Skeletal and dental relapses after skeletal class III deformity correction surgery: single-jaw versus double-jaw procedures

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Objective. In this prospective comparative study, we looked at the postoperative dental and skeletal relapses in patients undergoing orthognathic surgery for skeletal class III deformity. The surgical interventions were single-jaw versus double-jaw procedures.

Study Design. Twenty-four adult patients with skeletal class III deformity presented with functional and esthetic problems. Patients were randomized to receive single- or double-jaw corrective surgery. The assessment of outcome was by lateral cephalograms taken at different intervals and postoperative complications.

Results. At 1 year after surgery, no significant correlation was identified between surgical advancement and relapse regarding maxillary stability. The single-jaw procedure cohort had a significantly greater horizontal mandibular skeletal relapse. No differences were noted when examining the mandibular vertical stability. None of the patients reported any acute local neurology.

Conclusions. Single-jaw procedure may lead to less stability, leading to skeletal relapse, than double-jaw procedure. A higher evidence-based study and larger cohort is required to prove this. (Oral Surg Oral Med Oral Pathol Oral Radiol 2013;115: 466-472)

The establishment of normal jaw function, acceptable facial esthetics, and long-term stability are the main goals of a successful orthognathic procedure. Unfortunately, even when applying the optimal surgical care, postoperative complications are sometimes unavoidable.

Complications include nerve injuries (indirect—compression by surgical edema—or direct—compression or cut or stretching during surgical manipulation), temporomandibular joint (TMJ) complications (fibrous ankylosis or hypomobility, condylar displacement or resorption, or cartilage damage), vascular complications (uncontrolled hemorrhage or even avascular necrosis causing tooth devitalization, periodontal injuries, or loss of bone segments), infection, and dental or skeletal relapse or both. Relapse is an unpredictable risk of orthognathic surgery.[1]

The technique that is widely used to correct mandibular prognathism is known as bilateral sagittal split ramus osteotomy (BSSO), which was introduced by Schuchard and modified by Dal Pont, Trauner and Obwegeser.[2] This technique alone or combined with maxillary osteotomy (known as bimaxillary osteotomy) is widely practiced worldwide.[3] Despite the broad experience with this procedure, relapse or movement of an anatomic point toward its presurgical position is not uncommon.[4]

It has been emphasized through many published studies that mandibular advancement appears to be stable, especially if the anterior facial height is increased or maintained. Relapses have been attributed to condylar positioning and proximal segment rotation, counterclockwise rotation of the distal segment, degree

Statement of Clinical Relevance

The published literature on the outcome (especially relapse) of single-versus double-jaw procedures is scarce. The authors conducted a prospective comparative study with the aim to provide some answers on which procedure leads to a more stable outcome.

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Table I. Patients' demographics, length of presurgical orthodontics, and degree of overjet and overbite

	Single-jaw cohort	*Double-jaw cohort*	*Both cohorts*	*P value*
Female	5	4	9	.23
Male	7	8	15	
Age at surgery (y)	23.8 ± 2.9	25.26 ± 3.76	24.53 ± 3.1	.51
Presurgical orthodontics (mo)	12.4 ± 6.4	16.2 ± 5.8	14.44 ± 5.2	.24
ANB (°)	−3.86 ± 2.06	−3.22 ± 2.43	−3.54 ± 2.25	.11
Overjet (mm)	−5.24 ± 1.83	−4.23 ± 3.2	4.73 ± 2.0	.61
Overbite (mm)	0.46 ± 0.75	1.01 ± 1.95	0.73 ± 1.31	.34

of mandibular advancement, and stretching of the pterygomasseteric sling and other soft tissues. It would be assumed that a setback surgery to the mandible is likely to be more stable; however, the inclination of the ramus at time of surgery could result in a relapse. The maxilla, on the other hand, can relapse after osteotomy depending on the magnitude of the anterior movement and inferior repositioning; however, not all studies reached this conclusion. In general, most of the published studies in the peer-reviewed literature suffer from small cohort size, short duration of follow-up (<10 years), and lack of true comparison between corrective surgical procedures.[1-21]

Since the introduction of BSSO, the stability of single-jaw versus double-jaw surgery has been studied.[1,5,6] However, comparative studies of skeletal relapse (not combined dental and skeletal relapses) after mandibular prognathism correction are scarce. Proffit et al.[4] reported that the postoperative change after combined mandibular setback and maxillary advancement (double-jaw) procedure is similar to, and no greater than, the changes seen in a single-jaw procedure after maxillary advancement or mandibular setback alone.

The aim of the present prospective comparative study was to evaluate mandibular stability after surgical correction of class III deformity in patients undergoing either single-jaw (mandibular setback) or double-jaw (mandibular setback and maxillary advancement) procedures. Assessment of injuries to the local nerves in the area and other complications were looked at following both procedures.

MATERIALS AND METHODS

The study involved 24 patients (15 male and 9 female; average age 24 years) who presented to the Maxillofacial Unit at Damascus Hospital complaining of facial and functional problems. All patients had class III dentofacial deformity. Medical and psychologic history was acquired from all patients. All patients underwent full oral and maxillofacial examination and were investigated with 2-dimensional radiographs (including cephalometric analysis) and clinical photography to assess their suitability for surgery and select the most appropriate course of action.

Inclusion criteria involved patients ≥18 years of age. The exclusion criteria involved patients with chin deviation, body dysmorphic disorder, known history of facial trauma or congenital deformities, and severe TMJ symptoms. The 24 patients were randomized into single-jaw surgery or double-jaw surgery cohorts according to an adaptive random assignment procedure that balanced treatment cohorts on the basis of degree of overjet and overbite. The protocol of this study was approved by the local hospital Committee for Research Ethics Concerning Human Subjects. Each of the participating patients signed an informed consent and was provided with a patient information sheet and contact details of the investigators. The minimum follow-up period postoperatively was 12 months, and postoperative radiographs were taken when appropriate.

Presurgical orthodontics included dental decompensation and application of surgical splint to ensure intercuspation. Postsurgical orthodontics was carried out to ensure dental alignment, consolidation, and coordination of the maxillary and mandibular arches. Patients' demographics, length of presurgical orthodontics, and degree of overjet and overbite are presented in Table I.

The single-jaw procedure cohort underwent BSSO, whereas the double-jaw procedure cohort had Le Fort I maxillary osteotomy and mandibular BSSO. The surgical procedures were performed under general anesthesia. For the double-jaw procedure cohort, the maxilla was moved upwards at the posterior nasal spine in some patients, and no downward movement was performed. The bony segments were fixed in the new position with the use of a monocortical plating system and intraoral approach (Leibinger; 2.0 mm diameter). We used 1 monocortical plate per side on the BSSO and 4 monocortical plates for the maxilla.

Postoperative recovery was uneventful, and all patients were discharged from hospital within a few days. Intermaxillary fixation (IMF; using elastic bands) was applied for a period of 2 weeks postoperatively to ensure appropriate dental correlation. Assessment of nerve injuries and other postoperative complications was carried out immediately after surgery and continuously assessed throughout the follow-up period. The aim for any area of anesthesia, paresthesia, or dyses-