

Evaluation of Stability in Advancement Genioplasty: An 18-month Follow-up

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ABSTRACT

Statement of Problem: The main aim of advancement genioplasty is soft tissue and hard tissue stability which is important in improvement of the patients' aesthetics.

Purpose: The evaluation of the soft and hard tissue stability in advancement genioplasty was the aim of this study.

Materials and Method: The subjects in this study were 15 patients who presented with retrognathia. All of the 15 patients underwent advancement genioplasty alone to correct retrognathia. The soft and hard tissue pogonion in pre-operation, immediately post-operation, and 18 months after operation in two groups of 9 patients with genial advancement less than 7mm (means 5.22mm) and 6 patients with genial advancement equal or greater than 7mm (means 7.16mm) were assessed.

Results: After operation, no patient had infection or dehiscence and bone instability. In group 1 with advancement less than 7mm, hard tissue pogonion relapse was 0.60 ± 0.66 mm and soft tissue pogonion relapse was 1.55 ± 0.46 mm. In group 2 with advancement equal or more than 7mm, hard tissue pogonion relapse of 1.6 ± 0.46 mm and soft tissue pogonion relapse of 1.8 ± 0.68 mm were observed.

Conclusion: Advancement genioplasty is a predictable operation specially when using rigid fixation. In this study, the result of operation in an 18 month period was stable.

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Introduction

Genioplasty is defined as the osteotomy of the chin which changes the position of the chin in three dimensions. Genioplasty has become a single operation or adjunctive procedure to orthognathic surgery, rhinoplasty and rhytidectomy.

Advancement genioplasty has become a common

operation for improving retrognathia. The horizontal sliding osteotomy was first described by Hofer in 1942 [1]. He used an extraoral incision through which a horizontal osteotomy of the anterior half of the inferior border was completed. Following the advancement, transosseous sutures were used for stabilization

of the mobilized fragment. Trauner and Obwegeser [2] used the horizontal osteotomy through an intraoral incision with dissection of the anterior mandible. Stability of the final position of osteotomy segment is very important but after splitting of the chin segment and fixation, the perimandibular soft tissues (that is periosteum, ligaments, muscles, and submucosal tissues) tend to retain the segment in the original anatomic position. It is important to maintain the soft tissue attachment in the anterior and lingual side of the segment so that the soft tissue support and blood supply are maintained. Hinds and Kents [3] were the first to realize and discuss the importance of maintaining the soft tissue attachments along the inferior segment more and the role of these attachments in achieving the maximal soft tissue change. Rigid fixation improves the stability of osteotomy segment as compared to wire fixation. Kirkpatrick and Woods [4] showed a mean horizontal relaps of 8% after mandibular advancement with rigid fixation. Reyneke [5] et al compared the skeletal stability of wire and screw fixation after advancement genioplasty and demonstrated no difference between the two groups. Wittbjer and Rune [6] showed a soft-to-hard tissue ratio of 94%, with a mean relapse rate of 1mm, 3 years after advancement genioplasty. Several studies have addressed the outcomes after advancement genioplasty [7-8]. We studied soft and hard tissue stability in advancement genioplasty. In this study, the stability of advancement genioplasty during 18 months was evaluated.

Materials and Method

The subjects were 15 patients who presented with retrognathia. At the time of surgery, the age range of the patients was 18 to 32 years, with a mean of 24.1 years. All of the fifteen patients in this study underwent advancement genioplasty alone to correct retrognathia. Rigid internal fixation was achieved with mini-plats and screws. Operations were performed in one center with the same protocol. We maintained the soft tissue attachment in the inferior and lingual sides of

the osteotomy segment. The periosteum was left intact on the inferior border, and a minimum of 5 to 10mm of it was maintained in the midpoint of the anterior mandible so that the soft tissue support and blood supply were maintained [9]. The patients were studied in two subgroups of 9 patients with genial advancement less than 7mm (means 5.22mm) and 6 patients with genial advancement equal or more than 7mm (means 7.16mm).

For all the patients, lateral cephalograms were obtained to assess the skeletal and soft tissue changes before the operation, immediately after the operation, and 18 months after the operation. We assessed the change in the hard tissue and soft tissue pogonion to a point perpendicular to the horizontal line Sella-Nasion. Sella-Nasion line was determined, and the perpendicular line was drawn from sella-nasion line to a point [11]. Distances of hard and soft tissue pogonion were evaluated (Figure 1). For comparison of the hard and soft tissues in the two groups, Wilcoxon t.test was used.



Figure 1 Lateral cephalogram analysis: change in hard tissue and soft tissue pogonion to A point perpendicular to horizontal line sella-Nasion [11]

Results

After operation, no patient had infection or dehiscence and bone instability. In group 1 with advancement <7mm, hard tissue pogonion relapse was 0.66mm with a standard deviation (SD) of 0.66mm. Soft tissue pogonion relapse was 1.55 mm with a SD of 0.46mm (Figure 2).



Figure 2-A An 18-year old female view demonstrates retrognathic mandible **B** Postoperation view after advancement genioplasty

In group 2 with advancement ≥ 7 mm, hard tissue pogonion relapse of 1.16 mm with a SD 0.46 mm, soft tissue pogonion relapse was 1.8 mm with a SD of 0.68mm (Table 1). There was no significant difference between the two groups ($p = 0.53$). Also, in comparison of the soft tissue pogonion in the two groups, no significant difference was observed between the two groups ($p = 0.38$).

Table 1 Hard and soft tissue relapse in the study groups

Location	Advancement ≥ 7 mm	Advancement < 7 mm	P.value (wilcoxon Test)
Hard tissue pogonion	-1.16±0.44	-0.66±0.66	$p = 0.53$
Soft tissue pogonion	-1.8±0.68	-1.55±0.46	$p = 0.38$

Advancement genioplasty, therefore, requires an understanding of the stability of the postoperative skeletal position and the soft tissue response to the skeletal movement. The results indicated no relationship between the amount of advancement and long-term relapse in the hard and soft tissues after genioplasty. After 18 months, relapse in the pogonion of the hard and soft tissues was limited and these changes were clinically not significant. Advancement genioplasty is a predictable operation specially when using rigid fixation.

In our study, the result of the operation in an 18 month period was stable. A study by Brucal [10] et al. showed that a horizontal change at the pogonion of

less than 4mm was generally not recognized by more than one half of the lay groups. Orsinis et al. also showed at 1:1 change in soft tissue to hard tissue with a relapse of 1:0.94

Talebzadeh et al. [11] showed that the mean post-operative osseous tissue movement was 11.9 mm at the pogonion, with a mean soft tissue pogonion change of 8.9 mm and a 0.75:1 change of soft-to-hard tissue. They suggested that there was no significantly greater relapse for pogonion advancement more than 7mm, and no difference in the relapse rate for advancement genioplasty with various amounts of advancement was found. Shaughnessy et al. studied 21 patients with a mean surgical advancement at pogonion 8.4mm. The mean relapse at the pogonion was 8% of the surgical advancement in 3 years. They found no significant postoperative change at the pogonion.

Conclusion

Advancement genioplasty is a predictable operation, especially when using rigid fixation. In this study, the result of operation was stable during 18 months.

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