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Short Communication

Are condylar repositioning devices required in bilateral sagittal split osteotomies?

Pranave P[1,*], Rajesh Ashok Kshirsagar[1], Vikram Singh[1], Amruta Sardeshmukh[1]

[1] *Dept. of Oral and Maxillofacial Surgery, Bharati Vidyapeeth deemed to be University Dental College and Hospital, Pune, Maharashtra, India*

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ABSTRACT

Bilateral Sagittal split osteotomy (BSSO) is used to correct malocclusion by mobilizing the mandible during orthognathic procedures surgically. Although the use of condylar positioning devices (CPDs) seems judicious, its effect on condylar position and relapse has not been studied in depth. A few of the limitations are the precision of such devices, along with the added amount of time to the procedure. The outcomes of the CPDs may lead to the paralysis of the muscles of mastication, malalignment of the bone segments, and deranged position of condyle due to the inadvertent force used to bring the jaws into occlusion. Thus, an effort was made to compare the merits and demerits of manual repositioning with those of CPDs.

1. Introduction

Bilateral Sagittal split osteotomy (BSSO) is a surgical technique largely employed for mandibular mobilization in orthognathic procedures for correction of malocclusion. Changes in the geometry of maxillofacial structures affect the biomechanics of the stomatognathic system and the position of mandibular condyle by distal segment repositioning, bony fragment alignment, bony segment fixation method, the tensional balance of the muscles and surrounding tissue, and the surgeon's skill. The extent to which these changes exceed the natural adaptive capacity of the Temporomandibular Joints (TMJs) is likely to give rise to clinical entities, called condylar remodelling and resorption. The literature[1] put forward that untoward events like condylar changes, temporomandibular dysfunction, or reversion in the skeletal architecture might occur due to ill-positioned condyle after BSSO of the mandible.

2. Concepts Regarding Condyle Repositioning

A Condylar Positioning Device is significant development but is a ponderous device. It causes the conversion of non-rigid fixation to rigid fixation. But at the same time, very scarce scientific evidence is available in the literature supporting their routine use in orthognathic surgery. Therefore, this paper attempts to hoard some of the important narratives.

Gerressen et al. (2007)[1] and Costa et al. (2008)[1] preferred the manual positioning technique as their method of choice because of its ease to perform and cost-effective properties. They advocated for alike stable results using the manual technique in orthognathic surgery. Also, Hirjak D et al. (2017)[2] conducted a retrospective research to assess the impact of the manual condylar positioning method and bicortical fixation following BSSO on post-operative condylar position and TMJ function. They concluded that manual condylar positioning after BSSO and bicortical fixation achieves ideal condylar position, properly functioning TMJ, and ideal occlusion. Likewise, Costa F et al. (2008)[3] published a review on the use

* *Corresponding author.*
E-mail address: pranaveprasad@gmail.com (Pranave P).

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of Condylar Positioning Devices (CPDs) in orthognathic surgery, and how it can avoid skeletal instability and TMD. They stated that when both skeletal/occlusal stability and TMJ function after orthognathic surgery were investigated substantially since 1995, without the CPDs, manual reposition was the treatment of choice for attaining ideal mandibular-condylar fossa segmental relationship following sagittal split osteotomy. They believed that it was advisable to select more easy and economical means of recognizing a malpositioned condyle intraoperatively, such as intraoperative patient awakening. They also found 11 studies involving 1,313 patients, but none of them mentioned any use of CPDs. Thus, from the studies published to date, CPDs lack scientific base for their routine usage in orthognathic surgery.

Contradictory to the above mentioned studies, Shah PD, Mukherji S in 2014[4] discussed the properties and role of condylar positioning devices. They weighed more upon the advantages of the device, and concluded that although the device is difficult to use, time-consuming and some adaptability of condyle takes care of any malpositioning in most of the patients, it is still recommended for precise repositioning, harmonious, long-lasting and stable results and also to prevent TMD sequelae.

Lee CY et al. in the year 2012[1] conducted an in-vivo study to assess the degree of displacement achieved using a condylar-repositioning device of the mandibular condyle. They concluded that this procedure, due to its simplicity, maybe viable and effective for repositioning condyles. However, it only provides a limited examination in three dimensions, necessitating further computed tomography investigations (Figure 1 A, B) Also, Cortese A et al. in 2019[5] described a novel technique for the centric positioning of the condyle and ramus segments using computer-aided designed and computer-aided manufactured (CAD-CAM) technology and stated that CAD-CAM guidance during BSSO guarantees exact regulation of the condyle in a stable centric occlusion. (Figure 2)

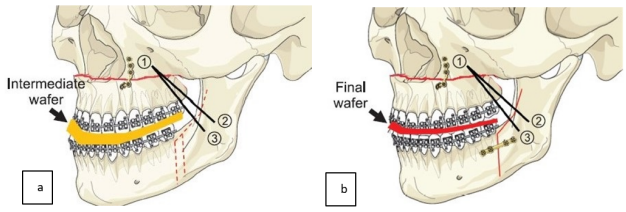

Fig. 1: A, B: Maxilla and mandible fixation after placement of the intermediate wafer and final wafer and performing condylar reposition using the reference points and wires.
The setting of 1 point at the upper part of the estimated osteotomy line of the maxilla (①) and 2 points at the lateral margin of the ramus (②, ③) as reference points using a wire bent before surgery after placing a centric relation bite record in the mouth

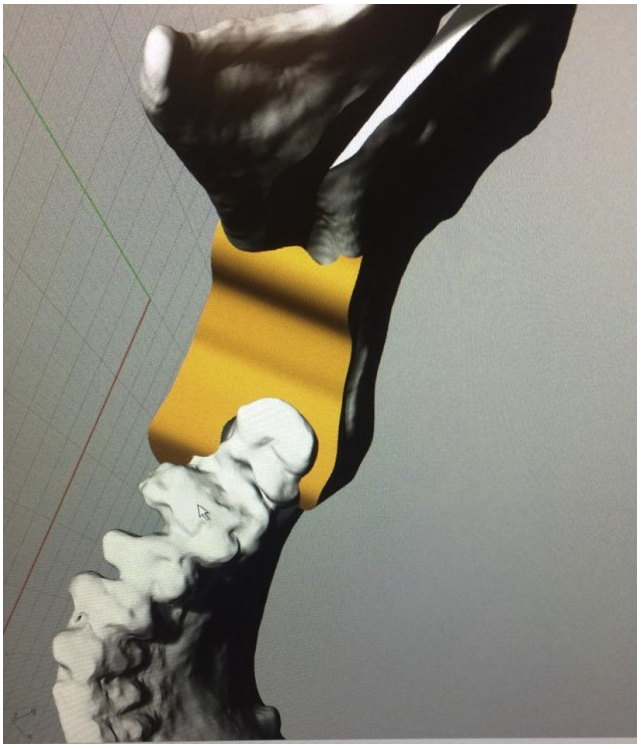

Fig. 2: Three-dimensional model of the surgical guide adapting to the bilateral sagittal split osteotomy site

3. Conclusion

Changes in condylar position during surgery can be due to the patient's recumbent position, masticatory muscle paralysis, joint edema, misalignment of the bone fragments, and the techniques employed for condyle repositioning and fixation.

The Condylar Positioning Devices (CPDs) that would seem to have the ability to reproduce condylar position in all three planes of space are those that attach a more rigid device between the proximal segment and a stable structure such as the maxillary dentition/splint or zygomaticomaxillary buttress. However, they are abandoned by many surgeons for being too time-consuming and difficult to practice. Most clinicians are comfortable with manual positioning of the condyle and tend to use humbler methods.

In our experience of 68 patients undergoing BSSO, we have consistently used the manual repositioning technique to ensure the ideal positioning of the condyle i.e. it being placed in the glenoid fossa. It was ensured that none of our subjects experience mid-procedure awakening so that accurate and satisfactory repositioning of the condyle was succeeded. We have followed-up all our cases and none of them have shown any evidence of TMJ dysfunction or condylar resorption.

Therefore, we conclude that manual repositioning after the sagittal split osteotomy is reliable for the ideal mandible to condylar fossa proximal segmental relationship. Based on the studies published so far, we conclude that the widespread use of CPDs in orthognathic surgery is still not well-studied and proven.

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Author biography

Pranave P, Postgraduate Trainee https://orcid.org/0000-0003-2960-0598

Rajesh Ashok Kshirsagar, Principal, Professor and HOD

Vikram Singh, Professor

Amruta Sardeshmukh, Postgraduate Trainee

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