Camouflage Orthodontic Treatment for Adult Patient with Skeletal Class III Malocclusion and Bilateral Posterior Cross-Bite

Rouh-Huai Wang
Department of Orthodontics, Chang Gung Memorial Hospital, Linkou Branch, Taiwan; Graduate Institute of Dental and Craniofacial Science, Chang Gung University, Taoyuan, Taiwan

Hsin-Lan Shen
Department of Orthodontics, Chang Gung Memorial Hospital, Linkou Branch, Taiwan; Graduate Institute of Dental and Craniofacial Science, Chang Gung University, Taoyuan, Taiwan, azure368@yahoo.com.tw

Follow this and additional works at: https://j.tjo.org.tw/tjo

Part of the Orthodontics and Orthodontology Commons

Recommended Citation
DOI: 10.30036/TJO.201709_29(3).0004
Available at: https://j.tjo.org.tw/tjo/vol29/iss3/4

This Case Report is brought to you for free and open access by Taiwanese Journal of Orthodontics. It has been accepted for inclusion in Taiwanese Journal of Orthodontics by an authorized editor of Taiwanese Journal of Orthodontics.
INTRODUCTION

For any kind of skeletal Class III malocclusion, Proffit\(^1\) states that there are three treatment options: 1) growth modification, whenever possible; 2) camouflage of the skeletal discrepancy through tooth movements to correct the dental occlusion and maintain the skeletal discrepancy; or 3) orthognathic surgical correction. The treatment option is depending on the patient’s age, the facial profile such as lip posture and chin projection, the lingual alveolar bone reaction on mandibular incisors, and the severity of malocclusion before treatment.

A large percentage of Class III malocclusions are the results of posterior cross-bite. Andrade et al has reviewed the posterior cross bite showing that the most common cause is the posterior transverse discrepancy due to reduced maxillary dental arch width alone or combined with increased mandibular arch width.\(^2\) Treatment for the dental arch transverse discrepancy in an adult is challenging and generally entails a combined orthodontic—surgical intervention. However, for adult patient who has minor dental arch transverse discrepancy and is reluctant to undergo any surgeries, an alternative

---

Case Report

CAMOUFLAGE ORTHODONTIC TREATMENT FOR ADULT PATIENT WITH SKELETAL CLASS III MALOCCLUSION AND BILATERAL POSTERIOR CROSS-BITE

Rouh-Hwai Wang,\(^1,2\) Hsin-Lan Shen,\(^1,2\)

\(^1\)Department of Orthodontics, Chang Gung Memorial Hospital, Linkou Branch, Taiwan
\(^2\)Graduate Institute of Dental and Craniofacial Science, Chang Gung University, Taoyuan, Taiwan

This 23-year-old female presents with skeletal Class III malocclusion, complicated by prominent chin projection, bilateral posterior lingual cross-bite, missing of bilateral maxillary first molars, and severely lingual-tilted lower second molars. The treatment modality was conventional edgewise appliance with bilateral lower first premolar extraction. A favorable result of ideal overbite and overjet and correction of bilateral posterior cross-bite were achieved. The patient was satisfied the improvement of function and esthetics after treatment. (Taiwanese Journal of Orthodontics. 29(3): 182-191, 2017)

Keywords: skeletal Class III malocclusion; camouflage orthodontic correction; posterior lingual cross bite
was to treat with dentoalveolar compensation without correcting the underlying skeletal deformity. 

The aim of this article is to present a case about a skeletal Class III adult patient with bilateral posterior lingual cross-bite treated by conventional edgewise appliance to resolve the chief complaint of the patient.

CASE REPORT

Extra-oral findings

A 23-year-old adult female was referred for orthodontic consultation with the chief complaint of crooked lower posterior teeth. The extra-oral examination showed that she had a concave profile with competent lips and prominent chin. She also had a broad and consonant smile arc without gummy smile, and her upper dental midline to facial midline is on (Figure 1).

Intra-oral findings

Intraorally, the lower midline shifted to her left side by 1 mm, the overbite was 2 mm and the overjet was 1 mm. The bilateral molar relationship could not be distinguished due to the missing of bilateral upper first molars. The canine was in Class III at right side and Class I relationship at left side. The anterior cross-bite involved the maxillary lateral incisors. The bilateral posterior lingual cross-bite involved the premolars and molars. The upper dental arch had spacing between the
premolars and molars. The lower dental arch had 6.7 mm space deficiency, left second premolar was submerged, and bilateral 2nd molars were lingually tilted, especially the right 2nd molar which caused upper 2nd molar complete buccal cross-bite to lower right 2nd molar. The curve of Spee at right side was 5 mm and left side was 6.5 mm (Figure 1). From the dental cast, the maxillary premolars and molars were buccally inclined, and mandibular molars were lingually tipped. This represents that there was some compensatory axial inclination produced at premolar and molar area.

**Radiographic findings**

The panoramic radiograph showed the presence of all the third molars, and only the upper left third molar was impacted. The upper right and left first molars were missing, and both the upper second molars were mesial tilting. There were no pathological findings of the temporomandibular joints and the two jaws (Figure 2).

Radiographic findings

The posteroanterior cephalometric findings showed: the maxillary width (JR-JL) is 78 mm, and the mandibular width (AG-GA) is 99 mm. According to Ricketts/RMO analyses, the maxillomandibular transverse differential was 1.4 greater than the Rocky mountain normal value (the maxillomandibular transverse differential index was 1.4 ) (Figure 2).

The lateral cephalometric tracing indicated: SN-FH: 8°, SNA: 82°, SNB: 83°, ANB: -1°, Wits appraisal: -6.5 mm, and Pg-Nv: 4 mm; revealing a skeletal Class III jaw relationship with mandible prognathism and prominent chin. The U1-SN (118°) and L1-MP (86°) presented proclined upper incisors and retroclined lower incisors (Table1).

The soft tissue analysis showed the facial convexity was only 4 degrees, belonging to concave profile. Her upper and lower lips were all behind to E-line.

**Figure 2.** Pre-treatment panoramic and cephalometric examination. The pre-treatment posteroanterior cephalometric examination showed the transverse discrepancy was 4 mm larger than the normal value.
Diagnosis
The patient was diagnosed as a skeletal Class III jaw relationship with mandible prognathism; for dental, she had bilateral posterior cross-bite with lower dentition moderate crowding and midline deviation.

Treatment objectives
The treatment objectives were to (1) relieve dental crowding; (2) correct bilateral cross-bite; (3) establish ideal overjet and overbite; (4) achieve canine Class I relationship; and (5) correct the dental midline.

Table 1. The comparisons of pre-treatment and post-treatment cephalometric analysis.

<table>
<thead>
<tr>
<th></th>
<th>Initial</th>
<th>Final</th>
<th>Norm</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SKELETAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SN-FH(°)</td>
<td>8</td>
<td>8</td>
<td>5.7±3.5</td>
</tr>
<tr>
<td>SNA(°)</td>
<td>82</td>
<td>82</td>
<td>79.4~82.5</td>
</tr>
<tr>
<td>SNB(°)</td>
<td>83</td>
<td>83</td>
<td>75.7~78.7</td>
</tr>
<tr>
<td>ANB(°)</td>
<td>-1</td>
<td>-1</td>
<td>3.2~5.0</td>
</tr>
<tr>
<td>A-Nv(mm)</td>
<td>0</td>
<td>0</td>
<td>-2~2</td>
</tr>
<tr>
<td>Pog-Nv(mm)</td>
<td>4</td>
<td>3.5</td>
<td>-9.3~1.3</td>
</tr>
<tr>
<td>Witts(mm)</td>
<td>-6.5</td>
<td>-6</td>
<td>-2~0</td>
</tr>
<tr>
<td>SN-MP(°)</td>
<td>38</td>
<td>38.5</td>
<td>33.8~38.4</td>
</tr>
<tr>
<td>UAFH/LAFH(%)</td>
<td>43/57</td>
<td>43/57</td>
<td>45/55</td>
</tr>
<tr>
<td><strong>DENTAL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U1-SN(°)</td>
<td>118</td>
<td>106</td>
<td>103.85~108.75</td>
</tr>
<tr>
<td>U1-NA(mm)</td>
<td>9.5</td>
<td>6.0</td>
<td>4.3~8.1</td>
</tr>
<tr>
<td>L1-MP(°)</td>
<td>86</td>
<td>78</td>
<td>93.4~99.2</td>
</tr>
<tr>
<td>L1-NB(mm)</td>
<td>5</td>
<td>2</td>
<td>5.4~10.2</td>
</tr>
<tr>
<td><strong>SOFT TISSUE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UL-E line(mm)</td>
<td>-5</td>
<td>-4</td>
<td>0.7~3.1</td>
</tr>
<tr>
<td>LL-E line(mm)</td>
<td>-2</td>
<td>-3</td>
<td>0.2~3.4</td>
</tr>
<tr>
<td>Facial convexity</td>
<td>4</td>
<td>5</td>
<td>8~16</td>
</tr>
</tbody>
</table>
Treatment plan

After discussion with the patient, the treatment plan was non-surgical approach with extraction of the bilateral lower first premolars to relieve the crowding, level the deep curve of Spee, and upright the lingually tilted 2nd molars of lower arch. The upper minor edentulous spaces of the missing first molars would be closed with the 2nd molars uprighting. The bilateral posterior crossbite would be corrected by dentoalveolar compensation (Table 2).

Treatment progress

The full mouth orthodontic treatment was started at September 2012. The total treatment course was summarized as Figure 3. All teeth were bonded with a 0.022x0.028-inch slot Roth prescription edgewise

### Table 2. The summery of treatment plan.

<table>
<thead>
<tr>
<th>Treatment plan</th>
<th>Upper arch</th>
<th>Lower arch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leveling and alignment</td>
<td>#34, 44 extraction</td>
<td>#34, 44 extraction</td>
</tr>
<tr>
<td>close #26 missing space</td>
<td>Leveling the curve of spee</td>
<td>Gain #47 space and upright the lingually-tilted #47 by cross elastic</td>
</tr>
<tr>
<td>#28 erupting to replace #27</td>
<td></td>
<td>Anterior retraction and space closure; Cl III elastics</td>
</tr>
</tbody>
</table>

**Figure 3. Flow chart of treatment progress.**
Camouflage Class III Correction

The NiTi wires at upper and lower arch were used for initial leveling and alignment. Three months later, the bilateral lower first premolars were extracted and a segment of open coil spring was placed between #46 and #48 with .016”-inch SS main wire for space gaining of #47. After space of #47 was enough, the cross elastics (3/16” 6 OZ) were used to upright the bilateral lingual-tilted 2nd molars.

During the space closure period, upper anterior teeth were retracted and #27 was protracted with .018x.025”-inch SS main wire. Lower anterior teeth were retracted by .018”-inch SS with a helix and combined with Class III elastics (3/16” 6 oz.) to accelerate lower anterior retraction and upper molars protraction. Concurrently, we continued the bilateral lower 2nd molars uprighting with cross elastics. Patient lost follow up for 6 months due to pregnancy.

At the time of all spaces were closed, we took a panoramic film for her and found that the #28 was going to erupt (Figure 4). Therefore, we waited for #28 eruption and re-leveled it for its antagonist with #38. After final finishing and detailing was completed, she was bonded with upper and lower fixed retainers. The removable wraparound retainers were given at debond. The total treatment duration was 3 years 6 months.

Treatment results

After orthodontic treatment, the upper and lower lips posture was more balanced as anterior teeth retraction. But the mentolabial sulcus became deeper and the chin became a little bit more prominent than before treatment (Figure 5-7). The vertical dimension including mandibular plane angle and anterior facial height were almost maintained (Table 1).

Intra-orally, both arch dentition were well-aligned with upper and lower dental midline coincidence. Both upper flared incisors and lingually-tilted 2nd molar were uprighting with minimal extrusion. Bilateral canine Class I relationship were achieved, and the posterior cross-bite were corrected with modest posterior teeth tipping and limited gingival recession. The chewing function of right side was enhanced by establishing good occlusion of second molars (Figure 7).

Figure 4. During treatment: all dental spaces were closed, the #28 had partially erupted.
Figure 5. Post-treatment panoramic and lateral cephalometric examination. #28 was well-aligned after orthodontic treatment.

Figure 6. Overall and regional superimposition of initial and final lateral cephalometric tracings.
DISCUSSION

When considering treatment plan of adult skeletal Class III malocclusion, the most important decision to make between camouflage or surgery should be based on whether the dentofacial cosmetic improvement accomplished with surgery is worth by the increase in the treatment cost and the risk that poses to the patient, as mentioned by Mihalik and Proffit (2003). In the samples of Taiwanese, Tseng et al have selected the best 6 diagnostic parameters to determine the treatment modalities for Class III malocclusion and suggested that if a Class III malocclusion has at least 4 conditions, the individual would be recommended to have orthognathic surgical treatment. For this skeletal Class III case with minor anterior-posterior and transverse discrepancies between the jaws, the dentally-compensated treatment not only resolved the patient’s chief complaint, but also achieved convincing esthetic results to the patient. Although her chin became more prominent after treatment and we had suggested her to have reduction genioplasty, she had no complaint about the chin contour and declined the suggestion.

In this case, we corrected the bilateral posterior lingual cross-bite by leveling and expanding upper dental arch. The severely lingual-tilted lower right second
molar was uprighted by buccal crown torque and cross-elastic with upper molar. Therefore, we need lower right third molar and upper right molars to be the anchorage of buccal uprighting. The cross-elastic is effective, but it should be used with great cautious in adults due to its strong extrusive component, which may cause the tendency of mandible downward and backward rotation. It is also important to upright the molars accompanied with occlusal reduction to minimize the extrusion of molars and trauma form occlusion.

When we treat the transverse skeletal discrepancy with dental camouflaged and expansion of buccal segments with fixed appliances, the risks may include unstable results and significant gingival recession in the buccal segments. Anzilotti et al has announced that transverse skeletal severity is a critical risk marker for identifying patients’ susceptible to gingival recession and periodontal disease; the skeletal differential width that greater than the Rocky mountain normal value by 5 mm could experience gingival recession no matter the RPE therapy or orthodontic treatment only. This important diagnostic information helped us to decide the camouflage treatment plan rather than surgically-assisted orthopedic expansion. As we expected, the posterior cross-bite was corrected with very limited buccal gingival recession in the molars and premolars.

One of the camouflage alternatives to treat non-growing Class III malocclusions is to use the lower micro-implant anchorage (MIA), which can be used to treat mild to moderate skeletal Class III malocclusion with whole dentition retraction or sequential retraction. The use of miniscrew in the posterior area of the mandible not only flatten the occlusal plane with clockwise rotation of the mandible, but also control the labial inclination of the maxillary incisors. The advantage using MIA in this case is no more sacrifice of healthy premolars, and limit the anterior retraction without over-retroclined the lower incisors and deteriorated the prominent chin contour. However, the extraction of the well-positioned third molar was necessary to upright and distalize the lingually tilted second molars with the aids of miniscrews. Such conservative option may take more time and cost of treatment to the patient.

**CONCLUSION**

This is a case of non-growing skeletal Class III malocclusions with bilateral posterior lingual cross-bite treated by less invasive camouflage orthodontic treatment. The patient’s cooperation, proper diagnosis, and a carefully executed treatment plan, as well as the initial dento-skeletal characteristics of the patient are the combination factors to the satisfactory results of treatment.

**REFERENCES**


