Introduction

- Orthognathic surgery requires precise definition of the original position of the dentofacial skeleton followed by estimation of the desired final position. The conventional bimaxillary model surgery and the following construction of two surgical splints for the transfer of the surgical planning to the operating theater has been a well-known accepted method until now.1,8
- Changes in condylar positioning and mal positioning of the proximal segment during sagittal split fixation can influence mandibular stability causing relapse.13,14 Regarding of the concept that rigid internal fixation can cause changes in condylar positioning, condylar positioning devices (CPDs) are advised. However, CPDs have some drawbacks as; extended operating times, the stability of the intermaxillary fixation is mandatory during their use, the process depends on the experience of the surgeon during bone segment reposition, the rotation of the mandibular ramus and additional expenses.15
- Computer guided surgery has gained a foothold in orthognathic surgery where a 3-D illustration of the intended final position of the bony segments are presented. CAD/CAM generated splints were assessed as being accurate, reproducible, not time consuming and cost effective.16 Repositioning the condylar fragment after a mandibular osteotomy in its original place at the glenoid fossa, not only anterosuperiorly but also medially is highly recommended.17 The 3D repositioning of the condyle could be better achieved using computer aided surgery.18
- The dual purpose surgical splint mechanism is virtually designed with respect to two factors. It guides the distal segment of the osteotomised mandible to the desired final occlusion with the stable maxilla and subsequently engages the proximal mandibular segment securing the condyle in its original planned position. The design of the computer-generated splint comprises a projection holding the proximal and the distal segment together, acting as CPD and concomitantly sustaining the desired occlusion during mandibular fixation after the sagittal split osteotomy. It has a unique advantage of combining CPD and wafer.

Patients & Methods

- Patients were chosen randomly from those attending the outpatient clinic of Oral and Maxillofacial Surgery Department at Faculty of Dentistry Cairo University. All patients had undergone bimaxillary surgery, six patients were suffering from midface hypoplasia, class III malocclusion and seeking correction by maxillary advancement combined with impaction and mandibular setback. In addition, four patients were suffering from class II malocclusion, vertical maxillary excess and protrusion correction by mandibular advancement and maxillary impaction. Each patient was subjected to the following:

i. Clinical examination

- Pre-operative extra and intra oral photographs
- A composite skull model is done by importing accurate digital dental models into the 3D CT model of the face, Followed by analysis of the deformity and virtual surgical simulation.
- Assessment of the pre-operative condylar position
  - a. Medio-lateral measurement by joining the two condylion (CO) and gonion (GO) on either side pre-operatively to assess the inter-condylar distance from highest point and lowest point on the ramus segment.
  - b. Posterioranterior measurement by joining the CO to the point of intersection of Frankfort horizontal plane (FH) and perpendicular from the nasion (N).

ii. Virtual surgical planning and simulation

iii. Assessment of the pre-operative condylar position

- a. Titanium plates adapted as the planned intra-operative position
- b. Pre-osseotomy templates

v. Splint fabrication

vi. Surgical Procedure

- The osteotomy cutting and locating holes placed on the exposed surface of the maxilla
- Post-operative superimposition and posteroanterior measurement

Results

- The condylar position analysis did not demonstrate any significant changes post-operatively. On reaching the desired post-operative occlusion, the patients did not report any TMJ symptoms.

Conclusions

- The dual-purpose splint acting as a final wafer and CPD simultaneously, is considered a simple, accurate and inexpensive device. This computer-generated splint could be used as final or intermediate, whatever is the sequencing of bimaxillary surgery. This twofold splint with posterior extension to seat the condyle in the pre-operative planned position brings the surgeon out of the dilemma of whether to use a CPD or not.

References


The authors declare no conflict of interest with the current study.