3D reconstruction using the Dolphin. Osteotomies and movement have been simulated by the software. Finally, in Group 1 the splint was performed by 3D printer using the STL models; in Group 2, we programmed the CAD/CAM cutting guide and PSI. After surgery, CT scan was carried out, and comparison was performed by overlapping the 3D plan. Cephalometric landmarks were used to calculate linear and angular displacements. Student T-Test and Kolmogorov-Smirnov Test were used and statistical significance was set at $P < .05$.

Results: Twenty patients were enrolled in the study, 10 for each group. The mean age was 24.07 years. In Group 1, our results show an average difference of 1.1mm between the pre- and postoperative position evaluating the linear values, and 0.46 degrees regarding the angular displacements. In Group 2, cephalometric linear landmarks show an average difference of 0.14mm and an angular average displacement of 0.09 degrees.

Conclusions: This study investigates the benefits that can be achieved using 3D VSP in maxillary-first orthognathic surgery. The critical issues within the splint is the relationship with the mandible. A forced malposition of the inferior jaw can raise the error and reduce the accuracy. The splintless surgical treatment with PSI appears to be the better system, rendering the osteotomy with cutting guide and fixation with custom-made plates have allowed to overcome the limits of splint technique. The repositioning of the maxilla is now completely released from the jaw.

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Accuracy of Centric Relation Record Derived from Intraoral Scan Versus Computed Tomography in Condylar Positioning for Computer Assisted Surgical Simulation

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The accurate condylar position derived from the centric relation (CR) record is important to the planning process for orthognathic surgery. The condylar position can be evaluated in the modern planning process with computer assisted surgical simulation (CASS). This technique relies on the fusion of cone beam computed tomography or multi-slice computed tomography (CBCT/MSCT) with the digital dental model to produce a 3-dimensional augmented model of the skeletal structures and dentition 1,2. As technology advances, intraoral scanners (IOS) are being introduced to provide the digital dental model and CR record by registering the occlusion during the scan.

The aim of this study is to compare the condylar position generated from the CBCT/MSCT CR record with the condylar position from the IOS CR record. Approval to conduct this research was granted by the University of Toronto Health Sciences Research Ethics Board.

A retrospective analysis of 30 patients who underwent orthognathic surgery planned with CASS was performed. All patients had a trimmed CR wax bite registration created by the same operating surgeon in place for both the IOS and a CBCT/MSCT scan. The imaging of the condylar position from the CR records from the CBCT/MSCT and the IOS was prepared by the clinical engineer as a video clip with each record randomly assigned a color either purple or green (Fig 1). The imaging was shown independently to 2 oral and maxillofacial surgeons experienced in CASS. They were required to indicate which condyle was in the correct position, on which they would base their surgical plan. The process was repeated for each surgeon 2 weeks later to test for reliability, generating 4 answers per case. Where there was disagreement, the most commonly reported answer was taken as the correct record. In the event of a tie, a joint meeting was held to determine the correct record. A Z-test was used to compare the 2 CR records and CBCT/MSCT was selected as the correct record and the 1 on which the surgeons would base their surgical plan in 90% of the cases ($P < .001$). Kappa scores for intra-rater reliability indicated moderate agreement with scores of 0.44 for surgeon 1 and 0.52 for surgeon 2.

The results of this study indicate that the CBCT/MSCT CR record is more accurate in condylar positioning than the IOS CR record. It highlights the need to confirm and check condylar position as part of the CASS process if the CR is based on the IOS. An incorrect CR record has the potential to impact surgical accuracy particularly when the conventional sequencing of maxilla first surgery is applied. The alternative sequencing of mandibular first surgery is less susceptible to errors from CR recording provided the condyle has been correctly seated during the surgical procedure and that the seating matches that of the CASS. One of the major goals of CASS is to improve the accuracy and efficiency of surgical planning. As the technique evolves and new processes are introduced, it is important that research continues to evaluate accuracy and validity.

Condylar Position from CBCT/MSCT vs IOS CR Record

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An Alternative Technique for Prevention of Mandibular Inferior/Lateral Defects After Sagittal Split Osteotomy Using Settable, Resorbable Hemostatic Bone Putty

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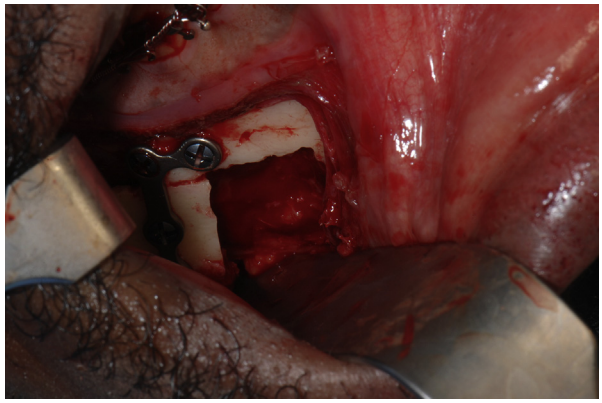
Problem: Mandibular inferior border defects (IBDs) after sagittal split osteotomy (SSO) are reported in anywhere from 5%-80% of operated sites (1). These osseous defects can be visible or palpable resulting in patient dissatisfaction and may require secondary surgery. Given the elective nature of SSO, care must be taken to minimize complications. Risk factors for IBDs include advanced age, larger advancements, or rotation of proximal segments (2). Previous strategies for prevention of IBDs include modified osteotomies and bone grafting techniques (2). Even with modified osteotomies, IBDs are present in 5.1%-20% of patients (1). Previous studies using bone grafting have shown problems including increased surgical time, donor site morbidity, increased infection, and graft resorption (3). An ideal material to decrease IBDs and improve bone healing has yet to be established.

Materials: MONTAGE settable, resorbable hemostatic bone putty is a sterile, biocompatible, putty-like material. It comes in 2 separate components comprised mainly of tri-calcium phosphate, vitamin E, and lactide-diester/polyester-based polymers. Resorption time is > 30 days. Two components are hand mixed for 45 seconds, then applied to bone, causing tamponade hemostasis. It conforms to the site, can be manipulated and irrigated during the hardening phase, or removed when set. It has up to 10% expansion and remains below body temperature during setting phase.



Defect after SSO

Methods: Retrospective cohort study was completed for 12 patients (24 osteotomies) who underwent BSSO advancements for mandibular hypoplasia. Six patients had their BSSO sites grafted with MONTAGE and 6 control patients underwent BSSO without grafting. Standard osteotomy techniques with Hunsuck and Epker modifications plus an inferior-border saw was used. The fixation technique employed a 1mm-thick, L-shaped miniplate secured with 4 mono-cortical screws supplemented with 2 bicortical 2.0mm positional screws. MONTAGE bone putty was manually adapted into the defect after fixation. Outcome variables included the presence of a palpable IBD, IBD on panorex, and complications related

Defect grafted with MONTAGE