Institutional Experience with Posterior Distraction Osteogenesis for Anterior Craniosynostosis

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Introduction

- Posterior cranial vault distraction osteogenesis (DO) involves the placement of cranial distractors to gradually expand and then retain posterior vault expansion.

- Posterior DO is thought to achieve greater volume expansion than anterior DO, which is of particular importance in syndromic craniofacial patients at risk for symptomatic intracranial hypertension as well as loss of deformity correction.

- Posterior cranial vault reconstruction is typically more straightforward than anterior vault reconstruction as a skull base/fronto-orbital advancement is not performed.

- We report our institutional experience with posterior DO for patients with coronal synostoses.
Distraction Osteogenesis

Initial Position

Final Position Distracted 20mm
Methods

• **Data:** Patients treated at Rady Children’s Hospital San Diego (January 2016 - September 2017).

• **Study Population:** Patients with anterior vault craniosynostosis treated with posterior distraction osteogenesis.

• **Demographics:** Age, diagnosis

• **Clinical variables:** Distraction characteristics, operative time, length of stay, intracranial volume change.

• **Statistical Analysis:**
  • Medians reported.
  • Intracranial volumes calculated from preoperative and postoperative CT scans.
Results

• **N, Diagnoses:** 4 bicoronal, 2 bicoronal + sagittal.
• **Procedure:** Posterior cranial vault remodeling with bilateral distraction.
• **Syndromic status:**
  • Four patients were syndromic (Saethre-Chotzen syndrome, Apert syndrome, and two with Crouzon syndrome)
• **Age:** Median 6.3 months.
• **Estimated blood loss:** Median 14.4 mL/kg.
• **Blood transfusion:** Median 19.5 mL/kg.
• **Operating time:** Median 135.5 minutes.
• **Length of stay:** Median 3 days.
Results

- **Distraction Characteristics:**
  - Latency duration: median 2.5 days
  - Distraction duration: median 32 days
  - Consolidation duration: median 136 days

- **Intracranial Volume Expansion** (between pre- and post-op CT scans):
  - Median 574 cubic centimeters (cc) (80%).

- **Complications requiring reoperation:** None

- **Deformity:** Significant improvement of frontal deformity was observed for all patients.
Posterior Distraction
Discussion

• Although somewhat counterintuitive, anterior intracranial volume expansion and anterior cranial deformities without associated posterior vault synostosis may be optimally addressed by posterior DO.

• Initial posterior vault distraction osteogenesis may allow for improved anterior cranial reconstructive results by increasing the durability of correction in addition to improving autograft retention to optimize overall cranial vault expansion parameters.

• Anterior cranial vault deformities are significantly improved via a relatively straightforward cranial vault procedure as skull base/fronto-orbital advancement is avoided.

• Increasing patient experience and length of follow-up will be needed to ultimately assess this promising technique.
Summary Points

• 6 patients with anterior cranial vault craniosynostosis and associated anterior vault deformities were treated with posterior cranial vault distraction osteogenesis.
• There were no complications requiring reoperation.
• Frontal deformities markedly improved for all patients despite the avoidance of fronto-orbital advancements.
• More studies will be required to ultimately assess the efficacy/durability of this promising technique