

## A NOVEL FIXED FUNCTIONAL LINGUAL ARCH SPACE MAINTAINER

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### ABSTRACT

**Background:** A lower lingual arch is usually recommended as a holding device to maintain mandibular arch length and to prevent mesial migration of the mandibular first molars. Lingual arch is also helpful for preserving lower arch dimensions, tooth position, and the efficient enough to preserve the space of lost primary teeth. But In spite of its widespread use, the major drawback is it is unsuccessful to restore masticatory function in place of lost primary teeth.

**Case report:** A 9 year old boy reported with bilateral early loss of primary mandibular 1<sup>st</sup> molars. To maintain the space for succedaneous teeth, A novel fixed functional lingual arch space maintainer was fabricated and cemented. Follow up after 1 year had satisfactorily maintained space for eruption of permanent teeth.

**Conclusion:** The Novel fixed functional lingual arch is an effective appliance for preserving masticatory function as well as prevention of supraeruption of the antagonist tooth.

**KEYWORDS** Space management, Supraeruption, Pontic.

### INTRODUCTION

The loss of multiple primary molars in the primary or mixed dentition will, in many instances, lead to disturbances of the developing dentition unless an appliance is constructed to maintain the relationship of the remaining teeth and to guide the eruption of the developing teeth.<sup>1</sup>

Sequelae of non-intervention following loss of the primary mandibular molars may include drifting of the permanent molars and inadequate space for succedaneous premolars. Due to space loss, premolars may erupt ectopically and in extreme situations may become impacted.<sup>1</sup>

Traditionally, the treatment of choice for mandibular space loss is the placement of a Lingual arch space maintainer. An alternative appliance which may be considered for use is the fixed functional lingual arch space maintainer. The purpose of this case report was to describe the novel fixed functional lingual arch space maintainer and present its advantages over the more conventional lingual arch space maintainer, thus encouraging clinicians to prescribe its use in certain clinical situations.

### CASE REPORT

A 9 year-old boy reported to The Department of Pedodontics and Preventive Dentistry of Karnavati School of Dentistry with the chief complain of difficulty in chewing from lower right & left back tooth region since last 7 days. The medical and dental histories were unremarkable. Oral examination revealed a mixed dentition. Upon Clinical examination, Mandibular arch shows edentulous area due to early loss bilateral deciduous primary 1<sup>st</sup> molars. (Figure 1)



Figure 1- Mandibular arch showing edentulous area distal to primary canine bilaterally due to early loss of primary 1<sup>st</sup> molars

Fig. 2 reveals Preoperative Orthopantomogram showing bilateral edentulous area distal to primary canine & mesial to primary 2<sup>nd</sup> molar due to early loss of primary 1<sup>st</sup> molars bilaterally, with tooth buds of succedaneous 1<sup>st</sup> premolar tooth in nolla's stage 7.



Fig2. Preoperative Orthopantomograph showing edentulous space bilaterally due to early loss primary 1<sup>st</sup> molars

Band pinching was done on permanent 1<sup>st</sup> mandibular molars bilaterally. (Figure 3)



Figure 3- Band Pinching is done on permanent 1<sup>st</sup> mandibular molars

Lower alginate impression was taken after band pinching. Stone cast was prepared over which wire component of conventional lingual arch space maintainer was prepared using 19 gauge stainless steel wire. Wire framework was prepared in edentulous area bilaterally from 19 gauge stainless steel wire to give support to artificial pontic.

Wire component of lingual arch space maintainer was soldered to bands on permanent 1<sup>st</sup> mandibular molars bilaterally & prepared wire framework is soldered to wire component of conventional lingual arch space maintainer lingual to edentulous areas bilaterally. Using white acrylic resin, Artificial pontics were prepared simulating the natural anatomy of primary 1<sup>st</sup> molars bilaterally and with the use of cold cure acrylic resin prepared artificial pontics were joined to wire framework prepared over edentulous area.

Using luting glass ionomer cement, the prepared modified lingual arch space maintainer was cemented over permanent 1<sup>st</sup> mandibular molars which are seen in Figure 4.



Figure 4 - A novel fixed functional lingual arch space maintainer in place

After cementation bilaterally occlusion of artificial pontic with opposing maxillary teeth was checked which was satisfactory. (Figure 5)



Figure 5 - Occlusion is checked bilaterally with opposing maxillary teeth

Orthopantomogram was taken showing wire framework of this newly modified novel lingual arch space maintainer after 1 year of follow up. (Figure 6)

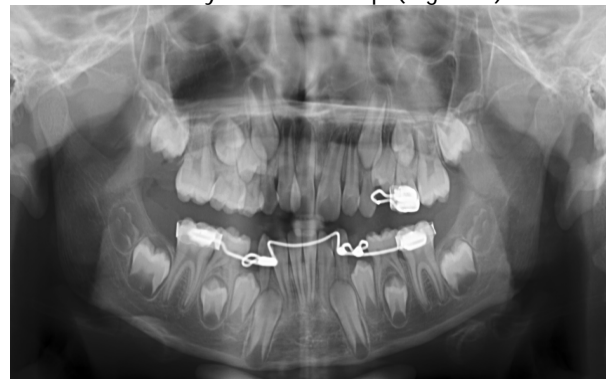


Figure 6: Orthopantomogram after 1 year follow up

## DISCUSSION:

Exfoliation of the mandibular primary molars is usually expected within late mixed dentition period, so space preservation becomes more critical if leeway space utilization is planned to resolve expected crowding as well as to preserve space for succedaneous teeth.<sup>7</sup>

A lower lingual arch is usually recommended as a holding device to maintain mandibular arch length and to prevent mesial migration of the mandibular first molars.<sup>5</sup> Despite its widespread use, comparatively little is known about the effect of a LLHA on preserving lower arch dimensions, tooth position, and the efficiency of this device in preserving the space of lost primary teeth.<sup>5,8</sup>

Arch length deficiency as a result of early loss of primary teeth may lead to the development of crowding, impaction, and irregularity of the permanent dentition.<sup>3</sup> Early loss of the primary molars had the greatest effect on dental arch length and resulted in 2–4 mm of space closure per quadrant in both arches. The greatest space loss has been attributed to mesial movement of the permanent molars.<sup>4</sup> In preventive and interceptive orthodontics; the use of a lower lingual arch is a widely accepted procedure. A lingual arch has been used to maintain arch length by preventing mesial movement of the molars and lingual collapse of the lower incisors.<sup>5</sup> It is recommended to use lower lingual holding device to utilize the leeway space to resolve mild lower arch crowding.

Moyers suggested that as much as 4.8 mm of space can become available as the permanent canines and premolars replace their primary successors.<sup>6</sup> Brennan and Gianelly studied the efficiency of a lower lingual arch in the mixed dentition stage to preserve arch length and concluded that preservation of arch length using a lingual arch resolved crowding in 68 per cent of subjects.<sup>7</sup> Rebellato investigated the efficiency of a lower lingual arch in preventing mesial migration of the first permanent molars. They reported that the lingual arch reduced arch perimeter loss but at the expense of mandibular incisor proclination.<sup>8</sup> Villalobos treated 32 patients with a lower lingual arch to control arch perimeter and concluded that the lingual arch is an effective appliance for preserving arch length.<sup>9</sup>

Management of premature tooth loss in the primary and transitional dentition requires careful thought by the clinician. Choosing the appropriate appliance is crucial to a successful outcome. No space maintainer—with the exception of the primary tooth—can fulfill all the requirements of an ideal appliance, including:

- (1) Preservation of space
- (2) Eruption of adjacent, succedaneous, and abutment teeth
- (3) Restoration of masticatory function
- (4) Prevention of over eruption of antagonists
- (5) Compatibility with soft tissues
- (6) Effective hindrance of torquing forces on abutment teeth.
- (7) Economy of construction and resistance to distortion
- (8) Allowance for adjustment or minor repair and
- (9) Universal application.<sup>2</sup>

The advantages of using this Novel fixed functional lingual arch space maintainer are as follows:

- (1) Restoration of masticatory function

- (2) Prevention of over eruption of antagonists

The idea of using artificial pontic in edentulous span was to improve masticatory efficiency in child along with space maintenance and also artificial pontics were preared from white acrylic resin for esthetic purpose. The advantage of using wire framework underneath the artificial pontic was to give support to artificial pontics and also wire framework helps to distribute occlusal forces applied on pontic while mastication as it is soldered to main component of conventional lingual arch space maintainer.

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