Stability After Bilateral Sagittal Split Osteotomy With Rigid Internal Fixation in Surgery-First Approach

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Purpose: The purpose of this study was to evaluate the stability of bilateral sagittal split ramus osteotomy (BSSO) setback with rigid internal fixation in a surgery-first approach (SFA) for patients with skeletal Class III malocclusion.

Patients and Methods: Twenty-seven consecutive patients with skeletal Class III malocclusion treated with BSSO with the SFA were included in the study. Lateral cephalograms were taken and traced before surgery and 1 and 6 months after surgery. Cephalometric measurements were compared using repeated-measures analysis of variance. A *P* value less than or equal to .05 was considered significant.

Results: The study included 9 men (age, 25.7 ± 2.9 yr) and 18 women (age, 26.6 ± 4.2 yr). Treatment time was 8.4 ± 1.5 months. Horizontally, there were no meaningful anteroposterior changes of the pogonion and B point during the postsurgical period (0.9 and 0.6 mm, respectively). Vertically, the pogonion showed superior movement after surgery (2.4 mm) without major postsurgical change (0.6 mm). The B point showed major superior movement after surgery (2.3 mm) and during the postsurgical period (1.2 mm). The inclination of the lower incisor was increased labially during the postsurgical period (2.4°), although this was not statistically important.

Conclusions: In the present study, there was no major horizontal relapse for any variable (<1 mm). Vertically, all variables showed no meaningful changes during the postsurgical period except the B point showed 1.2 mm of superior displacement. BSSO with rigid fixation using the SFA seems to be an effective and predictable procedure in patients with skeletal Class III malocclusion.

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Until recently, presurgical orthodontic preparation was believed essential for treating patients undergoing orthognathic surgery.[1] The 3-stage procedure in surgical orthodontic treatment was considered the standard. However, with the advancement of orthognathic surgical techniques, the inconveniences of presurgical orthodontics, which were overshadowed by the surgical procedure, became more pronounced. Patients preparing for orthognathic surgery are often fatigued by prolonged presurgical orthodontic treatment. During this period, worsening of the profile from dental decompensation and discomfort from orthodontic brackets and wires occur.

Recently, orthognathic surgery with minimal or no presurgical orthodontics, namely the surgery-first approach (SFA), has been proposed and popularized in East Asian countries.[2-7] However, the efficacy of orthognathic surgery with the SFA has not been fully

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verified and most previously published studies on the SFA concerned bimaxillary surgery.[2,3,8-10] Ko et al[8] concluded that relapse of the SFA did not differ in any important way from that of conventional orthognathic surgery.

Kim et al[4] reported 2.4 mm of horizontal relapse at the B point after mandibular bilateral sagittal split ramus osteotomy (BSSO) in the SFA group compared with 1.6 mm in the control (conventional treatment) group. At the pogonion, horizontal relapse was reported to be approximately 3.5 mm and was explained by the mandibular counterclockwise rotation that was induced by the vertical changes, because the pure surgical relapse was approximately 0.5 mm.[5,11] In addition, the intraoral vertical ramus osteotomy showed a minor amount of anterior relapse at the B point (0.8 mm), but a major superior relapse (1.9 mm).[12] In these studies, the relapse referred to changes that occur during postsurgical orthodontic treatment. The duration of this period ranged from 4 to 16 months.

The purpose of this study was to evaluate the stability of BSSO setback with rigid internal fixation with the SFA for patients with skeletal Class III malocclusion.

Patients and Methods

This retrospective case series study was approved by the institutional review board of the Catholic Medical Center, Catholic University of Korea (Seoul, Korea; number KC13RASI0161). The sample consisted of 27 consecutive patients with skeletal Class III malocclusion treated with BSSO with the SFA at the Department of Oral and Maxillofacial Surgery, Seoul St Mary's Dental Hospital (Seoul, Korea) from February 2009 to May 2010. Patients with no to minimal presurgical orthodontic treatment were included. Those without stable postsurgical occlusion because of minor arch width discrepancy or crowding underwent orthodontic treatment within 3 months before orthognathic surgery. No genioplasty was performed. Patients with maxillary surgery or other craniofacial anomalies were excluded.

Lateral cephalograms were taken with the Dimax 3 (Promax, Planmeca, Helsinki, Finland; 70 kVp, 11 mAs) before treatment within 1 month before surgery (T0), 1 month after surgery (T1), and 6 months after surgery (T2). Patients were in a natural head position with centric occlusion and reposed lips.

All surgical procedures were performed by 1 experienced surgeon (J.U.P.). The distal segment of the mandible was fixated with 3 noncompression titanium bicortical screws. Postoperative intermaxillary elastics were applied for 1 to 2 weeks. Postoperative orthodontic treatment usually started 3 to 4 weeks after surgery.

All cephalograms were traced by 1 examiner (Y.W.K.) using V-Ceph 5.5 (Cybermed, Seoul, Korea). Surgical changes were evaluated on cephalograms taken at T1 and postsurgical changes were assessed on cephalograms taken at T2. Horizontal and vertical reference lines were defined as follows:

- Horizontal reference line (HRL): a line 7° above the line connecting the sella to the nasion (SN) passing through the nasion.
- Vertical reference line: a line perpendicular to the HRL passing through the sella.

The vertical and horizontal positions of the pogonion, B point, soft tissue pogonion, soft tissue B point, and lower lip were measured to evaluate skeletal and soft tissue changes. To measure changes in dental relations, the angle between the mandibular incisor and the HRL, overjet, and overbite were measured (Fig 1).

STATISTICAL ANALYSIS

Statistical analysis was performed using SPSS 18.0 (SPSS, Inc, Chicago, IL). Repeated-measures analysis of variance was performed to analyze changes in cephalometric measurements from T0 to T1 and T2. Post hoc analysis was performed using the Bonferroni method. A P value less than .05 was considered significant.

Results

This study included 9 men with an age range of 21 to 31 years (mean, 25.7 ± 2.9 yr) and 18 women with an age range of 20 to 34 years (mean, 26.6 ± 4.2 yr). Treatment time was 8.4 ± 1.5 months (Table 1).

MANDIBULAR SKELETAL CHANGES

Horizontally, the pogonion and B point showed significant posterior movement after surgery (5.52 ± 4.39 mm, P <.001; 6.79 ± 4.24 mm, P <.001, respectively). There were no significant anteroposterior changes of these landmarks during the postsurgical period (0.91 ± 2.04 mm, P = .088; 0.54 ± 1.82, P = .406, respectively). Vertically, the pogonion also showed superior movement after surgery (2.41 ± 3.39 mm, P = .003), without significant postsurgical changes (0.61 ± 1.59 mm, P = .177). The B point showed significant superior movement after surgery (2.27 ± 4.22 mm, P = .029) and during the postsurgical phase (1.24 ± 2.27 mm, P = .027). The distance from the condylion to the B point showed a significant decrease from T0 to T1 (7.54 ± 2.88 mm, P <.001), but was stable from T1 to T2 (0.01 ± 0.15 mm, P = 1; Table 2).