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### Use of open NITI coil fixed space regainer: A case report

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#### Abstract

Development of normal occlusal relationship is prevented by premature loss of deciduous teeth due to caries or any other iatrogenic factors. The severity of developing malocclusion and complex orthodontic treatments are minimized or reduced by interceptive orthodontics which further may help in reducing the overall treatment time. The present case demonstrates use of King appliance in 11 year old patient to gain the space lost between first permanent premolar and first permanent molar to allow the eruption of permanent second premolar into the oral cavity.

**Keywords:** Interceptive orthodontics, king appliance, premature tooth loss

#### Introduction

The change from primary dentition to the permanent dentition is a complex phenomenon which includes the exfoliation of the primary teeth, the eruption of permanent teeth and the establishment of occlusion though independent yet harmonious sequence<sup>[1, 2]</sup>. There are many morphogenetic and environmental influences, which guide the occlusal development and a disorder or deviation in any of these elements may influence the occlusion. Among these elements, the primary teeth are of utmost importance since when there is physiologic exfoliation, there is also a favourable alveolar growth which often provide space for a better accommodation of the successor permanent teeth<sup>[1]</sup>.

The term interceptive orthodontics includes timely management of hostile features of a developing occlusion. Interceptive orthodontics is defined as a phase of science and art of orthodontics employed to recognize and eliminate the potential irregularities and malpositions in the developing dentofacial complex<sup>[2]</sup>.

Space management, space regaining in particular, evokes challenges during the mixed dentition period. If space maintenance is not carried out on the premature loss of deciduous molars, then an interceptive orthodontic procedure would have to be carried out with space regainers<sup>[3]</sup>. The goal of space regaining is to recover the lost arch width and perimeter.

The following case report discusses a case of space regaining using King appliance which is a fixed space regainer with open NITI coil spring. The concept of NITI coil springs was suggested in 1975<sup>[4]</sup>. A NITI orthodontic coil spring is made of alloy wire which exhibits shape memory thus allowing excellent super-elastic and spring-back properties. Also, coil spring can maintain a constant load value throughout a zone of deflection<sup>[5]</sup>. The open coil springs produce light, continuous forces through a long range of activation although the forces produced are slightly below the optimum 75-100 g range. NITI coil springs deliver a constant force over a range of 7mm tooth movement with one activation. They can be used throughout the arch and require few activations, possibly only one to produce the desired tooth movement<sup>[6]</sup>.

#### Case Report

An 11 year old male patient reported to the department with the chief complaint of pain in the lower right back tooth region. On examination, pulpally involved right first permanent molar was observed along with space loss in the mandibular arch. Moyer's mixed dentition analysis showed a space loss of 2.8mm on mandibular right side and loss of 1.3mm of space on the mandibular left side (Fig.1). Root canal for the tooth with chronic irreversible pulpitis and space regaining for the mandibular arch was planned. Using vernier calliper, space available for the eruption of second permanent premolar to erupt was found to be 4mm, whereas

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mesiodistal diameter of crown (ideal) of second permanent premolar is 7 mm.



**Fig 1:** Space loss wrt permanent right mandibular second premolar. Available space on cast was 4mm.

For space regaining using King Appliance, anchorage unit for the mandibular arch was a fixed lingual arch (21 gauge, 0.7mm) with bands fitted on the first permanent premolar (0.004 x 0.15)" of the treatment side and the first permanent molar (0.005 x 0.180)" on the opposite side. Then a bracket (edgewise, 0.022 x 0.028)" was spot-welded to the buccal surface of the premolar band, and the completed anchorage unit is cemented in place. A band with buccal tube (0.7 mm diameter, 10 mm length) is cemented on the molar, and a straight section of stainless steel wire (0.7 mm width) with an NITI open coil spring (Rabbit Force USA; 012" x 030") is introduced into the buccal tube with an additional length of 2mm of the space to ensure spring activation, is compressed on the stainless steel wire and ligated into the bracket (Fig.2, 3).



**Fig 2:** Insertion of the fixed space regainer in the oral cavity



**Fig 3:** Intraoral periapical radiograph showing unerupted right permanent mandibular second premolar after the insertion of appliance.

After 3 months and two activations, the space gained was 4 mm, hence the total space available between the permanent mandibular first molar and permanent mandibular first premolar was 8 mm (Fig.4).



**Fig 4:** Space regained after two months of treatment.



**Fig 5:** Appliance was replaced with lower lingual holding arch appliance till the eruption of the premolar.

The assembly was then removed and replaced with lower lingual holding arch appliance till the eruption of permanent premolar (Fig.5).

### Discussion

The early loss of primary molars, causes a reduction in the arch length by mesial movement of the permanent first molar, if space maintainers are not used.

The space regainers used can be fixed or removable. The removable type space regainers use springs or screws incorporated in a Hawley's appliance. Distalisation of one teeth is achieved, with a longer span of treatment time and also they have the disadvantage of requiring patient compliance. Hence, it was decided to go for a fixed space regainer [7].

Since it is a fixed appliance, patient compliance was good and oral hygiene could be maintained as the appliance was self-cleansing. However, the need for banding may affect gingival health and secondary caries might develop under the band [8]. NITI coils exhibit a long range of superelasticity with minimum load fluctuation despite large deflection due to excellent spring back and superelasticity [9]. Due to this property, it is possible to achieve large tooth movements without having to replace the springs [10].

King (1977) described an appliance for regaining of space in both maxillary and mandibular arch. The anchorage unit for the mandibular arch is basically a fixed lingual arch with bands fitted on the first deciduous molar of the treatment side and the first permanent molar on the opposite side. Then an edgewise bracket is spot-welded to the buccal surface of the

primary molar band, and the completed anchorage unit is cemented in place. A band with an angulated buccal tube is cemented on the malpositioned molar, and a straight section of wire with an open coil spring is introduced into the buccal tube and ligated into the bracket. The anchorage unit must be modified for the treatment in the maxillary arch. A millimeter a month is satisfactory progress in the repositioning of first molar. When a Class I or cusp to cusp molar relation is achieved, a conventional space maintaining appliance should be given<sup>(11)</sup>.

The lingual arch provides compound anchorage from all the other teeth which the lingual arch touches.

In the present case a space of 4 mm had been regained within the total treatment time of two months, and there was a need to change the springs twice within this treatment duration, which could be due to the fact that two teeth were to be moved.

The appliance can be removed or discarded soon after the succedaneous teeth erupted into proper position in the oral cavity.

### Conclusion

An early interception of the developing malocclusion by timely intervention can prevent its progression to a more complicated dentoskeletal problem that may require extensive treatment in later stage of maturity of the child. The current case has described the judicious and successful use of King's appliance with slight modifications to distalise two teeth.

### References

1. Kumari BP, Kumari NR. Loss of space and changes in the dental arch after premature loss of the lower primary molar: A longitudinal study. *J Indian Soc Pedod Prev Dent.* 2006; 24:90-6.
2. Moyers RE. *Ortodontia.* 4th ed. Cuanabara Koogan: Rio de Janeiro, 1991, 107-8.
3. Gawrishankar. *Textbook of Orthodontics.* 1st Edition, Jaypee Brothers, 470-500.
4. Civjan S, Huget EF, DeSimon LB. Potential applications of certain nickel-titanium alloys. *J Dent Res.* 1975; 54:89-96.
5. Miura F. inventor; Gac International, Inc., assignee. Orthodontic coil spring. United States patent US, 1991; 5:046-948.
6. Von Fraunhofer JA, Bonds PW, Johnson BE. Force generation by orthodontic coil springs. *The Angle Orthodontist.* 1993; 63(2):145-8.
7. Bhalajhi SI. Interceptive orthodontics. In: *Orthodontics the art and science.* 3rd ed. Arya Medi publishing house. 2006, 234.
8. Negi KS. NITI bonded space regainer/maintainer. *J Indian Soc Pedod Prev Dent.* 2010; 28:113-15.
9. Miura F, Mogi M, Ohura Y, Karibe M. The super-elastic Japanese NITI alloy wire for use in orthodontics. Part III studies on the Japanese NITI alloy coil springs. *Am J Orthod Dentofacial Orthop.* 1988; 94:89-96.
10. Chalakka P, Thomas AM, Akkara F, Pavaskar R. New design space regainers: 'Lingual arch crossbow' and 'Double banded space regainer'. *J Indian Soc Pedod Prev Dent.* 2012; 30(2):161-5.
11. Kisling E, Hoffding J. Premature loss of primary teeth: Part 111, Drifting patterns for different types of teeth after loss of adjoining teeth. *J Dent Child.* 1979; 46:34-8.