

Bilateral Long Span Fixed Distal Shoe Space Maintainer: A Case Report

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Abstract

Distal shoe space maintainer is indicated following premature loss of deciduous second molar when the adjacent permanent first molar is unerupted or erupting to guide the permanent first molar to erupt in proper position and alignment. There are many modifications of Distal shoe space maintainer. In the present case report a long span bilateral fixed Distal shoe space maintainer is fabricated following bilateral extraction of mandibular deciduous molars of a five year old male patient.

Keywords: Space maintainers, space loss, bilateral fixed Distal shoe space maintainer

Introduction

Premature loss of primary teeth is a common phenomenon and it occurs mainly due to either dental caries (for posterior teeth) and trauma (for anterior teeth). Early loss of primary teeth result in different types of space problems which may influence future dental development. On the other hand, timely interventions may save space for the proper eruption of permanent dentition¹. Following premature loss of primary teeth different types of corrective measures may be taken like passive space

maintainers or active tooth guidance with space regainer or combination of both according to the clinical situation². Distal shoe space maintainer is indicated following premature loss of deciduous second molar when the adjacent permanent first molar is unerupted or erupting to guide the permanent first molar to erupt in proper position and alignment¹. Premature loss of the primary second molar prior to the eruption of the permanent first molar is often a challenging problem to the dentist in managing the developing dentition. An erupting tooth adjacent to an edentulous area has a greater potential for space loss than fully erupted ones, indicating that clinical intervention should be considered³. Distal shoe space maintainer can be modified according to the treatment need of the patient¹. In this present case report a modified long span bilateral fixed distal shoe space maintainer is placed of a five year old patient following extraction of grossly decayed non restorable mandibular primary molars of both side.

Case Report

A five year old male patient reported to the out patient department of Pedodontics and Preventive Dentistry of Guru Nanak Institute of Dental Science and Research with

the chief complaint of pain in right and left lower back teeth region for few days. Clinical examination revealed carious 74, 75, 84, 85 (Figure 1). All the carious teeth were three degree mobile and non restorable. Buccal swelling with pus discharging sinus present on both side with respect to the carious molars. Intra oral periapical radiograph revealed pulp exposure with furcation radiolucency in 74, 75, 84 and 85 (Figure 2 and 3). OPG (Figure 4) revealed 36 and 46 in nollas VII stage and 34, 35, 44, 45 were in nollas IV stage. Approximately 1 mm of bone thickness was present over occlusal level of 36 and 46 and adequate bone thickness (1.5 mm- 2 mm) over erupting 34, 35, 44, 45. Based on the clinical and radiographic examinations a clinical decision of extraction of 74, 75, 84, and 85 was taken followed by a modified bilateral distal shoe space maintainer for guiding 36 and 46 and also for maintaining space for future eruption of 34, 35, 44 and 45. Modification of distal shoe space maintainer was advocated due to inadequate abutments because of multiple loss of deciduous molars of both side. Parents of the patient were informed about the procedure and consent was taken. From RVG approximate depth of coronal surface of 36 and 46 from gingival level of distal end of primary second molar crown was calculated. Right side the depth was approximately 1.2 mm and on left side the depth was 1.3 mm approximately. Stainless steel banding (125X0.04mm) was done in 73 and 83. Alginate impression was taken and bands were properly secured in the impression. Working model was prepared from the impression with dental stone keeping the bands positioned in the model. In the working cast removal of 75, 85, 74, 84 were done. At the distal end of 75 and 85 a groove of 1.5 mm were cut for the intra alveolar placement of loop to prevent mesial tilting of 36 and 46. The modified appliance was then fabricated with 18 gauge (1mm) SS wire (Figure 5 and 6). The SS wire was soldered with the

SS band in 73 and 83 on the working cast (both Buccally & lingually). Anteriorly 1.5 mm distance with lower anteriors were maintained for uninhibited eruption of permanent successors. The distal loop of the wire was positioned 1.5 mm inside the groove so that the vertical distal projection was in contact with mesial surface of permanent first molar crown on both side.

Extraction of all mandibular deciduous molars were done in single appointment. 4% Articaine infiltration was used as local anaesthesia of choice to prevent bilateral lingual block. After extraction fitting of the appliance was checked. Radiographs (Figure 10, 11, 12) were taken to check the horizontal and vertical extension of the appliance and the appliance was then cemented

(Figure 7, 8, 9) using Type I Glass Ionomer Cement (Fuji 1) on the same appointment following haemostasis. Systemic antibiotics and analgesics were prescribed. The patient was recalled after 24 hours and 72 hours to check stability of appliance and post operative healing. The patient were kept in regular follow up at every 1 month interval. After 1 year eruption of 36 and 46 was noticed. Also the mandibular permanent incisors have erupted. Then the modified distal shoe space maintainer was removed and followed by fixed lingual arch space maintainer and patient was kept under follow up at 6 months interval.

Discussion

Deciduous or primary teeth act as ideal space maintainer^{4,1}. So always a decayed primary tooth should be restored if possible by conservative or endodontic treatment¹. But sometimes decay in primary dentition becomes such advanced that they cannot be restored with conservative or endodontic treatment. Premature loss of primary tooth may result in arch space loss which result in future orthodontic malalignment⁵. The space maintainers preserve arch length following the premature loss of

primary tooth or teeth and allows the permanent successors to erupt in proper alignment and occlusion. The space maintainers are indicated when space after premature loss of deciduous teeth shows signs of space closing^{6,7}.

There are different types of space maintainer according to indication and design². Distal shoe space maintainers are indicated to guide the unerupted or erupting permanent first molar into normal eruptive position followed by premature loss of primary second molar⁸. This is a type of intra alveolar appliance where distal extension bar is positioned inside the alveolus contacting the mesial surface of erupting permanent first molar⁹. Case selection is very important because distal shoe space maintainers are generally not preferred because it needs surgical intervention and it is not hygienic also the compliance is very poor. In addition histologic examination reveals complete epithelisation does not occur after placement of appliance. Because the epithelium is not intact, the distal shoe space maintainer is contraindicated in medically compromised patients and in patients who require sub acute bacterial endocarditis coverage^{1,10}.

Depending upon clinical condition such appliances can be modified. Croll¹¹ suggested the use of modifications like prefabricated lingual arch wire embedded in acrylic and Gegenheimer¹² proposed the use of an acrylic pressure ridge. However, poor retention and patient compliance was a major drawback with these appliance designs. Bhatt PK⁹ used bilateral fixed distal shoe space maintainer banding primary canine on one side a primary second molar on other side. A similar design as used in this case has been given previously by Dhindsa et al.¹³, wherein the primary canine and the first molar were only banded. Somwanshi YD et al¹⁴ documented a case of bilateral extraction of both mandibular molars following banding on primary canines of both side and extension of the distal

loop was at level of permanent mandibular 1st molar intraalveolarly on both sides.

In the present case report bilateral primary molars had to be extracted resulting in need for long span space maintainers of both side. Long span reverse band and loop space maintainer was not considered as permanent first molar was not erupted. Distal shoe space maintainer individually on either side was not considered due to lack of retention as edentulous span was long and due to less abutment support. The treatment of choice in this case was long span bilateral distal shoe space maintainer. Anterior end of the appliance was not kept in contact with primary anteriors for uninhibited eruption of permanent mandibular anteriors.

One major limitation or drawback of distal shoe space maintainer is non compliance of the patient. In this particular case the appliance was well accepted by the patient.

This type of modified design have certain disadvantages like non functional design, does not provide mesio-distal space opening and can not be given in uncooperative patients. As the appliance is bilateral there is a possibility of hindrance of eruption of permanent incisors. So a gap of 1.5 mm with lingual surface of incisors were maintained. Close clinical and radiographic monitoring was also done to check eruption of permanent successors routinely.

Conclusion

Distal shoe space maintainer is indicated following premature loss of deciduous second molar when the adjacent permanent first molar is unerupted or erupting to guide the permanent molar to erupt in proper position and alignment. Depending upon clinical situation Distal Shoe space maintainers are modified. When there is multiple loss of deciduous molars on both side and span is long distal shoe space maintainers can be modified to bilateral

long span distal shoe space maintainer by banding both canines. Anterior segment of appliance is kept 1. mm lingual to the lingual surface of deciduous anteriors for uninhibited eruption of permanent anteriors. The post segment of the appliance is kept intra alveolarly just in contact with mesial side of crown of 36 and 46 on both side.



Figure 1



Figure 2



Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9



Figure 10



Figure 11



Figure 12

Figure 1: Preoperative view clinical

Figure 2: Grossly decayed 74,75

Figure 3: Grossly decayed 84,85

Figure 4: Preoperative OPG

Figure 5, 6: Appliance

Figure 7: Appliance in mouth

Figure 8: Appliance in mouth right sided occlusion

Figure 9: Appliance in mouth left sided occlusion

Figure 10: post operative iopar of 36 region

Figure 11: post operative iopar of 46 region

Figure 12: Postoperative OPG

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