COMBINING VIRTUAL SURGICAL PLANNING AND INNOVATION TO TREAT UNILATERAL LAMBDOID CRANIOSYNOSTOSIS: THE SAND-DOLLAR AND STAVES TECHNIQUE

Amjed Abu-Ghname[1], Berkay Basagaoglu[2], Mohamad Masoumy[2], Robert F Dempsey[2], Renata S Maricevich[2]

[1] Baylor College of Medicine, Department of Surgery, Plastic Surgery

[2] Texas Children's Hospital, Department of Surgery, Plastic Surgery

Background: Occurring once in every 40,000 live births, unilateral lambdoid synostosis (ULS) is the rarest form of synostosis. Due to the craniocaudal shift seen in ULS, surgical correction is technically challenging from a morphological standpoint. While numerous techniques have been proposed to provide optimal morphology, repair is often unable to correct all aspects of asymmetry and often leads to unsatisfactory results. We present a novel Sand-Dollar & Staves technique, aided by virtual surgical planning, for the repair of ULS.

Materials/Methods: A zigzag coronal incision is performed, and an anteriorly-based pericranial flaps are elevated. Prefabricated cutting guides are placed and the calvarium is marked. To treat the occipital flattening on the ipsilateral side, a wedged suturectomy is performed with additional barrel staves to allow for compensatory vault expansion. A large circle centered over the bulging of the occipitoparietal region on the contralateral side is cut out above the open lambdoid suture leaving the sutures intact. This piece is then barrel staved in a radial fashion, leaving only the center intact and creating a sand-dollar appearance. This circular disk is flattened and trimmed while keeping the construct in one piece. The modified sand-dollar is then fixed back onto the calvarium using absorbable plates. While gentle pressure is applied to the sand-dollar piece as it is being secured, the flattened ipsilateral side demonstrates compensatory filling. Results were evaluated by six board-certified craniofacial surgeons using the Whitaker Classification.

Results: Four patients underwent surgical correction with this novel technique. The procedure was performed at mean age of 11.7 months. Mean operative time was 2.5 hours. Intraoperative blood loss ranged from 50-100ml with no blood transfusions required. Total hospitalization time was 2–3 days. No complications were encountered. An acceptable aesthetic outcome was achieved in all cases when assessed by the parents. Mean Whitaker scores ranged from 1-1.5. Patients were followed for a mean of 10 months.

Conclusions: The Sand-Dollar & Staves procedure is a novel, single-stage approach for the management of ULS with decreased operative time, blood loss, and hospital stay with satisfactory aesthetic outcomes. This approach offers a valuable alternative that meets the functional and aesthetic goals for cranial correction of lambdoid synostosis with improved safety profile in comparison to previously utilized open techniques.