Patients With Syndromic versus Non-Syndromic Cleft: Who Faces Higher Perioperative Complications in Orthognathic Surgery?

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Background

Cleft is often treated as a homogeneous diagnosis when assessing orthognathic surgical risk. Yet syndromic patients carry distinct biologic and connective-tissue features that may meaningfully alter perioperative outcomes.

Cleft-associated dentofacial deformity is corrected with Le Fort I, BSSO, segmental osteotomies, and bone grafting. Compared with non-cleft patients, those with cleft face longer operative times, more frequent grafting, and higher relapse risk.

The independent contribution of syndromic status within the cleft population is poorly characterized. Existing evidence relies on NSQIP-type databases lacking granular syndromic, anatomic, and operative detail.

Purpose: Determine whether syndromic status independently predicts adverse perioperative and long-term orthognathic outcomes in patients with cleft lip and/or palate.

Methods

Study Design

Single-center retrospective review at a tertiary craniofacial center (Jan 2009 – Aug 2025).

Inclusion Criteria

Patients with cleft lip and/or palate, age ≥ 14 years, who underwent Le Fort I osteotomy with or without BSSO. Syndromic status confirmed by genetic testing.

Cohorts

Syndromic vs. Non-Syndromic cleft (primary). Cleft vs. Non-Cleft cohort referenced for context (n=120).

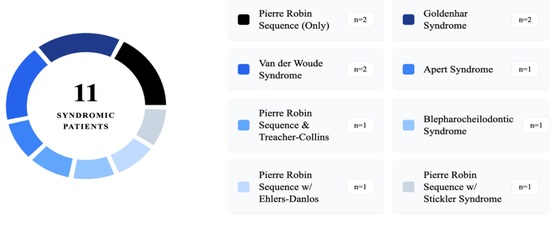
Statistical Analysis

Chi-square / Fisher's exact, t-test, ANOVA for bivariable comparison; multivariable logistic regression for independent predictors of reoperation, readmission, relapse, and any complication. Significance set at $p < 0.05$.

Syndromic Cohort

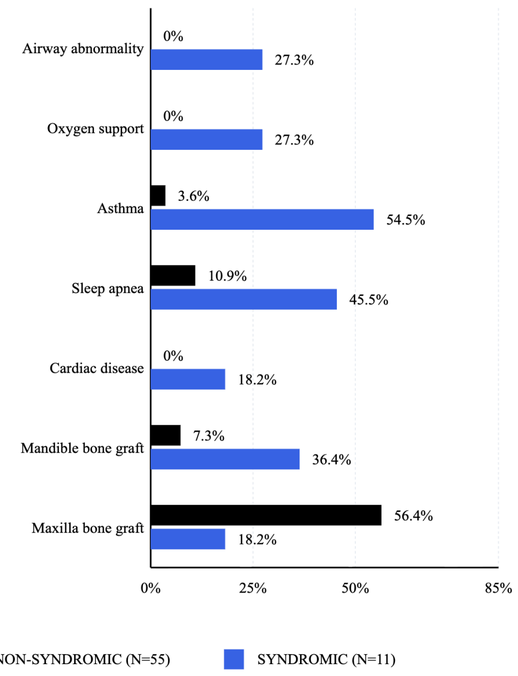
Total: 66 patients (70 procedures)

55 non-syndromic · **11** syndromic (16.7%)



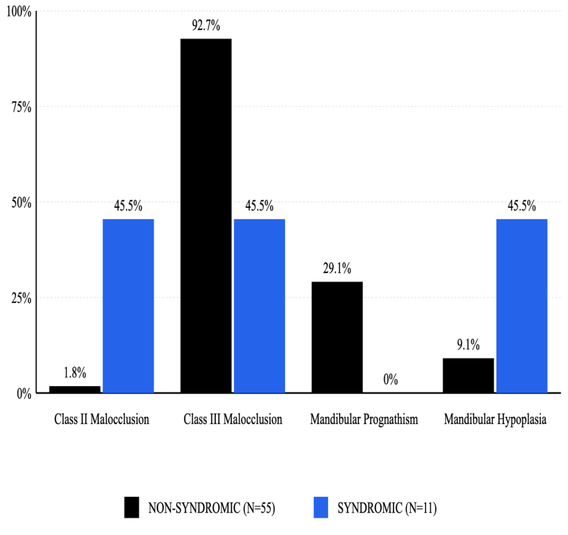
Co-morbidities & Surgical Indications

Syndromic patients carry a heavier systemic burden



Skeletal & Malocclusion Patterns

Syndromic patients show a more variable malocclusion profile



Peri-operative Course

Operative complexity & hospitalization were similar between cohorts

249.8 vs 402.8 min Procedure Time *p=0.134*	**322.8 vs 422.7 mL** Estimated Blood Loss *p=0.564*
2.09 vs 3.18 days Length of Stay *p=0.233*	**535.1 vs 858.7 days** Follow-up Time *p=0.410*

Values shown as Non-Syndromic vs Syndromic

Post-operative Outcomes

Outcome	Non-Synd	Syndromic	p-value
Skeletal Relapse	7.1%	**42.9%**	**0.003**
30-Day Readmission	1.8%	**21.4%**	**0.023**
30-Day Reoperation	1.8%	**21.4%**	**0.023**
Wound Dehiscence	3.6%	**21.4%**	0.051

Syndromic patients had **6× the relapse rate** and **12× the readmission and reoperation rates** of non-syndromic peers.

Multivariable Predictors

Adjusted for operative time, cleft type, and ASA class

Outcome	Adjusted OR (95% CI)	p-value
Any Reoperation	**9.20 (1.22 – 69.40)**	**0.031**
Any Readmission	**37.35 (3.26 – 427.93)**	**0.004**
Relapse	**13.01 (1.84 – 92.11)**	**0.010**
Any Complication	**63.80 (2.38 – 1708.89)**	**0.013**

Syndromic status independently predicts every adverse outcome examined.

Cleft vs Non-Cleft: A Parallel Insight

*In a parallel single-center analysis (**n = 120**; 65 cleft vs 55 non-cleft) of patients undergoing orthognathic surgery:*

- Cleft patients had **longer operative times** (270 vs 202 min, **p = 0.001**), more bone graft use (58.5% vs 38.2%, **p = 0.027**), and longer LOS (2.2 vs 1.4 days, **p = 0.010**).
- Unadjusted relapse was higher in cleft (13.8% vs 1.8%, **p = 0.021**).
- After multivariable adjustment, **cleft status alone did not independently predict** reoperation, readmission, relapse, or any complication.

Across both analyses, **syndromic status — not cleft status — emerges as the dominant driver of adverse outcomes.**

Discussion

Why are syndromic patients at higher risk?

- **Altered bone biology.** Reduced osteogenic capacity and impaired healing undermine fixation stability.
- **Connective-tissue variants.** Fibrillar abnormalities (Stickler, Ehlers-Danlos) predispose to dehiscence and relapse.
- **Greater anatomic complexity.** More frequent airway abnormality, OSA, and cardiac comorbidity raise complication risk.
- **Heterogeneous syndromic phenotypes.** Pierre Robin sequence, Goldenhar, Apert, Stickler, and Ehlers-Danlos all share an outsized vulnerability.

Clinical Implications

- **Cleft alone is not the right risk axis.** Risk stratification should center on syndromic diagnosis, ASA class, and operative complexity.
- **Targeted optimization for syndromic patients.** Multidisciplinary preoperative airway, cardiac, and connective-tissue evaluation; closer postoperative follow-up.

Conclusion

Within the cleft population, **syndromic status independently predicts** relapse, reoperation, readmission, and overall complications after orthognathic surgery.

Length of stay and follow-up are similar between groups, indicating the elevated risk is **biologic rather than logistical.**

Surgical risk in cleft orthognathic surgery should be stratified by **syndromic diagnosis and systemic comorbidity** — not cleft status alone.

Limitations Single-center retrospective design; small syndromic subgroup (n=11) yields wide confidence intervals; heterogeneous syndromic pathophysiology limits subgroup-specific inference.

Selected References

1. Posnick JC, Tompson B. Cleft-orthognathic surgery: complications and long-term results. *Plast Reconstr Surg.* 2. Susarla SM et al. Reoperation after orthognathic surgery in cleft patients. *Cleft Palate Craniofac J.* 3. Buchanan EP et al. NSQIP-P analysis of cleft orthognathic outcomes. *J Craniofac Surg.*