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Introduction

- Syndromic craniosynostosis may be characterized by variable multisuture craniosynostosis and midface hypoplasia.
- Despite the need for lifelong staged reconstruction, few centers have described a longitudinal, indication-driven surgical algorithm for syndromic craniosynostosis.

Objective

Aim 1: Characterize the timing and sequence of craniofacial procedures performed in patients with Crouzon vs Apert syndrome

Aim 2: Evaluate how these patients progress through our institutional staged treatment algorithm for syndromic craniosynostosis.

Methods

Study Design and Setting: Retrospective review at a tertiary pediatric center

Inclusion Criteria: Formal diagnosis of Crouzon or Apert syndrome + at least one craniofacial operation under the current algorithm between 2000 - 2026

Algorithmic Phases: Patients were evaluated through three phases: Infancy (early vault reconstruction), Skeletal Immaturity (midface advancement), and Skeletal Maturity (secondary midface/orthognathic surgery)

Table 1. Demographics

n	21
Female	14 (66.6%)
Age at presentation (median, IQR)	0.85 years (0.37–7.44)
Length of follow-up (median, IQR)	14.3 years (10.0–18.9)
Hydrocephalus/VP shunt	11 (52.4%)
Chiari/Posterior fossa crowding	12 (57.1%)
Tracheostomy placement	6 (28.6%)
Decannulation	1 (16.7%)
G-tube placement	5 (23.8%)

Results

Infancy: Early Vault Stage

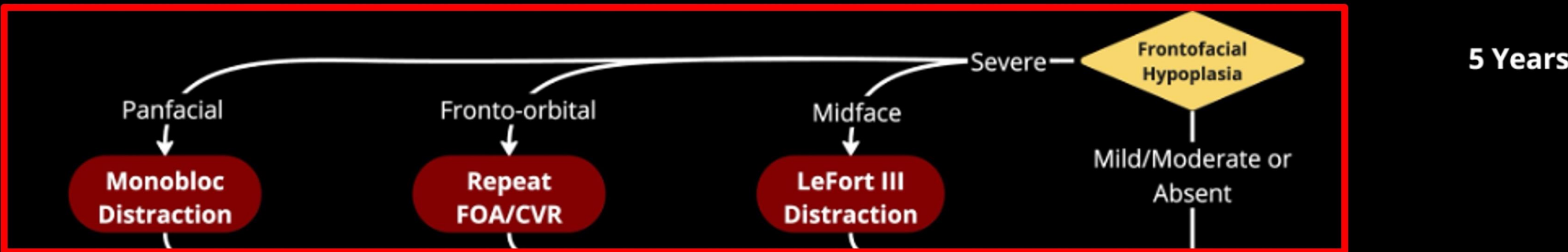
In infancy, early vault mx included PVDO in 5 patients for severe brachycephaly or turricephaly, Chiari malformation, central sleep apnea, and elevated intracranial pressure.

n	21
Median age at early vault surgery	
PVDO (n=5)	4.01 months (2.46–4.67)
FOA/CVR (n=21)	16.3 months (8.8–19.0)
Post-operative helmet therapy, n (%)	5 (23.8%)

Skeletal Immaturity: Midface Advancement

During skeletal immaturity, 14 patients underwent index midface advancement at a median age of 9.7 years, most commonly with Le Fort III distraction (85.7%), while 14.3% underwent monobloc with facial bipartition and no patients required box osteotomy.

n	14
Median age at index midface reconstruction	9.7 years (7.1–11.0)
Le Fort III distraction, n (%)	12 (85.7%)



Conclusions

- Midface hypoplasia was universal; all patients required midface advancement between ages 7 and 18 years.
- Compared to our Apert cohort, fewer Crouzon patients required PVDO (5/21 vs 10/37) and none required box osteotomy, suggesting different patterns of cranial and orbital involvement.

n	14
Median age at index midface reconstruction	9.7 years (7.1–11.0)
Monobloc + facial bipartition, n (%)	2 (14.3%)

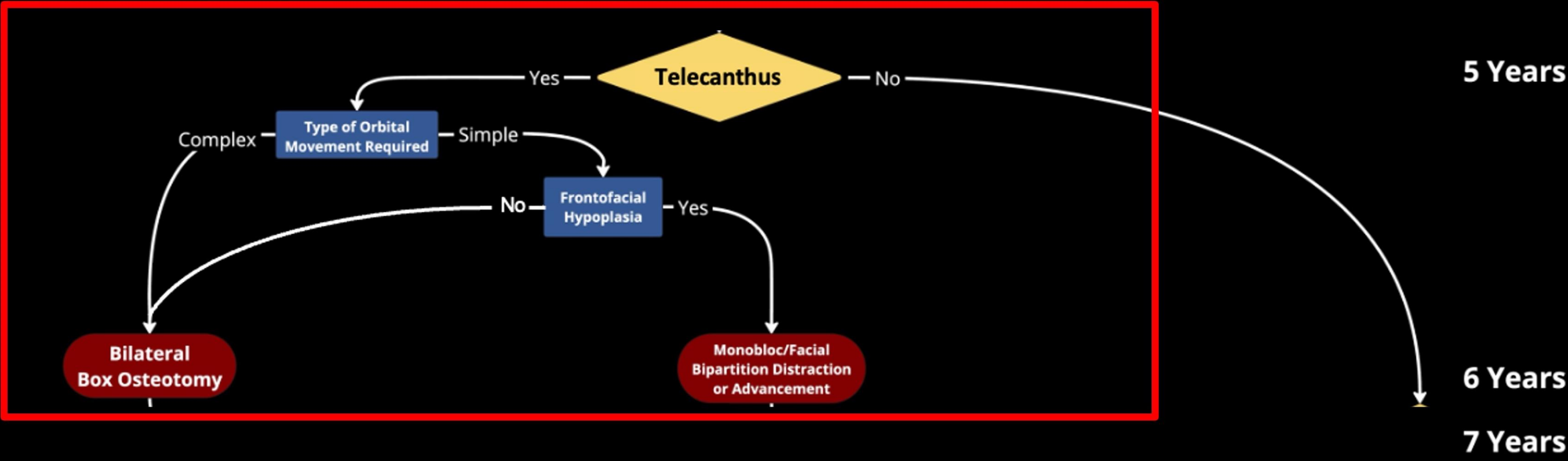


Table 4. Skeletal Maturity: Secondary Midface/Orthognathic Surgery

At skeletal maturity, 10 patients underwent secondary or orthognathic procedures at a median age of 18.6 years, most commonly Le Fort III/I osteotomy (60%), followed by Le Fort III distraction (20%) and SARPE (20%).

n	10
Median age at secondary midface/orthognathic procedure	18.6 years (17.5–19.7)
Le Fort III/I	6 (60%)
Le Fort III distraction	2 (20%)
SARPE	2 (20%)

