

# ORTHODONTIC-SURGICAL TREATMENT OF CLASS II MALOCCLUSION WITH MANDIBULAR ADVANCEMENT AND SARPE, A CASE REPORT

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## Abstract

While growth modification and camouflage orthodontic treatment offers a limited solution in treating some skeletal Class II malocclusion depending on the age of the patient, Underlying skeletal severity, alignment of the teeth, the vertical and transverse skeletal deformities, a combination of surgical and Orthodontic therapy is the treatment of choice in all severe skeletal class II malocclusion. In this case report I present a combination of surgical-orthodontic therapy for an adult female patient with skeletal class II malocclusion with narrow maxilla which resulted in good skeletal, dental and soft tissue relationship, with marked improvement in function and facial esthetics.

**Key Words:** Class II malocclusion, Narrow maxilla, Orthognathic Surgery, SARPE, Surgical orthodontics.

## Introduction

Class II type of malocclusion is a common orthodontic problem. It occurs in about 33% of the population.<sup>1,2,3</sup> The most common diagnostic feature in Class II malocclusion is retrognathic mandible.<sup>4</sup> It causes a significant facial deformity characterized by a deficient horizontal projection of the mandible, resulted in a convex profile, unbalanced facial proportions and occlusal disharmonies.<sup>5</sup> The etiological cause of this problem is multifactorial but there are two main factors: genetics and environmental factors such as habits and trauma to TMJ.<sup>6</sup> It has been demonstrated that facial and dental disharmonies that affect facial esthetics may result in negative social impact.<sup>7</sup> Combined orthodontic and orthognathic surgery is the treatment of choice to address severe skeletal discrepancies.<sup>8</sup> This approach aims to improve facial, skeletal and soft tissue relationship as well as to enhance occlusal function efficiency. Hence patients undergoing orthognathic surgery may experience psychosocial benefits and improve their social adaptation.<sup>9</sup> Posterior narrow maxilla is another type of common abnormality in children and adult patients. The incidence of posterior crossbite is estimated at 18% of patients attending to orthodontic clinics.<sup>10</sup> Orthodontic maxillary expansion is the mainly treatment option in growing patient because the force delivered by the appliance exceeds the limit of sutural resistance, the sutures open up with no or minimal teeth movements.<sup>11</sup> In adult patients, orthodontic expansion can produce unwanted effects, including tipping of posterior teeth<sup>12,13</sup> extrusion, fenestration of the buccal bone<sup>14,15</sup>, buccal root resorption and associated with unstable result.<sup>16,17</sup> To avoid all the mentioned side effects of orthodontic maxillary expansion in adult patients, surgical procedures have been recommended to facilitate correction of transverse discrepancies. These procedures can be segmenting the maxilla by a lefort osteotomy or surgically assisted rapid palatal expansion (SARPE).<sup>18</sup>

## Case Report

30 year-7 months old Caucasian female who presented for orthodontic treatment with primary complaint of unesthetic facial and dental appearance. She presented with a hyperdivergent Class II skeletal relationship. This is

characterized by retrognathic mandible, retrusive chin and increased lower facial height. The maxillary to mandibular width ratio is significantly reduced. Facially, the patient has an ovoid, relatively asymmetrical face with chin slightly deviated to the right. The lip line at rest displayed approximately 2 mm of upper incisor. At full animation there was 7mm of upper incisal display and 2 mm of lower incisal edge. She has a slightly convex profile, and competent lips [Figure1].



**Figure 1** Pretreatment extra oral photos

Intraorally, the oral mucosa was healthy. There were no periodontal pockets present. The gingival tissues were healthy, of normal size and contour. Free gingival margins were near to the CEJ and attached gingiva was of normal width throughout the mouth. The frenal attachments in both arches were normal. The tongue was normal in size, function and appearance. Teeth # 26, 36 and 46 have been crowned. There was a lingual arch placed one year ago to maintain lower incisors position. She was in the permanent dentition and has multiple fillings. She has a good oral hygiene.

Occlusion analysis, she was in the permanent dentition with a good oral hygiene and the 3rd molars were unerupted. Her occlusion shows a full unit class II div 1 dental relationship in with increased overjet, shallow overbite and midline discrepancy.

Frontal view: Shows a dental midline discrepancy. The lower midline is not coincident with the upper midline; it is off to the right by 1 mm. Right Lateral View: Shows the canines and molars in a full unit Class II relationship. Left Lateral View: Shows the canines and molars in a full unit Class II relationship, The upper occlusal view shows a symmetrical V -shaped arch with minimal crowding in the anterior segment. The maxillary arch-width is significantly reduced. The lower occlusal view reveals a symmetrical U -shaped arch with crowding and

Irregularity in the anterior segment. The upper and lower teeth are generally 0 to 1.4 times standard deviations larger than the mean. The curve of spee in the upper arch is normal and in the lower arch is moderately deep [Figure 2].



**Figure 2 Pretreatment intra oral photos**

The lateral cephalometric analysis depicts a hyperdivergent Class II skeletal relationship. This is characterized by retrognathic mandible, retrusive chin, positive wits, increased A-B distance, and increased lower facial height [Figures 3-4, table1].

**Table 1: Pre-treatment cephalometric finding**

Measurement	SD	Pretreatment
SNA	81°	78°
SNB	78°	69°
ANB	2.5°	9°
Mx 1 to NA	22°	20°
Mx 1 to NA	4mm	5mm
Md 1 to NB	25°	24°
Md 1 to NB	4mm	5mm
Md 1 to Md plane	92°	95°
Inter-incisors angle	130°	126°
UL to E line	-4mm	1 mm
LL to E line	-2mm	-1 mm
Nasolabial angle	110°	118°



**Figure 3: Pre-treatment lateral cephalometric radiograph**



**Figure 4 Pre-treatment panoramic radiograph**

### TREATMENT OBJECTIVES

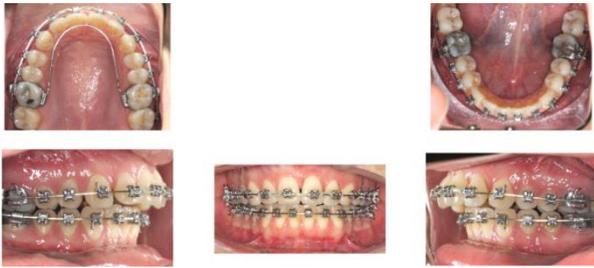
Our objective is to address transverse problem due to narrow maxilla by surgical assisted palatal expansion (SARPE) followed by pre-surgical orthodontics for Leveling and alignment then surgically increasing the horizontal projection of the mandible differentially to correct mandibular retrognathism, asymmetry in the lower jaw, convex profile, class II skeletal and dental relationship and increased overjet. Increased lower facial height and hyper-divergence will be relatively corrected by mandibular rotation after the advancement.

### TREATMENT PROGRESS

We started with SARPE to correct the transverse issue using Hyrax appliance which cemented in the upper arch before surgery. Surgical procedures done were: an osteotomy created parallel to the occlusal plane. The osteotomy were placed about 4 to 5 mm above the apices of the maxillary teeth in addition to a midpalatal cut.<sup>19,20,21</sup> There was no attempt made to separate the maxilla from the pterygoid plates to avoid invasion into the pterygomaxillary junction.<sup>22</sup> Post-surgically, activation schedule of one turn morning and other in the evening, total of 0.5 mm distraction was done daily for a period of 16 days. so that we achieved approximately 8mm expansion followed by transpalatal arch to maintain the expansion result [Figure 5]. Pre-surgical orthodontics started 24 weeks later after confirming with the radiographic evidence of new bone formation. We used self-ligation bracket system (Roth prescription, 022"slot). Leveling and alignment of maxillary and mandibular teeth began with round 0.014 progressing to 0.017x0.025 nickel titanium archwires. Coordinated 0.019x0.025 Stainless steel was then used for arch coordination before sending the patient for surgical procedure [Figure 6].



**Figure 5: Post-SARPE photos**



**Figure 6: Presurgical intra oral photos**

All the movement and prediction were planned on lateral cephalometric and study models to avoid any interference in occlusion during the surgical advancement. Bilateral sagittal split osteotomies (BSSO) were performed to advance the mandible for 9 mm in the right and 8 mm in the left mandible to correct mandibular asymmetry while addressing the A-P position of the mandible. Rigid type of fixations was used in both sides. The patient was followed closely and the post-surgical orthodontic was resumed 3 weeks after surgery. 0.019x0.025 stainless steel changed to 0.021" x 0.025" stainless steel to express the torque. Finishing was performed with settling elastics [figures 7&8].



**Figure 7: 3 weeks post-surgical intraoral photos**



**Figure 8: Post-surgical panoramic radiograph**

Six months later, fixed appliances were removed and lower fixed retainer 3-3 was cemented along with upper and lower Hawley's retainers. Cephalometric finding shows a good skeletal, dental and soft tissue relationship and improvement in the function and facial esthetics [Figures 9-14 and Table 2].



**Figure 9: Post-treatment extra oral photos**



**Figure 10: Post-treatment intra oral photos**



**Figure 11: Pre and Post-treatment lateral cephalometric radiograph**



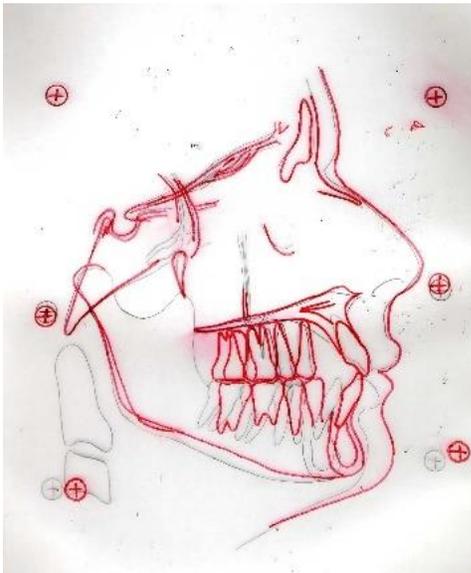
**Figure 12: Pre and Post-treatment profile**



**Figure 13: Post treatment panoramic radiograph**

Measurement	SD	Pre-treatment	Post-treatment
SNA	81°	79°	80°
SNB	78°	69°	78°
ANB	2.5°	10°	2°
Mx 1 to NA	22°	21°	19°
Mx 1 to NA	4 mm	5 mm	4mm
Md 1 to NB	25°	24°	27°
Md 1 to NB	4 mm	5 mm	6mm
Md 1 to Md plane	92°	95°	97°
Inter-incisors angle	130°	126°	127°
UL to E line	-4 mm	1 mm	-3mm
LL to E line	-2 mm	-1 mm	-4mm
Nasolabial angle	110°	118°	118°

**Table 2: Pre & Post-treatment cephalometric finding**



**Figure 14: Cranial superimposition of pre- and post-treatment cephalometric tracings**

### Discussion

This case report presents a combination of surgical and orthodontic therapy for an adult female patient with skeletal and dental class II malocclusion with reduced maxillary width. The magnitude of the problem was so severe and lies outside the envelope of possible correction by orthodontics alone.<sup>23</sup> In term of treatment of skeletal class II In growing patients, early treatment via growth modification with functional appliances resulted in significant improvement. According to Tulloch et al, The change in jaw relationship was favourable or highly favourable in 76% of the headgear, 83% of the functional appliance, and 31% of control (observation only) groups.<sup>24</sup> Early treatment can also indorse more favourable psychosocial development and better compliance.<sup>25,26</sup> During adulthood, correction of

the skeletal class II malocclusion usually requires complex surgical procedures to achieve a good skeletal, dental and soft tissue relationship and improve the function and facial esthetics.<sup>27</sup>

Regarding treatment of maxillary width deficiency, it can be treated with orthodontic expansion in growing patients and sometimes in adults with minor maxillary width discrepancies. In moderate to severe cases, surgical correction is recommended.<sup>28</sup> Surgical correction can be done either with Segmental Le Fort I osteotomy or surgical assisted palatal expansion (SARPE). Both techniques are well-established surgical technique to correct maxillary transverse discrepancies. However, in adults where the skeletal problem is in the transverse plane only, then SARPE is preferred. The major disadvantage of surgical maxillary expansion is stability and overexpansion is frequently recommended.<sup>29, 30, 31</sup>

In this case, even though the skeletal problems is in transverse and A-P planes, we choose a two stage surgical procedures, SARPE followed by surgical advancement of the mandible over a single stage Le Fort I maxillary osteotomy and mandibular advancement at once to avoid the reported morbidity associated with a segmentalized Le Fort I maxillary osteotomy and achieve more predictable results by limiting the major surgical procedure to just an advancement of a single jaw<sup>32</sup>. By the end, our objectives were achieved and we obtained a normal skeletal, dental and soft tissue relationship and the patient was happy about her facial esthetics.

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