ORIGINAL ARTICLE

CHANGE IN CONDYLAN POSITION AND SKELETAL STABILITY ASSESSMENT FOLLOWING BSSO FOR MANDIBULAR SET BACK
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ABSTRACT: Change in condylar position following mandibular bilateral sagittal split osteotomy (BSSO) has been implicated as an important factor in the appearance of immediate postoperative relapse during rigid fixation. It has been suggested that the control of the condylar segment following BSSO is the most important aspect in preventing relapse. The study was done to evaluate changes in position of condyle taken with lateral and frontal cephalograms with 20 patients were assessed, 10 male and 10 female patients were divided as group 1 and group 2. Patients undergoing sagittal split ramus osteotomy for mandibular set back were selected; radiographs before operation/surgery, immediately after surgery, 3 months and 6 months post-surgery. Differences between groups were measured by PAIRED 'T' TEST and time dependent changes in cephalometric measurements were examined by FISCHERS TEST. The present study results conclude significant difference occurring in both proximal and distal segment including condyle. Occlusal stability and skeletal stability also maintained post operatively

KEYWORDS: Bilateral sagittal split osteotomy, Condylar sag, Frontal and lateral cephalogram.

INTRODUCTION: Change in condylar position following mandibular bilateral sagittal split osteotomy (BSSO) have been implicated as an important factor in the appearance of immediate postoperative relapse during rigid fixation. Positional changes in the condyle are difficult to identify and even harder to predict following orthognathic surgery. It is evident that orthognathic surgery involves complex positional changes that need to be assessed in a systematic manner.

Displacement of the condyle can be expected as a result of 4 variables: anterior-posterior, vertical, angulation change and along the long axis of the condyle.

It has been suggested that the control of the condylar segment following BSSO is the most important aspect in preventing relapse.

Change in the occlusion as an immediate or late occurs due to condylar sag. Condylar sag is said to be due to change in position of condyle in the glenoid fossa seen after surgically established planned occlusion and rigid fixation of bony fragments.

Based on position of condyle, condylar sag can be central or peripheral, central condylar sag occurs due to positioning of condyle inferiorly in the glenoid fossa and hence there is no contact with any part of the fossa. Soon after the decrease in intraoperative oedema and release of MMF, the condyle moves back to its original position causing malocclusion.

Peripheral condylar sag can be of type 1 and type 2, in type 1 peripheral condylar sag the condyle is positioned inferiorly with peripheral contact with the fossa (lateral, medial, posterior or
anterior), while the MMF is in position and teeth are in occlusion. Due to condylar resorption, delayed occlusal relapse can occur and lead to malocclusion.

The aim of the study was to evaluate changes in condyle position taken with lateral and frontal cephalograms with patients undergoing SSRO sagittal split ramus osteotomy for mandibular set back; radiographs before operation/surgery, immediately after surgery, 3 months and 6 months after surgery.10

**METHODS: Source of the Data:** 20 patients were assessed, 10 male and 10 female patients were divided as group 1 and group 2. The study was set up in MVJ Medical College and Research Centre, Hoskote, Bangalore.

The details of patients, who reported to dept. of Dentistry and Oral and Maxillofacial surgery, were recorded.

Patients diagnosed with skeletal class 3 deformity were selected in the study, with a mean age group of 15-35 years of age.

**METHODOLOGY:** The subjects were 20, 10 were male and 10 were female who presented with mandibular prognathism.

At the time of orthognathic surgery the patients ranged in age from 15-35 years of age, with a mean age group of 22 years.

20 patients underwent BSSO to correct their mandibular prognathism. Rigid fixation was achieved with champy’s mini plates and monocortical screws. MMF with elastics was achieved to maintain stable occlusion.

All patients received orthodontic treatment pre and post-surgery.

For all 20 patients’ lateral and frontal cephalograms to assess the skeletal changes before operation, immediately after surgery, three months and six months postoperatively were done.

**Inclusion Criteria:**
1. Patients undergoing BSSO for mandibular set back will be recorded.
2. Age from 15-35 are included.

**Exclusion Criteria:**
1. Syndromic patients,
2. Bi Jaw surgery patients are excluded from the study.

**Following measurements were obtained from frontal cephalogram;**
1. Condylar width
2. ANS
3. Ag distance
4. Menton distance

**Following measurements were obtained from lateral cephalogram;**
1. Gonial angle.
2. Pog - N parallel to SN.
3. Pog – N perpendicular to SN.
4. Ramus inclination.
5. Mandibular length (Co – Gn).

STATICAL ANALYSIS:
- Differences between groups by paired ‘T’ test.
- And time dependent changes in cephalometric measurements were examined by fischers test.

RESULTS: significant differences was observed in measured SNB angle, when compared to initial with immediate after surgery, 3 months and 6 months after surgery the p value was significant as 0.003, 0.012, and 0.008 respectively in males and females showed p value of <0.001 very highly significant, 0.019 and <0.001 respectively (Table 1).

There were significant differences in Gonial angle, when compared to initial with immediate after surgery, 3 months and 6 months after surgery the p value was significant.

Following immediately after surgery with value of 0.002 in males and in females <0.001, <0.001 and 0.0002 respectively (Table 2).

There were significant differences in Ramus Inclination, when compared to initial with immediate after surgery, 3 months and 6 months after surgery the p value was significant as 0.005 three months after surgery and 0.0017 after six months in males respectively and 0.002, <0.001 and 0.005 in females (Table 3).

There were significant differences in Pog-N Parallel to SN, when compared to initial with immediate after surgery, 3 months and 6 months after surgery the p value was significant as <0.001, <0.001 and <0.001 respectively in males and <0.001, <0.001, and <0.001 in females (Table 4).

There were significant differences in Pog-N Perpendicular to SN, when compared to initial with immediate after surgery, 3 months and 6 months after surgery the p value was significant as <0.001, <0.001 and <0.001 respectively in males and <0.001, <0.001, and <0.001 in females (Table 5).

There were significant differences in Inter Incisal angle, when compared to initial with immediate after surgery, 3 months and 6 months after surgery the p value was as <0.001, <0.001 and <0.001 respectively in males and <0.001, <0.018, and <0.001 in females (Table 6).

There were significant differences in Occlusal Plane- SN, when compared to initial with immediate after surgery, 3 months and 6 months after surgery the p value was as <0.001, <0.001 and <0.001 respectively in males and <0.005, <0.003, and <0.001 in females (Table 7).

In condyle width measurement there were no significant differences (Table 8).

DISCUSSION: Sagittal split osteotomy of the mandible was introduced by Trauner and Obwegeser in (1957), since then it has undergone many modifications and improvements.

BSSO is an excellent procedure done to correct deformities of mandible. Stability of mandibular ramus osteotomy depends on multiple factors like, amount of retrusion /protrusion, clockwise rotation of mandible, method of fixation and amount of growth left within the individual. More the movement, the greater is the chances of relapse.
To achieve dental and skeletal stability proper anatomical restoration of TMJ is of vital importance. Factors like condylar head position, surgeons experience, movement of distal segment of mandible and fixation play an important role in achieving dental and skeletal stability. In BSSRO, temporomandibular joint dysfunction can occur due to improper positioning of proximal mandibular segment.\textsuperscript{11,12} To maintain proximal segment in its position many appliances have been developed.\textsuperscript{13,14}

However, Ellis\textsuperscript{15} raised doubts about as to the necessity of condylar positioning devices for orthognathic surgery, insisting that they are not always desirable.

Tuinzing et al\textsuperscript{16} has reported that the most troublesome sequel are skeletal instability and anterio-inferior condylar displacement (condylar sag) with resultant unpredictability of postoperative mandibular position, but they did not provide comparative cephalometric data.

Rotskoff et al\textsuperscript{17} developed techniques that use a geometrically corrected inter occlusal splint to compensate for condylar sag and to control mandibular position and postoperative occlusion.

In the present study we found significant differences in gonial angle, ramus inclination. This suggests that the group had a transient tendency towards posterior movement at the gonial point and anterio inferior movement at the condylar head (Sag). Hu et al postulated that anterio inferior movement of the condyle is to be expected from the direction of the lateral pterygoid muscle and the pterygomasseteric sling to the proximal segment in IVRO, where as in SSRO the proximal segment can be pulled posteriorly and superiorly by the temporalis muscle and masseter muscle, resulting in counter clockwise inclination of the condyle.

In our study there was no difference within groups in most measurement of the distal segment; however there were significant differences in mandibular length, Pog-N parallel to SN and Pog – N perpendicular to SN, and SNB angle. These results indicate that Pog and Gn points tended to move superioposteriorly postoperatively. This may be affected by condylar sag immediately after surgery and the difference in muscular attachments to the distal segment.

Condylar sag occurred just immediately after surgery so that the condyle change from inferoanterior position to superior –posterior position with relapse of proximal segment after bony adhesion and reattachment of medial pterygoid muscle.

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