

ISW for the Treatment of Bilateral Posterior Buccal Crossbite

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Abstract

The objective of the treatment is for the adult patient with bilateral posterior buccal crossbite by ISW (Improved Super-elastic Ti-Ni alloy wire, developed by Tokyo Medical and Dental University). An adult patient (20 years old) came to our clinic with a chief complaint of bilateral posterior buccal crossbite and not being able to chew food well. Clinical examination revealed bilateral posterior buccal crossbite. We extract #18 and #48 to facilitate the correction of posterior buccal crossbite. With successful molar up righting by bracket upside-down (b-u-d), adding torque on the archwire, the posterior buccal crossbite was corrected efficiently. The total treatment was completed within 7 months and the patient was satisfied with the outcome.

Keywords: ISW, skeletal Class II, buccoversion, bracket upside-down(b-u-d), crown buccal torque, intermaxillary elastics, ISW MEAW technique

Introduction

Treatment of posterior crossbite is considered one of the most common problems in orthodontics. [1-7] when an arch-length discrepancy exists in the posterior segments, the mandibular second molars erupt lingually producing a posterior crossbite, or a scissors-bite. In patients with bilateral posterior crossbites, the buccal cusps of the maxillary teeth occlude to the lingual of the buccal cusps of the corresponding mandibular teeth on both sides. Both dental and skeletal factors contribute to development of posterior crossbite [8-10]. In this case, bilateral dental posterior buccal crossbite will be discussed and the treatment was completed efficiently without conventional fixed orthodontic appliances or bite plate due to the fact that those appliances sometimes incur inconvenience and patients' discomfort.

History and Diagnosis

The 20 y/o male complained about posterior buccal crossbite and not being able to chew food well. His lateral profile was convex, and the frontal view showed slightly facial asymmetry phenomenon (Figure 1). Clinical examination revealed

bilateral Class II tendency of molar relationship, bilateral canine class I relationship, bilateral upper second molar buccoversion and lingually tipped mandibular molar region (Figure 2). Panoramic film showed #18, #48 existence (Figure 3).

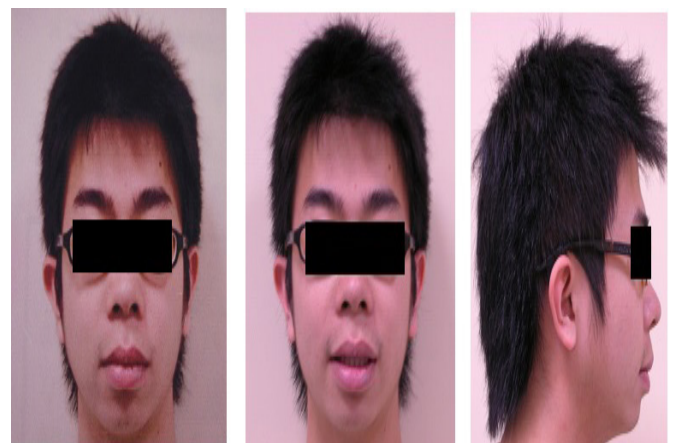


Figure 1: Facial photos before active treatment



Figure 2: Intraoral photos before active treatment

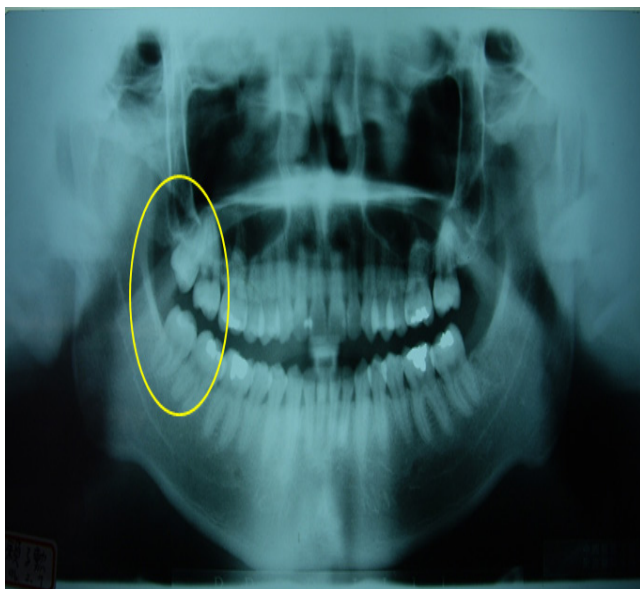


Figure 3: Panoramic film before active treatment

The radiographic methods of the research include intra-oral photos, lateral cephalometric projection and panoramic x-ray films. Also the cephalometric analyses before and after the treatment were presented in this case. The cephalometric analysis showed a skeletal class II tendency jaw relationships (SNA:89.0°`SNB:84.0°`ANB:5.0°) and dental compensation (U1 to SN plane:111.2°`interincisal angle:119.0°). The low angle skeletal pattern can be seen prominently in the polygon (Gonial angle:113.3°) (Figure 4, Figure 5).

Therefore, the summary of diagnosis includes:

1. Functional (-)
2. Skeletal(±):SNA:89.0° SNB:84.0° ANB:5.0°
3. Denture(+):U1 to SN plane:111.2°
4. Dental (-)
5. Discrepancy(+):Upper: R't: 0.0 mm/ L't: -0.5 mm Lower: R't: -0.5 mm/ L't: -0.5 mm

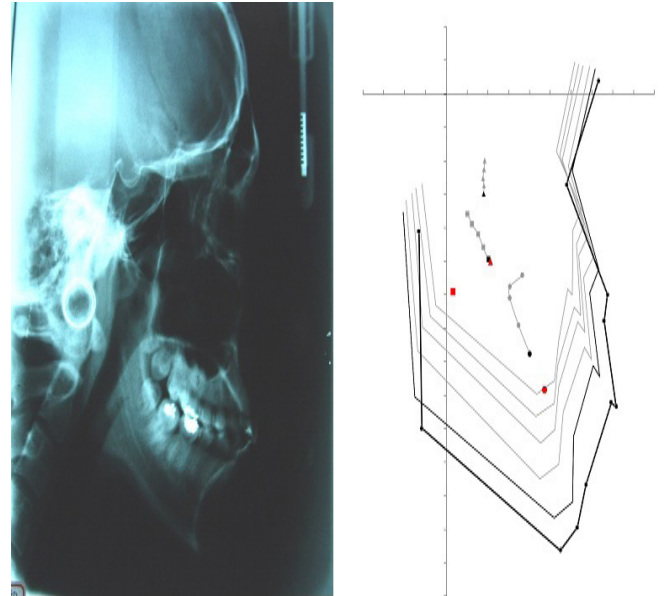


Figure 4: Lateral cephalometric film before active treatment

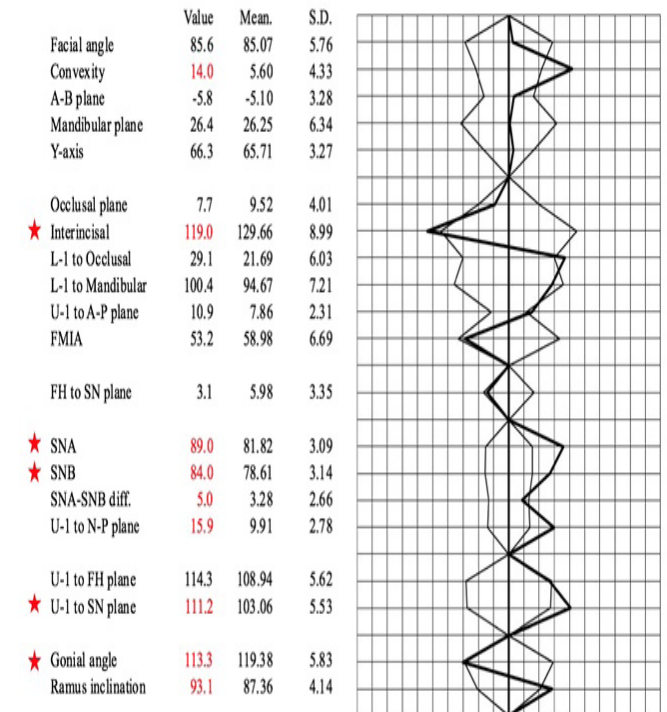


Figure 5: Polygon before active treatment

Treatment Objectives

Our treatment objectives were (1) to remove functional interference over bilateral maxillary second molar regions, (2) to improve facial profile, (3) to establish appropriate overbite, overjet and arch coordination, (4) to establish individualized occlusion

Due to the fact that the patient strongly refused the possibility of orthognathic surgery. Therefore, treatment plan includes:

1. #18, #48 extraction
2. Full mouth DBS

Treatment Progress

Treatment was started from 2007.04.06 with full mouth DBS and leveling with 0.016 x 0.022 ISW (Figure.6).



Figure 6: Period of active treatment: 0 month

On 2007.05.04. after one month of active treatment, for bite opening, #37, #47 were re-banded upside down and #17, #27 crown lingual torque and transpalatal IME (5/16M) was added. (Figure.7)



Figure 7: Period of active treatment:1 month

On 2007.06.11, for better torque control of #17, #27 region, reinforced crown lingual torque and Trans palatal IME were performed and #37, #47 crown buccal torque was added (Figure.8).

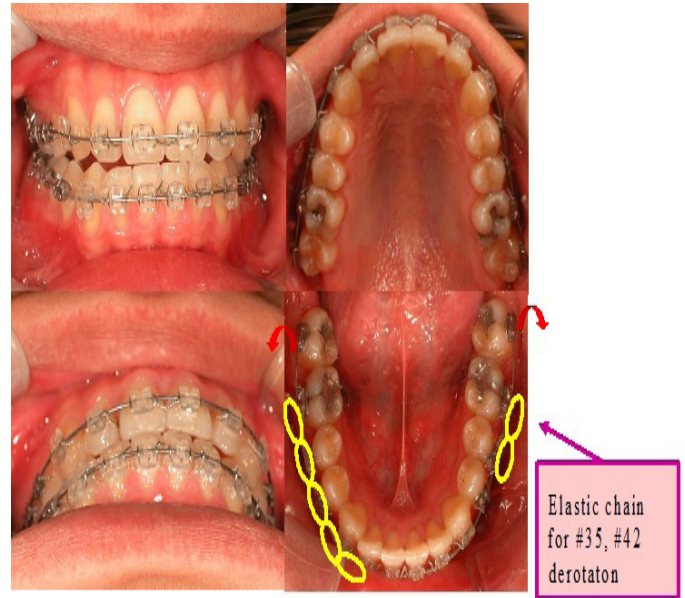


Figure 8: Period of active treatment:2 months

On 2007.07.13, after 3 months of active treatment, intermaxillary elastics (3/16M) were added to facilitate bite control, and at the same time, for midline adjustment (Figure.9).

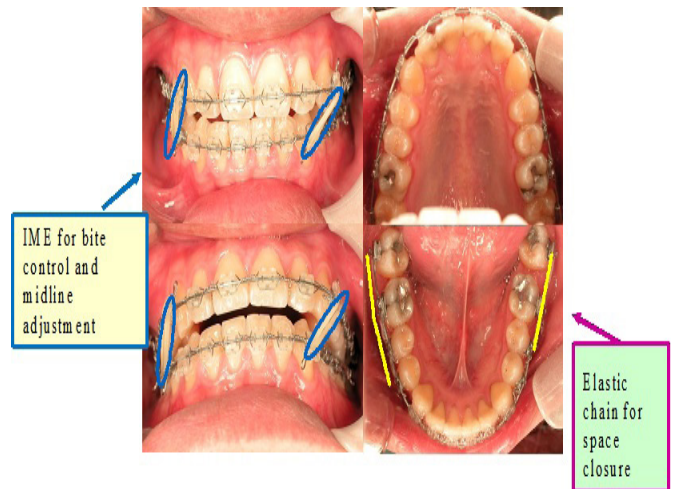


Figure 9:Period of active treatment:3 months

Treatment Result

After 5 months of active treatment, on 2007.09.07, IME and elastic chain were used for space closure and better cusp interdigitation (Figure.10).



Figure 10: Period of active treatment:5 months
On 2007.11.26, debonding of full mouth bracket was performed and circumferential retainer was delivered for the upper arch and Hawley retainer for the lower (Figure.11).



Figure 11: Period of active treatment: 7 months
For the total treatment time of 7 months, a stable occlusion was achieved and esthetic appearance was improved after the treatment (Figure. 12&13).

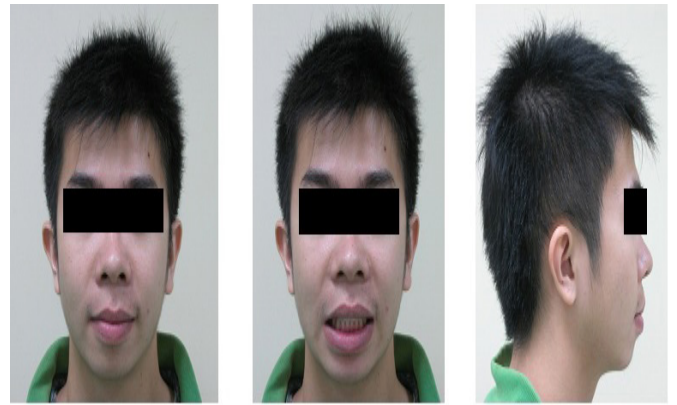


Figure 12: Facial photos after active treatment



Figure 13: Intraoral photos after active treatment



Figure 14: Panoramic film after active treatment

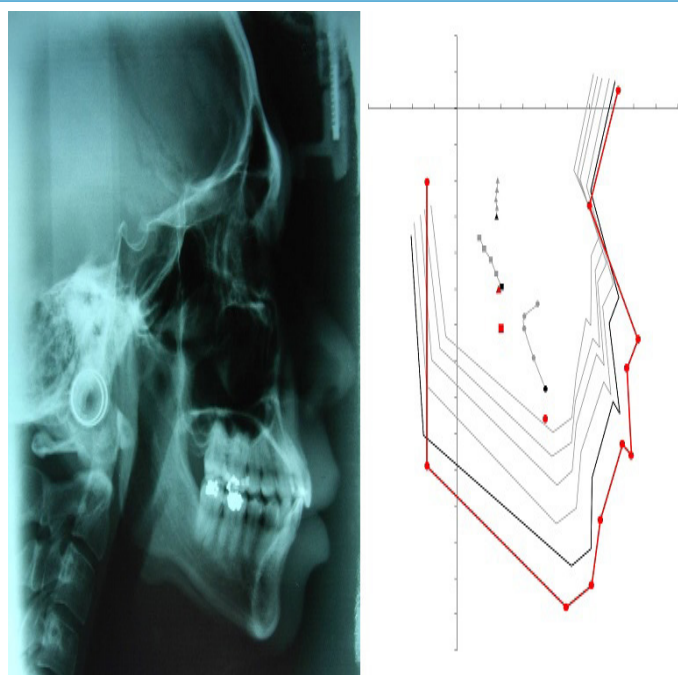


Figure 15: Lateral Cephalometric film after active treatment

	Before	After	Mean.	S.D.
Facial angle	85.6	85.0	85.07	5.76
Convexity	14.0	17.9	5.60	4.33
A-B plane	-5.8	-10.9	-5.10	3.28
Mandibular plane	26.4	28.1	26.25	6.34
Y-axis	66.3	68.0	65.71	3.27
Occlusal plane	7.7	12.9	9.52	4.01
Interincisal	119.0	125.8	129.66	8.99
L-1 to Occlusal	29.1	21.4	21.69	6.03
L-1 to Mandibular	100.4	96.3	94.67	7.21
U-1 to A-P plane	10.9	8.1	7.86	2.31
FMA	53.2	55.6	58.98	6.69
FH to SN plane	3.1	3.9	5.98	3.35
SNA	89.0	89.6	81.82	3.09
SNB	84.0	82.2	78.61	3.14
SNA-SNB diff.	5.0	7.4	3.28	2.66
U-1 to N-P plane	15.9	14.8	9.91	2.78
U-1 to FH plane	114.3	109.8	108.94	5.62
U-1 to SN plane	111.2	105.9	103.06	5.53
Gonial angle	113.3	114.2	119.38	5.83
Ramus inclination	93.1	93.9	87.36	4.14

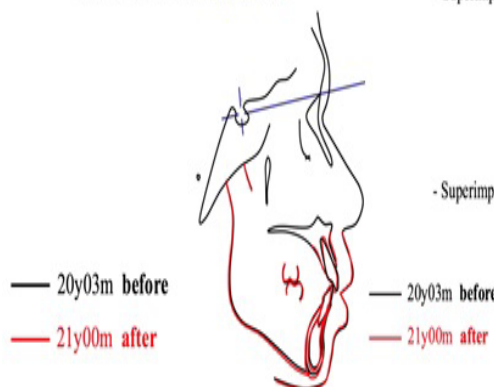


Figure 16: Polygon after active treatment

After 7 months period of orthodontic active treatment, lateral cephalometric projection and panoramic x-ray films was taken, polygon and superimposition after active treatment was analyzed and denture pattern improved prominently (U1 to SN plane:111.2°->105.9° interincisal angle:119.0°->125.8°) (Figures. 14-17).

Superimposition (1)

- Superimposed on SN plane at S -



Superimposition (2)

- Superimposed on Palatal plane at ANS -

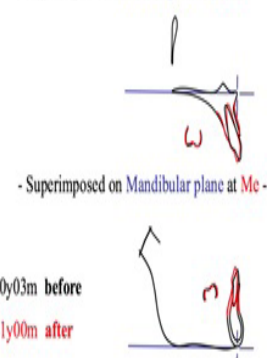


Figure 17: Superimposition after active treatment

Discussion

Treatment of posterior buccal crossbite case is a challenging scope of orthodontics. [11-13] sometimes, we have to use a bite plate for bite opening and cross elastics to correct the posterior buccal crossbite. However, with ISW treatment and reverse torque by bracket upside-down, correction of posterior buccal crossbite becomes much easier and we can avoid imposing too much inconvenience and discomfort on the patients. After 7 months of active treatment, a desirable outcome was achieved. Therefore, posterior buccal crossbite can be treated with ISW combined with a favorable torque control.

Buccoverversion correction

There are many methods to help correct buccoversions, such as bite plate, cross-elastics, transpalatal-arch with extension hooks, TADs, etc. However, those appliances sometimes incur inconvenience and patients' discomfort. In this case, we used the super-elasticity of ISW and intermaxillary elastics to level the buccoversions (Figure.18)

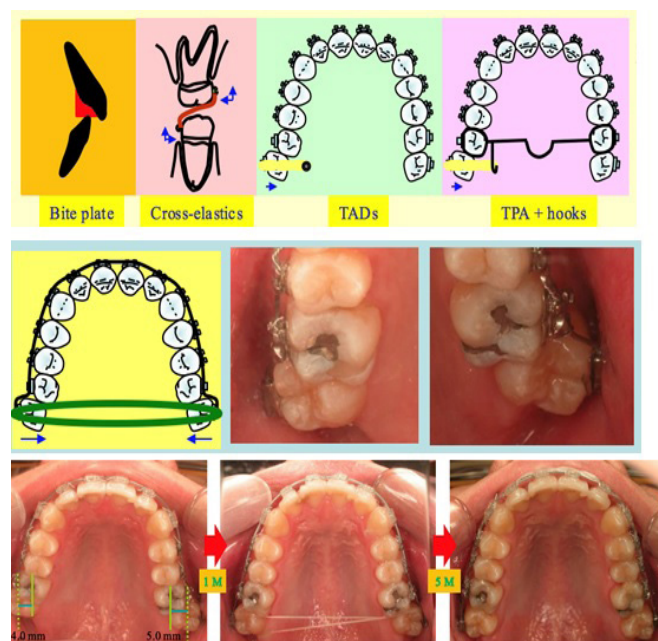


Figure 18: Buccoverversion correction

Linguoversion correction

There are many methods to help correct linguoversions, such as bite plate, cross-elastics, TADs, etc. However, those appliances sometimes incur inconvenience and patients' discomfort. In this case, we used some methods to change lower 2nd molars torque so as to correct linguoversion (Figure.19).

- (1) Bracket upside down (B-U-D)
- (2) Add crown buccal torque over ISW by heat bender
- (3) Use upper molar tubes instead, eg. #17 for #37

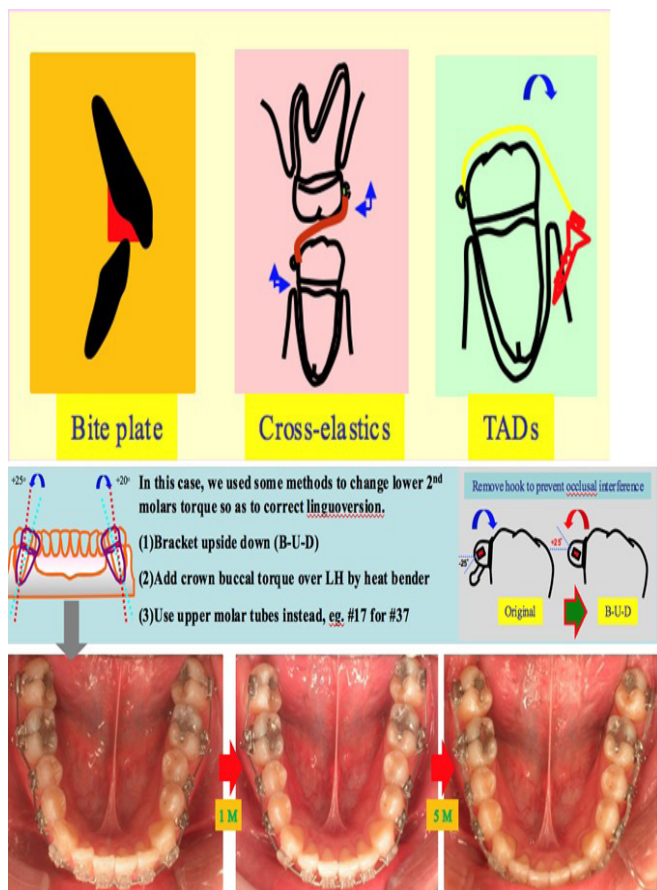


Figure 19: Linguoversion correction

Overbite control

Bite opening often takes place during scissors bite correction. In this case, we used intermaxillary elastics and elastic chain to control the overbite. In addition, the patient's occlusion gradually settling down also benefit the overbite control. If not the case, we can also use ISW MEAW and intermaxillary elastics to control the bite opening problem (Figure.20).



Figure 20: Overbite control

Transitional bite opening

During the orthodontic treatment, we may sometimes find transitional bite opening. In some situations, bite opening is inevitable (eg, during posterior buccal crossbite correction). However, in others, bite opening is intentional procedure (eg, during anterior crossbite correction). When transitional bite opening occurs, what we have to do first is keep close observation on the reasons, and then, eliminate possible occlusal interferences. We can use ISW MEAW and intermaxillary elastics to facilitate overbite increase (Figure.21).

Transitional bite opening(TBO)	Management to relieve TBO
<p>Transverse problems correction (inevitable)</p>	<ol style="list-style-type: none"> 1. Torque control (posterior teeth) 2. Palatal cusp reduction (→ remove occlusal interference) 3. IME 4. LH MEAW
<p>Anteroposterior problems correction (intentional)</p>	<ol style="list-style-type: none"> 1. Torque control (anterior teeth) 2. Up & down IME 3. Class III LH MEAW

Figure 21: Transitional bite opening

Retention

We can use either removable retainers or fixed retainers to maintain the treatment result. In this case, the reason why we chose removable retainers rather than fixed was because fixed retainers could be apt to damage, loosening, difficulty in keeping oral hygiene, etc. In terms of removable retainers, a wraparound design enveloping the corrected 2nd molars is essential to prevent them from rolling out (relapse) (Figure.22).

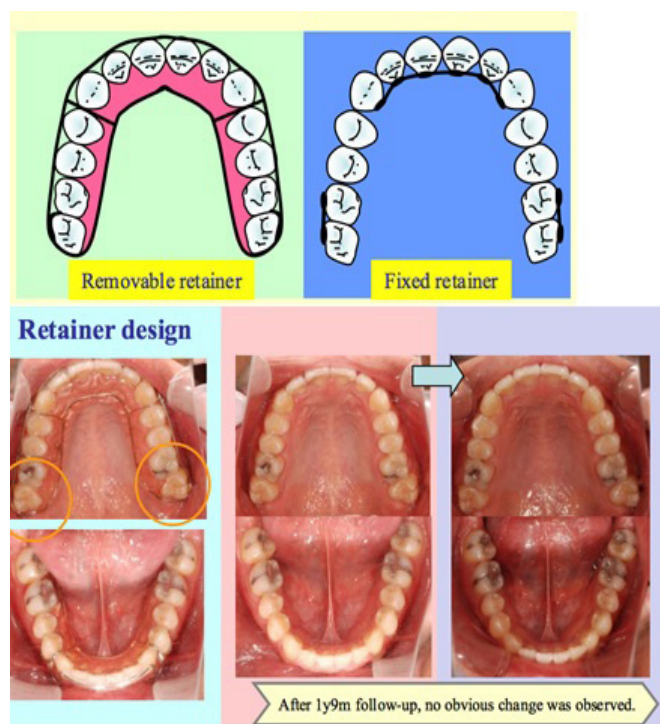


Figure 22: Retention

Conclusion

Treatment for the adult patient with bilateral posterior buccal crossbite by ISW (Improved Super-elastic Ti-Ni alloy wire, developed by Tokyo Medical and Dental University) was discussed in the article. With successful molar up righting by bracket upside-down (b-u-d), adding torque on the archwire, the posterior buccal crossbite was corrected efficiently.

After 7 months of active treatment, a normal occlusion and a desirable cusp interdigitation were achieved. Therefore, adult bilateral posterior buccal crossbite can be treated with ISW treatment.

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