

# ISW for the treatment of adult anterior crossbite with non-extraction

## Abstract

An adult female (26y5m) came to our clinic with a chief complaint of irregular dentition and protrusive mandible. Clinical examination found a functional anterior crossbite with midline deviation and minor crowding over the lower arch. ISW (Improved Super-elastic Ti-Ni alloy Wire, developed by Tokyo Medical and Dental University) leveling was performed to relieve the crowding and to correct the anterior crossbite. ISW MEAW technique with the use of up and down elastics was performed to facilitate the overbite correction. Treatment was completed within 14 months and a desirable occlusion after the active treatment was achieved.

**Keywords:** protrusive lower lip, anterior crossbite, derotation, molar uprighting

Volume 10 Issue 6 - 2018

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**Received:** August 08, 2018 | **Published:** November 19, 2018

**Abbreviations:** ISW, improved superelastic TiNi alloy wire; IME, intermaxillary elastics; MEAW, multiloop edgewise archwire; DBS, deep brain stimulation

## Introduction

Diagnosis of adult pedoskeletal class III with facial asymmetry is usually a challenge to the orthodontist. Careful clinical evaluation of Class III malocclusion always requires checking anterior and posterior dental relationships with the mandible in centric relation.<sup>1</sup> Anterior crossbite and reversed over jet are constantly present due to the anterior mandibular displacement. Usually, the soft tissues tend to camouflage the skeletal discrepancy and the patient's profile appears normal or slightly concave in centric occlusion. Different aetiological factors have been suggested in pseudo-Class III malocclusion.<sup>2</sup> The patient had functional class III malocclusion and facial asymmetry, orthognathic surgery combined with orthodontic treatment may be the better choice. But the patient refused the surgery. Before the orthodontic treatment was performed, differentially diagnosing a facial asymmetry case by dental/functional/skeletal is very crucial.<sup>3-7</sup> Sometimes a case may combine two or more. For instance, this case showed both functional and skeletal problems. It was important to locate functional interference in a facial asymmetry case. Sometimes a functional wax bite was helpful. This case showed possibility of functional interference around the anterior teeth. With ISW (developed by the Tokyo Medical and Dental University) curve technique and class III intermaxillary elastics (IME), functional interference was relieved. ISW MEAW was used not only for space creation, it can further upright the second molar due to its distal tipping effect.<sup>8-12</sup> Finally, when using ISW MEAW on the upper arch and Class II intermaxillary elastics (IME) was also performed, the control of excess over jet resulting from the upper anterior leveling can be achieved. MEAW on the upper arch and Class II intermaxillary elastics (IME) can bilaterally tip and intrude from canines to second molars so as to gain extra space for anterior retraction and to facilitate canine relationship. Moreover, "MEAW" can efficiently prevent profile from deteriorating.

## History and diagnosis

The 26y5m female complained about irregular dentition and pro-

trusive mandible. Her lateral profile was straight, and the frontal view showed slightly facial asymmetry phenomenon (Figure 1). Clinical examination revealed bilateral right Class III molar relationship tendency, bilateral canine class I relationship, anterior crossbite, and minor crowding combined with protrusive lower lip and a mandibular shift to left side resulting in facial asymmetry (Figure 2). Panoramic film showed no existence of #18, #28, #38, #48 (Figure 3).



Figure 1 Facial photos before active treatment



Figure 2 Intraoral photos before active treatment

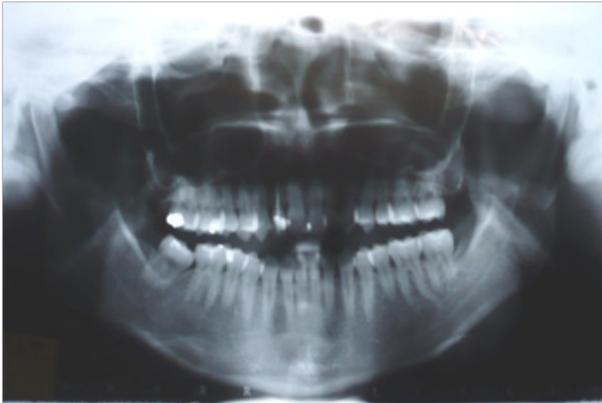


Figure 3 Panoramic film before active treatment

This patient refused to receive orthognathic surgery, so we decided to adopt non-surgical orthodontic treatment. ISW (Low Hysteresis Improved Super-elastic Ti-Ni alloy wire, developed by Tokyo Medical and Dental University) curve technique and class III intermaxillary elastics (IME) were performed to facilitate the correction of anterior crossbite.

The cephalometric analysis showed a skeletal class III jaw relationships (SNA: 82.7° SNB: 83.8° ANB: -1.1°) and dental compensation (U-1 to FH plane: 121.1° L-1 to mandibular plane: 85.8°) (Figure 4)(Figure 5).

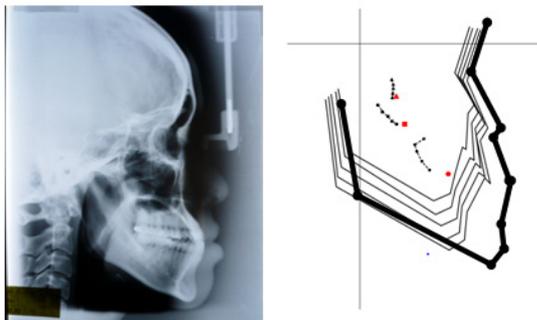


Figure 4 Lateral cephalometric film before active treatment

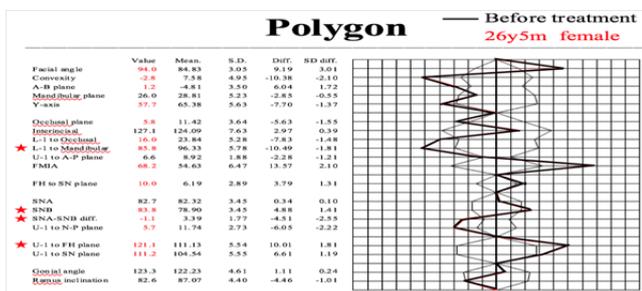


Figure 5 Polygon before active treatment

Therefore, the summary of diagnosis includes :

- a. Skeletal(±): Skeletal Class III
- b. Functional(+): #12,#11,#21,#23 crossbite

- c. Denture(+): U-1 to FH plane:121.1° → upper incisor flare-out,
- d. Dental(-): L-1 to Mandibular plane: 85.8° →lower incisor linguallly tipped Dentoalveolar compensation
- e. Discrepancy(+): upper: R't: -1.5mm/ L't: -2.5mm , lower: R't: -2.5mm/ L't: -1.5mm

### Treatment Objectives

Our treatment objectives were to correct uneven occlusal plane and remove functional interference, to improve facial profile, to establish appropriate overbite, over jet and arch coordination, to establish individualized occlusion . Due to the fact that the patient strongly refused the possibility of orthognathic surgery. Therefore, treatment plan includes:

- i. Full mouth DBS
- ii. ISW leveling
- iii. ISW MEAW with the use of intermaxillary elastics(IME)

### Treatment Progress

Treatment was started from 2008.02.22 with full mouth DBS, leveling with 0.016 x 0.022 ISW. ISW Curve was added over the upper arch for flare-out enhancement (Figure 6). After one month of active treatment, the anterior teeth have reached an edge-to-edge relationship. In the meantime, Class III intermaxillary elastics (IME) were used for anterior crossbite correction (Figure 7). On 2008.04.22, #31, #41 derotation was done by stripping, elastic chain traction, and ISW leveling (Figure 8). On 2008.05.22, ISW MEAW and Class III intermaxillary elastics (IME) were applied in the lower dentition for distal tipping of posterior teeth (Figure 9).



Figure 6 Period of active treatment : 0 month



Figure 7 Period of active treatment : 1 month

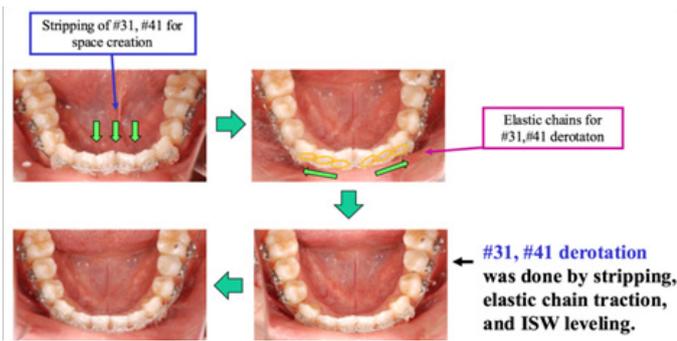


Figure 8 Period of active treatment : 2 months

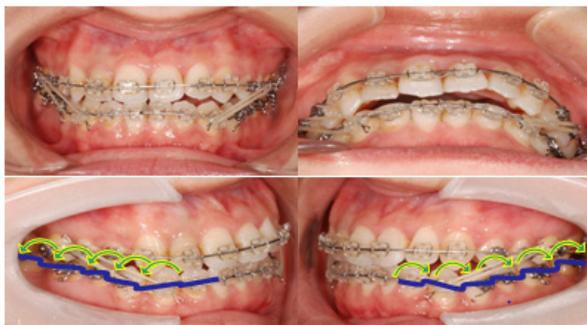


Figure 9 Period of active treatment :3 months



Figure 10 Period of active treatment : 4 months

After 4 months of active treatment, on 2008.06.22, ISW MEAW and Class II intermaxillary elastics (IME) were applied in the upper dentition for overbite increase and over jet reduction (Figure 10).

### Treatment Results

After 12 months of active treatment, for the final finishing and detailing stage, on 2009.02.22, Intermaxillary elastics(IME) was used for midline correction and unilateral ISW MEAW technique was used for space creation (Figure 11). On 2009.05.01, debonding of full mouth bracket was performed and circumferential retainer was delivered for the upper arch and Hawley retainer for the lower (Figure 12). For the total treatment time of 14 months, a stable occlusion was achieved and the asymmetrical appearance improved after the treatment (Figure 13–16). Polygon and superimposition after active treatment was shown and dental composition was achieved (U-1 to FH plane :  $121.1^\circ \rightarrow 121.8^\circ$  L-1 to mandibular plane:  $85.8^\circ \rightarrow 80.8^\circ$ ) by ISW curve technique and class III intermaxillary elastics (IME) traction, SNB was also improved due to the effect of ISW MEAW technique (SNB:

$83.8^\circ \rightarrow 82.4^\circ$ ) (Figure 17–18).

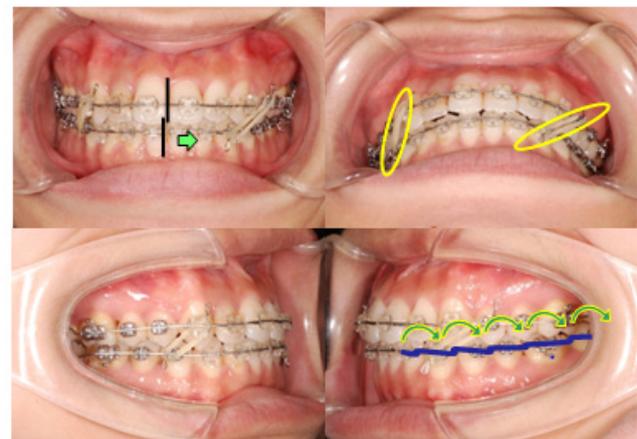


Figure 11 Period of active treatment :12 months



Figure 12 Period of active treatment : 14 months

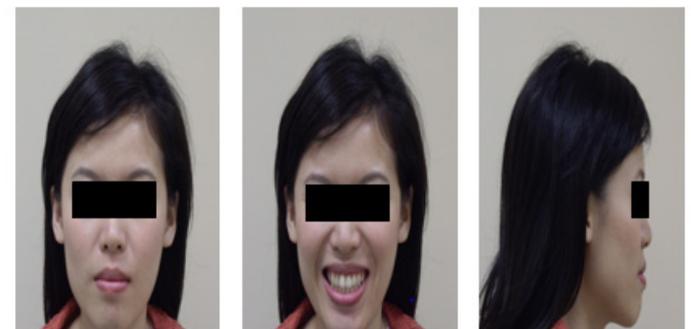


Figure 13 Facial photos after active treatment



Figure 14 Intraoral photos after active treatment

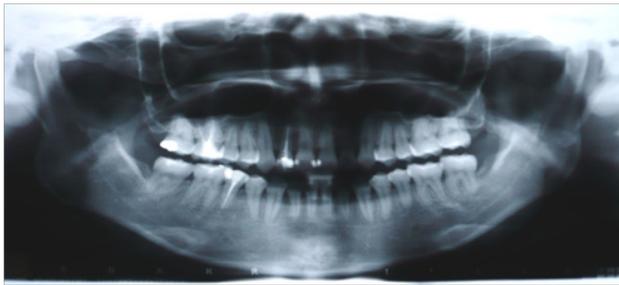


Figure 15 Panoramic film after active treatment

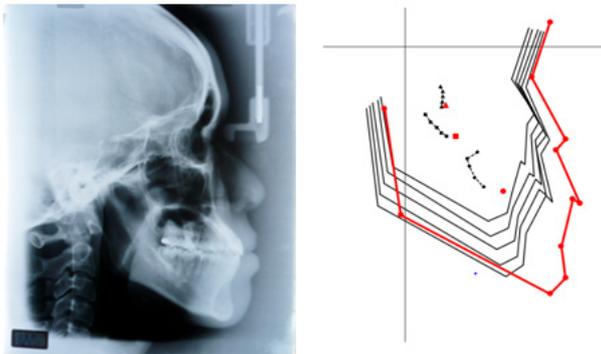


Figure 16 Lateral cephalometric film after active treatment

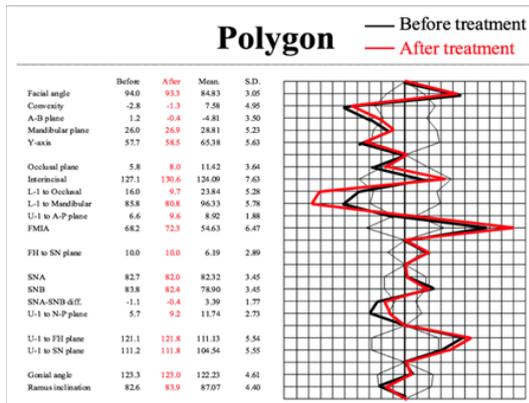


Figure 17 Polygon after active treatment

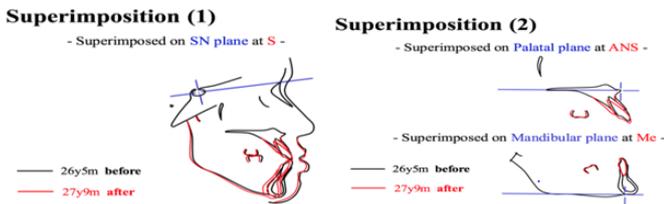


Figure 18 Superimposition after active treatment

**Discussion**

Differentially diagnosing an anterior crossbite case by dental/functional/skeletal is very important before the active treatment. In this case, the functional interference around the anterior portion was cor-

rected by ISW leveling. Moreover, ISW MEAW technique was used to correct the overbite and over jet, combined with intermaxillary elastics to achieve a better inter digitation. After 14 months of active treatment, a desirable outcome was achieved and the patient was much pleased with the treatment.

**Curve & Class III intermaxillary elastics (IME)**

ISW curve can lead to anterior flare-out, with a view to creating space for crowding relief. Also, Class III intermaxillary elastics provided a lower backward pulling force for anterior crossbite correction (Figure 19).

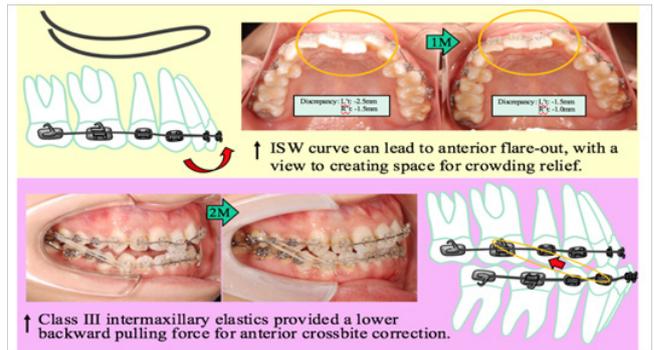


Figure 19 Curve & Class III intermaxillary elastics (IME)

**Derotation**

We can still observe the effect of derotation with full engagement of ISW into #31 and #41 brackets aided in the correction of rotation. Moreover, elastic chains provided distal pulling forces on #31 and #41 for derotation (Figure 20).

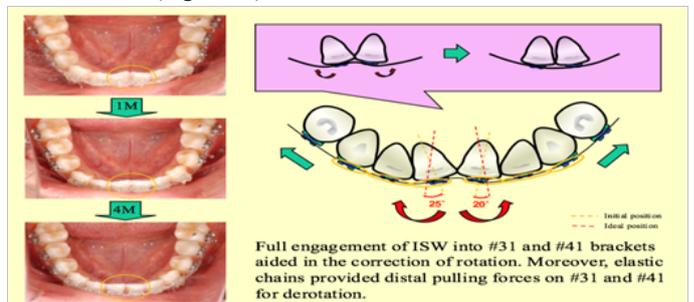


Figure 20 Derotation

**Uprighting**

Furthermore, by using ISW MEAW, originally set over the lower arch for space creation, it can further upright the second molar due to its distal tipping effect (Figure 21).

**MEAW on the upper arch**

Finally, when using ISW MEAW on the upper arch and Class II intermaxillary elastics (IME) was also performed, the control of excess over jet resulting from the upper anterior leveling can be achieved. MEAW on the upper arch and Class II intermaxillary elastics (IME) can bilaterally tip and intrude from canines to second molars so as to gain extra space for anterior retraction and to facilitate canine relationship. Moreover, "MEAW" can efficiently prevent profile from deteriorating (Figure 22).

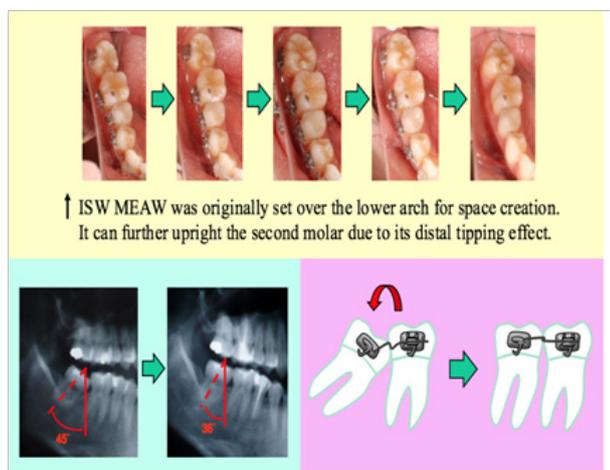


Figure 21 #47 Uprighting

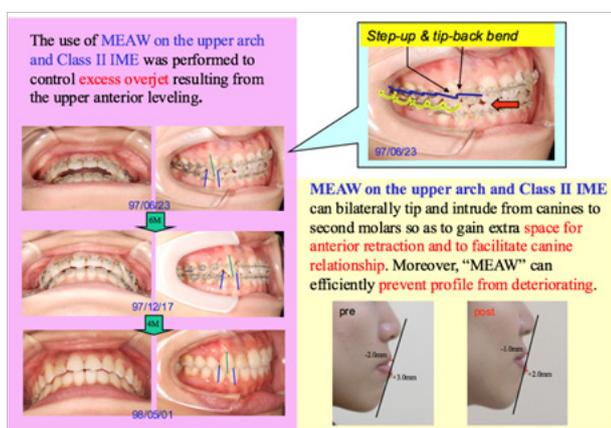


Figure 22 MEAW on the upper arch

## Conclusion

This case showed functional anterior crossbite with skeletal Class III tendency, midline deviation and minor crowding over the lower arch. Dento-alveolar compensation phenomenon of upper incisor flare-out and lower incisor lingually tipped was noticed. ISW (Improved Super-elastic Ti-Ni alloy Wire, developed by Tokyo Medical and Dental University) leveling, curve technique and class III intermaxillary elastics (IME) was performed to relieve the crowding and to correct the anterior crossbite. ISW MEAW technique with the use of up and down elastics was performed to facilitate the overbite correction. After 14 months of active treatment, a normal occlusion and a desirable cusp interdigitation were achieved. Therefore, functional

anterior crossbite with skeletal Class III tendency can be treated with ISW treatment.

## Acknowledgements

None.

## Conflict of interest

The author declares that there is no conflict of interest.

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