

## Rapid Distalization for Space Regaining Using A Novel NiTi Loop

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### ABSTRACT

**Background:** A novel method of regaining space with a NiTi loop is presented. Tooth #16 was distalized within two months and an impacted tooth # 15 erupted into the oral cavity. The treatment presented here has the advantages of being economical, expeditious and efficient. Additionally, minimal tipping and anchorage loss were seen with the use of this novel NiTi loop.

**Keywords:** Distalization, space regaining, NiTi Loop..

### INTRODUCTION

Space regaining, an essential component of space management aims to prevent malocclusion. Multiple techniques and appliances have been utilized for space regaining such as open coil springs, lip bumpers, Gerber and Herbst space regainers.<sup>1,2</sup> However, most often these involve laborious fabrication or are time consuming when used.<sup>1</sup> The present case report outlines an easy to fabricate, economic and expeditious NiTi loop used for rapid space regaining in an 11 year old boy.<sup>3</sup>

### CASE REPORT

A 11 year old boy reported to the clinic for a routine dental check up. Extra oral examination revealed an aesthetically pleasing proportional face with mild convex profile. On intra oral examination, Angles Class I molar relationship on the left side and end on relationship on the right side, an overjet of 3 mm and an overbite of 3 mm. was observed. The second premolar on the right side ie tooth # 15 was found to be missing (Figure 1). Orthopantomographic examination revealed that tooth # 15 was impacted (Figure 2)

Since the patient had an acceptable profile and no other abnormality was found in his dentition, we decided to distalize tooth # 16 and allow eruption of tooth # 15. Distalisation was to be carried out by

using a novel pre activated NiTi loop, designed as follows:

#### Loop design

The pre-activated loop was fabricated from a 1.5 inch piece of NiTi wire (G&H Wire company, 150gms) in the shape of a 'U' with extended horizontal sections mesial and distal to the loop (Figure 3). Mesially, the horizontal section of the loop was engaged into the premolar bracket slot, while the distal part was inserted into a round bondable molar buccal tube on tooth #16 (Figure 4). This loop was placed between tooth # 14 and tooth #16, deriving anchorage from a Nance palatal button bonded to tooth #14 and tooth # 24 (Figure 5).<sup>4</sup>

#### Biomechanics of the loop

The effect of opening of the 'U' loop on the molar being distalized can be discussed from three different aspects: mesiodistal, occlusogingival and occlusal, as follows:

1.Mesiodistal aspect: There is mesial root movement and crown movement in the distal direction. In addition there is an intrusive force on the molar. (Figure 6A)

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Fig 1. Orthopantomogram showing impacted tooth # 15.

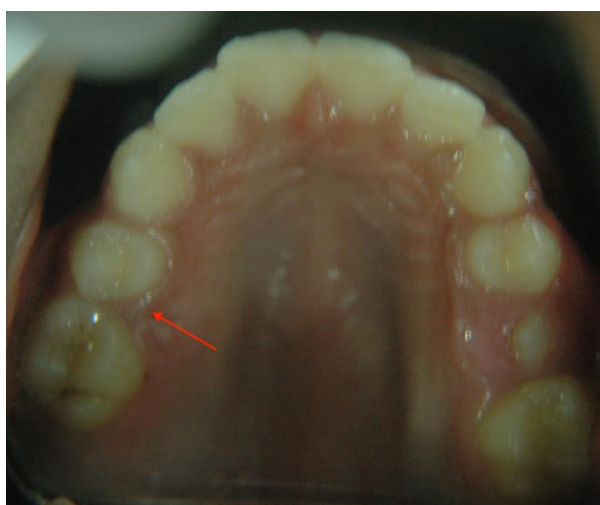


Fig 2. Occlusal view showing absent tooth #15.

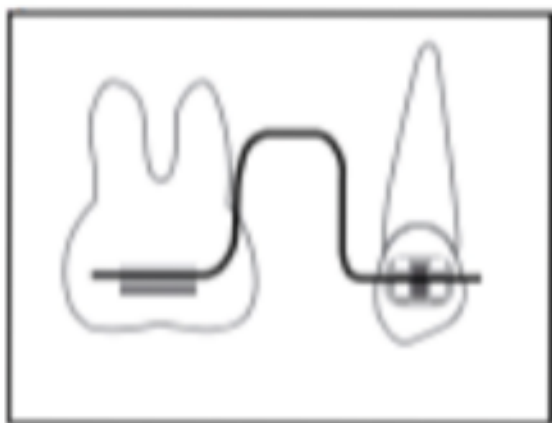


Fig 3. Diagrammatic representation of NiTi loop design.

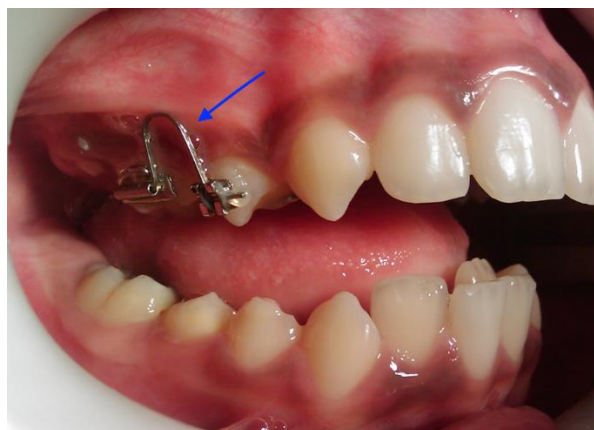


Fig 4. Right lateral view showing placement of the loop.

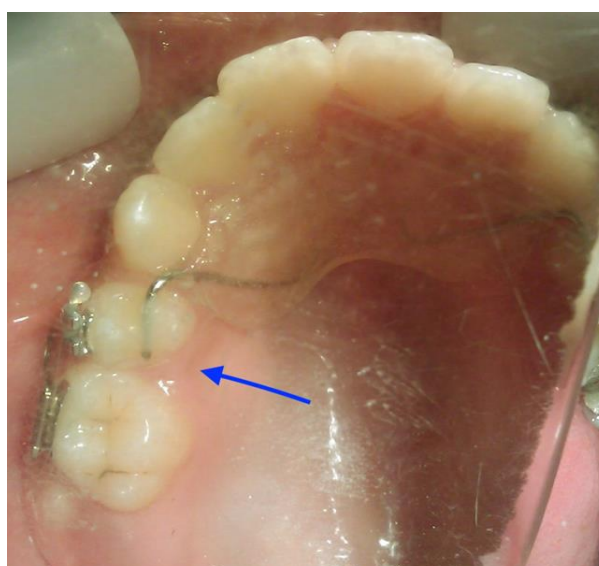


Fig 5. Occlusal view of NiTi loop and Nance palatal button bonded to tooth #14 and tooth #24.

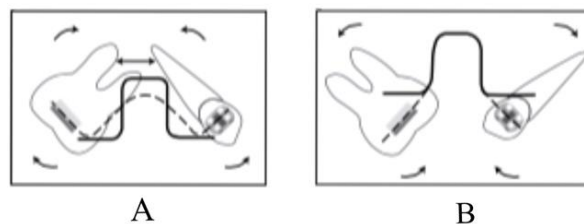


Fig 6. Diagram showing biomechanics of the NiTi loop.



Fig 7. 2-month post operative occlusal view showing space regained and erupting tooth #15.

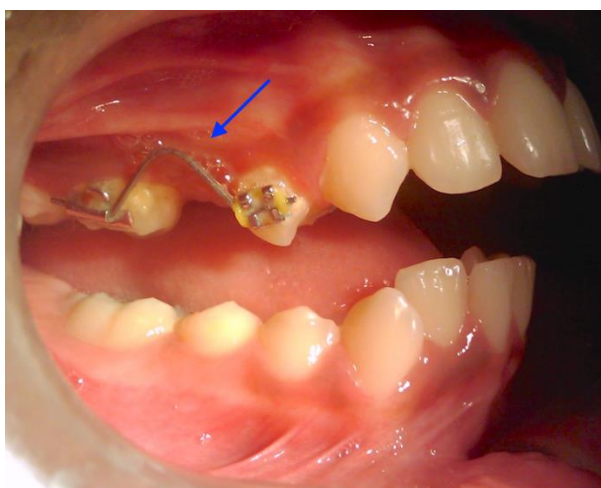


Fig 8. 2-month Right lateral view showing space regained between tooth # 14 and tooth # 16.



Fig 9. 3- month post operative occlusal view showing space regained and eruption of tooth #15 and SS stabilization wire.



Fig 10. 3-month post operative orthopantomogram showing space regained between tooth # 14 and tooth # 16 and erupting tooth # 15.



Fig 11. Right lateral view after alignment of teeth with mechanotherapy.

2.Occluso-gingival aspect: The distal horizontal extension of the loop in the molar tube tends to upright the molar i.e. a mesial crown and distal root moment, along with an extrusive component. (Figure 6B)

These two interactions produce bodily movement of the molar in the distal direction.

3.Occlusal aspect: The tendency of molar to rotate distopalatally is negated by the distal extension of the loop.

At the end of one month, the patient was recalled and 4 mm of space was regained by distalization of tooth # 16. After two months, a total of 6 mm was regained by the use of the NiTi loop and tooth # 15 had begun to erupt in the space thus created (Figures 7, 8)

The child did not complain of pain or discomfort during this period. After distalization was complete and tooth # 15 erupted completely, a stainless steel wire (17x25 inches) with mesial and distal stops was placed in order to maintain space (Figure 9). Orthopantomograph did not reveal tipping of tooth # 14 or tooth #16 (Figure 10). Subsequently, final

alignment of the teeth was achieved by fixed mechanotherapy (Figure 11).

## DISCUSSION

There are a myriad of appliances for noncompliance distalization of maxillary molars, however none are problem free. Some require elaborate and time-consuming procedures of fabrication, while others are cumbersome to the patient and expensive<sup>1</sup>. Noncompliance distalization methods also have undesirable side effects that diminish their clinical effectiveness, chief of these being anchorage loss: i.e. distal crown tipping/distopalatal rotation of molar crowns, mesial movement and proclination of the maxillary anteriors<sup>1</sup>. These side effects vary among the different techniques and appliances, but they are always associated with maxillary molar distalization.

The molar distalization appliance presented here has the following advantages:

1. Minimal chair side time required for appliance placement i.e. no complicated wire bending required.
2. Simple laboratory procedure for fabrication of a Nance button.
3. Inexpensive, as it requires only a small piece of rectangular 17 x 25 inches NiTi wire. The cut end of a preformed arch wire that is usually discarded can be optimally used for this purpose.
4. Delivery of sustained low force over a period of time without frequent activations due to the use of NiTi in a loop form.<sup>3</sup>
5. Excellent mesiodistal and bucco-palatal control of the molar to be distalised.

This loop can also be effectively used in the following cases.

1. Class III camouflage cases where proclination of maxillary incisors with good root control is required.
2. Unilateral extraction cases with midline shift to the opposite side.
3. Distalisation of canines with palatally bucked lateral incisors.

## CONCLUSION

The NiTi loop described in this report produces efficient molar distalization in a single activation within 8-10 weeks with minimal pain and discomfort. It provides excellent rotation control and tipping and anchorage loss are virtually non-existent. Although a thorough biomechanical evaluation is warranted to determine the exact force levels and moments produced by the NiTi loop, it merits attention as an efficient, economic and expeditious method of regaining space.

## CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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