

# Space Maintainer: A Review

Subhashree Samal

Intern, Institute of Dental Sciences, Siksha O Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

## Abstract

Space maintainers are useful incases of deciduous teeth to protect the dentition from malposition,impaction, crowding,etc. They can also be used inmixeddentition. Various types of space maintainersare there for Particular treatment. This is mainly aimed atthe management of space in children. This article mainly aims at Bandandloop,Distal shoe, and trans palatal arch space maintainers.

**Keywords:** *Band and loop, Distal shoe, Trans palatal arch space maintainers, Removable space maintainers.*

## Introduction

Early loss of primary dentition occurs very commonly in children due to various causes like maintenance of oral hygiene, dental caries is the most common one. Deciduous dentition is very important in child growth and development in terms of speech, mastication, and the good eruption of permanent dentition. When the natural process of teeth exfoliation is disrupted due to various causes like early loss of deciduous teeth, proximalcaries, early childhood caries, avulsion, periapicalpathology, systemic causes like hyperthyroidism, downs syndrome,etc. It may result in the mesial movement of the dentition, resulting in loss of arch length which may cause malalignment of adult teeth in form of crowding, impaction,supra-eruption, rotation, ectopiceruption, crossbite, overjet, etc. A space maintainer is a mechanical device that preserves the natural space after the early loss of deciduous dentition. Space Maintenance of arch length management of occlusal planes etc. It can also be used for esthetic purposes.<sup>1</sup>

### Space Maintainers Classified By Various Method:

Hitch cock classified them into removable/fixed/semi-

fixed, banded/non-banded, functional/non-functional, active/passive. Raymond C. Thurrowis classified into Removable, Lingual arch, Individual tooth. Hinrichsen classified into Fixed space maintainers (Bar type, Loop type, Lingual arch type distal shoe, Band, and loop) and Removable space maintainers (Acrylic partial dentures).

Various indications of spacemaintainers include when there is early loss of deciduous teeth shows signs of closing or if there is any chance of orthodontics treatment or if the permanent teeth are not ready for eruption. There should be a minimum of 1mm of bone coverage.<sup>2</sup>

Various contra indication of space maintainers includes if bone coverage is absent or if the root of permanent teeth is the only 2/3<sup>rd</sup> or when the permanent teeth have not erupted and space needs to be closed or the mesiodistal width of the crown of the deciduous tooth is less than the permanent teeth.<sup>1,2</sup>

### Basic requirements of space maintainers include:

The space maintainers should have good proximal dimensions to occupy the space created by the teeth. The space maintainers should be functional. It should not interrupt with the eruption of the opposite teeth. It should be strong enough to withstand the force. It should not harm the adjacent tooth. It should be easy to clean. It should not interfere in the normal growth and function of the tooth.<sup>3,4</sup>

**Band And Loop Space Maintainers:** It is a fixed type of space maintainer and used in the forms of loop bands, tailored bands, preformed seamless bends. It

---

### Corresponding Author:

Subhashree Samal

Intern, Institute of Dental Sciences, Siksha O Anusandhan (Deemed to be University), Bhubaneswar, Odisha, India

e-mail: samalsubhashree63@gmail.com

should possess the following; It should fit the teeth properly, it should not extend below the gingival margin, the band material it should be enough strong to resist the forces in the mouth. It should not tarnish. There should be no occlusal interruption.<sup>3,4</sup>

**Preparation of Band space maintainers:** Separation of teeth done by Brasswire, elastic threads. Band formation can be done by a direct method which includes; Band pinching, festooning, trimming, folded flap. It can be also done by indirect method/preformed bands. Welding-by welding the bands are joined by soldering. Band and loop appliances are used when there is more than one tooth is a loss in the quadrant, it can replace occlusal function.<sup>3,4</sup>

**Benefits of Band and loop:** It can be cleaned easily. It maintains the vertical dimensions. It can be warm sometimes. Space can be created for the eruption of permanent teeth. It prevents tongue thrusting habits. It is cheaper and can be fabricated easily.<sup>3,4</sup>

**Demerits of Band and loop:** It may be easily lost or broken by the patients. Some patients may not wear this. Side jaw growth may be restricted. It may cause tissue irritation. It could not restore the occlusal function of the lost tooth.<sup>3,4</sup>

**Indications of Band and loop:** It is used in case of esthetic purpose, when the abutment tooth is not supportive, in case of cleft palate patients, in case of delaying permanent tooth eruption, if the permanent tooth does not erupt properly when there is several loss of primary teeth.

**Contra indications of Band and loop:** When the patient is not co-operative, patients are allergic to acrylic material, epileptic patients.<sup>3,4</sup>

**Trans Palatal Arch Appliances:** This appliance is mainly used for stabilizing the upper first permanent molars. It provides rigidity. It protects the first permanent molar from rotation.

**Indications of Trans-palatal arch:** The best indication is when one side of the arch is firmly fixed and various deciduous teeth are missing on the opposite side. It is also indicated when the deciduous molars bilaterally missing. It can not be used when both permanent molars are mesially directed. In that case, Nance palatal arch is recommended.<sup>5,6</sup>

**Benefits of Trans-palatal arch:** Due to the absence of an acrylic base there is less tissue irritation and could be clean easily so preferred for oral hygiene maintenance.<sup>5,6</sup>

**The demerit of Trans -palatal arch:** This appliance fails to remain passive. Due to this, there are chances of vertical and transverse movement of permanent molars that can happen.

**Construction of Trans-palatal arch:** A round wire of 0.036 inches is bent to make the palatal surface of the band. Then the mesial part of the palatal side of the band is constructed then the wire is bent to the distal part to form the joint. Then soldering is done and the wire is heated to make it passive.<sup>5,6</sup>

### **Distal Shoe Appliance:**

This is the most ancient type of Space maintainers. It is used as a guiding device for the eruption of the first permanent molar mostly of the mandible. This is usually not used in the maxillary arch. Its arm managed the Leeway space of the second premolar and guides the eruption of the permanent molar. For that reason, it is designed to have a horizontal bar and intra alveolar extension which is used as a guiding plane. It should be used by the patients regularly until the eruption of the first permanent molar. Otherwise if not used regularly it shows negative effects.<sup>7,8</sup>

**Indications of Distal shoe appliance:** Early loss or extraction of a second deciduous molar before the eruption of the first permanent molar. It is used in the case of root resorption and periapical bone destruction of the second deciduous molar before the eruption of the first permanent molar. In the case of advanced dental caries in the second deciduous molar. Ectopic eruption of first permanent molar teeth. Ankylosis of deciduous second molar teeth.<sup>7,8</sup>

**Contra indications of Distal shoe appliance:** Lack of abutment teeth due to several loss of teeth. In the case of uncooperative patients. When the first permanent molar is absent. In the case of systemic diseases such as Diabetes mellitus. In the case of cardiac diseases, kidney diseases, juvenile diabetes, rheumatic fever, hemophilia require antibiotic treatment before dental treatment. In case of congenital missing of the first permanent molar.<sup>7,8</sup>

**Crown Distal shoe appliance:** It is also known as Willet's appliances or intra-alveolar appliances. This helps in guiding the path of eruption of the first permanent molar.

**Indications of crown Distal shoe:** Early loss of second deciduous molar before the eruption of the first permanent molar but first deciduous molar should be present as an abutment tooth.

**Contraindications of crown Distal shoe:** In the case of medically compromised patients and in patients who do not have good oral hygiene.

**Steps in the placement of Crown Distal shoe appliance:** First IOPA is taken of second deciduous molar and first permanent molar. Then the abutment tooth is prepared. Then metal crown is made on the abutment tooth. Then the cast is poured and the working model is prepared. Dimensions of the second premolar are measured on the IOPA then the horizontal arm of the Distal shoe is prepared. The vertical height should be 1 mm downwards the mesial marginal ridge of the first permanent molar. The primary second molar is trimmed and the desired horizontal length is marked.<sup>9,10</sup>

**Fabrication and placement of Distal shoe Spacemaintainers:** A cobalt-chromium bar or stainless steel of 0.9 mm wire is used. The wire is bent to the desired shape. The vertical height of the horizontal wire of the Distal shoe should not touch the opposite tooth. Then soldering is done and the metal crown is polished. In the next appointment, the second deciduous molar is extracted and the bleeding is managed. The infection of the crown is controlled. Then the metal crown and Distal shoe are tried in the mouth. Then an IOPA is taken and the location of the Distal shoe concerning the erupting first permanent molar is confirmed. Then final managements are done if required and then the metal crown with the Distal shoe is placed on the abutment tooth.<sup>9,10</sup>

#### **Removable Space Maintainer:**

**It is used as a partial denture.**

**Active Removable Space Maintainers:** Here a labial bow is made for the anterior teeth on the working model. The side which is affected by the U shaped wire is bent to protect the alveolar ridge between the first premolar and molar.<sup>8-10</sup>

**Acrylic partial Denture:** It is indicated when there is several loss of teeth in the mandibular or maxillary arch. This is used when there is a bilateral loss of more than one tooth and can be used for the eruption of the tooth. It is constructed with stainless steel wire 0.036 inches on deciduous canines and permanent molars. It can also be used in permanent incisors when they are in an active state of eruption.<sup>8-10</sup>

**Benefits of Removable spacemaintainers:** It manages the mesiodistal space. It also maintains the vertical shape. Do not interfere with mastication. It helps in the improvement of esthetic in the anterior region. It does not interfere with speech. It helps in protection from oral habits.<sup>8-10</sup>

**Demerits of Removable space maintainers:** It is difficult in uncooperative and medically compromised patients.

**Indications of Removable space maintainers:** When there is an absence of more than two deciduous molars it is indicated. When there is an absence of more than one deciduous tooth bilaterally. In cases of absence of anterior teeth.<sup>8-10</sup>

## **Conclusion**

This article mainly highlights the types of Space maintainers. Space maintainers are mainly very essential in children before eruption of permanent teeth as it maintains good oral hygiene. It helps in the preservation of deciduous teeth from deleterious oral habits and dental complications such as malalignment of teeth, rotation, crowding, etc. at a young age. Space maintainers help in the preservation of space when the teeth are prematurely lost. It helps in maintaining good esthetics in children. It also controls orthodontics complications which may occur in the future. Thus Space maintainers help in the better eruption of permanent dentition.

**Conflict of Interest:** Nil

**Funding:** None

**Ethical Permission:** Approved

## **References**

1. Setia V, Pandit IK, Srivastava N, Gugnani N, Sekhon HK. Space maintainers in dentistry: past to present. *J Clin Diagn Res.* 2013;7(10):2402-2405
2. Vinothini V, Sanguida A, Selvabalaji A, Prathima GS, Kavitha M. Functional Band and Loop Space

- Maintainers in Children. *Case Rep Dent.* 2019; 2019:4312049.
3. Watt E, Ahmad A, Adamji R, Katsimpali A, Ashley P, Noar J. Space maintainers in the primary and mixed dentition - a clinical guide [published correction appears in *Br Dent J.* 2018 Sep 28;225(6):555]. *Br Dent J.* 2018;225(4):293-298.
  4. Brothwell DJ. Guidelines on the use of space maintainers following premature loss of primary teeth. *J Can Dent Assoc.* 1997;63(10):753-766.
  5. Barbería E, Lucavechi T, Cárdenas D, Maroto M. Free-end space maintainers: design, utilization and advantages. *J Clin Pediatr Dent.* 2006;31(1):5-8.
  6. Qudeimat MA, Fayle SA. The longevity of space maintainers: a retrospective study. *Pediatr Dent.* 1998;20(4):267-272.
  7. Simsek S, Yilmaz Y, Gurbuz T. Clinical evaluation of simple fixed space maintainers bonded with flow composite resin. *J Dent Child (Chic).* 2004; 71(2):163-168.
  8. Setia V, Kumar Pandit I, Srivastava N, Gugnani N, Gupta M. Banded vs Bonded Space Maintainers: Finding Better Way Out. *Int J Clin Pediatr Dent.* 2014;7(2):97-104.
  9. Tayab T, Vizhi K, Srinivasan I. Space maintainer using fiber-reinforced composite and natural tooth-a non-invasive technique. *Dent Traumatol.* 2011; 27(2):159-162.
  10. Dental Space Maintainers for the Management of Premature Loss of Deciduous Molars: A Review of the Clinical Effectiveness, Cost-effectiveness and Guidelines. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; October 20, 2016.