

## Presurgical Planning and Time-Efficiency in Orthognathic Surgery: The Use of Computer-Assisted Surgical Simulation

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**INTRODUCTION:** Orthognathic procedures require extensive preoperative planning to maintain high fidelity of fabricated splints to anticipated skeletal and soft tissue changes. Operative reimbursement infrequently covers the prolonged labor incurred, as reflected by a national survey of the ASMS that found the rates of orthognathic surgery declined significantly in 70% of practices over a 5-year period, due to a complete lack of or continued decline of insurance reimbursement. The use of computer-assisted surgical simulation may markedly decrease preoperative time required for splint fabrication and planning, and thereby increase the rate of reimbursement (1-3).

**METHODS:** Bite registration with a bite jig and fast-curing bisacryl bite registration material was used to record detailed occlusal anatomy. Upper, followed by lower, bite registrations were sequentially created on a single bite jig, which was then mounted to a fiducial-based facebow for facial skeleton indexing. Indexing was done with standard Euler angles (pitch, yaw, and roll) based on accelerometer readings for the head in a normal resting position. The data was submitted and CAD/CAM occlusal splints were fashioned and returned to the senior surgeon (Figures 1-2).

**RESULTS:** Between September 2010 and January 2011, 10 consecutive patients were enrolled in the study. Indications for surgery included 6 LeFort I advancements, and 4 combined LeFort I/BSSO cases. Average time for bite registration was 10 min 16s ± 1 min 33s, with an additional 8 min 6s ± 4 min 45s needed for CASS modeling and virtual splint confirmation. 6 patients required cephalometric tracings, for an additional 12 min 50s ± 1 min 10s. Average total session time for all patients was 26 min 4s ± 9 min 13s.



Figure 2. Bite jig mounted to the fiducial-based facebow for facial skeleton indexing.

**CONCLUSION:** The use of computer-assisted surgical simulation (CASS) markedly decreased the time for preoperative splint planning and fabrication time, and had a positive impact on reimbursement rates for orthognathic surgery, as calculated on a per-hourly basis. The improved accuracy generated by the CASS system may lead to decreased operative times and improved outcomes, again making for more efficient surgery with better patient outcomes and satisfaction.

### REFERENCES:

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Figure 1. Upper and lower occlusal registrations created on the bite jig.