:293-298, 2018.)

space maintainers. Compensatory extractions are generally not indicated with loss of a primary second molar. If the area will remain without a tooth for an extended period of time, a modified occlusal bar can be used to prevent overeruption of the opposing dentition.

Primary First Molars

If the first molar is prematurely lost but the first permanent molar has erupted and is in good occlusion, no space maintenance is indicated. For patients with severe crowding who will likely require premolar extractions, it's best to wait and plan for later extraction. When crowding is more than 3.5 mm per quadrant, the maintenance of spacing becomes critical and can be achieved using a stainless steel crown with a soldered band and loop device on a restored primary second molar. Crown or band and loop space maintainers can also be used with loss of a single molar per quadrant with a carious or restored second molar distal to the edentulous space. Crown-retained space maintainers have better longevity than band and loop space maintainers and are the preferred choice. Failure in band-retained space maintainers is usually caused by loss of cement or cementation.

Primary Canines

For the loss of deciduous canines in the upper arch, space maintenance is not indicated, but if a primary canine is lost, balancing extractions are indicated to preserve the center line. For lower arch unilateral loss of a primary canine, contralateral extraction is also indicated for the same reason. However, lingual movement of the lower incisors and distal movement of developing permanent canines can create a loss of space that should be addressed. The dentist should carefully monitor the development and eruption of the primary first molars and permanent canines if the primary canines are lost prematurely.

Primary Incisors

Usually the loss of primary incisors requires no space maintainers because the effects on developing dentition are minimal. Space maintainer use could be considered if the primary incisors are lost before the primary canines erupt in an unspaced primary dentition or deep overbite or if the primary incisor is lost in a child who has an active digit sucking habit. Such children should undergo counselling to discourage this habit. Sometimes esthetic concerns can lead to the use of space maintainers, but these are not used to address space maintenance and are not indicated or needed in mixed dentition.

Assessment and Removal of Space Maintainers

Several appointments may be required to obtain an impression and fabricate space maintainers. Once in place, these appliances should be regularly evaluated for proper oral hygiene, for the intactness of the device, and to ensure there are no major problems with the wearing of the appliance. Patients should also be instructed in what to look for when inspecting their own appliances, how to clean them thoroughly, the importance of attending regular follow-up evaluations, and the need to return for maintenance should any breakage, loss, or slippage of the device occur. The schedule for appointments is every 6 months. Clinicians should expect both repair and maintenance to be required because the failure rates for space maintainers are high. If repeated failures occur, the method of space maintenance should be changed. Once permanent dentition begins to erupt, the space maintainer can be removed.

Clinical Significance

Space maintainers can be valuable aids when primary dentition is lost prematurely and there is concern for maintaining the space and arch length. Their use should be avoided in children who have poor oral hygiene habits, are unlikely to attend regular appointments, or have an ongoing high risk for caries. In general, these devices are well tolerated, but they can be difficult to keep clean and require patient compliance with the schedule of appointments. Their ultimate advantage is the ability to reduce the need for lengthy, complex orthodontic treatment.

Watt E, Ahmad A, Adamji R, et al: Space maintainers in the primary and mixed dentition – a clinical guide. *Br Dent J* 225:293-298, 2018

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