

Modified intra-oral subcondylar osteotomy with short term immobilization at mandibular setback

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Abstract

Aim: The BSSO is an excellent operation for a mandibular setback. Beyond 7-8 mm of posterior repositioning of the mandible with a BSSO is difficult, and consideration should be given to an inverted L osteotomy or intraoral vertical ramus osteotomy (IVRO). Currently the period of immobilization ranges between 7-21 days following the release of IMF, guiding elastics should be used to direct the mandible to maximal intercuspation.

Materials and Methods: This study implied a 1 year follow-up on a group of 40 patients, who had undergone modified subcondylar osteotomy for mandibular setback. Relapse is measured as the distance from Sn perpendicular to Pog at the lateral cephalogram preoperative, one week, and one year postoperatively.

Conclusion: Modified intra-oral subcondylar osteotomy with short term immobilization appeared to be a relatively safe and reliable procedure.

The mean skeletal horizontal relapse at Pog of the whole group, after one year was 0.6mm and neurosensory disturbance (NSD) incidence after 6 months was 2.5%.

Keywords: Subcondylar Osteotomy, Immobilization, Mandibular, Set-back

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Surgery of the mandibular ramus for mandibular deformity has been performed since the early 1900s.¹ At the present time, access to the ramus is via a trans-oral approach such as SSRO, IVRO almost exclusively.¹ Beyond 7-8 mm, posterior repositioning of the mandible with a BSSO is difficult and consideration should be given to an inverted L osteotomy or intra-oral vertical ramus osteotomy (IVRO).¹

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Minor asymmetries can easily be managed with a BSSO. If a large asymmetry is present, an inverted L osteotomy or IVRO may be preferable, to the sagittal split osteotomy.¹ Unlike fractures of other bones, the exact anatomic re-approximation of the fracture segments may not be absolutely essential.² Currently the period of immobilization ranges between 7 to 21 days. Following the release of IMF, guiding elastics should be used to direct the mandible to maximal intercuspation.²

The most common reported complications for the ramus osteotomy are nerve injury, bleeding, relapse and TMJ dysfunction.¹

The SSRO-related nerve injury is reported greater than 20%, the incidence of permanent inferior or long buccal nerve injury following IVRO is between 1% to 8%.¹ If the inferior

osteotomy at IVRO extends to the angle or higher on the posterior border, an inadequate amount of muscle attachment usually remains on the condylar sag following retrusion.¹ In a study by Tornes there was no significant correlation between postoperative stability and length of osteotomy and it seems that length of osteotomy is not an important factor in postoperative stability.³

The aim of this study was to assess postoperative relapse and neuro-sensory disturbance of modified sub-condylar osteotomy which is a method of managing condylar fractures. Thus, immobilization duration will be maximally two weeks and followed up by elastic therapy.

Material and methods

This study implied a 1 year follow-up on a group of 40 patients, who had undergone modified sub-condylar osteotomy for mandibular setback.

The degree of relapse was measured as the distance from Sn perpendicular to Pog at lateral cephalogram preoperatively, one week, and one year postoperatively. Incidence of neuro-sensory disturbance one year postoperatively has been evaluated by a questionnaire.

Patients

The sample comprised 40 skeletal class III patients (28 female and 12 male) who had following preoperative criteria:

- 1) No more than 12 mm jaw relation discrepancy.
- 2) No anterior vertical open bite.
- 3) All of the operations were done after the end of growth age.
- 4) Pre and postoperative orthodontic treatment with fixed appliances.
- 5) All of the operations were only mandibular setback without genioplasty.

Surgical technique

Procedure of modified subcondylar osteotomy are as follows:

- 1) complete exposure of lateral surface of the ramus.
- 2) Pterygomasseteric sling detachment.
- 3) Hump reduction.
- 4) Decortication and lining of osteotomy pathway.
- 5) Osteotomy of upper 2/3 bicortically.
- 6) Lower 1/3 splitting.

Evaluation of postoperative relapse and neuro-sensory disturbance

a) Relapse

The distance from Sn perpendicular to Pog at lateral cephalogram is measured preoperatively, one week and one year postoperatively.

Mandibular set-back surgery has no effect on the sub-nasale or the tissue superior to the subnasale.¹

b) Neuro-sensory disturbance (NSD)

A questionnaire was designed on the basis of patients own subjective probable complaints. The questions were about presence or absence of NSD, and if present, about site, severity, time duration of NSD and anatomical distribution and probable problems due to NSD. Finally a question about overall satisfaction of the operation.

This questionnaire completed by the patients at least 1 year after operation.

Results

1) Relapse

The mean setback was 8.9 mm one week postoperatively and after one year it was 8.3 mm and represents a mean relapse of 0.6 mm (7%) of total setback. (Tables 1-4)(Figures 1-4)

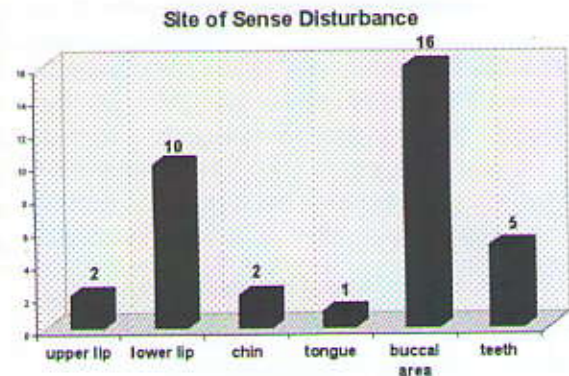


Figure 1: Site of Sense disturbance

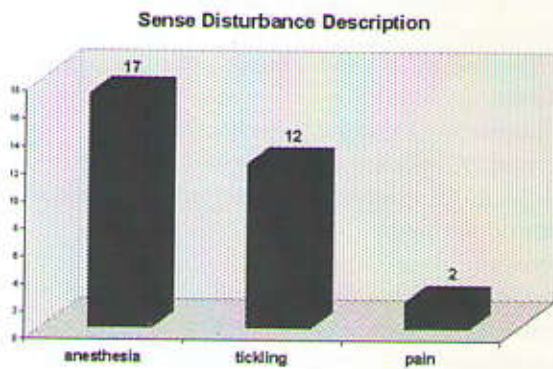


Figure 2: Sense disturbance description.

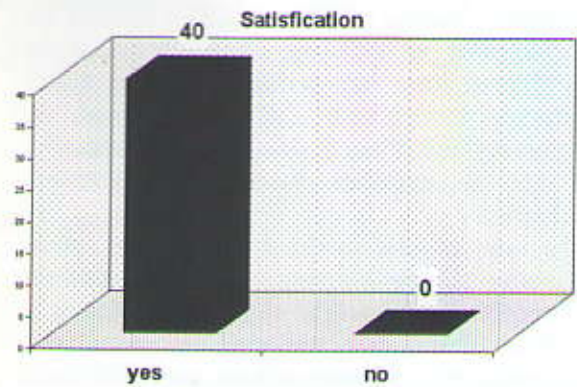


Figure 4: Patient satisfaction after surgery.

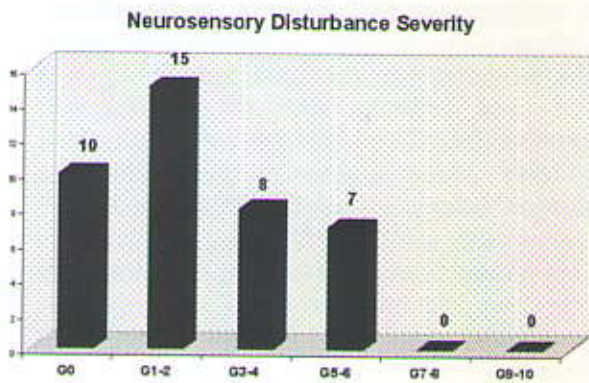


Figure 3: Neuro-sensory disturbance Severity.

	Mean	N	Std.Deriation	Mean Std. Error
Pair1 PRE.OP	-6.65	40	6.803	1.075
POST.OP	-15.55	40	6.456	1.020
Pair2 POST.OP	-15.55	40	6.456	1.020
ONE.YAER	-15.02	40	6.458	1.201
Pair3 PRE.OP	-6.65	40	6.803	1.075
ONE.YAER	-15.02	40	6.458	1.021

Table 1: Paired samples Statistics

	N	Correlation	Sig
Pair1 PRE.OP& POST.OP	40	.885	.000
Pair2 POST.OP& ONE.YAER	40	.996	.000
Pair3 PRE.OP& ONE.YAER	40	.891	.000

Table 2: Paired Samples Correlations

	Paired Differences				
	Mean	Std. Deriation	Std. Error Mean	95% Confidence Interval of the Difference	
				Lower Upper	
Pair1 PRE.OP- POST.OP	8.9000 -.5250	3.20096 .55412	.50612 .08761	7.8763 -7.022	9.9237 -3.478
Pair2 POST.OP- ONE.YAER	8.3750	3.11067	.49184	7.3802	9.3698
Pair3 PRE.OP- ONE.YAER					

Table 3: Paired Samples t-Test

	t	Df	Sig.(2-tailed)
Pair1 PRE.OP- POST.OP	17.585	39	.000
Pair2 POST.OP- ONE.YAER	-5.992	39	.000
Pair3 PRE.OP- ONE.YAER	17.028	39	.000

Table4: Paired Samples t-Test

2) Neuro-sensory disturbance (NSD)

Twenty five percent of the patients (n=10) reported no NSD. 40% (n=15) described the NSD severity as mild and 20% (n=8) as mild to moderate. 17.5 % (n=7) of patients complained of moderate NSD (G5 -6) and no patient described his disturbance as moderate to severe or severe.

Thirty two patients (%80) had no NSD after one month and 7(17.5%) regained their neuro-sensory function before 6 months, In only 1(2.5 %) of them the NSD lasted for more than 6 months but not more than 12 months.

The most common anatomic site of NSD was in buccal area. The most type of NSD was anaesthesia and the most of patients' problem was at touching. Regarding patient satisfaction, 100% were satisfied.

Discussion

Although the BSSO is the most widely used surgical procedure in the mandibular setback, relatively few articles have addressed its stability.⁴ Reviews on the stability of mandibular setback by BSSO reveal relapse percentages from 7.1% to 47.3% which increases up to 9.8% to 51.4% when using wire fixation and rigid internal fixations.⁴

Mobarak et al found that about one third of the patients, fixed with bicortical screws, showed an anterior post operative movement of 2 mm or more at pog.⁵

Several authors have described a subcondylar osteotomy, including only the condyle and a small portion of the neck, as a complication of the VRO.⁶

The short osteotomy may result in significant rotation and displacement of the proximal segment. This is a well-known phenomenon but seems to disagree with the experience of Wad and colleagues almost 40 years ago, for TMD treatment.⁶

According to Hogevoold et al, in 42 patients who were operated up using the extra-oral subcondylar oblique ramus osteotomy and plate fixation, the mean anterior relapse in a 6-months-follow-up period was 0.5 mm, representing 9% of the surgical setback.⁷

In our study mean skeletal relapse after one year post-operation was 0.6 mm and 7% of mean total set back neuro-sensory disturbance after sagittal split osteotomy remains which is the main drawback of this operation with an incidence ranging from 9% to 86.6 % objectively and 100% subjectively. The result of NSD obtained by questionnaires and records differed indicating a disagreement between the judgment of the surgeon and patient's opinion.

In a study by Westermarck et al, more sophisticated methods, such as light touch thresholds using monofilaments and thermal thresholds, were compared with subjective sensitivity scores. They found a positive correlation between subjective evaluation and objective assessment of the sensitivity of the lower lip.⁸

We therefore believe that the method of choice for evaluation in this study is satisfactory. According to Al-Bishri, NSD was described as mild in 97% of the affected patients in the IVRO group and no patient described his disturbance as moderate to severe or severe.

In our study, buccal area is the most common site of NSD, due to long buccal nerve injury during intra oral vestibular incision.

In the Al-Bishri study, only one patient (2%) was not satisfied in the IVRO group who was not affected by NSD but due to functional reason. Regarding patient satisfaction, 98% of the IVRO and 91% of the SSO patient were satisfied. In our study, patient satisfaction was 100%.

In our study long lasting NSD after 6 months was 2.5% and 1 year postoperatively 0%. Neuro-sensory deficit following a BSSO is usually bilateral.¹

Raveh and others reported an immediate neuro-sensory deficit of 97%. At 1 month 55% patients still reported some degree of paresthesia which further reduced to 12.5% at 1 year.

Conclusion:

Modified intraoral sub-condylar osteotomy with short term immobilization appeared to be a relatively safe and reliable procedure giving rise to adequate result and a high degree of patients' satisfaction.

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