Orthodontists are perpetually challenged with gaining space. In lingual orthodontics, correction of crowding and rotations is even more challenging compared to labial orthodontics because of the decreased interbracket span. In the present article, the fabrication of a bi-helix spring is described which can be prepared easily, chairside and effectively creates space in crowded lingual orthodontic cases. The clinical application is demonstrated in two cases.

**Keywords:** Lingual orthodontics, Bi-Helix spring, Crowded dentition.


**INTRODUCTION**

Interest in lingual orthodontics has increased recently due to increase in the awareness of this treatment modality and adult patients’ desires for a less conspicuous appliance. Lingual orthodontics, however, presents a few biomechanical challenges to the orthodontist compared to labial appliances. According to Scuzzo and Takemoto, the interbracket distance in lingual orthodontics is shorter than the labial appliances. This shorter wire span translates to lesser efficient coupling of forces during rotational correction, increased wire stiffness makes it difficult to engage in lingual brackets in crowded cases. This makes space creation for alignment of crowded anterior teeth one of the major challenges of lingual treatment.

Amm Elie had introduced an inexpensive, custom-made auxiliary bi-helix opening spring made from 0.016” SS wire that can be easily clipped on the archwire after bonding and engagement of blocked out teeth during the leveling and alignment stage. Alignment and space opening occurs simultaneously, thus saving treatment time. Fabrication of the same spring from 0.016" premium plus Australian wire (AJ Wilcock, Whittlesea, Victoria, Australia) is demonstrated which has high resilience which is specially used for auxiliaries and springs in Begg mechanotherapy.

**Fabrication and Activation**

1. Cut a small piece of wire (about 6-7 cm) from the spool and straighten the segment using fingers or Delarosa plier. Make a small helix of approximately 1.5 mm diameter with a bird beak plier (Fig. 1).

2. After measuring the space needed between the first and second helices, mark the position of the second helix in the appropriate location on the wire and bend a second helix similar to first one (Fig. 2).

3. Mark the legs of the spring with the locations of the bends that will place the spring at the appropriate height, usually at the gingival margin.

4. Bend the leg into J hooks and cut off the excess wire ends (Figs 3A and B).

5. Hook one leg of the spring over the archwire, compress the spring slightly to place the second leg and then close the hooks with a Weingart plier (Fig. 4).

6. Further activations may be performed intraorally by bending the horizontal section between the helices with a three prong or Tweed loop forming plier.

**Fig. 1:** Bi-helix 1st loop
CASE REPORTS

Case 1
A 23-year-old female patient presented with Class I bimaxillary protrusion and lower anterior crowding of 2 mm. An extraction treatment plan involving all first bicuspids was chosen. Lingual brackets (Dentos smile lingual brackets, Dentos Co., Korea) were bonded in both upper and lower arches following the extractions. In the lower arch, 0.014” nickel-titanium archwire was placed. Four weeks later, a bi-helix opening spring was inserted to create space for correction of rotation of tooth 42. After 2 weeks space opening was evident. Alignment was completed with 0.016” nickel-titanium wire (Fig. 5).

Case 2
A 19-year-old female patient presented with Class II division 1 malocclusion with upper and lower anterior crowding of 6 and 3 mm respectively. A uniarch extraction involving the upper bicuspids was planned. Lingual brackets (Dentos smile lingual brackets, Dentos Co., Korea) were bonded in both upper and lower arches following the extractions in the upper arch. In the lower arch, 0.014” nickel-titanium archwire was placed. Four weeks later, a bi-helix opening spring was inserted for space in relation to tooth 41. After 2 weeks, space was created and alignment was completed in another 4 weeks with 0.016” nickel-titanium wire (Fig. 6).
DISCUSSION

Lingual orthodontic mechanics does have limitations especially in terms of rotational control due to reduced interbracket span and lingual bracket design. Correction of rotation and crowding can be problematic especially in the anterior segment. Open coil springs are used frequently in conventional labial orthodontics for space opening to correct blocked out or rotated teeth. Open coils, however, are difficult to insert and manipulate in lingual orthodontics. They can also cause unwanted side effects, such as rotations due to the single wing lingual bracket design. Interproximal reduction is another popular method for space gaining but the procedure is invasive leading to loss of the fluoride rich enamel layer.

This spring with the twin helix design delivers light forces and is comfortable for the patient. Because of the clip on design, they can be used in combination with round wires without hampering leveling and aligning process, thus saving time.

CONCLUSION

The bi-helix spring could be an important adjunct to lingual orthodontics which is economical, easily fabricated at chairside and effectively creates space with no significant side effects.

REFERENCES