Posterior Vault Distraction Osteogenesis Conveys Anterior Benefit in Apert Syndrome

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Disclosure: None

Background:
The volumetric advantages of posterior vault distraction osteogenesis (PVDO) are well established. Our clinical experience further suggests that PVDO may confer morphologic changes to the anterior cranium that may delay or defer the need for fronto-orbital advancement (FOA). We sought to evaluate the effects of PVDO on anterior cranial morphology and timing of FOA in patients with Apert syndrome.

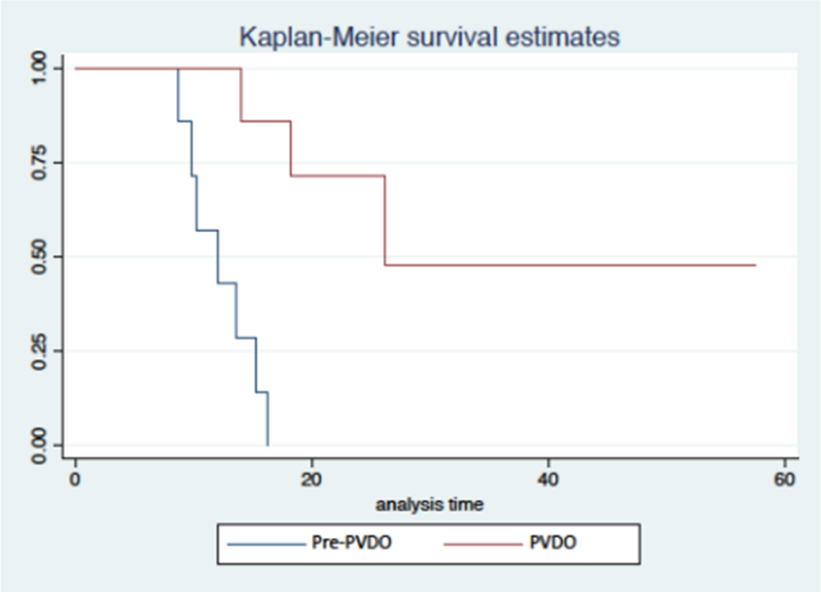
Methods:
Craniometric analysis was performed on patients with Apert syndrome who underwent PVDO with emphasis on morphologic changes to the anterior calvarium. Treatment patterns of Apert syndrome treated with early PVDO (2006-2014) were compared to those initially treated with FOA (1998-2006) at our institution.

Results:
14 Apert patients were studied: 7 treated with early PVDO and 7 treated with early FOA, with an average follow-up of 6.7 years (± 4.7 years). Craniometric analysis demonstrated that after PVDO, frontal bossing angle normalized by an average of 7.6%. In the PVDO group, surgery was performed at a mean age of 6 months (± 2 months). Although this cohort is young (mean age 3.3 years), only 3 patients (43%) have undergone FOA at an average age of 20 months (± 6 months,) and none has required revision. In contrast, early FOA patients underwent initial frontal treatment at a mean age of 12 months (± 3 months); each of these subsequently required repeat FOA (4, 57%) at an average age of 6.0 years or monobloc advancement (3, 43%) at an average age of 5.8 years. Kaplan-Meier survival analysis (Figure 1) indicates significant delay in need for subsequent FOA in patients who underwent early PVDO compared to early FOA ($p=0.02$).

Conclusions:
In addition to its volumetric benefits, PVDO results in anterior morphological changes that may allow for a delay or deferral of frontal advancement. This delay may have significant advantages in reducing number of intracranial surgical procedures and durability of fronto-facial advancement.

Figure Legend:

Figure 1: Kaplan-Meier “survival” analysis demonstrates significant delay in timing of FOA for patients who undergo early PVDO


Kaplan-Meier survival estimates
1.00
0.75
0.50
0.25
0.00
0
20
40
60
analysis time
Pre-PVDO
PVDO