

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

Zialesi W. Adissem, BS<sup>1</sup>, Logan McColl MD, MBA<sup>1,2</sup>, Monirah Albathi MBBS<sup>3</sup>, Jonathan Grischkan MD, FACS, FAAP<sup>1,2</sup>

<sup>1</sup>Department of Otolaryngology—Head and Neck Surgery, Nationwide Children’s Hospital, Columbus OH, USA

<sup>2</sup>Department of Otolaryngology—Head and Neck Surgery, The Ohio State University Wexner Medical Center, Columbus, OH, USA

<sup>3</sup>Princess Nourah Bint Abdulrahman University College of Medicine, Riyadh, Saudi Arabia



## 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 preformed 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 1. Comparison of Change in AHI

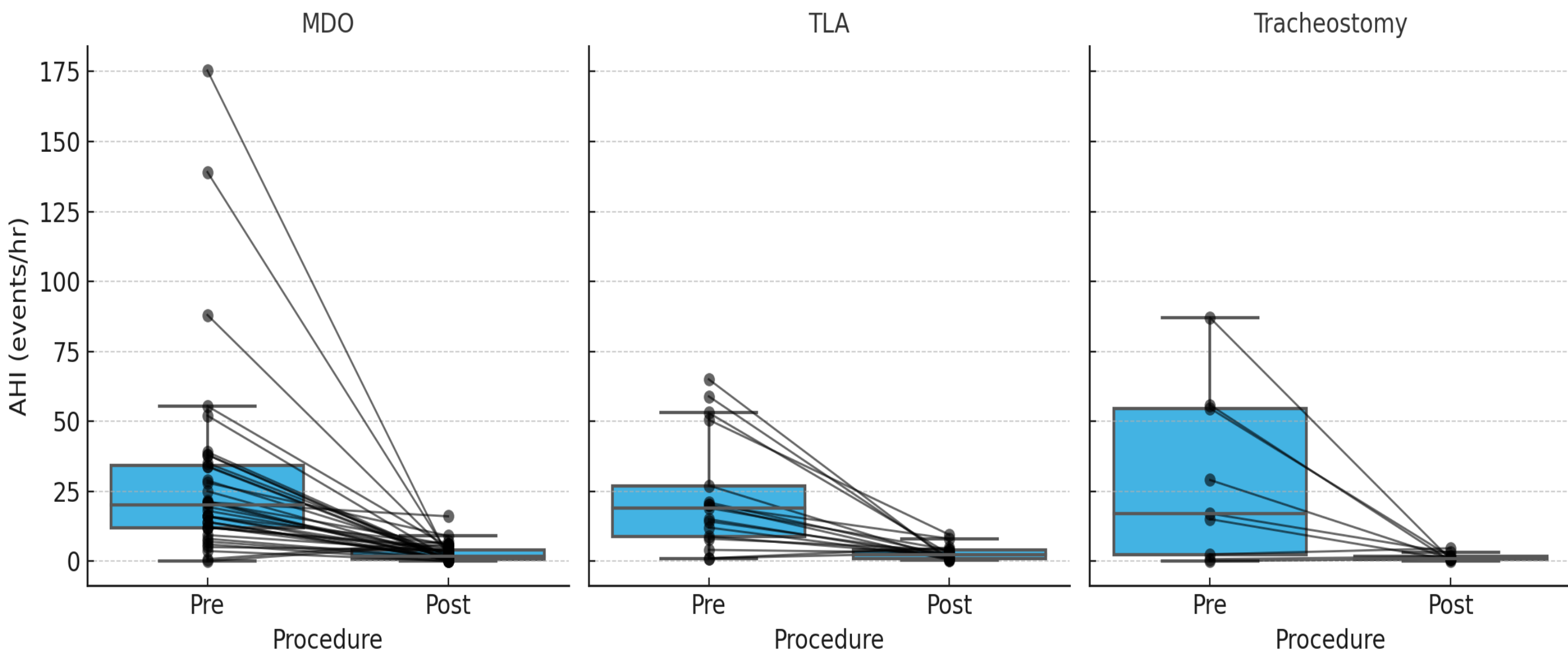


Table 2. AHI	N	Pre-op AHI	Post-op AHI	Mean Change	Median Change (IQR)	p-value*
MDO	36	32.7	3.3	-29.4	-20.5 (-34.0, -12.0)	<0.001
TLA	17	23.6	2.9	-20.7	-17.0 (-27.0, -8.0)	<0.001
Tracheostomy	9	29.6	1.2	-28.4	-16.5 (-31.0, -8.0)	<0.001

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

Post-Operative G-tube Requirement by Group

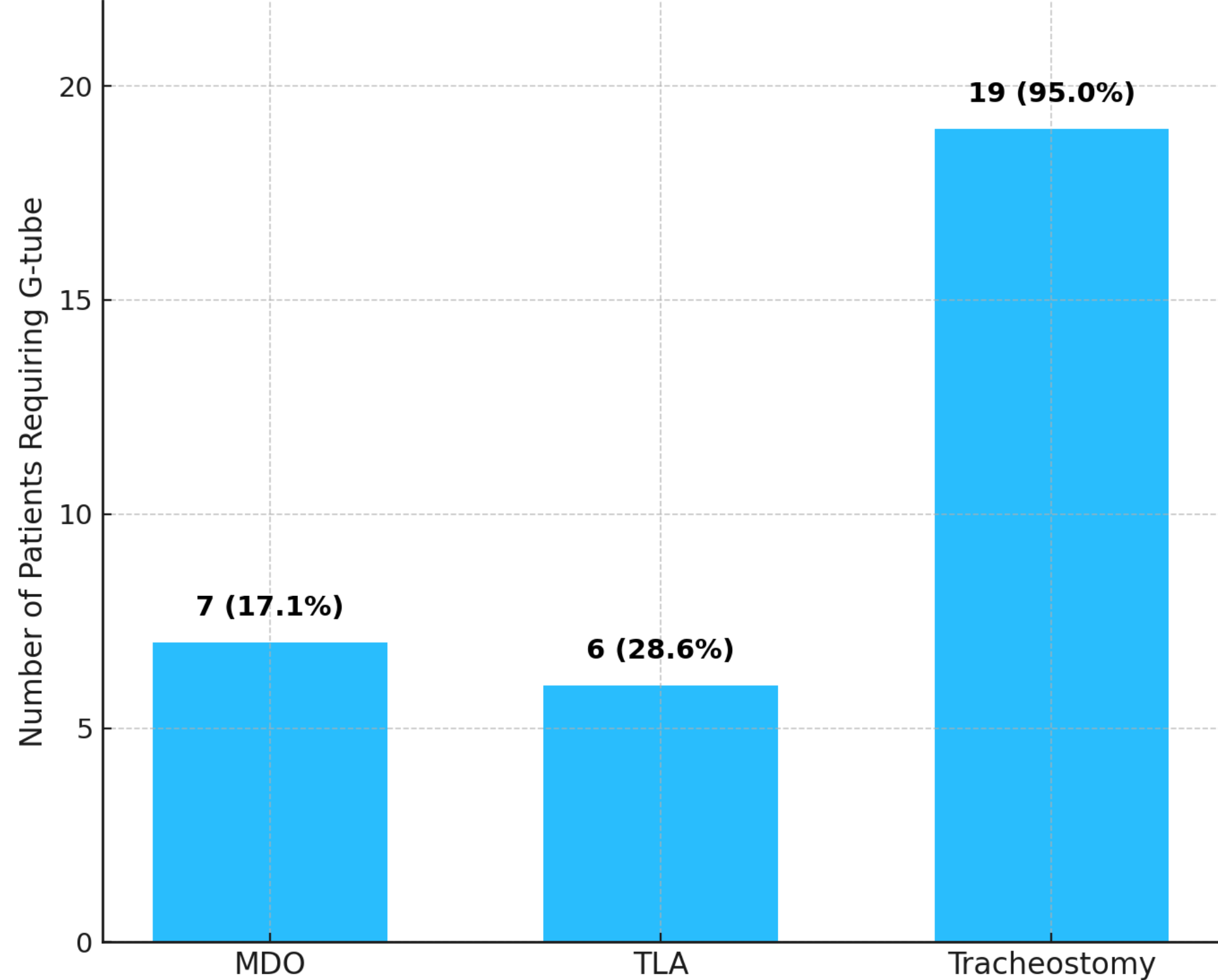
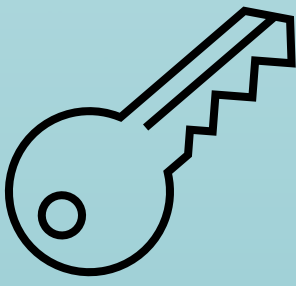


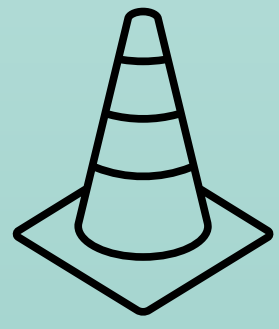
Chart 2. Post-operative gastrostomy tube requirement

## 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.

## Conclusions

Patients undergoing MDO displayed significant improvement in AHI and feeding outcomes despite high preoperative TBAO severity. TLA offered resolution of severe OSA with marginally higher rate of G-tube dependence. Tracheostomy was essential for patients with more complex genetic conditions or significant comorbidities. These patients required long-term enteral support and carried a greater care burden. Baseline AHI and comorbidities may help guide surgical selection and individualized care planning.

## Contact

Jonathan Grischkan MD, MS, FACS, FAAP  
Nationwide Children’s Hospital Otolaryngology Department  
700 Children’s Drive, Columbus, OH 43205  
Jonathan.Grischkan@nationwidechildrens.org  
(614) 722-5210

## References

- Hsieh ST, Woo AS. Pierre Robin Sequence. Clin Plast Surg. 2019 Apr;46(2):249-259. doi: 10.1016/j.cps.2018.11.010. Epub 2019 Feb 8. PMID: 30851756.
- Giudice A, Barone S, Belhous K, Morice A, Soupre V, Bennardo F, Boddaert N, Vazquez MP, Abadie V, Picard A. Pierre Robin sequence: A comprehensive narrative review of the literature over time. J Stomatol Oral Maxillofac Surg. 2018 Nov;119(5):419-428. doi: 10.1016/j.jormas.2018.05.002. Epub 2018 May 17. PMID: 29777780.
- Chaisrisawadisuk S, Lauvalert A, Vathanophas V, Kongchu N, Vongviriyangkoon T. Prognostic Risks for Tracheostomy in Pierre Robin Sequence: A Cohort From a Tertiary Hospital in Thailand. Ann Plast Surg. 2024 Jun 1;92(6):653-657. doi: 10.1097/SAP.0000000000003885. Epub 2024 Mar 26. PMID: 38718326.
- Morice A, Soupre V, Mitanchez D, Renault F, Fauroux B, Marlin S, Leboulanger N, Kadlub N, Vazquez MP, Picard A, Abadie V. Severity of Retrognathia and Glossoptosis Does Not Predict Respiratory and Feeding Disorders in Pierre Robin Sequence. Front Pediatr. 2018 Nov 20;6:351. doi: 10.3389/fped.2018.00351. PMID: 30525013; PMCID: PMC6256711.