Epidemiological and Surgical Outcomes of 321 Pediatric Subglottic Stenoses

Aliya Turayeva, MD[1] · Meryem Miri, MD[4] · Kalamkas Sagandykova, MD, PhD [2] · Jerome R. Lechien, MD, PhD, FACS [3,4,5]

[1] Department of Otorhinolaryngology, NCJSC "Astana Medical University," Astana, Kazakhstan
[2] University Medical Center Corporate Fund, School of Medicine, Nazarbayev University (NUSOM), Astana, Kazakhstan
[3] Phonetics and Phonology Laboratory (UMR 7018 CNRS, Universite Sorbonne Nouvelle), Paris, France
[4] Department of Surgery, UMONS Research Institute for Language Science and Technology, University of Mons, Belgiu
[5] Department of Otolaryngology-Head and Neck Surgery, Foch Hospital, University of Paris Saclay, France

National Scientific Center for Maternal and Child Health · Astana, Republic of Kazakhstan · January 2019 – December 2024

1 BACKGROUND

Pediatric subglottic stenosis (PSS) — narrowing of the airway at the cricoid level — together with posterior glottic stenosis, ranks among the leading causes of neonatal stridor and dyspnea, affecting an estimated 0.9–8.3% of intubated children. Reported drivers include prolonged intubation, craniofacial malformations, and intrinsic structural disease, yet large-cohort outcome data remain scarce: most published series are confined to small, single-center populations.

Objectve: to characterize the epidemiology, etiology, and surgical outcomes of pediatric subglottic stenosis in a large, six-year national cohort

2 METHODS

Retrospective review of children (birth–18 years) treated for laryngeal stenosis at the National Scientific Center for Maternal & Child Health (Astana, Kazakhstan), January 2019–December 2024. Diagnosis was confirmed by flexible/rigid laryngoscopy and bronchoscopy; severity was graded with the Myer–Cotton classification. Patients with incomplete records, major congenital anomalies, or stenosis secondary to cancer therapy were excluded.

3 RESULTS : COHORT OVERVIEW

520→321
children treated for laryngeal stenosis (PLS); 321 (61.7%) had confirmed subglottic stenosis (PSS)

383
surgical procedures performed — 1.2 per patient across the 321-patient PSS cohort

73.1%
overall decannulation rate achieved with grade-tailored management

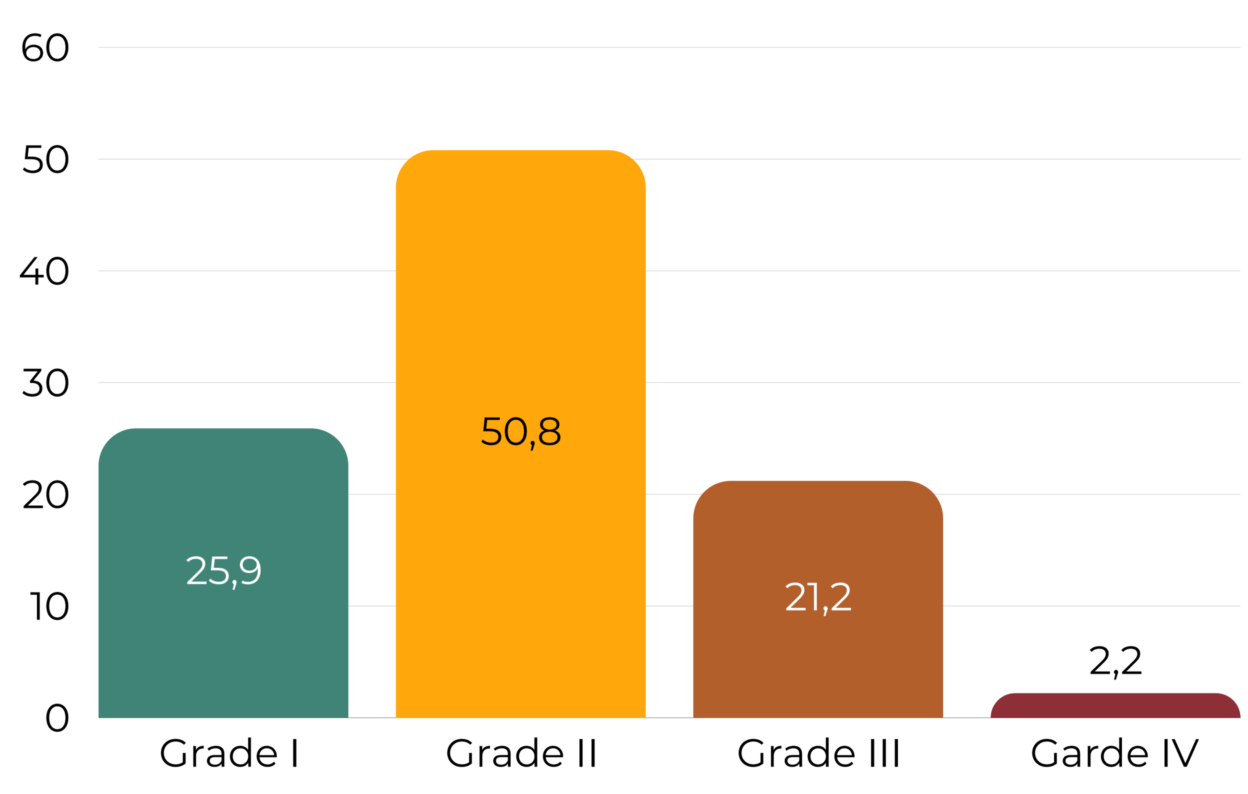
9.0±4.0 d
mean hospital stay following surgical intervention

20.9%
of patients required a surgical revision procedure (62 patients)

41%/59%
female / male ratio, shifting toward male predominance 2019–2024*

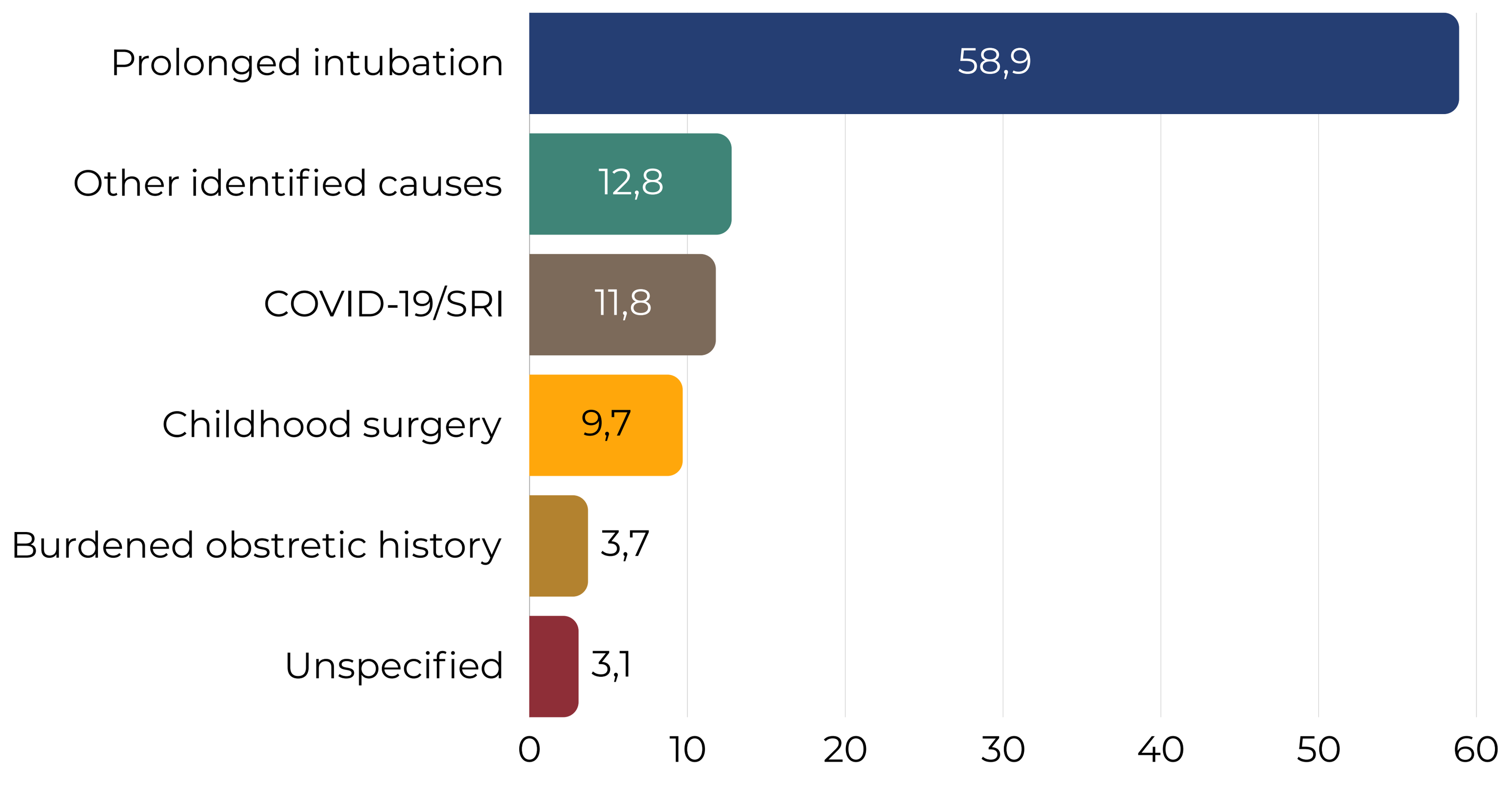
Tracheostomy & decannulation: 36 patients had a preoperative tracheostomy and 39 were tracheostomized intraoperatively (all open procedures). Of the 39 tracheotomized patients, 14 (28.6%) were adequately decannulated postoperatively, while 61 patients across the cohort were decannulated immediately after their first procedure.

4 SEVERITY AT DIAGNOSIS



Grades I–II accounted for more than three-quarters of cases (76.6%), consistent with early diagnosis before airway compromise becomes critical.

5 ETIOLOGY



Other identified causes (12.8%): *burns & tracheostomy (2.2% each); benign lesions, foreign body, papillomatosis/hemangioma (1.9% each); trauma (1.5%); craniofacial/neuromuscular disease (1.2%). Congenital upper-airway anomaly in 4% (n=13); intubated at birth in 19.4% (n=62).*

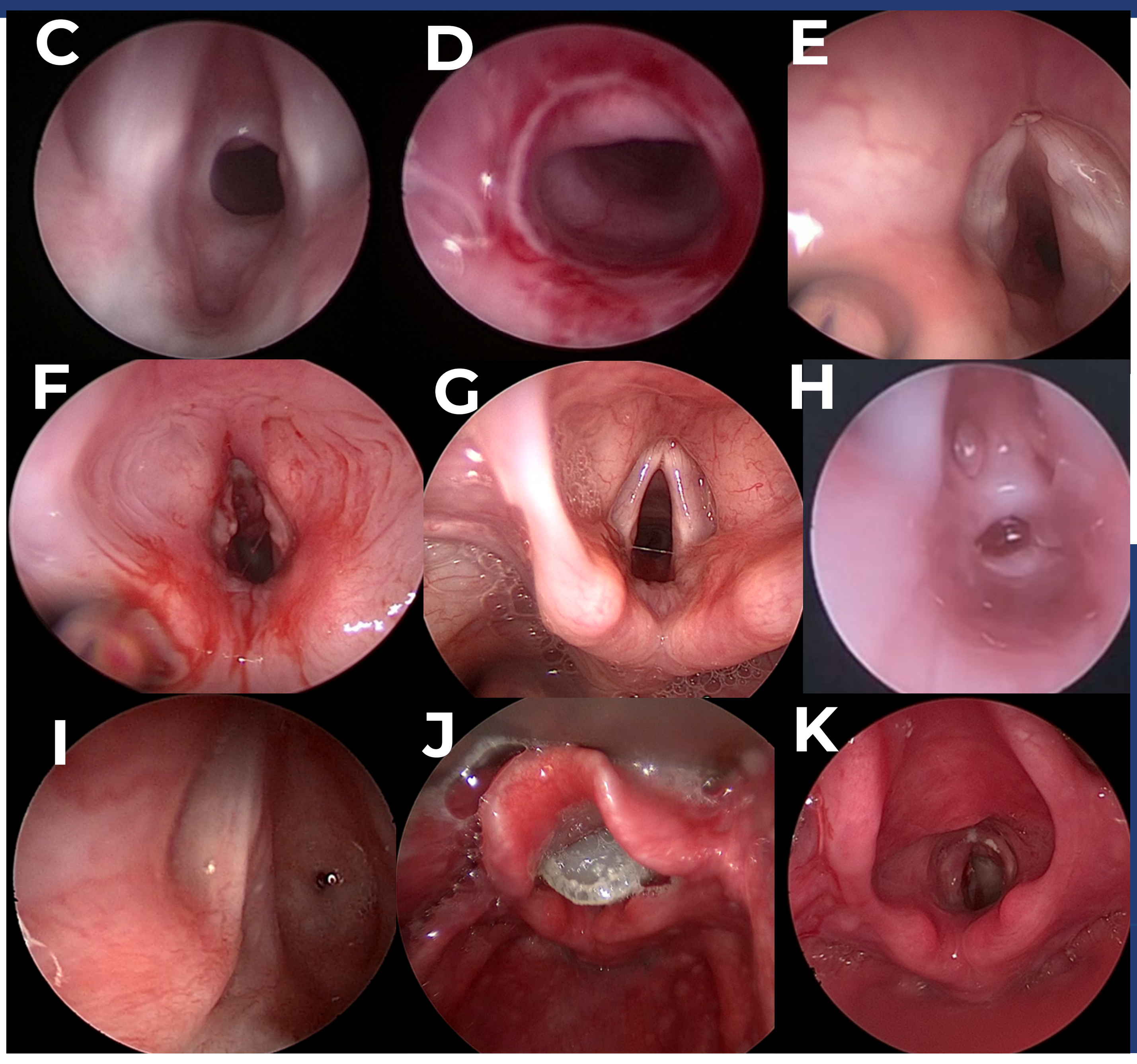
6 PROCEDURES BY SEVERITY GRADE

Grade	N	BD+TLE	TE	CO2 Laser TLE	BO	SP	T-Tube	PLR
GradeI	83	62	15	6	0	0	0	0
Grade II	163	108	42	34	6	1	0	0
Grade III	68	21	26	24	12	2	11	1
Grade IV	7	0	6	0	0	0	6	0
Total	321	191	83	64	18	3	17	1

BD = balloon dilatation; TLE = transoral laser excision; TE = transoral cold-instrument tissue resection; BO = balloon dilatation alone; SP = stent placement; T-tube = T-tube placement; PLR = partial laryngotracheal resection. Grades I–II were managed primarily by transoral approaches; Grade III by transoral or external approaches; most Grade IV cases required T-tube placement.

7 CONCLUSION

In this six-year national cohort, prolonged intubation was the leading cause of PSS, and most cases presented at low-to-moderate severity (Grades I–II). Grade- tailored, largely transoral management achieved a 73.1% overall decannulation rate, supporting endoscopic-first strategies with reconstructive or external approaches reserved for higher-grade disease.



- Grade II–III subglottic PLS before (C) and after CO2 laser excision (D);
- Grade III subglottic laryngeal stenosis before (E), immediately (F) and 3-month post-dilatation and excision (G);
- Grade IV subglottic PLS in a neonate before (H, I), immediately after T-tube placement (J) and 3-month post-tube removal (K). Example of supraglottic partial stenosis (papillomatosis).

REFERENCES

1. Cotton RT, Prescott CJ. Congenital anomalies of the larynx. In: Practical Pediatric Otolaryngology. Lippincott-Raven; 1999:497–514.
2. Nouraei SA, et al. Validation of the ADVS scale in paediatric laryngotracheal stenosis. Clin Otolaryngol. 2017;42(2):283–294.
3. Redondo-Sedano J, et al. Laryngeal stenosis in children: types, grades and treatment strategies. J Pediatr Surg. 2019;54(9):1933–1937.
4. Cakir E, et al. Post-intubation subglottic stenosis in children. Pediatr Int. 2020;62(3):386–389.
5. Talwar R, Virk JS, Bajaj Y. Paediatric subglottic stenosis — have things changed? Int J PediatrOtorhinolaryngol. 2015;79(12):2020–2022.
6. Quesnel AM, et al. Minimally invasive endoscopic management of subglottic stenosis in children. Int J Pediatr Otorhinolaryngol. 2011;75(5):652–656.
7. Hartnick CJ, et al. Surgery for pediatric subglottic stenosis: disease-specific outcomes. Ann Otol Rhinol Laryngol.2001;110(12):1109–1113.
8. George M, et al. Management of severe pediatric subglottic stenosis with glottic involvement. J Thorac Cardiovasc Surg. 2010;139(2):411–417.