

## CASE REPORT

# A Clinical Application Of Modified Z Spring Appliance -A Case Report

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## ABSTRACT

**Introduction:** Orthodontic treatment is sometime undertaken even during mixed dentition in specific clinical situations. One of them being esthetic concerns, that can have negative psychological impact on the child. Treatment in mixed dentition warrants consideration of growth, tooth exchange, proximity of deciduous and permanent successors, Occlusal dynamics, estimation of tooth size arch length discrepancy.

**Case report:** The article presents the role of a modified removable appliance to treat a unique crowding pattern in mixed dentition and discuss the appropriateness of this appliance against other conventional appliance.

**Conclusion:** The modified appliance with incorporation of various scientific facts helped achieve the treatment goal.

**Keywords:** Modified z spring, Modified double cantilever spring, Removable appliance, crowding in mixed dentition.

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## INTRODUCTION

Mixed dentition presents a challenge to treat due to growth dynamic, teeth exchange and proximity of roots to the subjacent teeth.

The appliance is selected or designed on the nature of malocclusion presented to the clinician so as to achieve the treatment goals with least duration, patient discomfort, ability to maintain oral hygiene and economy in mind.

Removable appliances are commonly used in mixed dentition treatment. Removable appliance can bring about tipping movement where as Multidirectional movement is difficult to obtain. This article demonstrates use of modified Z spring to achieve multidirectional tooth movement.

## CASE REPORT

A 10 year old female patient presented to us with protruding upper front tooth (figure 1). On examination it was found that she had straight profile with mild protrusion of upper lip. Intraorally upper right central incisor was labial ectopic with the other anteriors in normal labiolingual position and Angle's class I molar relation. There was 5 mm of space deficiency.

The appliance (figure-2,3) consist of a modified Z spring fabricated from 0.6mm stainless steel wire, Adams clasp of 0.7mm stainless steel on first molars. An accessory C clasp was incorporated to counter the dislodging effect of active Z spring. In spite of this measure the appliance had poor retention due to shallow undercut a common clinical challenge in mixed dentition. The retention problem was addressed by building a composite ridge with relation to C clasp on deciduous second molars (figure 3).

The desired movements were achieved by recurving the circumferential component by of Z spring so as to have an activation of 1 to 2mm



**Figure-1:** The initial malocclusion with appliance in frontal view; **Figure-2:** View of appliance; **Figure-3:** Intra oral occlusal view of seated appliance; **Figure-4:** Post operative frontal view.

causing distalization. After sufficient distal movement, the helix of z spring was opened by 1 mm for labial advancement of other incisors to yield sufficient space for alignment ectopic incisor.

The post operative (figure 4) view shows the effectiveness of appliance.

## DISCUSSION

Orthodontic treatment involves accurate diagnosis, treatment planning, appropriate appliance, patient education and motivation. Various factors were considered and appliance design was modified to reach the treatment goals. To achieve the alignment it was desired to drive of incisors incisors distally after diskling the upper deciduous canines there by utilizing leeway space. This could yield 2-4 mm of space,<sup>1</sup> and rest was achieved by marginal proclination of other incisors.

Diskling of primary canine may cause sensitivity, were as studies have shown there is decrease of pulpal innervations after the initiation of root resorption.<sup>2</sup> In the event of tooth sensitivity application of fluoride, ferric oxalate or other methods mitigates the problem.

The fixed appliance was not favoured in this case because, the attachment on prominent incisor cause severe discomfort to the lip at rest and movement, Secondly a continuous wire mechanics would cause undue proclination of other incisors.

Preadjusted appliances were contraindicated in this case, due to the tip expression of lateral incisors that cause lateral incisor root impingement on permanent canine crown. This can either result in resorption of lateral incisor root and/ or displacement, impaction of permanent canine.

Hence it was decided to treat by removable appliance that had a modified Z spring with circumferential labial extension.

Labial bow was avoided due concern of possible lip irritation. In this case good amount of lingual movement of the malaligned incisor was anticipated due to constant lingual directed muscular force of the lip. It was planned to use circular elastic anchored to z spring in case of non reduction of malposed tooth by natural muscular activity. This case however showed no need of active orthodontic force for the correction. Emphasizing the role of muscle equilibrium theory as anticipated.<sup>3</sup>

## CONCLUSION

Careful selection of appliance, modifications according the clinical need, with consideration of growth and biomechanical principles would yield predictable result as shown in above case.

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