

A Simplified Space Regainer and Functional Space Maintainer - A Case Report

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Abstract

The occlusion in primary dentition is of major importance as it plays a crucial role in the development and stability of the permanent dentition. The early loss of primary teeth can result in changes arch length, permanent teeth malocclusion, difficulty in speech and mastication. Hence preservation of the space created by premature loss of primary teeth is one of the challenging goals for the Pediatric dentist. Interceptive treatment in the mixed dentition may result in favourable occlusion. Through this article we are presenting a case of interceptive orthodontic management using a helical loop regainer followed by a functional space maintainer.

Keywords: Space Discrepancy; Helical Loop Space Regainer; Functional Lingual Arch

Introduction

Transition from primary to mixed dentition or from mixed to permanent dentition is never accurate and ideal. The hurdles like early loss of primary teeth, space loss due to premature exfoliation of primary tooth, arch length and tooth size discrepancy and difference in sequence of eruption.

Early orthodontic intervention is often initiated in the developing dentition to promote favourable developmental changes. Interceptive orthodontics should enhance long term treatment options and outcomes without compromising future needs [1].

Patient and Methods

Case Report

A 11-year-old girl reported to the out-patient Department of Pedodontics and Preventive Dentistry, Faculty of Dental Sciences, M S Ramaiah University of Applied Sciences, Bengaluru, Karnataka, India with the chief complaint of a broken tooth in left lower back teeth region since three months. Medical history was nothing in particular. Dental history disclosed that she had undergone oral prophylaxis and restoration in relation to 65.

Clinical examination revealed Fair oral hygiene (OHI-S Score-2.6), restored 65, Grossly decayed tooth-75, root stump-74 and clinically missing 45, distally migrated-44, mesially migrated-46 (Figure 1).



Figure 1: Pre-Operative Photograph.

Investigation carried out included both radiographic and model analysis. An ortho Pantamograph (Figure 2) revealed grossly destructed 85 with pathological root resorption involving more than 2/3rd of root length and erupting 45 in Nolla's developmental stage 6 (crown formation complete), congenitally missing 35, Erupting 34 in Nolla's developmental stage 8 (2/3rd root completed). A lower arch alginate impression was made (Hydrogum[®], Zhermark, Deutschland, Germany) and the cast was poured (Elite master[®], Zhermark, Deutschland, Germany). Tanaka Johnston and Moyers mixed dentition space analysis were carried out to assess

the space available, which gave the result of space discrepancy of ~3.8mm. According to mixed dentition analysis, interpretation by McDonald, space regainer is indicated in cases for >3mm space deficit, the treatment plan was outlined as space regainer with respect to missing 45, extraction of grossly decayed 74 and 75 followed by a space maintainer. However, it was noticed that the space deficit was due to both the distal migration of 44 and mesial tipping of 46 (Figure 1).

surface and a mandibular arch alginate impression extending 5 mm beyond the distal abutment tooth was made. The band was stabilized and the cast was poured. Conventional lingual arch was fabricated using 0.9 mm (0.036") gauge orthodontic stainless steel wire on the dental stone model and soldered to the band (Figure 5). The functional component was fabricated after mounting upper and lower models to the articulator in occlusion. Acrylic teeth of corresponding missing teeth were selected (Acryrock® Deccan Dental Depot Pvt. Ltd.). The pink self-cure acrylic (DPI) was used to fabricate the saddle area of the pontic. The appliance was removed after setting of self-cure acrylic and polished. The fit of the appliance was done and oral hygiene instructions like use of mouth wash was stressed.

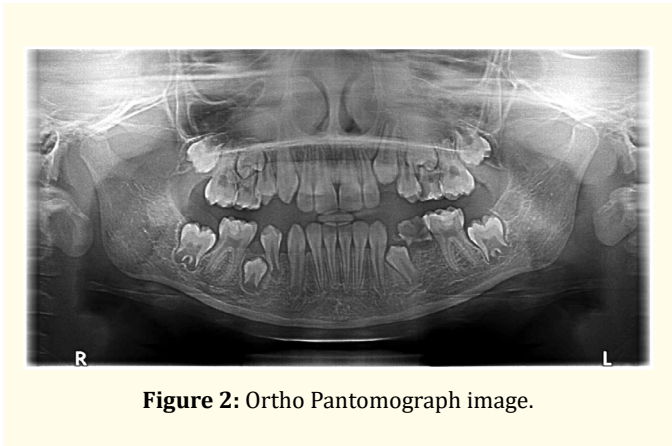


Figure 2: Ortho Pantomograph image.

Design and fabrication of the appliances:

Space regainer

A preformed band (35 + size, Optifit™ orthodontic bands, Desires) was selected for the 46, adapted and burnished against the tooth surface and a quadrant alginate impression extending 5 mm beyond the distal abutment tooth was made. The band was stabilized and the cast was poured.

A space regainer was fabricated using 0.9 mm (0.036") gauge orthodontic stainless steel wire on the dental stone model to consist of loop touching the distal surface of 44 with incorporated two helical coils buccally and lingually. The coil incorporated loop was soldered to the 46 band. The coil was fabricated in order to increase the range of action. The appliance was finished and polished. Try in was done to check for any occlusal hindrances and soft tissue impingement. The appliance was then removed, activated by opening the coil about 2mm, dried and cemented with type I Glass Ionomer Cement (GC gold label™, Tokyo, Japan) (Figure 3). The reactivation of appliance was done after 15 days. Uneventful gaining of space was found after 1 month (Figure 4).

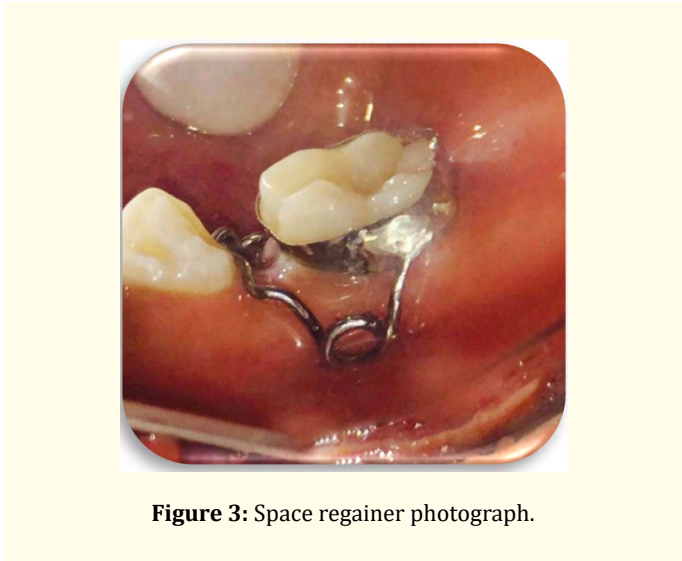


Figure 3: Space regainer photograph.

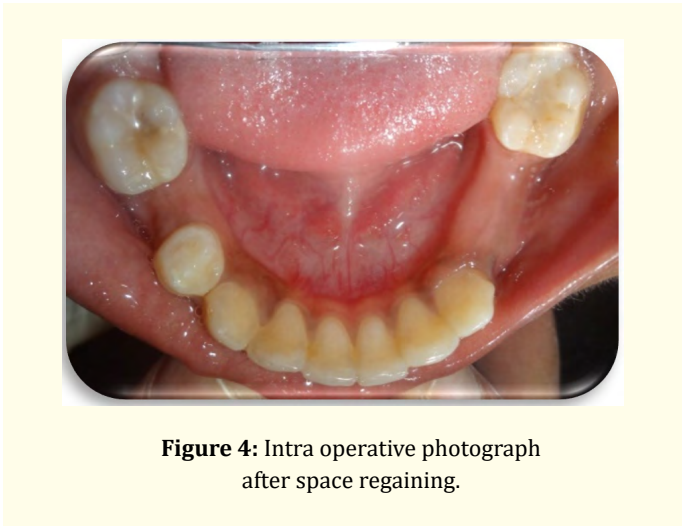


Figure 4: Intra operative photograph after space regaining.

Functional Space maintainer

A preformed band (35 + size, Optifit™, Desires) was selected for the teeth 36 and 46, adapted and burnished against the tooth



Figure 5: Functional space maintainer.

Discussion

Space management curtails the emerging malocclusion in the permanent dentition essentially by preservation and management of space constituted by premature loss of the primary molars and Leeway space by placing holding arches for the unimpeded eruption of the permanent teeth and for future prosthetic rehabilitation [2].

Ronnermann and Thilander examined unilateral space loss after extraction of the mandibular primary molars and compared it with the contralateral quadrant. The results of their study states that the space loss associated with mandibular deciduous first molar are 0.8 to 1.7 mm; mandibular deciduous second molar is 2.1 to 3.1 mm; maxillary deciduous first molar is 0.5 to 1.4mm and in maxillary deciduous second molar is 3.7 to 4.5 mm². In this case we calculated the space loss to be 3.8 mm.

As there is a clear indication for space regainer [1] in space discrepancy of >3 mm fixed space regainer followed by space maintainer was planned in the present case.

The distal movement of mandibular molars is recognized as one of the most difficult-to achieve treatment objectives in clinical orthodontics; it is much more difficult than the distalization of maxillary molars. Various conventional space regainers have been introduced over the years, like the Gerber space regainer, Herbst appliance, activated lingual arch [3], lip bumper [4], Jones jig, Franzulum appliance and multiloop edgewise archwire to correct mild crowding. The newer appliances like niti coil spring [5], Ni Ti loop [6], Lingual arch cross bow and double banded regainer can also be used [7]. In the present case, we could not use these conventional space regainers because not only did we require distalization of molar but also mesialization of the premolar and more over the space required to be regained was more than 3 mm.

Considering all these reasons, modification of the conventional regainer was done. Maintaining the space regained is a rule till the

tooth erupts in to the oral cavity, the patient is in late mixed dentition stage, to prevent the super-eruption of erupting upper teeth and further drifting of the teeth in to space regained a functional space maintainer was planned. Since the tooth loss is bilateral, lingual arch was planned with functional component. The patient was under regular follow up for the past 6 months. Good acceptability, without any distortion, cement loss and gingival inflammation was noticed. (Figure 5). Periodic recall with radiographic examination to create window by removing the acrylic for the erupting premolars is planned further.

Advantages of this appliance are

- Simple to fabricate, rigid and stable
- Fast space regaining
- longer range of action
- Good patient acceptability
- Functional space maintenance

Conclusion

This is one of the many cases showing the role of interceptive orthodontics in Pediatric dentistry. It displays a method of space regaining which can be utilized for early intervention in the mixed dentition period, where conventional space regainers cannot be used. It also shows how early diagnosis and intervention helps in eliminating the severity of a developing malocclusion and also future prosthetic rehabilitation.

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