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Original Article

Facial profile and frontal changes after bimaxillary surgery in patients with mandibular prognathism

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Received 2 March 2017; received in revised form 5 August 2017; accepted 24 August 2017

KEYWORDS

Facial profile;
Frontal dimension;
LeFort I operation;
Mandibular
prognathism;
Sagittal split ramus
osteotomy;
Relapse

Background/Purpose: Patients are always concerned about their postoperative appearance before surgery for facial deformity correction. The present study investigated the facial profile and frontal changes following two-jaw surgery.

Methods: Forty patients who underwent two-jaw surgery were divided by the amount of mandibular setback (group I: ≤ 8 mm and group II: > 8 mm). Cephalometric radiograms (lateral and frontal) were collected and analyzed at three intervals: preoperatively (T1), immediately postoperatively (T2), and final follow-up (T3). The following points were identified: cheek points (C1–C5), pronasale (Prn, tip of the nose), anterior nasal spine (ANS), subnasal (Sn), point A, labrale superius (Ls), incision superius (Is), labrale inferius (Li), incision inferius (Ii), point B, labiomental sulcus (Si), pogonion (Pog), soft tissue pogonion (PogS), ramus point (RP), and gonion (Go). The immediate postoperative changes (T21), final postoperative changes (T32), and final stability (T31) were calculated and analyzed.

Results: In T31, the cheek line showed significant advancements of 2.3 mm (group I) and 1.6 mm (group II). The soft:hard tissue ratios were significantly correlated: Prn:ANS (0.37:1), Prn:A (0.39:1), Sn:A (0.85:1), C3:A (0.82:1), Ls:Is (0.92:1), Li:Ii (0.91:1), Si:B (0.88:1), and Pog-S:Pog (group I, 0.78:1 and group II, 0.93:1). The intercondylion and intergonial widths of group II (T31) significantly increased 1.8 and 4 mm, respectively. Regarding the postoperative skeletal stability (T32), group I showed significant correlations between amounts of mandibular setback, but group II did not.

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<http://dx.doi.org/10.1016/j.jfma.2017.08.009>

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Please cite this article in press as: Chen C-M, et al., Facial profile and frontal changes after bimaxillary surgery in patients with mandibular prognathism, Journal of the Formosan Medical Association (2017), <http://dx.doi.org/10.1016/j.jfma.2017.08.009>

Conclusion: In the facial profile, the cheek line showed significant advancement postoperatively. The frontal mandibular transverse dimensions were significantly increased.

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Introduction

Mandibular prognathism, a hereditary disorder, causes mandibular overgrowth and leads to a protrusive lower third of the face with skeletal Class III malocclusions. Mandibular prognathism not only causes mastication and speech problems in patients but also affects their social activities. The prevalence^{1,2} of mandibular prognathism has been higher in Asian populations than in Caucasians. This condition is characterized by a concave profile, typically combined with a mild maxillary deficiency. Mandibular prognathism is corrected through orthognathic surgery in conjunction with orthodontic treatment. The surgery is generally performed with maxillary advancement (Le Fort I operation) and mandibular setback (sagittal split ramus osteotomy [SSRO]).

Predicting facial profiles is an important aspect of surgery for the correction of mandibular prognathism. After maxillary advancement surgery, the overlying tissues (including the cheek line), which are between the cheilions (corners of the mouth) and cheek bones, are also involved in the forward movement. The cheek line provides an attractive and curve-shaped appearance in front of the cheek bone. However, no cephalometric studies have reported changes in the cheek line after orthognathic surgery. Patients are concerned with their frontal appearance and facial profile. Many studies have reported changes in the lateral profile^{3–8} and frontal dimension^{9–11} after orthognathic surgery. The present study investigated the lateral (including the cheek line) and frontal changes after mandibular prognathism correction through a two-jaw surgery.

Methods

A total of 40 patients (skeletal Class III malocclusions) underwent the two-jaw surgery for the correction of mandibular prognathism. All surgeries were performed at the Oral and Maxillofacial Surgery Department of China Medical University Hospital by using the SSRO setback (Epker's¹² method and miniplate fixation) and traditional Le Fort I (miniplate fixation) advancement techniques. The indications for the two-jaw surgery of the patients were as follows: (1) presence of skeletal Class III malocclusions, (2) absence of craniofacial anomalies, (3) no account of injury or acknowledged syndromes as etiologic factors, and (4) no active development at the time of surgery. According to the literature review,¹³ the magnitude of mandibular setback was ≤ 8 mm in the most studies. On the basis of clinical experience, patients required greater mandibular setback (>8 mm). Therefore, 8 mm was considered the cutoff point of mandibular setback. In the present study, 20 patients (group I) required a setback of ≤ 8 mm, and 20 others (group II) required a setback of >8 mm.

Cephalometric radiograms (lateral and frontal) were superimposed and analyzed at three intervals: preoperatively (T1; 1 month before surgery), immediately postoperatively (T2; 2 days after surgery), and final follow-up (T3; at least 6 months postoperatively). The immediate postoperative changes (T21), final stability (T32), and final postoperative changes (T31) were calculated and analyzed. The following points were identified: sella (S), nasion (N), pronasale (Prn, tip of the nose), anterior nasal spine (ANS), point A, labrale superius (Ls), incision superius (Is), labrale inferius (Li), incision inferius (Ii), point B, labiamental sulcus (Si), pogonion (Pog), and soft tissue pogonion (PogS). For analysis, the x–y coordinate axes were constructed. This coordinate system had its origin at point N and its x axis at an upward angle of 7° with the horizontal axis or reference line (NS; Fig. 1). The vertical line was perpendicular to the horizontal axis through S as the vertical axis. Furthermore, the mandibular plane angle is the angle between a tangential

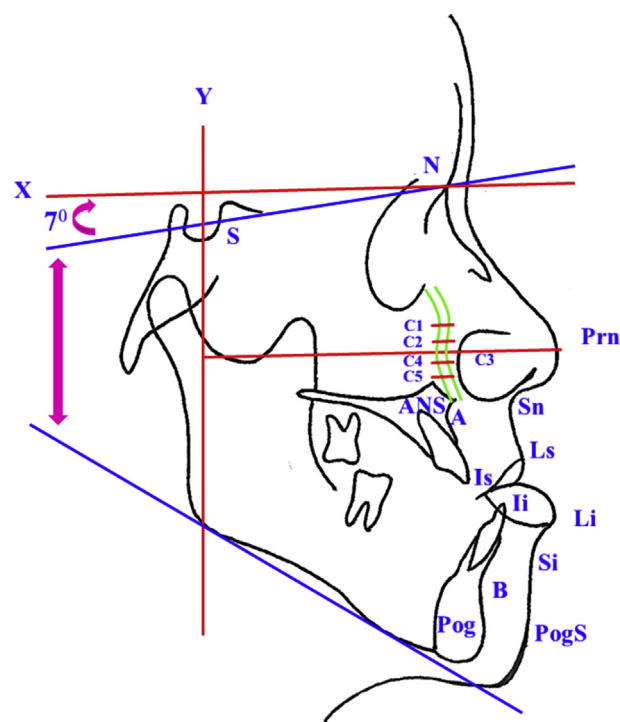


Figure 1 N: nasion, S: sella, Prn: pronasale, ANS: anterior nasal spine, Sn: subnasale, point A, Is: incisor superius, Ii: incisor inferius, Ls: labrale superius, Li: labrale inferius, point B, Si: labiamental sulcus, Pog: pogonion, PogS: soft tissue of Pog. Red lines: X axis (horizontal line: 7° to the NS line), Y axis (vertical line through S). Green lines: Cheek lines (Left side: anterior line; Right side: posterior line). Cheek point (C1–C5): C3 through Prn parallel to X axis. Blue lines: Mandibular plane angle.

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