

Infants with Cleft Palate: Comorbidities Necessitating Surgery and Risk Factors for G-Tube Placement



Cynthia Hinderscheid, BA¹ ; Ava Adler, BA¹; Sara Best¹; Grace Schaefer¹; Aleezay Khan¹; Harish Neelam²; Caroline Baker³; Elizabeth Busheong⁴; John Girotto⁴

¹Michigan State University College of Human Medicine, East Lansing and Grand Rapids, MI ²Michigan State University, East Lansing, MI ³Corewell Health West/Helen DeVos Children's Hospital Pediatric Plastic Surgery, Grand Rapids, MI ⁴Michigan State University/Corewell Health Integrated Plastic Surgery Program, Grand Rapids, MI

BACKGROUND & PURPOSE

- Patients with a cleft palate can feature complex system-level comorbidities that might require intervention other than cleft palate repair.
- In the first few months of life, these patients may also require gastrostomy-tube (G-tube) placement to address feeding difficulties.¹
- Previous data found that system-level comorbidities are significant risk factors for G-tube insertion and may be more predictive than syndromic status alone.²
- Purpose:** We evaluated surgical risk factors in other system-level comorbidities and G-tube placement.

METHOD & DESCRIPTION

Study Design

- Retrospective chart review

Study Population

- 370 infants with cleft palate born between 2006 to 2025 from a tertiary care center

Inclusion Criteria

- Any feeding-relevant comorbidities
 - With a G-tube: Date of placement
 - Without a G-tube: 2.9-month index age

Data Collected

- Feeding-relevant comorbidities grouped by organ system: neurologic/neuromuscular (neuro), cardiac, respiratory, gastrointestinal (GI)
 - Major (required surgery) and minor (did not require surgery) status
- Covariates: sex, race, ethnicity, insurance status, syndromic status

Statistical Analyses

- Pearson's chi-squared test; Fisher's exact test; Poisson regression
- Adjusted and unadjusted relative risks

RESULTS

Table 1. Statistically Significant (p<0.05) Characteristics of Infants by G-tube Placement			
Characteristics, N (%)	Non-G-tube patients (N = 459)	G-tube patients (N = 24)	p-value
Patient demographics			
Sex			0.010
Female	187 (40.7)	9 (37.5)	
Male	272 (59.3)	15 (62.5)	
Insurance			0.049
Private	279 (60.8)	9 (37.5)	
Public	170 (37)	14 (58.3)	
Unknown and self-pay	10 (2.2)	1 (4.2)	
Comorbidities and systems affected			
Any major comorbidity			<0.001
No	318 (69.3)	15 (62.5)	
Yes	28 (6.1)	9 (37.5)	
Any minor comorbidity			<0.001
No	262 (57.1)	6 (25)	
Yes	84 (18.3)	18 (75)	
Neurologic/Neuromuscular system	15 (3.3)	9 (37.5)	<0.001
Cardiac system	22 (4.8)	5 (20.8)	0.023
Respiratory system	45 (9.8)	15 (62.5)	<0.001
Gastrointestinal system	48 (10.5)	13 (54.2)	<0.001
Presence of syndromes			
Pierre-Robin syndrome (PRS)			0.002
No	424 (92.4)	17 (70.8)	
Yes	33 (7.2)	7 (29.2)	
Any syndrome			<0.001
No	403 (87.8)	10 (41.7)	
Yes	54 (11.8)	14 (58.3)	
Syndrome status			<0.001
No syndrome and No PRS	403 (87.8)	10 (41.7)	
Other syndrome	21 (4.6)	7 (29.2)	
PRS	22 (4.8)	1 (4.2)	
PRS and other syndrome	11 (2.4)	6 (25)	

Table 2. Unadjusted and Adjusted Associations Between Patient Characteristics and Major/Minor Comorbidities Depicting Surgical Indication				
Characteristics (N = 370)	Major comorbidities (Surgery Indicated)		Minor comorbidities (Surgery NOT indicated)	
Relative Risk (RR), 95% CI	Unadjusted RR	Adjusted RR	Unadjusted RR	Adjusted RR
G-tube placement				
No	1 (ref)	1 (ref)	1 (ref)	1 (ref)
Yes	4.99 (2.64-9.42)	2.04 (0.88-4.76)	3.14 (2.33-4.22)	2.35 (1.62-3.42)
Sex				
Female	-	1 (ref)	-	1 (ref)
Male	-	1.01 (0.58-1.75)	-	1.52 (1.08-2.14)
Syndromic status				
No syndrome and No PRS	-	1 (ref)	-	1 (ref)
Other syndrome	-	5.31 (1.75-16.13)	-	1.99 (1.23-3.21)
PRS	-	20.68 (9.77-43.77)	-	2.88 (1.85-4.48)
PRS and other syndrome	-	18.95 (7.32-49.06)	-	2.5 (1.61-3.89)

- Presence of a minor comorbidity was associated with 2.4-times (95% CI 1.6-3.5) increased adjusted RR for a G-tube.
- All syndromic status categories had increased risks for major and minor comorbidities.

Total patient charts (N = 483)

- 24 (6.5%) infants received a G-tube.
- 37 (10%) and 102 (27.6%) had a major and/or minor comorbidity, respectively.
- Syndromic status was present in 68 infants (18.4%), of which 40 (10.8% overall; 58.8% of all syndromes) featured Pierre-Robin (PRS).

Study cohort (N = 370)

**Excluding infants with missing information (e.g. adopted patients, establishing care past the index age)*

- Patients who received a G-tube exhibited 9 (38%) major, 18 (75%) minor, and 9 (38%) multi-system comorbidities.
 - Comorbidities were most commonly **respiratory > GI > neuro > cardiac**.
- These patients were more frequently male (**p=0.010**), had public insurance (**p=0.049**), were diagnosed with a syndrome (**p<0.001**) and/or PRS (**p<0.002**), and possessed more comorbidities (any major, minor or multi-system, **all p<0.001**).

CONCLUSIONS

Significance

- Our findings demonstrate a strong association between syndromic status and the overall complexity of care.
- While this study strengthens the role of syndrome and comorbidity as G-tube risk factors, syndrome was more predictive than the presence of other comorbidities in our cohort.

Implications for Practice

- For patients with cleft palate and syndromic overlap, reliance on conservative management is possible.
 - However, overcoming feeding difficulties may require more emphasis on early surgical intervention.

Study Limitations

- Over 20% of patient charts were excluded due to incomplete historical records, potentially impacting trends identified in the characteristics of data.
- Effect size may be overestimated due to smaller sample sizes for G-tube-specific data.

Potential Directions for Future Research

- Characterizing system-level indications for surgery and risk factors for G-tube insertion in adopted patients with cleft palate.

REFERENCES

- Miller CK. Feeding issues and interventions in infants and children with clefts and craniofacial syndromes. Semin Speech Lang. 2011 May;32(2):115-26. doi: 10.1055/s-0031-1277714.
- Cu SR, Sidman JD. Rates and risks of gastrostomy tubes in infants with cleft palate. Arch Otolaryngol Head Neck Surg. 2011 Mar;137(3):275-81. doi: 10.1001/archoto.2011.18.