

Background

- Craniosynostosis is characterized by premature suture fusion, with an incidence of ~1 in 2,000.
- Despite effective primary surgical intervention, **secondary surgeries** may be necessary to correct **fronto-orbital retrusion** and/or **midface hypoplasia**, which is often observed in cases of **syndromic craniosynostosis**
- The purpose of this study was to evaluate the **impact of craniofacial-syndrome status** on **long-term secondary surgery rates** and investigate factors that might mitigate the need for secondary surgeries.

Methods

- Retrospective review including patients with craniosynostosis who:
 - Underwent primary CVR+FOA at our institution between 2004-2023
 - Had unicoronal or bicoronal synostosis with ≥ 3 years of follow-up
- Compared two cohorts: **Syndromic vs. Non-syndromic** craniosynostosis
- Primary outcome was **secondary surgery**:
 - Repeat FOA**
 - Monobloc** advancement/distraction
 - LeFort III or III/I** advancement/distraction.
- Statistics:
 - Multivariate logistic regression with interaction analysis (**adjusting for age at CVR+FOA, suture type, craniofacial syndrome diagnosis, and PVDO**)

Patient Demographics and Craniofacial Surgical History	Total n=276	Non-Syndromic n=197	Syndromic n=79	p-value
Suture Type				
Isolated Unicoronal	148 (53.6%)	144 (73.1%)	4 (5.1%)	<0.001*
Isolated Bicoronal	80 (29.0%)	28 (14.2%)	52 (65.8%)	<0.001*
Multisuture	46 (16.7%)	24 (12.2%)	22 (27.8%)	0.001*
Age at CVR+FOA (Months) [Mean±SD]	10.7±8.4	11.2±9.4	9.4.1±5.1	0.146
PVDO	22 (7.79%)	4 (2.0%)	18 (22.8%)	<0.001*
Age at PVDO (Months) [Mean±SD]	4.74±3.70	5.05±0.43	3.25±3.99	0.002*

Table 1. Demographics and Prior Surgical Interventions

Multivariate Logistic Regression	Odds Ratio	[95% CI]	p-value
Age at CVR + FOA	1.0287	[0.9791–1.0807]	0.262
Suture Type			
Isolated Unicoronal		<i>Reference</i>	
Isolated Bicoronal	4.2291	[0.2187–81.76]	0.340
Multisuture	2.6575	[0.1402–50.35]	0.515
Craniofacial Syndrome	68.3715	[3.3980–1375.7]	0.006*
PVDO	44.2032	[1.0000–1953.8]	0.050
Craniofacial Syndrome x PVDO	0.0099	[0.0002–0.5023]	0.021*

Table 2. Predictors of Secondary Surgery

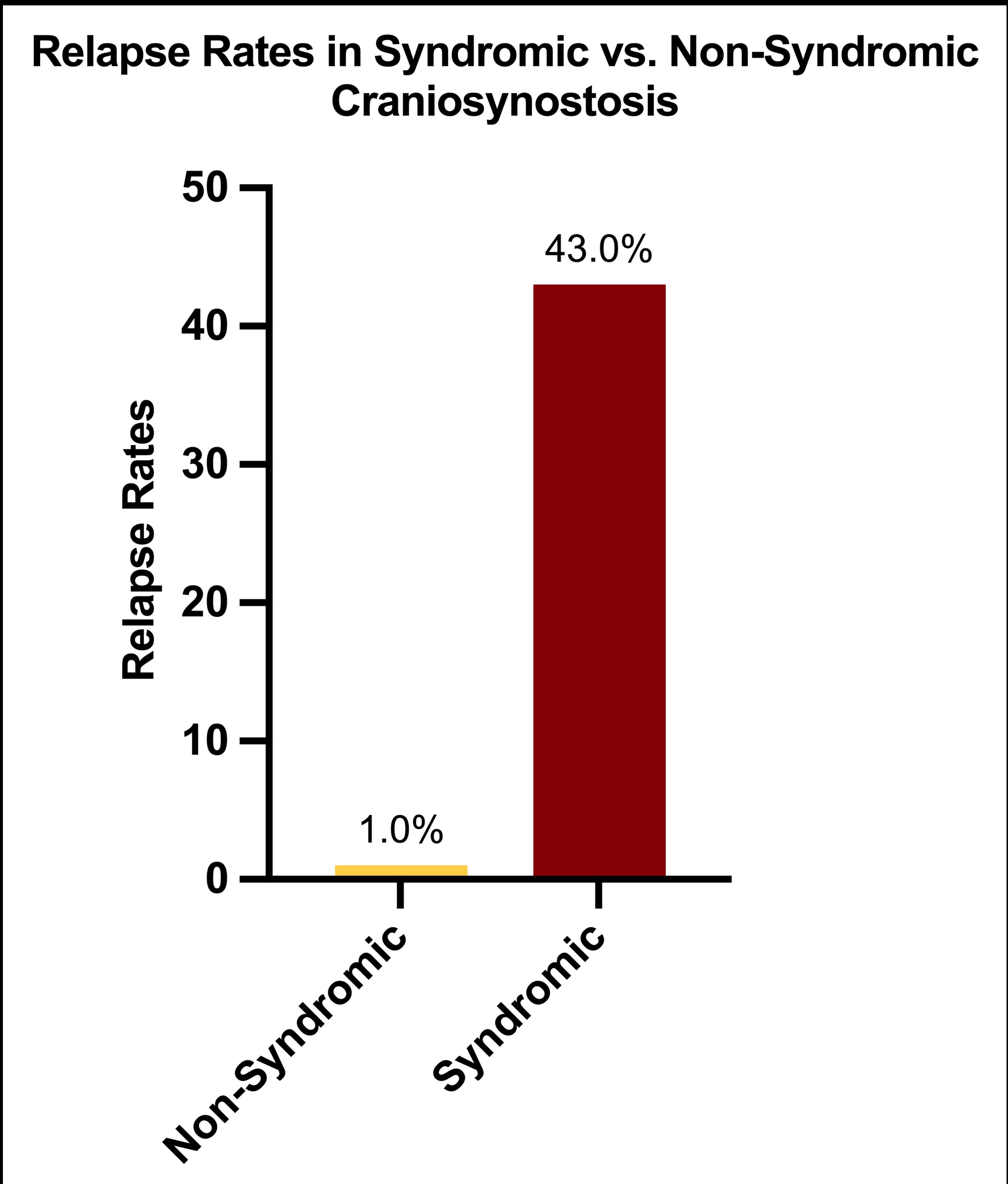


Figure 1. Bar Graph of of Secondary Surgery Rates

Results

- n=276** (79 Syndromic; 197 Non-Syndromic)
- Mean follow-up: 5.6±5.4 years
- Table 1. Demographics + Surgical Interventions
- Comparing prior surgical interventions:
 - There was no difference in age at operation between cohorts
 - Higher rates of PVDO in syndromic cohort
 - Age at index operation was significantly younger when PVDO was the index operation (4.7±3.7 months) vs. when CVR+FOA was the index operation (10.9±8.4 years) [p=0.006*]
- Figure 1. **Rates of secondary surgery were significantly higher in syndromic cohort (43.0%) vs. non-syndromic cohort (1.0%) (p<0.001*)**
- Predictors of PVDO:
 - Syndromic diagnosis** (increased odds by 68-fold)
 - Syndromic diagnosis + PVDO** (reduced odds by 99-fold)

Conclusion

- Craniofacial syndromic diagnosis significantly predicted secondary surgery** for patients with coronal synostosis after CVR+FOA.
- Implementing **PVDO significantly decreased rates** of secondary surgery for this cohort.
- PVDO might slow progression of frontofacial retrusion due to the earlier intervention compared to when CVR+FOA is the index operation.
- Continued investigation of protective factors against secondary surgery is encouraged