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Orthodontic treatment outcome with PAR Assessment rating

Digit sucking literature review

Using MCQs in postgraduate orthodontic education

Non-surgical treatment of AOB with MEAW

Transmigrated canine: A case report

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# The Non-Surgical Treatment of a Patient with a Class III Malocclusion and Anterior Open Bite Complicated by Mandibular Lateral Displacement (MLD) with the use of the Multiloop Edgewise Archwire (MEAW): A Case Report

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***Abstract***

A case of an 18 year old who presented with a class III malocclusion, anterior open bite and mandibular lateral deviation who was successfully treated using the multiloop edgewise archwire (MEAW) mechanics with the extractions of all third molars. She was treated using 0.018X0.030 MBT brackets and the MEAW was constructed with 0.016X0.022 blue elgiloy wire. Total active treatment time was 19 months followed by six months of passive treatment without archwires

***Keywords:*** Multiloop edgewise archwire (MEAW), class III malocclusion, anterior open bite

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ORIGINAL ARTICLE

## Introduction

Mandibular lateral deviation (MLD) is quite a common occurrence in patients with malocclusion and may present with mild to very severe deviations. MLD is characterized by deviation of the mandible to one side, deviation of the chin from the facial midline, posterior crossbite, and may also involve facial asymmetry[1] and internal derangement of the temporo-mandibular joint[2]. The etiology of anterior open bite (AOB) has been attributed to a combination of genetic and environmental factors[3,4]. According to Kim, AOBs may manifest with divergent maxillary and mandibular occlusal planes and mesial angulation of posterior teeth, together with increased vertical dimensions[5].

MLDs and open bites are challenging malocclusions which can be difficult to treat orthodontically because of the adaptations in the soft tissues and skeletal frame. The multiloop edgewise archwire (MEAW) appliance, which was first described by professor Kim Young-Ho in 1967, initially for the treatment of anterior open bites, can now be used to treat all types of malocclusions including complex ones thanks to further development of the technique by Sadao Sato who evolved the theory of posterior discrepancy in the development of malocclusions.

The use of MEAW requires patient compliance with the use of elastics continuously. A systematic review by Tabancis et al. revealed that MEAW shows appreciable stability in the long term[6].

## Case report

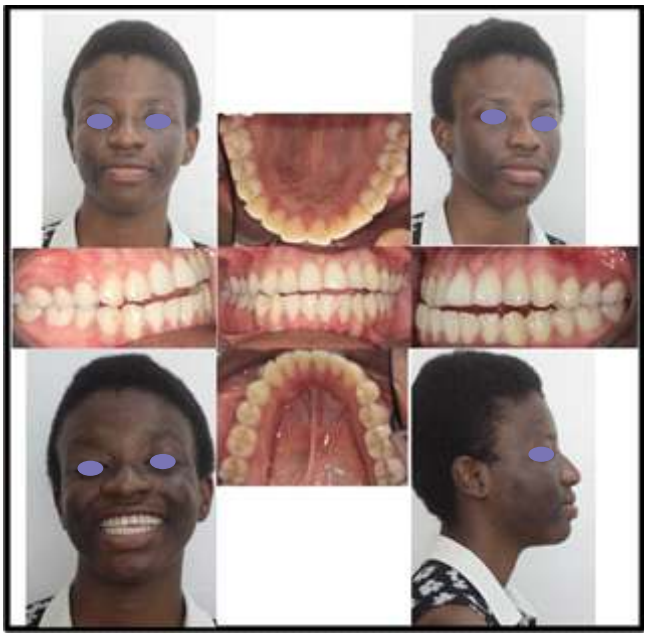
An 18-year-old female presented with complaints of inability to chew properly and to bring her teeth together. Examination showed the patient with a class III malocclusion on a mild skeletal class 3 base, 3mm anterior open bite, -5mm overjet and a 2mm mandibular lateral deviation to the right. The patient's facial proportions were increased and her profile was mildly prognathic.

Intraorally, on the right side, the molar relationship was class III (or super class I) with some occlusal contact between the upper and lower first molars. The premolars and canines were all in full class III.

On the left side the canines, premolars, and first molars were in full class III with no occlusal contact between the first molars on that side, as a result of the shift of the mandible to the right. The molars were also in an edge to edge relationship, signifying a crossbite tendency.

The maxillary canines in the maxilla were distally angulated. In the lower arch, there was a 2mm hypoplastic patch on the mesiobuccal surface of tooth no 44. There were plaque deposits on the teeth in the lower labial segment and a Panoramic x-ray showed mesial angulation of posterior teeth.

Cephalometric analysis was performed using the denture frame analysis. Ricketts' analysis was also used to augment the findings. The analyses confirmed a skeletal class III with increased vertical proportions



Treatment objectives were:

1) Alignment and leveling of the teeth and establishing a normal functional occlusion with normal overjet and overbite
2) Correction of the molar and canine relationships to class I
3) Correction of the mandibular lateral deviation
4) Correction of posterior crossbite tendency on the left side
5) Referral for composite veneering of tooth 44 after orthodontic treatment

The MEAW was the method chosen for achieving the above objectives due to the author's experience in the use of the treatment approach. Treatment plan involved the extraction of all 3rd molars and the use of 0.018X0.030 MBT equilibrium II brackets (Dentaurum Germany).

After explanation of treatment and signing of consent forms, brackets were placed on all the teeth. Bands with convertible tubes were placed on all first molars and tubes were placed on all the second molars.

## Treatment progress

The initial archwires placed in both arches were 0.016 heat activated nickel titanium to level and align the teeth. Over the course of the next two visits all the 3rd molars were extracted under local anaesthesia.

Six months later impressions were taken for the fabrication of the customized multiloop wires and 0.016 stainless steel wires were placed in both arches

The MEAW was bent with 0.016X0.022 blue elgiloy wire ( rocky mountain orthodontics). The wires were heat treated at 500°C for 10 minutes before insertion at her next visit.

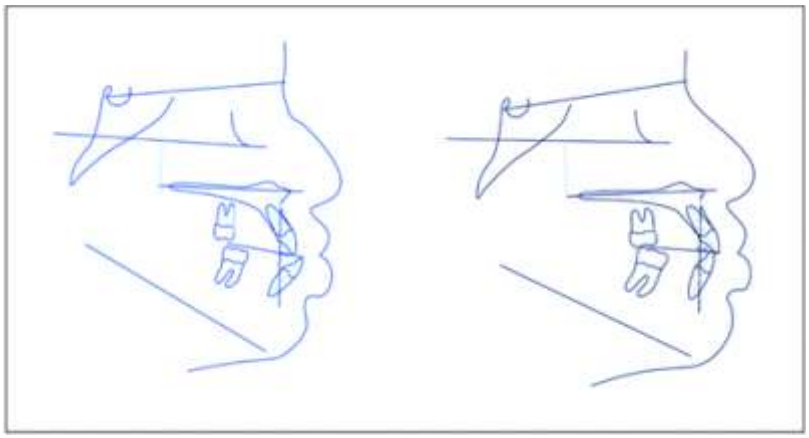
The MEAW wires were inserted after 8 months. 15° tip back bends were placed in the wires starting from the 3rd loop. The tip back bends were slightly increased on the left side to help with the repositioning of the mandible and correction of the centre line.

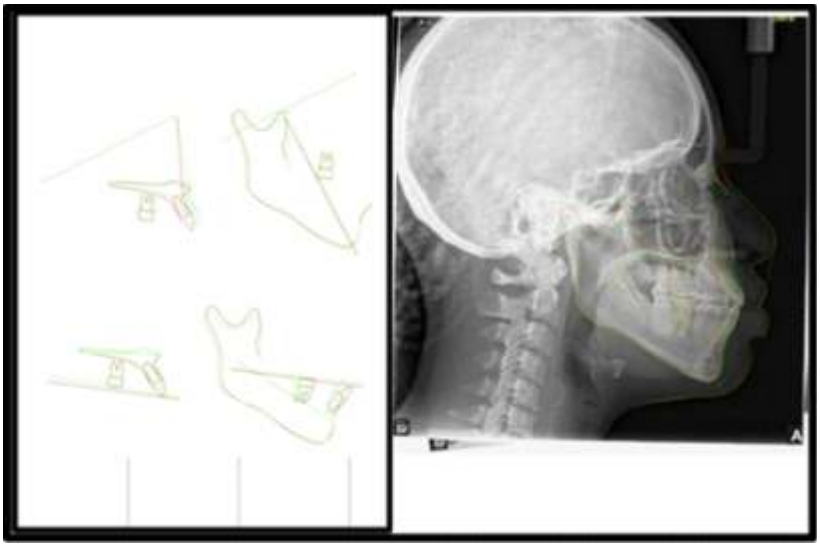
3/16 heavy short (6OZ) elastics were attached from the first loop in the lower arch to the second loop in the upper arch. The elastics were worn full time and changed everyday. After maximum intercuspation, positive overjet and overbite had been achieved, the wires were removed and all the teeth were undertied. The patient was observed for a further 6 months in this state to check for stability of overbite and mandibular deviation correction before the braces were finally taken off. The overall active treatment time was 19 months.

After debonding, Hawley retainers were prescribed for night-time wear.

**Table 1: Pre- and Post treatment cephalometric analysis**

| Measurement | Pretreatment | Post treatment |
|---|---|---|
| ODI° | 60 | 65 |
| APDI° | 92 | 87 |
| CF° | 150 | 149 |
| FMA° | 28 | 26 |
| Lower facial height° | 42 | 43 |





**Treatment results**

The assessment of the treatment outcome showed that all the major objectives were achieved. These changes were augmented by slight counterclockwise rotation of the mandible with a decrease in FMA by 2°. The APDI decreased by 5° and the ODI also increased by 5°. The lower facial height however increased minimally as evidenced by 1° changes in the combination factor (CF) and lower facial height. The panoramic x-ray and lateral cephalograms showed uprighting of the mesially tipped teeth.

## Discussion

Constructing a functional occlusion is a very important challenge underlying orthodontic treatment. Studies have shown that changes in the vertical dimensions of posterior teeth and occlusal plane to a large extent influence the growth of the mandible. Thus unusual changes in the vertical dimension and cant of the occlusal plane during growth equally can contribute to the development of malocclusions(7, 8) The underlying concept of the MEAW philosophy is based on the hypothesis that selective changes in the inclination of the occlusal plane can compensate various types of malocclusions by utilizing the adaptability of the temporomandibular joint(9). The MEAW is able to control the individual position of each tooth through the application of gentle and uniform forces. Challenging cases as seen in this case report can be treated effectively by MEAW as an alternative to invasive orthognathic surgery. Extensive skeletal deficiencies cannot be eliminated, however it (MEAW) causes change through dentoalveolar compensation(10). One advantage of the MEAW concept is the avoidance of premolar extractions due to its several mechanical properties. For a successful outcome however, this requires patient compliance with the wear of the elastics. Successful outcomes In this case was achieved mainly through uprighting of the mesially inclined teeth, reconstructing of the maxillary occlusal plane with the aid of MEAW followed by the adaptation of the mandible

## Conclusion

The successful treatment of this malocclusion shows that the MEAW is a very effective method of treating skeletal malocclusions without resorting to orthognathic surgery and extractions of premolars.

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