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CASE REPORT

Fixed Functional Distal Shoe Appliance for Bilateral Loss of Deciduous Molars

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ABSTRACT

Pediatric dentistry aims at preserving the deciduous teeth till its normal time of exfoliation as it maintains the integrity of the dental arches. Premature loss of deciduous teeth might lead to a wide range of implications such as the mesial migration of the erupting permanent first molars as well as the supra eruption of the opposing dentition. In such cases the intra alveolar type of space maintainer is given however such an appliance may not fulfill all the needs. So, modification of these conventional designs will be required. This paper describes a new design for distal shoe appliance in cases of bilateral loss of primary first and second molars prior to the eruption of the permanent mandibular first molars.

Keywords: Fixed functional distal shoe, Bilateral primary molars, Space maintainer.

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INTRODUCTION

Preservation of the deciduous dentition till its normal time of exfoliation has been of significance in preventive and interceptive dentistry.[1] Yet the exfoliation/extraction of primary teeth could be due to various causes such as deep dental caries, trauma, congenital absence, lack of finance for treatment, ignorance about the importance of deciduous teeth, etc.[2] Premature loss of primary teeth results in space loss as reported in early 20th century by Stallard, Lyons, Willet and others.[3] Literature reveals that about 51% of first primary molars and 70% of second primary molars are lost prematurely and results in loss of space and consequent malposition of developing permanent tooth in that quadrant.[4]

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Several appliances have been described for space maintenance of several damaged or lost primary second molars prior to the eruption of permanent first molars. The most commonly used appliances are the willet distal shoe, Roche crown and bar maintainer with distal extention.[5] In certain clinical situations like bilateral loss of both the primary first and second molars, the conventional design needs to be modified to meet the patient needs.

CASE REPORT

A 5-year-old boy reported to the department of Pedodontics and Preventive dentistry with the chief complaint of pain in the lower left back teeth since 2 days. Clinical examination revealed grossly carious primary mandibular left and right first and second molars (Fig. 1). Radiographic examination revealed furcal radiolucency and root resorption in relation to the same (Figs 2 and 3). The permanent mandibular left and right molars showed stage 7 of development (Nolla's stages of tooth development, 1952). It was diagnosed as chronic furcal abscess and a treatment plan included extraction of the above mentioned primary molars under antibiotic coverage and with the parents consent, followed by space maintainers. In this case Willet's appliance, distal shoe or intra alveolar, eruption guidance appliance type of space maintainer was indicated on both sides with relevant modifications.[6] Inspired by the previous modifications of the willet's appliance by Dhindsa A,[7] where in a single wire component was made bilaterally using the band on canine on the left side and primary first molar on the right side, a single component was constructed for stability. Similarly

Fig. 1: Clinical picture showing the grossly carious mandibular primary molars on the left and right side

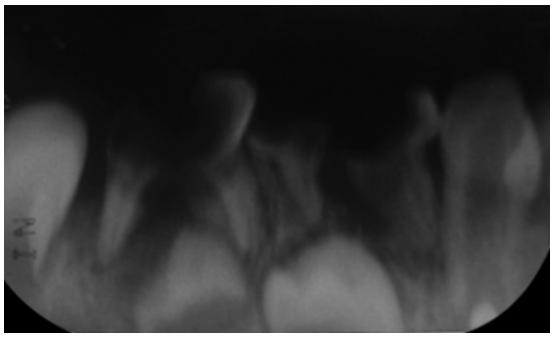

Fig. 2: Intraoral periapical radiograph showing the grossly carious primary left mandibular first and second molars

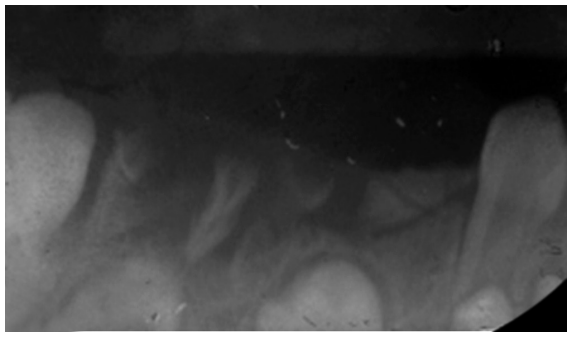

Fig. 3: Intraoral periapical radiograph showing the grossly carious primary right mandibular first and second molars

Fig. 4: Modified distal shoe with band adaptation on the mandibular right canine with the acrylic component cemented

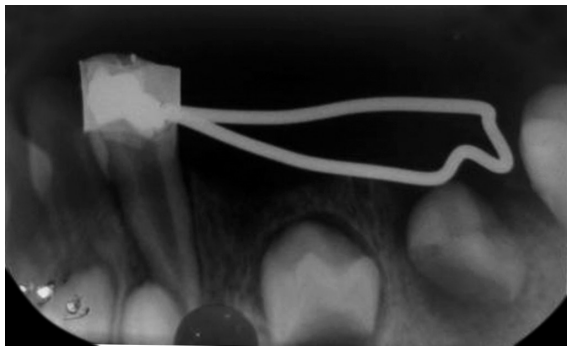

Fig. 5: Intraoral periapical radiograph showing the modified appliance on the right side before cementation

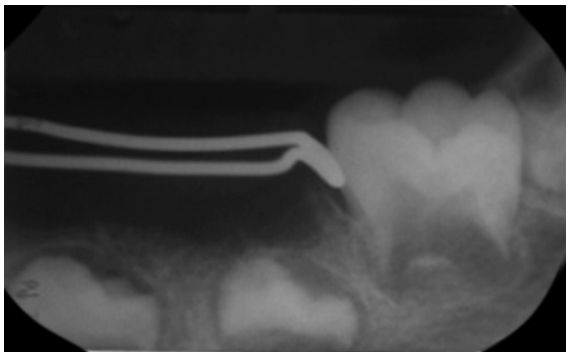

Fig. 6: Intraoral periapical radiograph showing the modified appliance on the left side before cementation

Fig. 7: Clinical picture showing the erupted permanent mandibular left and right molars and followed by removable functional space maintainer

in the present case the wire component was made where in the distal extension was calculated radiographically and a cut was made in the cast and wire component were adapted using 19-gauge wire. These wire components were soldered to the bands on the canines bilaterally but as two individual units. Then the acrylic component was made in the edentulous area on the wire component in a similar fashion on the left and right side (Fig. 4). Teeth were placed/positioned to make it functional. It was placed on the lower left canine and right canine followed with radiographs to check the passive contact between the mesial end of permanent first molar and the appliance before cementation (Figs 5 and 6). The recall visits were planned every two months for a check up. After eight months the right side permanent first molar erupted and the following month the left permanent first molar erupted (Fig. 7).

DISCUSSION

The most important phase of pediatric dentistry has been the period of mixed dentition. Proper management and guidance to the developing permanent dentition has always led to a harmonious occlusion. One such condition in which both the right and left deciduous first and second molars were extracted and the developing first permanent molar had to be guided, as the erupting tooth adjacent to edentulous area has a greater potential for space loss than fully erupted ones, indicating that clinical interventions should be considered. As described earlier and practiced, a simplified chair side fabricated distal shoe appliance[6] has been efficient and cost effective appliance with success rates approximately equal to the other space maintainers. Nonetheless, a few drawbacks have been seen like inflammation of the soft tissue surrounding the extension resultant, a metallic tattoo. Contra

indication in medically compromised conditions such as cardiac ailments, history of rheumatic fever, diabetes, generalized debilitation etc. It is also contra indicated in multiple losses of primary first and second molars. Eventually certain modifications started emerging like in clinical situations in which the permanent molar has begun, but not erupted completely. The appliance design includes a prefabricated lingual arch wire embedded in the acrylic as well as acrylic pressure ridges, however, scientific evidence is lacking for either technique.[8] Another modification was with a crown and loop on the first deciduous molar and loop with a vertical extension reaching the mesial surface of the permanent first molar, upon eruption of the permanent first molar, the sub gingival extension can be severed from the stainless steel crown at the solder joint at the distal crown surface therefore leaving the posterior crown and loop portion of the appliance in contact with the erupted tooth. Therefore, removing the sub gingival extension does not cause significant mesial movement of the erupted tooth.[9] Another modification in a similar case of missing bilateral molars was done. In place of giving two separate space maintainers for each side, some modifications were planned on willets appliance. Bands were made on lower first deciduous molars and canine on right side and on lower deciduous canine on the left side. Anteriorly the wire component was made like lingual holding arch and posteriorly short term willet's appliance was made bilaterally. The wire components were soldered on bands on both the sides.[7] But this type of design has certain disadvantages such as its nonfunctionality, which does not help in mastication. To overcome certain disadvantages an effort was made to fabricate a modified distal shoe appliance with the basic requirements.

The basic principles of a good space maintainer should present many qualities namely:

- Maintain the desired mesio distal dimension of the space.
- Provide mesio distal space opening when it is required.
- Should be hygienic.
- Have good durability.
- Cost efficient.[10]

In the present case, it was difficult to employ willet's distal shoe because of the missing bilateral molars both first and second molars and also the threat of supra eruption. As in another design suggested by Dhull et al the horizontal loop was fabricated to have buccal and lingual loops because of the supra eruption of the opposing teeth.[11] In the present case we wish to guide the developing permanent first molar as well as prevent the supra eruption of the opposing teeth. The procedure follows, firstly band adaptation on both the lower left and right canine. The wire component was constructed with a horizontal and vertical bends according to the radiographic measurements. To the above, teeth were incorporated on the teeth missing sides. By doing this, a stability was gained, since the teeth were in occlusion because of which there were faint chances of the component dislodging in the oral cavity. At the same time canines of both the sides were not the sole anchorage for the retention. After a period of eight to nine months the permanent first molars erupted and the appliance was removed and replaced with a removable functional space maintainer because of hygiene concerns with the fixed appliance. Presently, we are waiting for the molars and incisors to erupt completely and then change it to a lingual arch holding appliance.

CONCLUSION

Preventive and interceptive orthodontics plays an important role in pediatric dentistry to provide appropriate treatment to the children. In the present situation an effort has been made to fabricate a newer design to recruit the needs as well as to reduce the patient discomfort. By doing so, we will be avoiding the further occurrence of malocclusion. Further clinical feasibility and usefulness is yet to be established, which is possible when there is a quest for innovation.

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