

INTRODUCTION

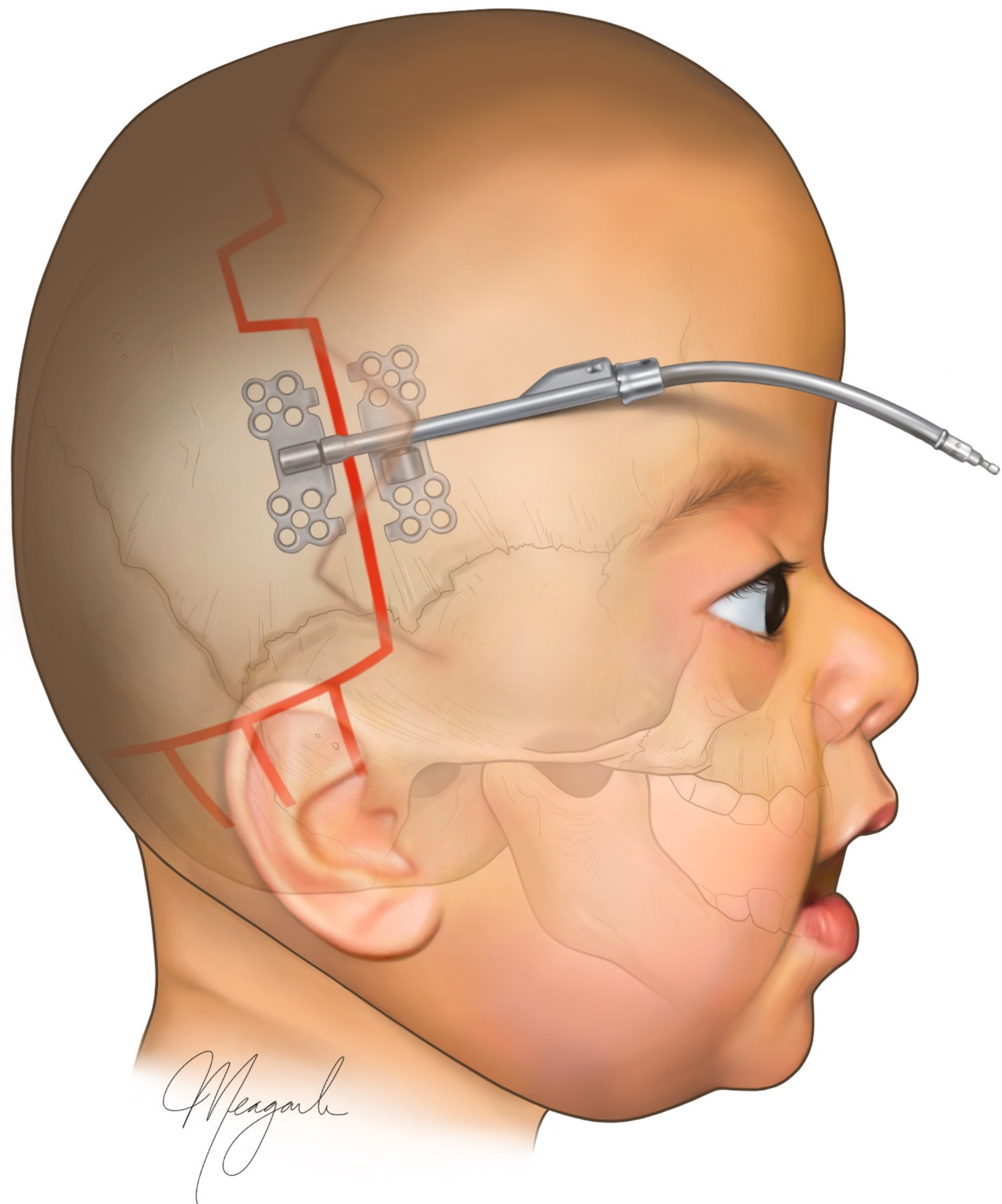
- Since 2009, our institution has employed posterior vault distraction osteogenesis (PVDO) as the first-line intervention for most syndromic patients at six to nine months of age.
- Among its advantages, PVDO provides greater volume expansion than fronto-orbital advancement (FOA) and has a favorable safety profile.
- Perhaps one of the greatest potential benefits of PVDO over conventional treatment paradigms lies in the possibly reduced future surgical burden resulting from a larger, more gradual, and less devascularizing early vault expansion.

OBJECTIVES

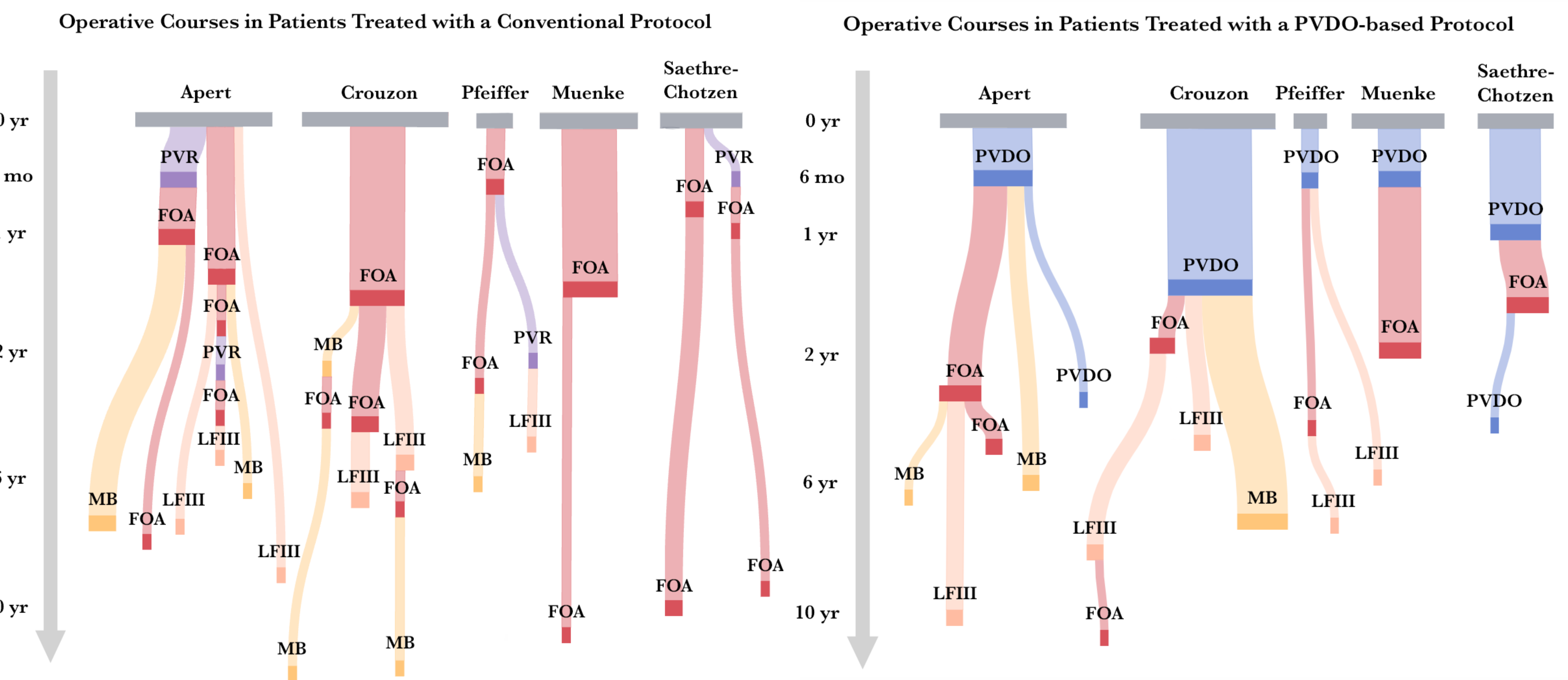
- By analyzing the number and timing of operations in patients from initial vault surgery to frontofacial advancement, this long-term study compares our institution's experience with a PVDO-based protocol to a conventional protocol.
- We hypothesized that early PVDO would be associated with a reduced burden of craniofacial surgical intervention, in particular rate of revisionary frontal procedures, with syndrome-specific variations.

METHODS

- A retrospective review was performed of patients with a diagnosis of Apert, Crouzon, Pfeiffer, Muenke, or Saethre-Chotzen syndrome treated from 2000 to 2023. Patients were included if they had minimum five-year follow-up and presented under age 2.5 years.
- Cohorts were divided into those who underwent early PVDO (2009 onwards) or conventional vault reconstruction (before 2009) without PVDO to compare the number and timing of operations between treatment groups.
- All craniofacial interventions were recorded, including vault procedures, frontofacial procedures, and ventriculoperitoneal (VP) shunt placements and revisions.
- Preoperative computed tomography (CT) scans were used to evaluate for underlying differences in clinical severity.



RESULTS



- Of 131 syndromic patients treated from 2000 to 2023, 55 were included: 30 (55%) underwent early PVDO and 25 (45%) underwent conventional reconstruction.
- Median age at presentation and initial surgery was similar between groups.
- In the PVDO cohort, 12/30 (40%) patients did not require any FOA at greater than age six, with 8/12 (67%) of these patients undergoing monobloc advancement at a mean age of 5.7±1.1 years.
- Multiple FOAs were performed in only 1/30 (3%) PVDO-treated patient compared to 12/25 (48%) conventionally-treated patients ($p<0.001$).
- When dividing by syndrome, in the Apert/Crouzon group ($n=31$), fewer patients required FOA prior to midface surgery (33% vs. 92%, $p=0.003$) or repeat FOA (6% vs. 50%, $p=0.005$) in the PVDO versus conventional cohort. In the Muenke/Saethre-Chotzen group ($n=20$), the number of patients undergoing FOA did not differ between the PVDO and conventional cohorts (91% vs. 100%, $p=0.353$), though no PVDO-treated patients required repeat FOA (0% vs. 44%, $p=0.018$).

CONCLUSIONS

- Early PVDO is associated with a reduced need for secondary frontal procedures. Granted that patients present in a timely fashion, total surgical burden is reduced.
- As variations in treatment patterns by syndrome type became increasingly apparent during the period of mixed dentition and through skeletal maturity, our algorithm should be further tailored to the functional and aesthetic goals of each patient.