Purpose: The microvascular free fibula flap has become the gold standard for reconstruction of complex mandibular defects since its description by Hidalgo in 1989.[1] Prior studies have demonstrated its safety and efficacy in the pediatric population.[2,3] However, this reconstructive method is often used only as a last resort for correction of congenital mandibular hypoplasia, after failure of bone grafting and distraction osteogenesis. We describe our experience using this technique, facilitated with virtual planning and pre-fabricated cutting jigs, for children with severe congenital mandibular hypoplasia.

Methods: All cases of mandibular reconstruction with a microvascular free fibula flap in children with congenital mandibular hypoplasia between 2009 and 2014 by the senior authors were identified. Each patient underwent preoperative CT scanning and virtual surgical planning (Figures 1 and 2) to create custom cutting jigs for creation of the mandibular defect and fibular osteotomies. Preoperative, intraoperative, and postoperative medical records were examined in detail.

Results:
Five patients between the ages of 10 and 18 with congenital mandibular hypoplasia and Pruzansky Grade III mandibles[4] underwent free microvascular fibula flap for mandibular reconstruction between 2011 and 2014. Flap success rate was 100%. All patients underwent subsequent revision procedures to improve symmetry or for hardware removal. The four patients in our series who required dental implants were able to have them placed into their mandibular reconstruction.

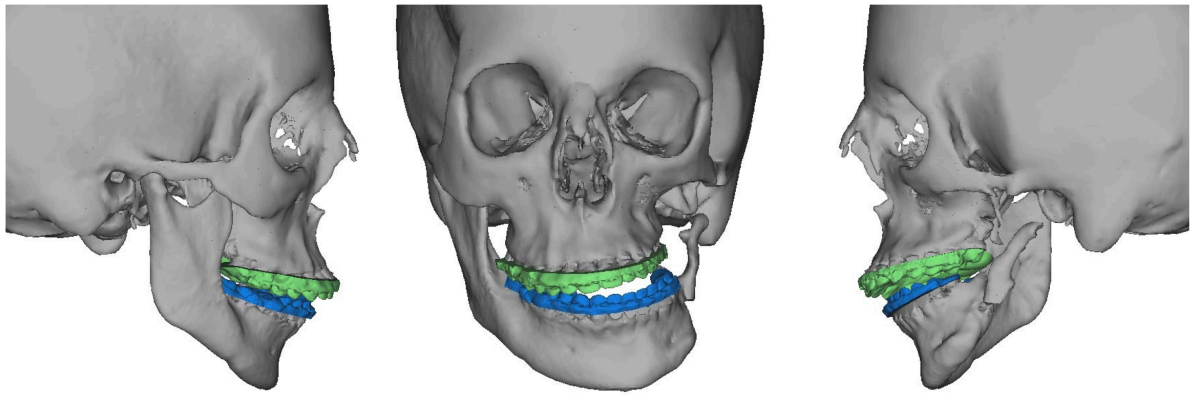
Conclusions: Pre-operative virtual planning along with use of prefabricated cutting jigs allows for precise complex fibula reconstruction of the mandible in the pediatric population. Additionally, virtual planning facilitated concomitant orthognathic procedures in patients with hemifacial microsomia. Our early success in this patient population leads us to suggest that while the free fibula can be safely and successfully used after multiple prior surgical interventions in the same anatomic region, it can also be a powerful tool for primary correction of congenital mandibular hypoplasia.

References:

1. Hidalgo DA. Fibula free flap: A new method of mandible reconstruction. Plastic and Reconstructive Surgery. 1989;84:71-79.
2. Santamaría, E., Morales, C., Taylor, J. A., Hay, A., & Ortiz-Monasterio, F. (2008). Mandibular microsurgical reconstruction in patients with hemifacial microsomia. Plastic and Reconstructive Surgery. 122(6), 1839–49.
3. Mueller, C.K., Bader, R-D., Schultze-Mosgau, S. (2011) Microvascular Free Flaps for Mandibular Reconstruction in Goldenhar Syndrome. Journal of Craniofacial Surgery. 22(3), 1161-1163.
4. Pruzansky S. Not all dwarfed mandibles are alike. Birth Defects. 1969;5:120.

Legend:
Figure 1: Preoperative position
Figure 2: Planned postoperative position

Preoperative Position



Final Position