

Use of the Open Coil Space Regainer for Tooth Movement Prior to Prosthodontic Treatment

GODWIN CLOVIS DA COSTA¹, PAUL CHALAKKAL², MEENA AJAY ARAS³, VIDYA CHITRE⁴

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A 25-year-old female patient reported to the Department of Prosthodontics with a chief complaint of a gap between her right upper teeth which got exposed every time she smiled. On intraoral examination [Table/Fig-1,2], it was found that the right maxillary first premolar was previously extracted due to dental caries involvement three years ago. This had resulted in distal migration of the adjacent canine into the premolar space, thereby creating two millimetres (measured by a digital vernier calliper) of space between the canine and the lateral incisor. The patient did not want any prosthetic treatment with regard to other edentulous areas due to missing first molars (mandibular right and maxillary left), since they were not exposed whenever she smiled.

The treatment plan was to move the right maxillary canine forwards by two millimetres (to achieve contact with the lateral incisor) using a fixed open coil space regainer (OCSR), followed by placement of a fixed partial denture thereafter to replace the missing maxillary first premolar. The treatment plan was explained to the patient and consent was obtained.

The OCSR was constructed and inserted in the following way: The second premolar was banded, on to which, buccal and lingual tubes (0.25 inches long) were welded. The tubes were welded parallel to each other, such that, they pointed towards the junction between the crown and gingiva of the canine. An alginate impression of the upper arch was taken with the band (with tubes) seated on the second premolar. The band was then removed and seated in the impression and a dental plaster cast was poured. A 0.7mm stainless

steel wire, bent in a 'U' shape was inserted into the tubes, such that, the horizontal part of the 'U' pressed against the distal border of the canine, at the junction between the crown and gingiva. At the junction between the horizontal and vertical parts of the 'U' shaped wire, soldered stops were made in order to restrict the action of the open coil springs. Next, NiTi open coil springs (Rabbit Force USA; 012" x 030") were inserted onto the wire (on either side) such that each spring had a length that was twice that of the distance between the soldered stop and the anterior border of the tubes. The appliance was then inserted intraorally on to the second premolar by compressing the springs with the 'U' shaped wire [Table/Fig-3]. In doing so, the springs try to get back to their original configuration, thereby creating a reciprocal force, anteriorly towards the canine and posteriorly towards the first molar. The desired anterior tooth movement of the canine was achieved in one month [Table/Fig-4], after which, the appliance was removed [Table/Fig-5].

After removal of the appliance, tooth preparation for the second premolar and the canine were carried out [Table/Fig-6] and an upper impression was taken with addition silicone (Aquadil, Dentsply). An auto polymerising resin (DPI india) temporary was made and delivered to the patient [Table/Fig-7]. The final fixed partial denture (porcelain fused to metal) was appropriately shade matched and cemented seven days later [Table/Fig-8].

The active component in the OCSR is the NiTi coil spring. NiTi springs demonstrate a superelastic effect, with a constant load for a large range of deflection. Open-coil springs deliver a relatively more



[Table/Fig-1]: Right lateral view showing distally migrated maxillary canine **[Table/Fig-2]:** Occlusal view showing distally migrated maxillary canine **[Table/Fig-3]:** Open coil space regainer cemented on the maxillary right second premolar (pre-treatment) **[Table/Fig-4]:** After the space was regained by the space regainer (post-treatment) **[Table/Fig-5]:** After removal of the space regainer



[Table/Fig-6]: After tooth preparation of second premolar and the canine **[Table/Fig-7]:** Provisional restoration **[Table/Fig-8]:** Fixed partial denture

constant load value in superelastic region, thus, a more desirable continuous force can be obtained [1]. The mean rate of space closure is 0.81 mm per month for NiTi springs [2]. However, in this case, space closure by two millimetres for the maxillary canine by forward movement was achieved in one month.

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 [3]. Another disadvantage of using the OCSR is that it is not possible to control

the axial inclination of the tooth being moved and tipping may occur.

REFERENCES

- [1] 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 Dentofac Orthop.* 1988;94:89-96.
- [2] Dixon V, Read MJ, O'Brien KD, Worthington HV, Mandall NA. A randomized clinical trial to compare three methods of orthodontic space closure. *J Orthod.* 2002;29:31-36.
- [3] Negi KS. NiTi bonded space regainer/maintainer. *J Indian Soc Pedodont Prev Dent.* 2010;28:113-15.

PARTICULARS OF CONTRIBUTORS:

1. Postgraduate Student, Department of Prosthodontics, Crown and Bridge, Goa Dental College and Hospital, Bambolim, Goa, India.
2. Lecturer, Department of Pedodontics and Preventive Dentistry, Goa Dental College and Hospital, Bambolim, Goa, India.
3. Professor and Head, Department of Prosthodontics, Crown and Bridge, Goa Dental College and Hospital, Bambolim, Goa, India.
4. Assistant Professor, Department of Prosthodontics, Crown and Bridge, Goa Dental College and Hospital, Bambolim, Goa, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Paul Chalakkal,
Lecturer, Department of Pedodontics and Preventive Dentistry,
Goa Dental College and Hospital, Bambolim, Goa – 403202, India.
Email: atomheartpaul@yahoo.com

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