Sagittal craniosynostosis treatment

- Extended Phenotype of Bilateral Coronal Craniosynostosis Due to Novel TCF12 Mutation
- The incidence of subsequent high intracranial pressure in patients undergoing early, open, and wide strip craniectomy for sagittal synostosis
- Shaping futures: how surgical timing influences outcomes in endoscopic sagittal craniosynostosis repair
- Head Shape After Sagittal Craniosynostosis Surgery: Open Versus Endoscopic Strip Craniectomy
- Craniocerebral Disproportion Corrected With Biparietal Distraction Osteogenesis
- Prevalence of Incidental Normocephalic Craniosynostosis: Findings From a Large Cohort Study
- An Evaluation of the Adequacy of the Liberal Transfusion Strategy in Endoscopy-Assisted Metopic, Coronal, or Sagittal Craniosynostosis Surgeries: A Retrospective Observational Study
- Surgery of craniosynostosis: a historical review

In 2018 a systematic review and meta-analysis aimed to directly compare open surgical and endoscope-assisted techniques for the treatment of sagittal craniosynostosis, focusing on the outcomes of blood loss, transfusion rate, length of stay, operating time, complication rate, cost, and cosmetic outcome Endoscopic procedures were associated with lower estimated blood loss, operating time, and days in the hospital. Future long-term prospective registries may establish advantages with respect to complications and cost, with equivalent cosmetic outcomes. Larger studies evaluating patient- or parent-reported satisfaction and optimal timing of intervention, as well as heterogeneity in outcomes, are indicated. [1].

There are several approaches to correct sagittal craniosynostosis. described in the literature, yielding similar outcomes.

П, H-type craniectomies (Renier), endoscopic suturectomy, FLAG procedure.

Regardless of technique, the goals are to (1) release the fused suture and (2) impart a normocephalic head shape with resultant functional and aesthetic benefits.

A article and video detail the preferred technique of Veeramani et al. for the treatment of sagittal synostosis. This novel method involves three-dimensional planning and an open approach to focus on immediate correction of the anteroposterior, mediolateral, and vertex dimensions, using vault remodeling, pedicled osseous (“Maltese”) crosses, and corset pericranial flaps [2].

Sagittal craniosynostosis has been treated using both cranial remodeling techniques and modification of the sagittal strip craniectomy. A more recent technique is to implant springs in conjunction with a suturectomy to transversely expand the parietal bones to accommodate the growing brain

Surgery of sagittal craniosynostosis has a long history. The first surgeries of this type (linear craniotomies) were performed by Lannelongue and Launet in the early XIX century. Treatment results were rather controversial and reoperations were often needed. In that period, the new trend in surgery was not widely supported [3].

Is less easy with conventional calvarial remodeling surgery if they are older than 1 year. Gradual cranial vault compression with distractors can be another option in these cases [4].

A survey of neurosurgeons and craniofacial plastic surgeons worldwide shows that for young infants treated, the bicoronal incision is most commonly used and a greater number of surgeons do not use drains. A great variability in the transfusion protocols used in the care of these patients as well as a low reoperation rate were also found. The latter however may suggest a lack of strict monitoring in most centers [5].

Spring assisted cranioplasty (SAC) has become an accepted treatment for patients with sagittal craniosynostosis.

see Distraction osteogenesis.

Of U.S. craniofacial and neurosurgeons, 94 percent routinely admit patients to the intensive care unit following cranial vault remodeling for correction of sagittal synostosis.

Despite the common practice of postoperative admission to the intensive care unit following cranial vault remodeling for sagittal craniosynostosis, the authors suggest that postoperative care be considered on an individual basis, with only a small percentage requiring a higher level of care [6].

Strip Craniectomy

Strip Craniectomy for sagittal craniosynostosis treatment.

Endoscopic strip craniectomy

see Endoscopic sagittal strip craniectomy.

Spring-mediated cranioplasty

Spring-mediated cranioplasty.

Case series

The aim of Bradford et al. from the University of Virginia Health System was to review the evolution of surgical techniques at the institution and compare patient outcomes. A retrospective review was performed on consecutive patients undergoing correction for craniosynostosis from 2008 to 2018. All patients with a diagnosis of nonsyndromic isolated sagittal craniosynostosis were included and classified into one of 4 groups by the type of surgical correction performed (H-type, FLAG, endoscopic, other). The authors identified 166 consecutive patients with a mean age at time of surgery of 6.7 ± 4.0 months. 91 (54.8%) carried a diagnosis of nonsyndromic sagittal synostosis. 63 patients underwent H-type procedures, 9 underwent FLAG procedures, 5 underwent endoscopic procedures, and 14 were classified as other (distraction or other implant). Perioperatively, the FLAG group had the shortest ICU stay (1.3 days, $P < 0.05$), postoperative transfusion requirement (42cc pRBC, $P < 0.001$),

and complication rate (0.0%). The endoscopic group had the shortest surgical time at 2.00 hours ($p < 0.001$). No statistically significant difference in cranial index or revision procedures between the four groups was identified. Overall, the mean length of follow-up was 25.3 months. All procedures had similar results for cranial index with decreased surgical time, transfusion volume, and hospital stay seen in FLAG and endoscopic groups [7].

2017

100 patients with sagittal synostosis who underwent each of the 3 surgical correction techniques before June 30, 2013, were identified. Clinical, operative, and process of care variables and their associated specific charges were analyzed along with overall charge.

The study included 300 total patients. Endoscopic strip (ES) patients had fewer transfusion requirements (13% vs 83%, $P < .001$) than TCV patients, fewer days in intensive care (0.3 vs 1.3, $P < .001$), and a shorter overall hospital stay (1.8 vs 4.2 d, $P < .001$), and they required fewer revisions (1% vs 6%, $P = .05$). The mean charge for the endoscopic procedure was $21 203, whereas the mean charge for the TCV reconstruction was $45 078 ($P < .001$). ES patients had more preoperative computed tomography scans (66% vs 44%, $P = .003$) than OSS patients, shorter operative times (68 vs 111 min, $P < .001$), and required fewer revision procedures (1% vs 8%, $P < .001$). The mean charge for the endoscopic procedure was $21 203 vs $20 535 for the OSS procedure ($P = .62$).

The ES craniectomy for sagittal synostosis appeared to have less morbidity and a potential cost savings compared with the TCV reconstruction. The charges were similar to those incurred with OSS craniectomy, but patients had a shorter length of stay and fewer revisions [8].

2015

Arko et al. retrospectively reviewed patients who presented to the Children's Hospital of Philadelphia with a diagnosis of sagittal synostosis from August 2011 to November 2014. A pooled data set was created to compare our institutional data to previously published work. A comprehensive literature review was performed of all previous studies describing the spring-mediated cranioplasty (SMC) technique, as well as other techniques for sagittal synostosis correction.

Twenty-two patients underwent SMC at our institution during the study period. Patients were 4.2 months of age on average, had a mean blood loss of 56.3 ml, and average intensive care unit and total hospital stays of 29.5 hours and 2.2 days, respectively. The cranial index was corrected to an average of 73.7 (SD 5.2) for patients who received long-term radiological follow-up. When comparing the authors' institutional data to pooled SMC data, blood loss and length of stay were both significantly less ($p = 0.005$ and $p < 0.001$, respectively), but the preoperative cranial index was significantly larger ($p = 0.01$). A review of the SMC technique compared with other techniques to actively expand the skull of patients with sagittal synostosis demonstrated that SMC can be performed at a significantly earlier age compared with cranial vault reconstruction (CVR).

The authors found that their institutional modifications of the SMC technique were safe and effective in correcting the cranial index. In addition, this technique can be performed at a younger age than CVRs. SMC, therefore, has the potential to maximize the cognitive benefits of early intervention, with lower morbidity than the traditional CVR [9].

Sagittal craniosynostosis treatment complications

Iatrogenic pseudoaneurysm of the superficial temporal artery after surgery for craniosynostosis is a complication that has never been described in the pertinent literature. Although reported for other types of surgeries, no case has been described in the pediatric population.

Anania et al from the Division of Neurosurgery, Giannina Gaslini Institute, Genoa, Italy report on a case of pseudoaneurysm of the superficial temporal artery occurred 9 days after corrective surgery for scaphocephaly. They describe also the management of this complication. Pseudoaneurysm is an exceptional complication in surgery for craniosynostosis, but it should be considered in case of swelling in the temporal region [10].

Case reports

Shcherbakov et al. presented a rare clinical case of isolated sagittal craniosynostosis in dichorionic diamniotic twins [11]

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