

## Unsupervised Distal Shoe Appliance: A Case Report

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### Introduction

Primary dentition plays a vital role in developing speech, mastication, aesthetic, prevention of bad oral habits and eruption of permanent teeth [1,2]. Especially primary molars are very important in development of occlusion and guidance for the eruption of permanent molar. So whenever restoration in primary molar is not possible and extraction is the choice, there is always a risk of losing space resulting in malocclusion. Other adverse effects of pre-mature extraction of primary molar are mesial migration of first permanent molar, increased overbite, increased crowding, impaction, occlusal impairment, arch asymmetry and disruption of eruption sequence [2-5]. To avoid these problems and reduce the need for prolonged orthodontic treatment, space maintainer should be advised. There are different types of space maintainers and the paediatric dentist must decide which one to utilize, on the basis of dental age, eruption patterns, the amount of bone covering the succedaneous tooth and the type of tooth lost [6] as well as the dentist's familiarity and experience with different types of space maintainers [7]. Various treatment options have been suggested in case of premature loss of second primary molar before eruption of first permanent molar [8,9]. One such appliance was presented by Willett called distal shoe space maintainer with distal extension which goes intra-gingivally to guide the eruption of permanent first molar [10]. The purpose of this case report was to present a side effect in a case of unsupervised distal shoe space maintainer which was placed in a child and not followed regularly.

### Case Report

A 10 year female child reported to the dental department with the chief complaint of pain in the upper front teeth. On intraoral examination it was found that both upper central incisors were fractured (Figure 1). All the permanent incisors, first molars, maxillary first premolars and mandibular right second premolar were erupted. Whereas, distal shoe space maintainer was present on the mandibular left side (Figure 2). The history as reported by the parents revealed that fracture of teeth occurred few days back while playing. On further questioning they stated that right mandibular second primary molar was extracted because of abscess about 1½ years back and left mandibular second primary molar was extracted at the age of 5 years and space maintainer was given at that time by another dentist. Radiographic examination shows that the root of left mandibular first primary molar was completely resorbed and bone was not seen on the occlusal surface of both mandibular left premolars. However



Figure 1: Photograph showing fracture of both maxillary central incisors.

it appeared that intragingival extension of distal shoe appliance was obstructing the eruption of mandibular second premolar (Figure 3).

Considering the age of the child, position and developmental stage of both mandibular left premolars, it was decided to remove mandibular left first primary molar along with distal shoe appliance. Procedure was explained and informed consent was taken from child's parents. Extraction and removal of distal shoe space maintainer was done under local anaesthesia (lidocaine with adrenaline 1:100,000). In the maxillary central incisors pulp treatment were done followed by composite build-up in maxillary right central incisor and fragment reattachment in maxillary left central incisor (Figure 4). Periodic recall appointment was advised to monitor the eruption of mandibular left second premolar. It was found that after a follow-up of one year eight months left mandibular second premolar had erupted (Figure 5).

### Discussion

Distal shoe space maintainer maintains the space for the eruption of second premolar and at the same time guide the eruption of permanent first molar. It consists of crown and an intra-alveolar distal extension which guide the eruption of permanent first molar. Such appliance is contraindicated when multiple teeth are lost on the same side, unsatisfactory abutment is present, poor oral hygiene, poor patient and parents' cooperation [9]. Other contraindications includes blood dyscrasias, juvenile diabetes, low resistance to infection, congenital heart disease, history of rheumatic fever and generalized debilitation [7,9]. This patient does not had any such problem and so distal shoe space maintainer was given after extraction of left mandibular second primary molar at the age of five years.



Figure 2: Photograph showing distal shoe on the left and erupting second premolar on the right.

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Received September 19, 2016; Accepted October 20, 2016; Published October 28, 2016

Citation: Jafri SAH (2016) Unsupervised Distal Shoe Appliance: A Case Report. *Pediatr Dent Care* 1: 122.

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**Figure 3:** Radiograph showing obstruction of second premolar from eruption by the intra-alveolar extension.



**Figure 4:** Photograph after restoration of central incisors.



**Figure 5:** Photograph after eruption of premolars.

This appliance is difficult to place into proper position passively contracting the mesial surface of the erupting permanent first molar while extending only 1mm below the mesial marginal ridge [9,11]. This placement is very technique sensitive, as it is difficult to see the permanent molar's crown [11]. Also gingival extension of the distal shoe may damage the developing tooth bud, which may cause displacement of tooth [12]. Another disadvantage of this appliance is that, the gingival tissue around the intra-alveolar extension never becomes completely lined with epithelium, thus maintaining an open wound in the oral cavity [13]. Also there is evidence of an associated chronic inflammatory response [13]. But in this patient no clinical problem was evident even after having the appliance for such a long period.

The patient had not visited the dentist for a long period of time and so the distal shoe space maintainer was still present even after eruption of permanent first molar. Patient and the parents were completely unaware of the problem caused by the appliance on the eruption of succedaneous second premolar. Due to lack of regular follow-up, in this case, space maintainer remained for the longer time in the mouth, causing hindrance in the eruption of second premolar from its intra-gingival extension. Probably to the best of our knowledge this is the first report in which the adverse effect of distal shoe space maintainer on the eruption of succedaneous second premolar was highlighted. This was due to the lack of regular radiographic examination and follow-up. After removal of the space maintainer, patient was regularly followed

and it was found that on this side second premolar had completely erupted after one year eight months, although on the contralateral side it was present when first time patient reported to us. Thus a high level of cooperation and motivation is required from the child and the parent's whenever any space maintainer is given and it should be stressed for the regular follow-up to avoid any adverse effect of the appliance on the eruption of succedaneous teeth.

## Conclusion

Distal shoe space maintainer is advised in case of early loss of second primary molar before eruption of first permanent molar. This appliance should be changed with band and loop space maintainer after eruption of permanent first molar to avoid any adverse effect on the second premolar, as seen in this case. For this a regular follow-up should be stressed after placement of space maintainer.

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