

Surgical correction of mandibular prognathism: A clinical study

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One hundred and seventeen cases of mandibular prognathism underwent surgical correction in our clinic between the years of 1983 and 1990. Sixty patient could be followed up and were studied with regard to the results of surgical procedures.

Forty six cases underwent extra-oral vertical ramus osteotomy (EVRO) and 14 cases had sagittal split ramus osteotomy (SSRO). The diagnosis of prognathism was confirmed by the cephalometric studies and the plaster models. Lateral caphalograms were taken again 12 months following the operation.

In conclusion; it is likely that both methods can be successfully applied, but the details in the pre-operative planning and the operative technique should be kept in mind to minimize the morbidity and to obtain a Junctional and cosmetic result.. [Turk J Med Res 1992,10(2): 100-104]

Key Words: Mandibular prognathism, extra-oral vertical ramus osteotomy, sagittal split ramus osteotomy

The surgical treatment of mandibular prognathism is to obtain a stable functional occlusion and correct the total facial appearance.

Mandibular prognathism can be hereditary or due to trauma or disease. Underdevelopment of the maxilla can be associated in varying degrees with mandibular defonnity (1).

Two frequently used operations for correction of pure mandibular prognathism is well described and utilized; extra-oral vertical ramus osteotomy and sagittal split ramus osteotomy (1,2).

The aim of this study is to compare the skeletal changes that result from these two surgical procedures and to relate the predicted changes of each procedure to the pre-operative situation.

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MATERIALS AND METHODS

One hundred seventeen patients were operated with the diagnosis of mandibular prognathism from 1983 to 1990. Sixty of them could be followed up in terms of the clinical appearance and the changes in the cephalometric tracings.

The diagnosis of the mandibular prognathism was made on the basis of the cephalometric studies and the plaster models pre-operatively. The panorex graphs as well as the anterior and the profile photographs of the patients were obtained.

The group who underwent extra-oral vertical ramus osteotomy (EVRO-Group) consisted of 25 females (54.35%) and 21 males (45.65%). Patients in whom sagittal split ramus osteotomy were performed (SSRO-Group) consisted of 10 females (71.43%) and 4 males (28.57%). The ages of all the patients were between 17 and 28. Pre-operative orthodontic treatment was applied to 12 cases in the EVRO-Group and 5 cases in the SSRO-Group.

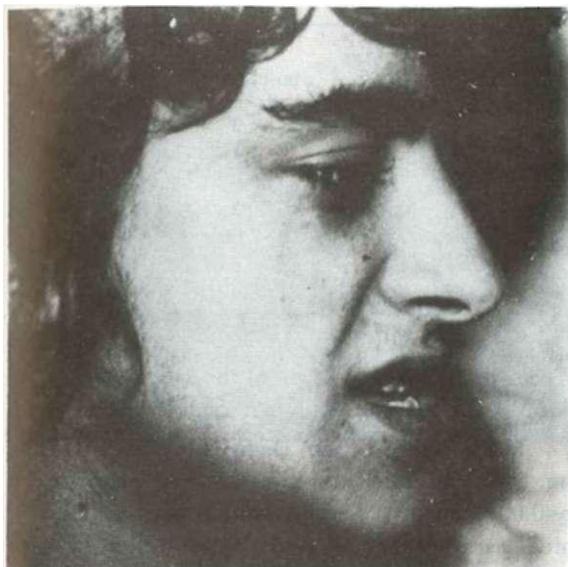


Figure 1. Preoperative photograph of a mandibular prognathism which operated by EVSO in our clinic.



Figure 2. The postoperative photograph of the same case after EVSO.

Extra-oral vertical osteotomy of the ramus was performed through the Risdon approach, getting to the ramus of the mandible by protecting the mandibular branch of the facial nerve and cutting the bone all the way from the sigmoid notch down to the angle area.

Sagittal splitting of the mandibular ramus was accomplished by means of a lingual cortical cut

extending the full width of the ramus and a buccal cortical cut directed toward the angle region.

Prophylactic antibiotics were not given to any of the patients. Intermaxillary fixation was used in all patients for a period of 6 weeks. No skeletal fixation or an inter-occlusal acrylic wafer were used for fixation. The patients were discharged between the 3rd and 7th post-operative days and in the EVRO-Group the sutures were removed on the 5th to 6th days.

All the patients were followed up by clinical examinations at 1.3 and 6 weeks after the release of the fixation and 12 months after the operation. At the examination; the subjective complaints of the patients, the tissue reaction and scar appearance at the operation site, the sensory changes in the perioral soft tissues, the activity of the muscles of expression and the occlusion of the teeth were recorded. Radiographic examination with lateral cephalogram was performed 12 months post-operatively with changes in SNA and SNB angles respectively. The changes in the degrees of SNA angle (S=sella, N=nasion, A=subspinale) and SNB angle (S=sella, N=nasion, B=supramentale) were compared statistically utilizing the student's t test in both group. Mean values and standard deviation of the pre-operative and one year post-surgical SNA and SNB angles were calculated. The extent of displacement of the lower jaw was measured via the change in degrees in the SNB angle on superimposed tracings of the cephalograms.

RESULTS

The mean complaints of the patients with mandibular prognathism were mostly cosmetic appearance (88.33%), difficulty in eating (58.33%) and speaking (11.67%).

In the EVRO-Group, changes in the degrees in the SBN angle were statistically significant ($p < 0.001$, $Sd = 45$). Skeletal relapse occurred in one case. There was no extensive bleeding in any of the patients and intra-operative hemorrhages could be controlled by tamponade. Damage to the marginal mandibular nerve was seen in four patients in the EVRO-Group (8.69%). The return of the function of the nerve was observed in all the cases within five months. Post-operative oedema was present in almost all of the patients, but none of them required medical treatment. There wasn't any difficulty in

Table 1. Complications in EVRO-Group and SSRO-Group

Complications	EVRO		SSRO	
	no of patients		no of patients	
Bleeding	—	—	3	21.43
Serious oedema	—	—	1	7.14
Infection	—	—	—	—
Unwanted fracture	—	—	2	14.28
Temporary nerve damage	4	8.69	13	92.86
Permanent nerve damage	—	—	8	57.14
Relapse	1	2.17	4	28.57

obtaining the described retropositioning of the mandible during surgery. Dental occlusion was satisfactory in all the patients all through the post-operative period. The cutaneous scar was not noticeable when the incision was properly placed and the patients



Figure 3. A case with mandibular prognathism plus anterior open bite deformity.

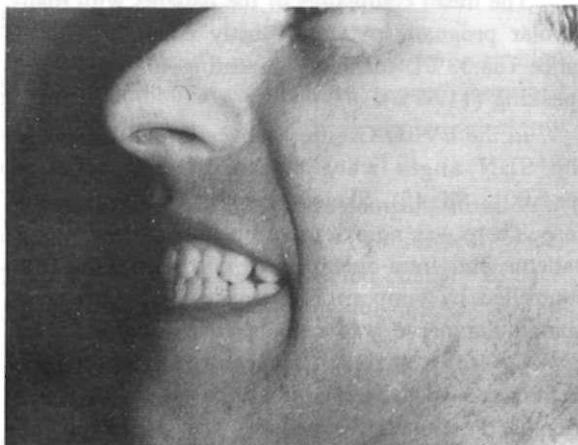


Figure 4. Same case after SSRO.

were satisfied with the sight of the scar within three months following the operation (Table 1).

In the SSRO-Group, changes in the degrees in the SNB angle were statistically significant ($p < 0.001$, $Sd = 13$). Serious hemorrhage occurred in three cases but they all could be controlled by tamponade and none of the required blood transfusion post-operatively. There was one case with a post-operative respiratory problem which necessitated the release of the ramus unilaterally. There were four cases which had skeletal relapse (28.57%). Temporary nerve damage occurred in 13 cases (8 bilaterally) and permanent nerve damage in 8 cases (3 bilaterally). Sensory recovery occurred within 8 to 12 months in patients with temporary nerve damage.

In both groups, extrusion of frontal teeth occurred when rubber bands were applied on the incisors during the period of interdental fixation. As would be expected, there were not any significant changes in the values of the degrees in the SNA angles. In all cases the aesthetic improvement produced by either extra-oral vertical ramus osteotomy or sagittal split ramus osteotomy method was satisfactory. The patients were pleased with the surgical results, both functionally and cosmetically.

DISCUSSION

In a comparative study it is important to use groups which may be samples from the same population. In this study there was a close resemblance between the patient groups with regard to age, sex and cephalometric characteristics (3). The application of the orthodontic treatment was of similar extent in both our groups. Thus main difference between the group was the type of surgical approach. Differences found between the groups may therefore be ascribed to the surgical procedure.

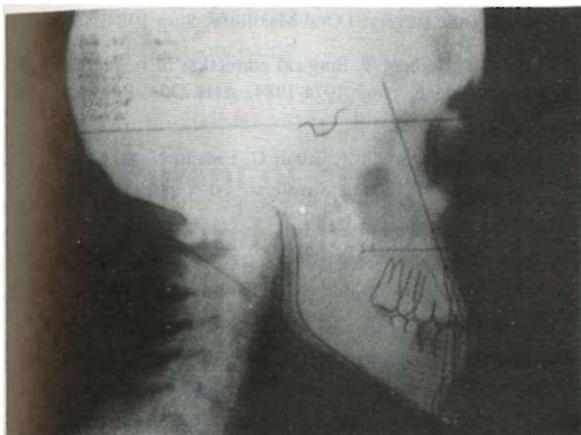


Figure 5. Cephalometric analysis of a prognathic patient.

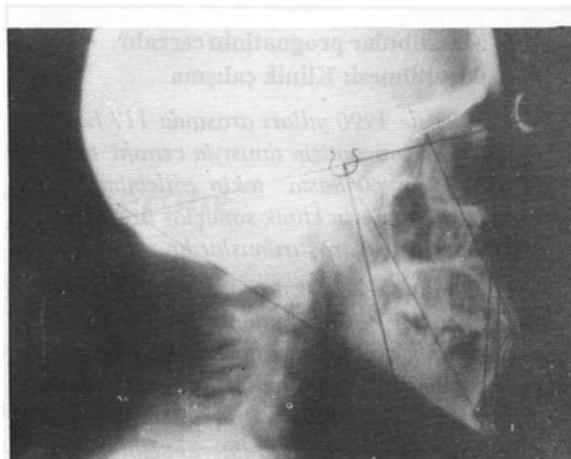


Figure 6. Cephalometric analysis of same case after F.VSO.

Proper timing of the operation is essential and correction of the mandibular prognathism should be delayed until the adolescent mandibular growth spurt is passed (1,4). Our cases were all treated accordingly.

Pre-operative and post-operative orthodontic treatment is essential in the treatment of prognathism. On the other hand, orthodontic treatment produces changes in the relation and form of the dentoalveolar segment of the jaw, but it does not significantly influence the position and shape of the skeletal structures (1).

The dominant complaints of patients with mandibular prognathism were similar to the ones in the literature (1). In spite of some authors recommending the use of rigid fixation of the fragments and decortication procedure, to prevent the relapse, we have not accomplished any of the above procedures (5). It is emphasized that the prophylactic use of antibiotics is unnecessary in the orthognathic surgery and we have not used any antibiotics (6,7).

Interdental fixation for 6 weeks is said to be sufficient for the healing of the bone fragments in mandibular osteotomies (8,9,10,11). We utilized this type of immobilization without any other routes of fixation in all of our cases.

Complications associated with EVRO are not as significant as the ones encountered in SSRO technique (2,12,13). Injury to the marginal mandibular branch of the facial nerve is always a possibility (4,15) and we had four such cases (8.69%) with

temporary damage. Post-operative cephalometric studies show an anterior movement of pogonion of 1 to 3 mm in patients who had undergone EVRO method (9) and our findings were consistent with these results, except one case who turned up with a significant relapse in our EVRO-Group.

SSRO is indicated if two dimensional (antero-posterior and vertical) movement is required for correction of mandibular prognathism and we ended up with good occlusion of the teeth in our SSRO-Group where it was easy to manipulate the cut fragments as described by the authors (2,16,17,18,19). Permanent nerve injury is one of the major drawbacks of this method (1,13,18) and we had 8 patients who had such sensory disturbance. Facial palsy following SSRO is rare and is generally temporary (20). Relapse rate after SSRO technique is approximately the same as that observed after EVRO technique (15). We observed more relapse in our SSRO-Group compared to EVRO-Group (2.17% vs 28.57%).

This study does not reveal any significant difference between the results of osteotomies made (EVRO versus SSRO). The choice between the two methods described in this study is mainly by the surgeon's wish for good visibility and greater possibility of manipulating the fragments. Time consumed during the operation, possibility of nerve damage, adequate instrumentation and avoidance of an extra-oral scar may be factors influencing the choice of the surgeon.

Mandibular prognatinin cerrahi düzeltilmesi: Klinik çalışma

1983 ile 1990 yılları arasında 117 hasta mandibularprognatiztn tanısıyla cerrahi tedavi görmüştür. 60 hasta takip edilebilmiş ve cerrahi girişimlerin klinik sonuçlar üzerindeki etkisini tesbit için araştırılmışlardır.

Kırkaltı vakada ekstra-oralvertikal ramus osteotomisi (EVRO) uygulanırken, 14 vakada sagittal split ramus osteotomisi (SSRO) gerçekleştirilmiştir. Mandibular prognati tanısı sefalometrik çalışmalar ve alçı modellerle konulmuştur. Oniki ay sonra lateral sefalogramlar tekrarlanmıştır.

Sonuç olarak; her iki cerrahi metod başarıyla uygulanabilmekte, fakat pre-operatif planlama ve operatifteknikteki detaylar morbiditeyi en azda tutmak, fonksiyonel ve kozmetik bir sonuç olmak için göz önünde tutulmalıdır. [Türk Tıp Araştırma 1992,10(2): 100-104]

Anahtar Kelimeler: Mandibular prognati, ekstra-oral vertikal ramus osteotomisi, sagittal split ramus osteotomisi

REFERENCES

1. McCarthy JG. Surgery of the jaws. In Plastic Surgery Vol 2, Philadelphia, WB Saunders Co 1990; 1188.
2. Wang JH, Waite DE. Vertical osteotomy vs. sagittal splitli osteotomy of the mandibular ramus: Comparison of operative and post-operative factors. J Oral Surg 1975; 33:596.
3. Nystrom E, Rosengvits J, Astrand P, Nordin T. Intraoral or extraoral approach in the oblique sliding osteotomy of the mandibular ramus. A cephalometric study. J Max Fac Surg 1984; 12:239.
4. Wist PJ, Isaksen TS. Changes in the vertical position of die anterior teeth after surgicval correction of mandibular protrusion. Am J Orthod 1980; 77:174.
5. Reitzig M. Cortex to cortex healing after mandibular osteotomy. J Oral Maxillofac Surg 1983; 41:658.
6. Ruggles ER, Harm JR. Antibiotic prophylaxis in intraoral or thognatic surgery. J Oral Maxillofac Surg 1984; 45:87.
7. Tomes K, Lyberg T. Surgical correction of mandibular prognathism in Norway 1974-1984. Acta Odotal Scand 1987; 45:87.
8. Görgün B, Hyiroğlu T, Tufan G, Enünlü N, Uğur T. Çene-lerde açık kapanış defonnitesi. İst Tıp Fak Mec 1981; 44:504.
9. Bell WH, Proffit WR, White RP. Surgical correction of dentofacial deformities. WB Saunders Co, Philadelphia 1980; 104.
10. Parker MG, Lehman JA, Martin DE. Mandibular prognathism. Clin Plast Surg 1989; 16:4.
11. Smith JW, Aston SJ. Surgery of the jaws. Wolfe SA(e-4). In Plastic Surgery. Boston, Little Brown Co, 1991; 227.
12. Behrman S. Complications associated with orthognathic surgery, in Irby W (Ed): Current advances in oral surgery. St Lous CV Mosby Co 1974; 109.
13. Behrman S. Complications of sagittal osteotomy of the mandibular ramus. J Oral Surg 1972; 30:554.
14. Astrand P, Berglinjung L, Nord PG. Oblique sliding osteotomy of the mandibular rami. In 55 patients with mandibular prognathism, hit J Oral Surg 1973; 2:89.
15. Egyedi P, Huowing M, Juten E. The oblique subcondylar osteotomy: Report of results of 100 cases. J Oral Surg 1981; 31:871.
16. Mason RM, Georgiade NG. Facial osteotomies. In Georgiade NG, Georgiade GS, Riefkohl R, Barwick MJ (Eds). Essentials of plastic maxillofacial and reconstnctive surgery. Baltimore, Williams and Wilkins Co 1987; 332-40.
17. Broadbert R, Woolf R. Our experience with sagittal split osteotomy for retrognathia. Plast Rec Surg 1977; 99:860.
18. Gurnsey L, DeChamplain R. Sequelae and complications of the intraoral sagittal osteotomy in the mandibular rami. Oral Surg 1971; 32:176.
19. Mcintosh R. Experience with the sagittal osteotomy of the mandibular ramus. A 13 year review. J Maxillofac Surg 1981; 8:151.
20. Karabouta I, Martis C. Facial paresia following sagittal split osteotomy. Oral Surg 1984; 57:600.