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# Multidisciplinary treatment of a severe facial asymmetry

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This case report presents the multidisciplinary treatment of an adult female who presented with a previously repaired right unilateral cleft lip and palate. The patient had been referred with a complaint of facial asymmetry, eating difficulties and a missing right central incisor. A clinical evaluation revealed severe facial asymmetry created by a mandibular deviation to the right side and a compensatory transverse cant of the maxillary occlusal plane. After pre-surgical orthodontic treatment, a Le Fort I osteotomy and a bilateral sagittal split osteotomy were performed. During post-surgical orthodontic treatment and, as a result of the rotational surgery, the maxillary left central incisor became the right central incisor. The left lateral incisor was subsequently moved toward the midline and reshaped with a composite buildup to serve as a new left central incisor. The combination of orthodontic, orthognathic and restorative treatment established a favourable occlusal and aesthetic result. (Aust Orthod J 2018; 34: 70-77)

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## Introduction

Facial asymmetry is a challenging deformity to manage by orthodontic correction. Often, an asymmetric deformity has associated problems related to eating difficulties, psychosocial acceptance and facial aesthetics.<sup>1</sup> The main aetiologic factors are congenital anomalies, temporomandibular disorders or trauma to the face.<sup>2,3</sup>

The management of asymmetry cases usually requires an interdisciplinary approach involving both surgery and orthodontic treatment following precise and accurate diagnosis and treatment planning. In most cases, the asymmetry cannot be simply corrected by one-jaw surgery as mandibular asymmetry is commonly associated with unilateral vertical maxillary excess.<sup>4</sup> Most maxillary asymmetry develops subsequent to asymmetric mandibular growth.<sup>5</sup> Therefore, the correction of facial balance requires a combination of Le Fort I osteotomy and a bilateral sagittal split ramus osteotomy (BSSO).<sup>6</sup>

The present case report describes the treatment of a female patient who presented with severe facial

asymmetry. The patient had vertical maxillary asymmetry and a mandibular deviation to the right side with an associated unilateral posterior crossbite. The treatment protocol included a combination of two-stage orthognathic surgery and orthodontic treatment.

## Diagnosis and aetiology

A 29-year-4-month old female patient was referred to the Department of Orthodontics with a complaint of facial asymmetry and eating difficulties. She had a previously repaired unilateral cleft lip and palate but there was no history of injury to the head or jaw. Her extra-oral facial assessment showed severe facial asymmetry involving a mandibular deviation to the right side and a compensatory transverse cant of the maxillary occlusal plane (Figure 1). Magnetic resonance imaging showed that the right temporomandibular joint disc was anteriorly positioned and the right condyle was not anteriorly positioned in the open mouth position. However, mouth-opening restriction was not obvious but crepitation was detected in the



Figure 1. Pretreatment facial and intraoral photographs.

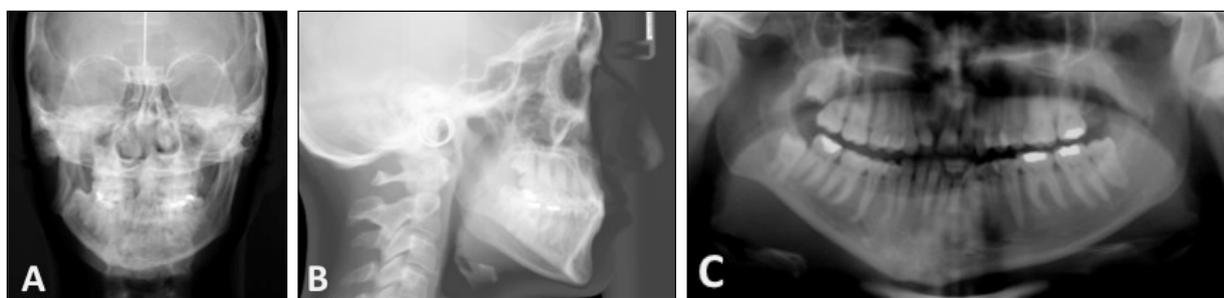


Figure 2. Pretreatment radiographs: A, posteroanterior cephalogram; B, lateral cephalogram; C, panoramic radiograph.

left joint without other symptoms. The patient did not complain of muscle or joint pain associated with her temporomandibular disorder. A one-year observation period revealed no clinically significant increase of the mandibular asymmetry. The aetiology of the asymmetry was attributed to a combination of hereditary and environmental factors.

Intraorally, a crossbite was observed on the right side from the maxillary right lateral incisor to the first molar. The patient had a missing upper right central incisor associated with the cleft region. The mandibular left third molar was positioned buccally and was not in occlusion. The canine and molar relationships were cusp-to-cusp on the right and Class I on the left side (Figure 1). The mandibular dental midline had deviated to the right by 6 mm when compared with the facial midline. The maxillary dental midline had deviated to the right side due to the missing

right central incisor. There was moderate crowding (-5 mm) in the maxillary arch and mild crowding (-2.5 mm) in the mandibular arch according to a Hayes-Nance analysis.

A lateral cephalometric assessment indicated a skeletal Class III relationship (ANB: 0.5°, Wits: -4.3 mm) with a vertical growth pattern (SN-MP: 38.9°). The maxillary (Mx1-SN: 100.1°) and mandibular incisors (IMPA: 88.3°) were slightly retroclined (Table I). The posteroanterior cephalometric radiograph revealed a deviation of the chin by a 17° angle to the right side and the occlusal plane canted down on the left side. A panoramic radiographic evaluation revealed increased left ramal height and mandibular body length. The left condyle was elongated and enlarged. The right mandibular lower border was bowed downward more than the left side. The patient had a missing maxillary left third molar and right central incisor (Figure 2).

**Table 1.** Cephalometric variables at pretreatment (T0) and post-treatment (T1).

Measurement	Pretreatment (T0)	Post-treatment (T1)	Norm
SNA°	76.6°	79.3°	82.0°
SNB°	76.1°	76.2°	80.0°
ANB°	0.5°	3°	2.0°
Witts (mm)	-4.3 mm	-0.3 mm	1.1 mm
Convexity (mm)	0.1 mm	2.2 mm	0.9 mm
MP-FH°	25.9°	36.4°	25.0°
SN-MP°	38.9°	43.4°	32.0°
Mx1-SN°	100.1°	104.3°	104.0°
Mx1-NA°	23.6°	25°	22.0°
IMPA°	88.3°	88°	90.0°
Md1-NB°	23.2°	27.6°	25.0°
Overjet (mm)	-1.2 mm	2.4 mm	2.5 mm
Overbite (mm)	0.1 mm	1 mm	2.5 mm
Low.Lip-E (mm)	-2.8 mm	-2.0 mm	-2.0 mm

***Treatment objectives and alternatives***

The treatment objectives were to correct the skeletal deformity, obtain an ideal occlusion and improve oral function by a combination of surgery, orthodontic therapy and restorative treatment. Orthognathic surgery was the preferred approach because of the severe skeletal asymmetry. Pre-surgical orthodontic treatment was planned to restore the normal inclinations of the maxillary and mandibular incisors and to co-ordinate the dental arches. The maxillary and mandibular third molar teeth were to be extracted at the beginning of treatment to avoid interference with the surgical procedures. A BSSO and Le Fort I osteotomy were planned to correct the jaw deformities of the mandible and maxilla respectively. Furthermore, a rhinoplasty was also proposed as an adjunctive surgical procedure to improve facial aesthetics and nasal breathing.

***Treatment progress***

Before orthodontic treatment, the patient was referred for evaluation of her periodontal status and the extraction of all third molar teeth. The initial stage of pre-surgical orthodontic treatment involved the expansion of the maxillary arch with a Quad-Helix appliance. After the desired expansion had been achieved, pre-surgical orthodontics in both arches was commenced using 0.022 inch slot preadjusted

Roth prescription fixed appliances. The arches were levelled and aligned with continuous archwires commencing with a 0.016 inch nickel-titanium wire and continuing up to a 0.019 × 0.025 inch stainless steel wire placed just before orthognathic surgery. Complete arch alignment and coordination were required as prerequisites for surgery. After 20 months of pre-surgical orthodontic treatment (Figure 3), two-jaw orthognathic surgery involving a maxillary Le Fort I osteotomy and mandibular BSSO were performed. The maxilla was downgrafted 5 mm on the right posterior segment and advanced 3 mm with a 3 mm rotational movement to the right side. The mandible was set back 2 mm with a 6 mm rotational movement to the left side. Maxillomandibular fixation was maintained for four weeks followed by post-surgery orthodontics for six months. Occlusal settling was facilitated by diagonal and vertical elastics (Figure 4).

After orthognathic surgery, the maxillary left central incisor was repositioned to the site of the missing right central incisor as a consequence of the rotational movement of the maxilla. The left lateral incisor was subsequently moved toward the midline and reshaped with composite resin to act as a new left central incisor. A dentist specialising in paediatric dentistry performed the direct composite buildups. Before restorative treatment, the patient received oral hygiene instruction and periodontal care from a periodontist. The left canine was also reshaped to act



Figure 3. Pre-surgical facial and intraoral photographs.



Figure 4. Post-treatment intraoral photographs before reshaping procedure.

as a new lateral incisor. Figure 5 shows the intraoral photographs of the patient with reshaped teeth and with the direct composite buildups. Fixed lingual and Hawley retainers were applied to the maxillary and mandibular arches for one year.

A second surgical procedure to correct the remaining asymmetry of the lower border of the mandible was recommended to the patient; however, this was declined because of the satisfaction with the initial treatment result. The surgeon also suggested a rhinoplasty for the severe deviation of the nasal septum and the patient underwent surgery with good functional and aesthetic outcomes.

## Results

The combination of orthodontic and orthognathic treatment provided favourable aesthetic and functional results. The mandibular protrusion, asymmetry and maxillary retrusion were much improved. The anterior and right posterior crossbites were corrected and the mandibular midline was rendered coincident with the facial midline. The maxillary left central incisor was located to the site of the missing right central incisor due to the rotational movement of the maxilla, and the left lateral incisor acted as a new left central incisor. A Class I canine and molar relationship on the right side and a Class I canine and Class II molar relationship on the left side were achieved (Figure 5).



Figure 5. Facial and intraoral photographs after restorative treatments.

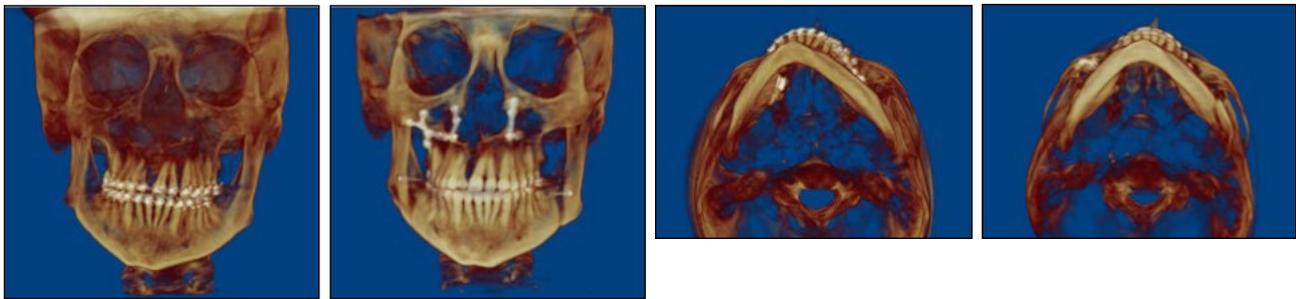


Figure 6. Pre-surgical and post-surgical three-dimensional images.

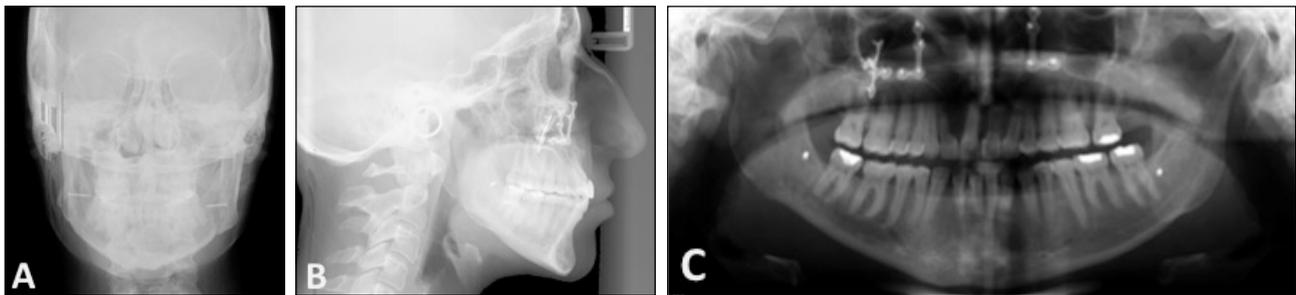


Figure 7. Post-treatment radiographs: A, posteroanterior cephalogram; B, lateral cephalogram; C, panoramic radiograph.

Three-dimensional images showed that considerable mandibular symmetry had been restored by the end of treatment (Figure 6).

The post-treatment lateral cephalometric analysis and the regional superimpositions revealed skeletal changes (ANB: 3°, Wits: -0.3 mm) and an increase in the mandibular plane angle (SN-MP: 43.4°).

The maxillary incisor inclinations improved (Mx1-SN: 104.3°) and mandibular incisor inclinations remained stable (IMPA: 88°). The post-treatment posteroanterior cephalogram verified mandibular midline coincidence with the facial midline and improvement of the mandibular symmetry. The post-treatment panoramic radiograph showed no alveolar bone loss or apical root resorption (Figure 7 and 8).

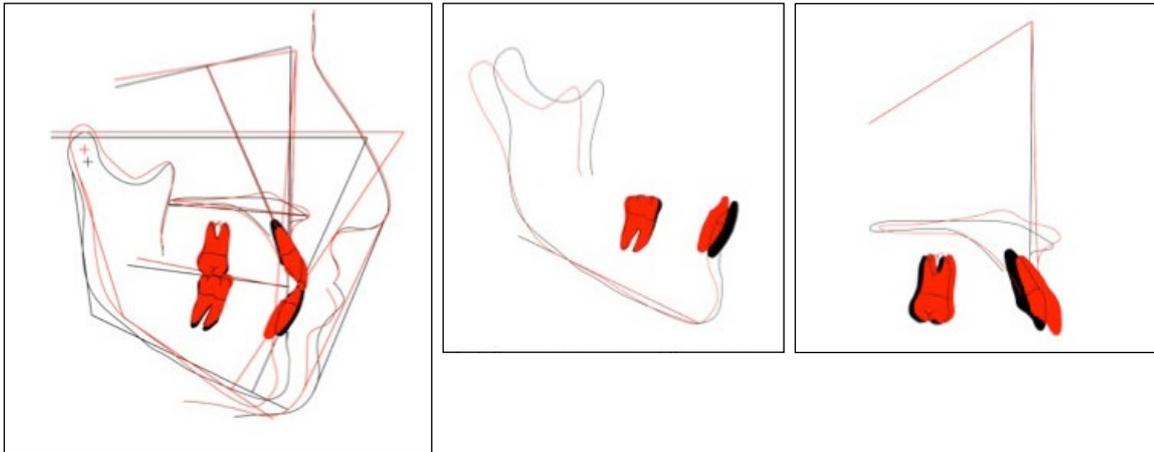


Figure 8. Cephalometric superimpositions. Black line, pretreatment; red line, post-treatment.



Figure 9. One-year post-treatment facial and intraoral photographs.

At a one-year review, the patient had a stable occlusion and an acceptable facial profile. A rhinoplasty was performed six months after the debonding process in order to improve the severe septal deviation and facial aesthetics (Figure 9). All of the skeletal and dental measurements were preserved from the post-treatment to post-retention period (Figure 10).

## Discussion

Facial asymmetry is a challenging problem and has a significant effect on the aesthetic and functional development of the patient.<sup>7</sup>

Establishing the cause of an asymmetry is crucial in the determination of an appropriate treatment plan. Severe skeletal deformities usually require complex surgical procedures in conjunction with orthodontic treatment.<sup>8-10</sup>

Mandibular skeletal asymmetries are classified as either hemimandibular hyperplasia or hemimandibular elongation according to Obwegeser and Makek.<sup>11</sup> Hemimandibular elongation is characterised by lengthening of either the condyle or the ramus in the vertical plane or the mandibular body in the horizontal plane. The dental midline usually deviates to the

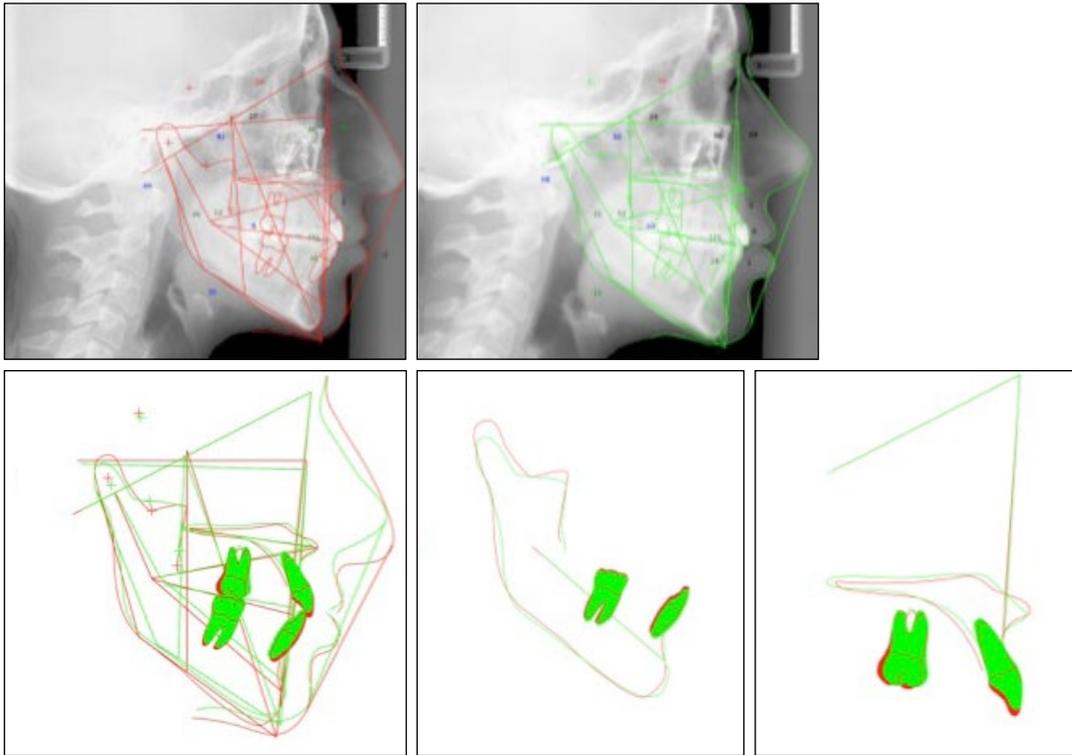


Figure 10. Cephalometric superimpositions. Red line, post-treatment; green line, post-retention.

opposite side of the deformity.<sup>12</sup> The presented patient was characterised by hemimandibular elongation by the lengthening of the mandibular left body, condyle and the ramus respectively in the horizontal and vertical planes (Figure 6). In the preoperative orthodontic phase, decompensation of the teeth and dental arches was undertaken to facilitate the sagittal and vertical correction of the maxilla and mandible by the surgical procedure.

One surgical option to manage facial asymmetry caused by condylar hyperplasia is to carry out a high condylectomy to reduce compensatory growth and to reduce the overgrowth of the maxilla on the affected side. This option relocates the angles of the mandible into reasonable symmetry.<sup>13</sup> However, a high condylectomy can cause a lateral limitation because of the decreased function of the lateral pterygoid muscle. In addition, postoperative pain, swelling and trismus can develop if coronoidectomy is also required during the surgical approach.<sup>14,15</sup> A BSSO is the most common procedure to surgically correct a mandibular deformity.<sup>16</sup> However, in surgical treatment for rotational mandibular asymmetry, a BSSO can create a space between the proximal and distal segments, which increases the risk of early relapse and temporomandibular disorders.<sup>17-20</sup> During the surgical management

of this patient, careful bone removal between the segments was performed to minimise the flaring of the proximal segment. However, it is not possible to remove all bony interferences between the segments because of the anatomical limitations particularly associated with the neuromuscular bundle.<sup>17</sup> An alternative treatment option for the presented patient would be a unilateral vertical ramus osteotomy on the short side combined with a contralateral BSSO in order to avoid mediolateral flaring of the bone segments.<sup>21</sup> In the current case, it was decided to rotate the maxilla to the right side and the mandible to the left side to correct the midline asymmetry instead of rotating only the mandible to the left side by a greater extent to minimise the surgical risk. Rotating the maxillary arch to the right side would also produce a better result with respect to the nasal deviation. The stability of the maxilla was assisted by a bone graft placed during the lowering of the right maxilla to correct the occlusal cant. The surgical plan was designed not only to achieve a functional improvement, but also to manage the aesthetic concerns of the patient. Shortening the left side of the mandible and reducing the left maxilla would produce soft tissue accumulation and a bulging affect on the left side, which would defy easy correction. The post-treatment results showed that the

maxillary and mandibular midlines were coincident, but there was a 1 mm discrepancy between the facial and dental midlines. The patient was satisfied with the final dentofacial aesthetics as it has been reported that a 2 mm deviation between the maxillary dental midline and facial midline is acceptable to patients.<sup>22,23</sup>

During the latter stages of orthodontic treatment, the patient was offered two options for the restoration of the maxillary left incisor and canine teeth, involving either porcelain veneers or composite buildups respectively. The patient selected the second minimally-invasive option. The composite buildups provided an excellent treatment alternative for the aesthetic improvement of the anterior teeth. It has been suggested that increased benefits can be gained by this treatment approach by way of a shorter treatment time, lower treatment cost and better prognosis for the teeth.<sup>24</sup> In addition, acceptable marginal adaptation and aesthetically satisfactory results have been reported with composite restorations.<sup>25,26</sup>

## Conclusions

Multidisciplinary treatment comprising orthognathic, orthodontic and restorative treatment yielded acceptable results for the presented patient. The skeletal deformity and malocclusion were successfully managed, resulting in a significant improvement in aesthetics and function.

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