

STABILITY OF THE SURGERY-ONLY ORTHOGNATHIC APPROACH IN CLASS III PATIENTS WITH MAXILLARY RETROGNATHIA

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Abstract: Introduction: The aim was to compare the stability of the surgery-only approach (SOA, indicating surgery without orthodontics) to the orthodontics-first approach (OFA; orthodontics followed by surgery) in patients with dentofacial deformities.

Methods: All ten patients who underwent SOA and 10 OFA were included. Cephalometric radiographs were taken before surgery (T0), and six months after SOA or OFA (T2). The actual maxillary movement was measured intraoperatively (T1). The difference between T2-T0 and T1 is accepted as relapse. Each cephalometric film was analyzed using specialized software and the stability of actual advancement was analyzed.

Results: Difference of relapse amount between SOA and OFA groups was statistically significant ($p = 0.016$).

Conclusion: Although the stability of SOA was less than OFA, the amount of advancement was higher in SOA.

Key words: orthognathic surgery, surgery only approach, orthodontics first approach.

INTRODUCTION

Skeletal disharmonies associated with severe malocclusion can be treated with orthognathic surgery. The classical treatment procedure, known as the orthodontics-first approach (OFA), has three stages: initial orthodontics, surgery, and final orthodontics. As the total duration of OFA treatment is long, patient cooperation may diminish during this time.

In the surgery-only approach (SOA), surgery is performed without orthodontics (1). At the initial examination, cast models are made and cephalometrics are

recorded. Occlusion is evaluated using the cast models. In cases where the model can be occluded acceptably with single- or multi-piece surgery and the patient refuses orthodontic treatment, orthognathic surgery without orthodontics becomes an option. This procedure (SOA) is classified in the surgery-first approach (SFA) that involves no orthodontic treatment pre- or postoperatively (2). Typically, patients who undergo SFA are older, have higher numbers of missing or restored teeth, and require only minor occlusal adjustments.

While the stability of other forms of SFA has been reported previously (3), the stability of SOA is unknown. This study aimed to compare the relapse amount between SOA and OFA.

MATERIALS AND METHODS

This retrospective study was carried out between April 2014 and April 2016 at the Oral and Maxillofacial Surgery Department at Medipol University, School of Dentistry. Ethics Committee approved the protocol and participants gave informed consent. All patients who underwent SOA during this period participated and ten control (OFA) patients were also randomly selected. The criteria for SOA were as follows: skeletal malocclusion with no need for orthodontic treatment, no craniofacial syndrome, no prior maxillofacial trauma, no previous maxillary surgery, and no evident physiologic problem. Cephalometric radiographs were taken before (T0) and six months after surgery (T2) in both groups. To measure the horizontal movement of the maxilla, we drew a line passing from the Nasion perpendicular to the SN plane. The distance of ANS to this line was noted. The difference between T2 and T0

radiograph noted as maxillary advancement amount (Figure 1). Maxillary linear surgical movement was also measured intraoperatively (T1) from two opposite points marked on osteotomy sites. Following maxillary down fracture and stabilization with miniplates, the horizontal distance was measured and noted as T1.

Statistical Analysis

Power analysis was done before data collection, and it was determined that a sample size of 10 patients per group yielded a power of 83%. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS for Windows, version 18.0, SPSS Inc., Chicago, USA). Differences between the noted measurements of the maxillary movement were evaluated between the SOA and OFA groups using Student's t-tests for independent samples. Significance was set at $p < 0.05$.

RESULTS

The SOA group comprised four men and six women of mean age 33,2 years. The OFA patients were five men and five women of mean age 30.4 years. The advancement amount of SOA group was larger than OFA group and relapse amount of OFA and SOA groups was statistically significant ($p < 0.05$) (Table 1).

In the present study, the amount of maxillary advancement in each patient was measured in the operation room. Mean value of advancement was 7.5 ± 1.6 mm for SOA group with $0.74 \text{ mm} \pm 0.19$ relapse and 3.5 ± 0.6 mm for OFA group with 0.08 ± 0.23 relapse.

Table 1. Comparison of maxillary movement recorded at the two timepoints in each group (values shown as mean \pm SD)

	n	Maxillary movement at T1	Maxillary movement at T2-T0	p
SOA group	10	7.5 ± 1.6	6.8 ± 1.5	0.006*
OFA group	10	3.5 ± 0.6	3.6 ± 0.5	0.730

SOA: surgery-only approach; OFA: orthodontics-first approach; T1: intraoperative; T2-T0:

* statistically significant

Table 2. Between-group comparison of the relapse difference in maxillary movement (values shown as mean \pm SD)

	n	Relapse Difference in maxillary movement	p
SOA group	10	0.74 ± 0.19	0.016*
OFA group	10	-0.08 ± 0.23	

SOA: surgery-only approach; OFA: orthodontics-first approach
* statistically significant

There was a statistically significant relapse between the SOA and SFA (Table 2).

DISCUSSION AND CONCLUSION

Surgery first approach has been becoming popular as a new treatment concept in the correction of dento-facial deformities. SOA approach that is included in surgery first approach is carried out when the patient has skeletal malocclusion, but unwilling orthodontic treatment, when the need for dental decompensation is low and the patient has acceptable occlusion (Figure 2 and 3). The main finding of this study was that the re-

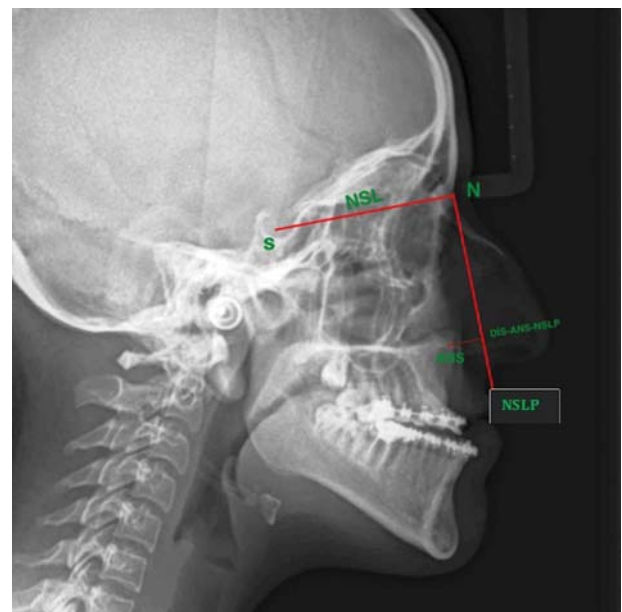


Figure 1. Anatomical landmarks and reference lines used for the cephalometric evaluation. S: sella; N: nasion; NSL: nasion-sella line; ANS: anterior nasal spine; NSLP: nasion-sella line perpendicular; Dis-ANS-NSLP: distance from ANS to NSLP



Figure 2. Pre-operative profile picture of a patient in SOA group



Figure 3. Post-operative profile picture of the patient in Figure 2

lapse amount in the SOA group was larger than the OFA group. In previous reports, acceptable postoperative relapse in the first year of Le Fort I osteotomy was reported as 'less than 2mm' (4). In our study, relapse amounts in both SOA and OFA group came accordance with previous reports.

There may be several reasons causing more relapse in the SOA group. One of them was the advancement amount in SOA is higher than OFA. Similar to our study's findings, Chen K.J. et al. (5) found a significant correlation between the amount of maxillary advancement and skeletal relapse. Another reason; intercuspation was not as good as in OFA. In the SOA group, less tubercle contact may be a potential risk for skeletal relapse. The relationship between skeletal stability and occlusal contact remains controversial in the literature. In previous studies, it was reported that occlusal contact was a risk factor for skeletal stability (6, 7). However, Lo S.H et al. (8) found no significant difference between skeletal relapse and occlusal contact.

Sažetak

STABILNOST SAMO HIRURŠKOG ORTOGNATSKOG PRISTUPA KOD PACIJENATA SA MAKSILARNOM RETROGNACIJOM III KLAŠE

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Uvod: Cilj ove studije bio je da se uporedi stabilnost samo hirurškog pristupa (SOA, koja indikuje hirurģiju bez ortodoncije) i inicijalno-ortodoncijskog pristupa (OFA, ortodoncija praćena hirurģskom intervencijom) kod pacijenata bez dentofacijalnih deformiteta.

In our study, we measured the real advancement amount of maxilla in the operating room. Because duration between removing intermaxillary fixation in operating room and the first postoperative cephalometric radiograph may affect the relapse amount of our study. Larsen et al. (9) stated that maxillary stability could be evaluated by knowing the amount of movement in orthognathic surgery operation.

SOA is the best treatment option for especially elderly patients who will undergo orthognathic surgery and unwilling to have fixed orthodontic appliances. Treatment duration in SOA only includes surgical procedure and aftercare period and minor occlusal grinding. In this study, the stability of SOA was less than OFA, but both of the groups showed sufficient stability. However, higher relapse rates should be considered in the planning of SOA and overcorrection may become an option in skeletal relapse. Within the limitation of this study, it can be concluded that in selected patients, SOA has many advantages with acceptable relapse and should be considered in treatment alternatives of orthognathic surgery patients. However, relapse should be evaluated in more extensive trials by correlating the results by the amount of movement.

Abbreviations

SOA — surgery-only approach

OFA — orthodontics-first approach

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Metod: Svih deset pacijenata koji su podvrgnuti SOA i 10 OFA su bili uključeni. Cefalometrijska radiografije su urađene pre hirurģije (T0) i 6 meseci nakon SOA i OFA (T2). Trenutna pokretljivost maksile je bila merena intraoperativno (T1). Razlika između T2-T0 i T1 su shvaćeni kao relapsi.

Svaki celfometrijski film je analiziran koristeći specijalizovani softver i analizirana je stabilnost aktuelnog napretka.

Rezultati: Razlika relapsa između SOA i OFA grupa su bile statistički značajne ($p = 0.016$).

Zaključak: Iako je stabilnost SOA manja od OFA, napredak je značajno viši kod SOA.

Cljučne reči: ortognacijska hirurgija, samo hirurški pristup, prvi pristup ortodonticije.

REFERENCES

1. Baek SH, Ahn HW, Kwon YH, Choi JY. Surgery-first approach in skeletal class III malocclusion treated with 2-jaw surgery: evaluation of surgical movement and postoperative orthodontic treatment. *J Craniofac Surg.* 2010; 21(2): 332–8.
2. Peiró-Guijarro MA., Guijarro-Martínez R., Hernández-Alfaro F. Surgery first in orthognathic surgery: A systematic review of the literature. *Am J Orthod Dentofacial Orthop.* 2016; 149(4): 448-62.
3. Choi JW, Lee JY, Yang SJ, Koh KS. The reliability of a surgery-first orthognathic approach without presurgical orthodontic treatment for skeletal class III dentofacial deformity. *Ann Plast Surg.* 2015; 74(3): 333-41.
4. Proffit WR, Phillips C, Prewitt JW, Turvey TA. Stability after surgical-orthodontic correction of skeletal Class III malocclusion. 2. Maxillary advancement. *Int J Adult Orthodon Orthognat Surg.* 1991; 6(2): 71-80.
5. Chen KJ, Chen YC, Cheng JH, Chen CM, Tseng YC. Factors related to skeletal relapse in the two-jaw surgery treatment of mandibular prognathism. *J Stomatol Oral Maxillofac Surg.* 2018; 119(2): 113–7.
6. Rhee CH, Choi YK, Kim YI, Kim SS, Park SB, Son WS. Correlation between skeletal and dental changes after mandibular setback surgery-first orthodontic treatment: Cone-beam computed tomography-generated half-cephalograms. *Korean J Orthod.* 2015; 45(2): 59–65.
7. Choi SH, Hwang CJ, Baik HS, Jung YS, Lee KJ. Stability of pre-orthodontic orthognathic surgery using intraoral vertical ramus osteotomy versus conventional treatment. *J Oral Maxillofac Surg.* 2016; 74(3): 610–9.
8. Lo SH, Chen YA, Yao CF, Liao YF, Chen YR. Is skeletal stability after bimaxillary surgery for skeletal class III deformity related to surgical occlusal contact?. *Int J Oral Maxillofac Surg.* 2019; 48(10): 1329–36.
9. Larsen AJ, Van Sickels JE, Thrash WJ. Postsurgical maxillary movement: a comparison study of bone plate and screw versus wire osseous fixation. *Am J Orthod Dentofacial Orthop.* 1989; 95(4): 334-43.

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