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Comparison of Changes of the Gonial Angle in 2 Methods: IVRO and BSSO

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Abstract: The gonial angle plays an important role in ensuring a harmonious facial profile. Changes in this angle especially after surgery may be an aesthetic concern for both the patient and the surgeon. The aim of the present study was to evaluate gonial angles changes after mandibular setback with the BSSO and IVRO techniques. Fifty eight patients with mandibular prognathism referred to zakaria and Emam hospitals were selected from 2004-2006. Patients with other deformities like discrepancy of both jawz which need mandibular setback more then 10 mm, asymmetry, vertical discrepancy syndroms were excluded. Patients were randomly divided into 2 groups. In first group mandibular setback was done with obwegeser technique and wire osteosynthesis with 4 weeks IMF in second group mandibular setback with IVRO technique with wire ostesynthesis with 4 weeks IMF were used. For all patients before the surgery (T_0) and one year after surgery (T_1) lateral cephalograms were obtained. Gonial angle and occlusal plan-SN in T_0 and T_1 was evaluated. After the surgery the gonial angle had decreased in all samples. Decrease in IVRO group was more then BSSO group. The average decrease in gonial angle in BSSO group was 2° and in IVRO group was 7° that significantly more than BSSO group ($p<0.05$).

Key words: Mandibular setback, gonial angle, BSSO, IVRO, discrepancy

INTRODUCTION

Orthognathic surgeries are performed in order to enhance the patient's function and aesthetic. Usually these surgeries improve balance and esthetic (Bell, 1992). Skeletal class III deformities caused by mandibular Prognathism, maxillary deficiency or combination of them (Epker, 1995). Class III skeletal problems,either mandibular prognathism or maxillary deficieny, do not respond to orthodontic camouflage and growth modification as well as does mandibular deficiency. Bilateral Sagittal Split Osteotmy (BSSO) and Intraoral Vertical Ramus Osteotomy (IVRO) techniques are common for correction of mandibular prognathism.

Many studies have been performed comparing these 2 techniques and both of them are supported.

IVRO technique is an acceptable way for correction of mandibular prognathism. It is easy and fast and esthetic of gonial angle is better than sagittal technique (Nicola *et al*., 2004; Michael *et al*., 2003; Glenda *et al*., 2005).

On the other hand, there are much more relapse in vertical osteotomy because of less bone contact. Sagittal osteotomy is useful for correction of most of the deformities and is commonly used in correction of mandibular prognathism (Epker, 1995).

From the esthetic point of view, the mandibular or gonial angle plays an important role in ensuring a harmonious Facial Profile (Claudio *et al*., 2005). In the last few years, esthetic Studies have become more and more important in the Planning of patients undergoing orthognathic Surgery (Arnettt and Bergmen, 1993). Xie and Ainamo (2004) concluded that elderly and edentulous subjects had larger gonial angles than did dentate Individuals. This fact suggests the employment of techniques other than BSSO In these patients.

Obwegeser, developed the BSSO technique and claimed that the gonial angle decreased during mandibular set back. Previous studies conducted to evaluate gonial angle changes and its relapse rate, it was concluded that the use of Obwegser's Setback techrique caused an increase in the gonial angle (Van Spronsen *et al*., 1997; Bell, 1992).

Singer and Bays (1985) and Gomes and Wisteh (1993) in different Surveys concluded that gonial angle increases with mandibular advancement.

Gu *et al*. (2003) evaluated the process of relapse after mandibular Setback Surgery by an analysis of the role of craniofacial morphology. They reported of 2.6° in gonial

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angle (Gu *et al*., 2003). The aim of this study is evaluation of gonial angle's changes following mandibular setback in BSSO and IVRO techniques using lateral cephalometry.

MATERIALS AND METHODS

All patients with mandibular prognathism who refered to Zakaria and Emam hospitals. In 2004-2006 and accepted the concent in participating in the study, had formed the examinated Community. Sixty four patients had been choosen.

Patients with other deformities like discrepancy of both jaws which needs mandibular setback more than 10 mm, assymetry, vertical discrepancy, syndroms were excluded. Patients were randomly divided into 2 groups.

In first group mandibular Set back was done with Qbwegeser technique (Fig. 1) and wireosteosynthesis in upper border with 4 weeks IMF were used. In second group mandibular setback with IVRO technique (Fig. 2) with wireosteosynthesis and 4 weeks IMF were used.

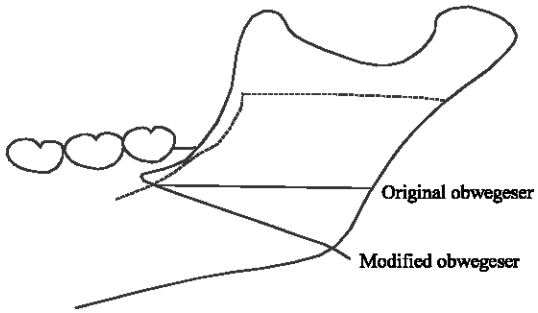

Fig. 1: Obwegeser technique

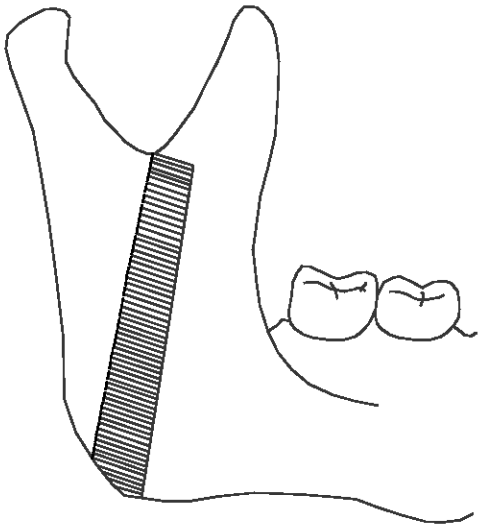

Fig. 2: Intraoral vertical ramus osteotomy

For all patients before the surgery (T_0) and one year after surgery (T_1), lateral cephalograms were obtained. All radiographs analysis had been done by one dentist. Gonial angle and occlusal plan-SN plan in T_0 and T_1 was evaluated.

RESULTS

The study group consisted of 58 patients between ages 18-35 with the average of 34. 29 patients were in first group and 29 patients in second group. The average gonial angle in first group before the Surgery was 136±5 and the average gonial angle in the second group before the surgery was 134±5°. The gonial angle in females were about 4° more than males which was significant from the statistical point of view ($p<0.05$).

After the surgery the gonial angle had decreased in all Samples. The average gonial angle in first group one year after the surgery (T_1) was 134±5° which was significantly decreased comparing T_0 ($p<0.05$). In second group in T_1, the average gonial angle was 127±5 with a significant decrease comparing T_0 ($p<0.05$). Decrease In vertical osteotomy group was more than Sagittal osteotomy group. The average decrease in gonial angle in first group was 2.13° and in second group was 7.37°.

Decrease in gonial angle in vertical group was significantly more than first group. The average occlusal plan-SN angle in first group before the surgery was 14±2° and in second group was 15°2°. The change of occlusal plan angle in T_1 in 2 groups comparing T_0 was not significant.

DISCUSSION

Gonial angle decrease was observed in the present study. Following mandibular setback using the methods, IVRO and BSSO that this decrease in IVRO was significantly more. The change in occlusal plan-SN angle wasn't significant.

Gu *et al*. (2003) performed Sagittal split ramus osteotomies on 62 patients and showed a 2.6° reduction in the gonial angle which was less than that achived in the current investigation.

In Claudio *et al*. (2005) study, which simultaneous surgery on two jaws and simultaneous clockwise rotation of ANS-PNS was operated, increase in gonial angle was concluded. According to clock wise rotation of maxilla and mandible, increase of gonial angle was predictable (Claudio *et al*., 2005). Gomes and Wisteh (1993) in their study on 45 patients with mandibular retrognathia showed that after the BSSO, clock wise rotation of anterior segment can cause increase in gonial angle.

Gungor *et al*. (2007) compared right and left gonial angle's and showed that there is no difference in right and left gonial angle's. Yanikoglu and Yilmaz (2008) studied on 20 patients and showed that by teeth extraction the gonial angle increases.

This study showed that in choosing a technique on patients with increased gonial angle, it's better to use IVRO technique. In jonsson's study, increase in gonial angle was reported in BSSO, so that, they suggested vertical technique for setback. Against their research, the present study shows the decrease in gonial angle. This difference may be because of the difference in IMF period or because of different sample size or internal derangement in joints (Jonsson *et al*., 1981). In Alhaija (2005) study, strong corelation was expressed among gonial angles in panaromic radiograph and lateral cephalogram.

In this study, we used lateral cephalogram. Larger gonial angle was seen in females before the surgery such as vansponsen's study. This study shows that in patients with larger gonial angle, IVRO technique can be used in mandibular setback for more esthetic results.

CONCLUSION

Gonial angle decrease was observed in the present study following mandibular setback using the IVRO and BSSO that this decrease in IVRO was significantly more. This study showed that in choosing a technique on patients with increased gonial angle. It 's better to use IVRO technique.

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