Management of Premature Loss of Primary Mandibular Second Molar in 5 Year Old Child Using Distal Shoe Space Maintainer

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ABSTRACT

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INTRODUCTION

Primary dentition plays a very important role in guiding the eruption of permanent teeth and also in chewing, appearance, prevention of bad habits and speech. (1) Preservation of deciduous dentition till its normal time of exfoliation is one of the most important factor involved in preventive and interceptive dentistry. (2) Dental caries is one of the most common reason for the premature loss of primary teeth (3). Premature loss of primary second molar may result in mesial migration of the first permanent molar occupying some or most of the future space of permanent second premolar and consequently its possible impaction. (4) About 51% of the prematurely lost first primary and 70% of prematurely lost second primary molars result in a loss of space and consequent malposition of a permanent tooth in that quadrant (5). The distal shoe space maintainer, as introduced by Gerber and extended by Croll is a valuable part of the pediatric dentist’s armamentarium, because in those cases where the second primary molar is lost prematurely, (6) it helps guide the first permanent molar into place, it helps guides the first permanent molar into place and prevents mesial drifting of the tooth. The distal shoe has an extension going subgingivally to a location mesial to the unerupted first permanent molar and it also guiding unerupted permanent teeth into the arch. (7)

Case Reports

A 5 year old girl reported to the Department of Pediatric and Preventive Dentistry with the chief complain of pain with lower left and right back region of jaw since 20 days. There was no significant medical history present. On intra oral examination, chronic irreversible pulpitis with 75, 85 and Dental caries with 55, 65, 51, 61 were evident in [figure1,2]
Figure 1: Preoperative maxillary view

Figure 2: Preoperative mandibular view

Figure 3: Area of chief complain

Radiographic examinations: Intra oral periapical radiograph of 55 revealed a marked radiolucency extending to enamel, dentin and approaching to pulp [Figure 4] Intra oral periapical radiograph of 85 revealed a marked radiolucency extending to enamel, dentin and also involving pulp with involvement of the furcation area. [Figure 5] Whereas radiograph of 85 revealed a radiolucency involving enamel, dentin and pulp. [Figure 6]

Figure 4 - Pre-operative radiograph of 55

Figure 5 - Pre-operative radiograph of 75
Figure 6- Pre-operative radiograph of 85

Treatment planned in this case was the extraction of 75 followed by distal shoe space maintainer. Pulpectomy in 85 was done followed by stainless steel crown [Figure7]. Glass ionomer cement restoration was done with 65,51 61. Indirect pulp capping was done with 55 followed by stainless steel crown.[ Figure 8]

Figure 7- Post-operative radiograph of 85  
Figure 8 - Post-operative radiograph of 55

Figure 9- Distal shoe space
Figure 10: Post operative intraoral view of maxillary and mandibular arch

It was decided to extract primary mandibular left second molar and an eruption guidance was indicated. Band was fabricated on mandibular primary first molar. An alginate impression was made and band was transferred to the impression. Impression was poured in dental stone. The gingival extension was calculated radiographically, distal shoe appliance was fabricated in such a way that distal extension can be seated at mesial surface of permanent first molar just 1-2 mm below the mesial marginal ridge. The procedure was explained to the patient, the inter alveolar projection of the appliance was placed in the socket so as to touch and guide the vertical eruption of unerupted permanent first molar on the left side of mandibular arch. [Figure 10] Intra oral periapical radiograph was taken to check the passive contact between the mesial end of permanent first molar and the appliance before the cementation. [Figure 9]

The recalled visits were planned after every 3 months to check the condition of the appliance. This is the radiograph and clinical photograph after 3 month follow up.

DISCUSSION

The concept of space loss due to premature loss of deciduous teeth was described by Davenport as early as 1887(5). Holding space to allow the teeth to erupt and to prevent impactions is valuable. 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 considered(3) Active eruption of first permanent molar beings as early as 4 ½ years of life and continues until they are in full occlusal contact, i.e. 6 ½ to 7 years of age.(5) In the mandibular arch the first permanent molar erupts in a lingual and mesial direction using the distal surface of the second primary molar as the buttress to guide into position. Hence the design of the distal extension of the appliance should have a slight lingual position over the crest of the alveolar ridge in order to engage the mesial contact area of the first permanent molar. This consideration is important in preventing the erupting permanent molar from slipping contact with the appliance, resulting in rotation of both the molar and the appliance(5) There are distal shoe appliance kits available (Dental Supply Co, Covina, Calif; Denovo, Arcadia, Calif) whereby the distal shoe can be
fabricated and inserted immediately after extraction of the second primary molar while the patient is in the chair during one visit(6) Among several designs of guiding appliances, the most common are the Willet’s appliance or the Roche’s appliance. Willet’s design unable to provide broad contact often results in dislodgment of the vertical arm, slipping, and rotation of erupting molar. The modified design was planned to increase flexibility, broaden the contact area, and prevent the dislodgment. The conventional designs can be used successfully for unilateral loss of deciduous second molar however in case of bilateral loss of mandibular second primary molar modify the appliance design with a lingual holding arch is beneficial (1). The success criterion of a distal shoe space maintainer, as defined by Baroni et al and Qudeimat et al, is the successful guidance of the unerupted permanent tooth into the arch with no problems associated with the appliance.(7)

CONCLUSION

Maintenance of space during premature loss of primary second molar is the most important to prevent development of malocclusion. The distal shoe space maintainer is cost and time effective and useful, meets all the criteria for proper space maintenance.

References: