

# Optimizing Patient-Specific Management of Tongue-Based Airway Obstruction: Polysomnography and Feeding Outcomes Following Surgical Intervention

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## Introduction

Pierre Robin sequence is characterized by micrognathia and glossoptosis, resulting in a tongue-based airway obstruction (TBAO).<sup>1</sup>

Mandibular distraction osteogenesis (MDO) and Tongue-lip adhesion (TLA) are the most common surgical treatments for severe TBAO to avoid tracheostomy for patients with Pierre Robin sequence and other congenital causes of TBAO.<sup>1,2</sup> Tracheostomy may be required for infants with PRS who are not good candidates for TLA or MDO, though it carries significant morbidity and long-term care burden.<sup>3</sup>

Treatment success can be defined by resolution or improvement in airway obstruction, avoidance of tracheostomy and ability to feed by mouth.<sup>4</sup>

## Purpose

To evaluate pre- and post-operative polysomnography (PSG) results for obstructive sleep apnea (OSA) and enteric feeding outcomes in patients with micrognathia who underwent either MDO, TLA or Tracheostomy for TBAO.

## Methods and Materials

### Study Design

- Retrospective cohort study
- Exposures: TLA, MDO, and tracheostomy
- Outcomes: End Apnea-Hypopnea Index, Change in AHI, & Post-Operative Feeding Requirement

### Study Population

- Inclusion: Ages 0-18, Diagnosis of micrognathia, underwent surgical management between 1/1/2013 and 12/31/2023
- Exclusion: Procedures performed at outside institutions

### Statistical Analysis

- 84 Patients included
- Count and percentage when categorical
- Median/interquartile when continuous

## Results

Table 1. Patient Demographics	MDO (N=41)	TLA (N=21)	Tracheostomy (N=22)
Sex (Male)	32 (51%)	17 (40%)	15 (71%)
Genetic Diagnosis			
Non-diagnostic	15 (24%)	13 (31%)	2 (9.5%)
PRS	31 (49%)	16 (38%)	4 (19%)
Other	17 (27%)	13 (31%)	15 (71%)
Cleft Status			
Non-Cleft	7 (11%)	7 (17%)	0 (0%)
Veau I	27 (43%)	25 (60%)	2 (9.5%)
Veau II	29 (46%)	10 (24%)	19 (90%)
Age at Surgery (mo)			
MDO	39 (29, 62)	—	—
TLA	—	40 (32, 59)	—
Tracheostomy	—	—	32 (21, 54)

### High Pre-Operative OSA Severity Across All Treatment Groups

#### MDO:

78% with severe OSA  
Mean pre-op AHI of 30 events per hour

#### TLA:

71% with severe OSA  
Mean pre-op AHI of 23 events per hour

#### Tracheostomy:

67% with severe OSA  
Mean pre-op AHI of 29 events per hour

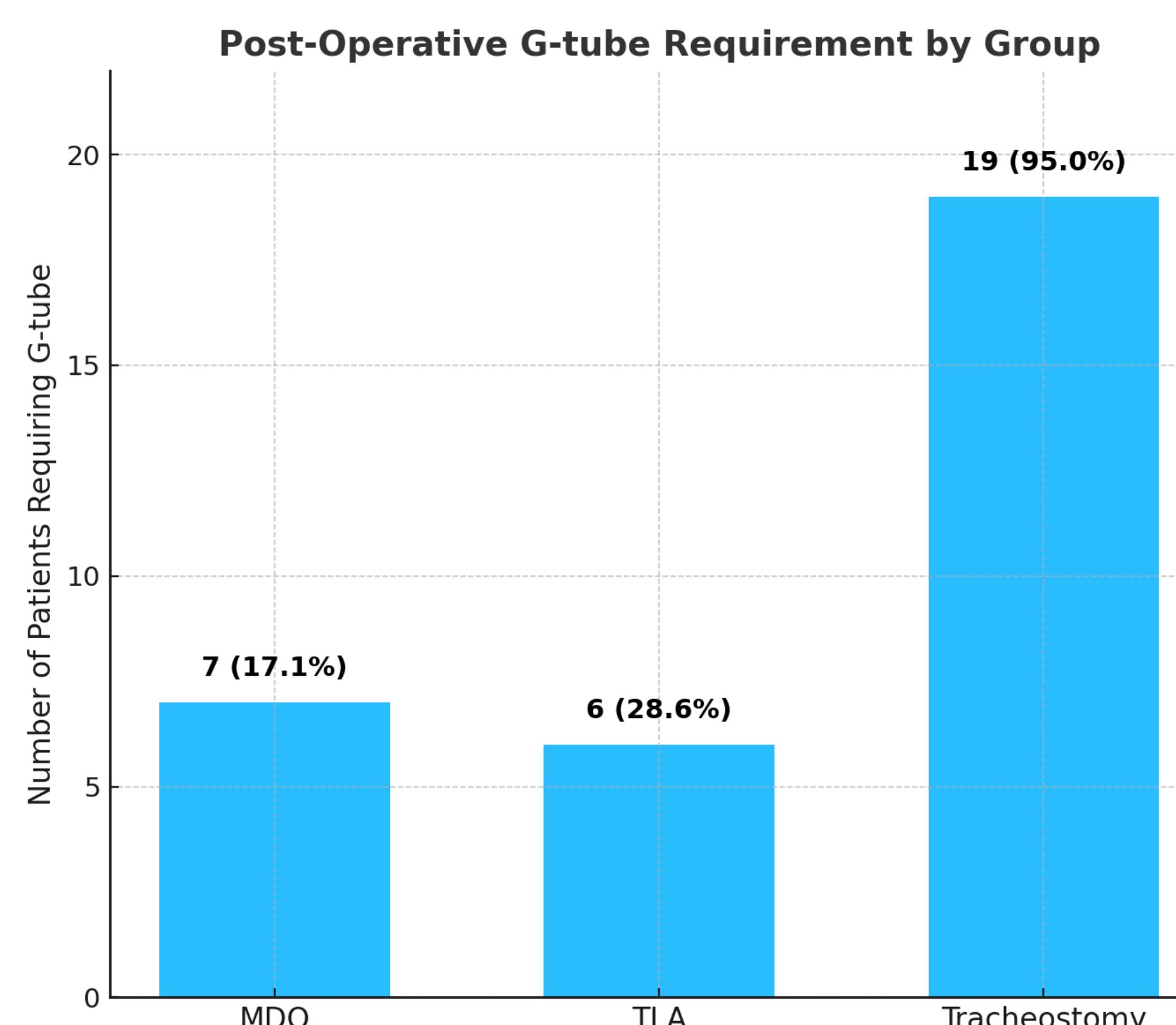


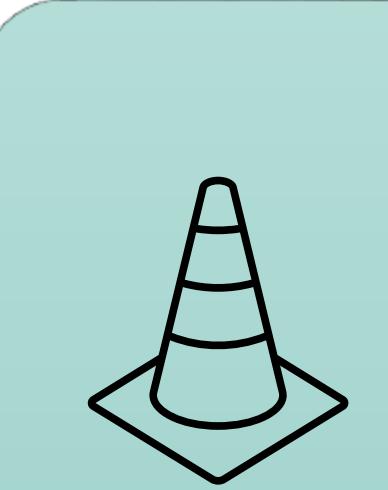
Chart 2. Post-operative gastrostomy tube requirement

## Discussion



### Key Points

- Patients presented with a high pre-operative disease burden, most demonstrating severe OSA at baseline.
- All interventions effectively reduced OSA severity, supporting the role of surgical management for upper airway obstruction.
- Despite having the highest baseline AHI, patients undergoing MDO achieved considerable reduction, highlighting its ability to correct severe obstruction.



### Limitations

- Small sample size for tracheostomy group, with heterogeneity in genetic diagnoses and comorbidities.
- Patients with higher baseline AHI and/or comorbidities may have been preferentially offered MDO or tracheostomy, influencing outcomes.



### Future Directions

- Further studies will analyze additional outcomes, including post-operative growth percentiles, feeding status, and airway findings, to guide the stratification of patients into appropriate treatment categories.

### Chart 1. Comparison of Change in AHI

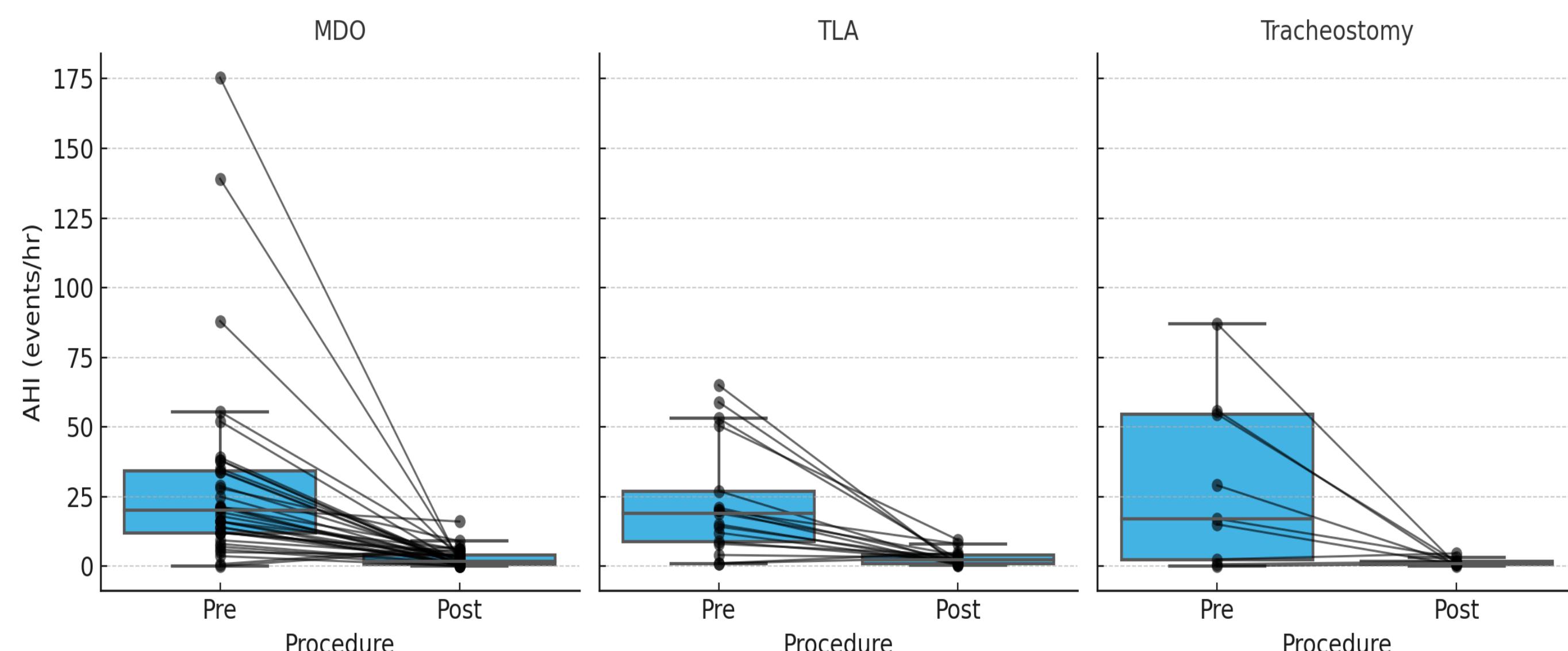


Table 2.

AHI	N	Pre-op AHI	Post-op AHI	Mean Change	Median Change (IQR)	p-value*
MDO	36	32.7	3.3	-29.4	-20.5 (-34.0, -12.0)	<0.001
TLA	17	23.6	2.9	-20.7	-17.0 (-27.0, -8.0)	<0.001
Tracheostomy	9	29.6	1.2	-28.4	-16.5 (-31.0, -8.0)	<0.001

\*Paired t-test for pre- vs post-op AHI within group.

## References

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