



ORIGINAL ARTICLE

Intraoperative Ultrasonographic Assessment of Vocal Cord motion under sedation, following paediatric thyroidectomy in the Era of COVID-19: A double-blinded preliminary study

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Abstract

Introduction: Unilateral vocal cord paralysis (UVCP) is a known complication of thyroid surgery, due to iatrogenic recurrent laryngeal nerve injury, with reported rates of 2%–5% in children. The gold standard for assessing vocal cord function in flexible nasendoscopy (FNE) examination, which is considered high-risk for contraction of the COVID-19 virus. Intraoperative ultrasonographic assessment (IUA) of vocal cord function is a non-invasive and relatively simple procedure performed in a supine position, performed during spontaneous breathing, following reversed anaesthesia, while the patient is still sedated.

Objectives: To evaluate the validity of IUA modality in children undergoing thyroidectomy and to compare it to the standard FNE.

Design: A prospective double-blind study covering 24 months (March 2019–March 2021). Twenty thyroid lobectomies were performed, during 15 surgeries. Vocal cord function was assessed three times: Pre-operatively by FNE, intraoperative (IUA) following extubation, and a second FNE on the first post-operative day.

Settings: A tertiary paediatric hospital.

Results: The overall accuracy of IUA results in our study was 92%. IUA sensitivity, specificity, positive and negative predictive values were 100%, 89%, 33% and 100%, respectively. Patient's age demonstrated borderline significance ($p = .08$). The resident's experience was associated with a better correlation between IUA and FNE results ($p < .05$).

Conclusions: IUA of vocal cord motion has a high accuracy rate for detection of iatrogenic vocal cord paralysis, similar to FNE. It is easily learned by residents, well-tolerated by children, and it provides a safe and valid alternative modality while ensuring the safety of the medical staff in treating patients, especially in times of COVID-19 pandemic.

KEYWORDS

COVID-19, Friedman criteria, IONM, nerve monitoring, paediatric, paralysis, recurrent laryngeal nerve (RLN) injury, ultrasound assessment

1 | INTRODUCTION

Complications of thyroid surgery, both in adults and children, include among others, transient and permanent unilateral vocal cord paralysis (UVCP) due to iatrogenic recurrent laryngeal nerve (RLN) injury.¹ Clinical manifestations of such neurological damage vary from mild hoarseness to aspirations and respiratory distress, depending on the severity of injury and the extent of compensation from the contralateral vocal cord (VC).² When bilateral VC injury occurs, the patient often requires emergent tracheotomy. Reported rates of VC palsy among paediatric patients undergoing thyroidectomies range from 2% to 5%.³

The gold standard for the assessment of vocal cord mobility is flexible nasoendoscopy (FNE) examination, which enables a direct vision of the larynx.⁴ Although it is relatively safe for the patient, this examination might generate aerosols. It is considered as a high-risk for contraction of the COVID-19 virus, detected in the mucosa of the upper airways.⁵ Furthermore, FNE is an invasive procedure, which often in children is more complicated and time-consuming due to lack of cooperation from the child.⁶

Intraoperative ultrasonographic assessment (IUA) of VC function is a non-invasive and relatively simple procedure, performed in spontaneous breathing, following endotracheal extubation. The patient is still sedated in supine position, similar to awake transcutaneous cervical ultrasonography.^{7,8} It is painless and non-traumatic and does not require patient cooperation. Since it is transcutaneous, it does not expose the examiner to aerosols and droplets contrary to FNE.

2 | OBJECTIVES

We sought to evaluate the validity of intraoperative ultrasonographic assessment of VC motion in children undergoing thyroidectomy, and to compare this modality to the standard FNE.

3 | METHODS

3.1 | Study design

After receiving the institution review board (IRB) approval, and a written informed consent from the parents, we conducted a prospective study of paediatric patients undergoing thyroidectomies for various reasons, in the largest tertiary paediatric medical centre in the country. The study period was 24 months (March 2019–March 2021). Half of the study period occurred during the COVID-19 pandemic.

3.2 | Study protocol

All patients underwent pre-operative neck ultrasonography (US) and fine-needle aspiration (FNA), as well as blood work for thyroid function (TSH, FT3, FT4). FNE was performed in all patients during

Key points

- Unilateral vocal cord palsy occurs in 5% of paediatric thyroid surgery.
- Intraoperative assessment of vocal cord function, according to the Friedman criteria is easy to learn and master by residents, with no additional costs and without discomfort to the child.
- Level of agreement between IUA and FNE are 92%
- Recording and storage of examinations is beneficial for resident training and teaching by the attending physicians.
- IUA is safer than FNE in preventing exposure of medical staff to COVID-19 virus in the nasopharyngeal mucosa of the patients and can potentially lower infection rates.

pre-operative evaluation, as well as COVID-19 nasopharyngeal swab test following the outburst of the epidemic. Following extubation, with the patient still sedated and in the supine position, an IUA of the VC was performed by a designated resident. On the first post-operative day (POD-1), a second double-blind FNE was done in our clinic, by a different resident, who did not participate in the surgery.

3.3 | Surgeries

All thyroidectomies were performed by the same two highly trained paediatric head and neck surgeons. Some of the surgeries were primaries, and some were revisions either hemi-thyroidectomy or total thyroidectomy. Some of the patients underwent central compartment and/or lateral neck dissections, according to clinical indications, which were benign and malignant lesions. Intraoperative nerve monitoring (IONM) system was applied in all surgeries, using intermittent RLN stimulation with a monopolar probe, and a specialised paediatric oro-tracheal tube.

3.4 | Assessment of VC function

Assessment of VC function using ultrasound required autodidactic training of 2 h following basic instructions from a paediatric anaesthesiologist and online videos. A flexible paediatric endoscope (Karl Storz®) was used in all FNE examinations. IUA were performed by Zonare Pro Ultrasound system® available in our operating rooms. Ultrasonographic assessment was performed using a midline approach. The transducer was placed transversely over the thyroid cartilage in the frontal midline plane. During spontaneous respiration, VC motion, according to Friedman criteria,⁹ was assessed for asymmetry between right and left VC (adduction and abduction), abnormal arytenoid movements, lengths and alignment of both VC and anterior bowing.

TABLE 1 patient demographics, medical history, surgeries, and vocal cord assessments

Patient	Gender	Age	Medical History	Hemi/Total	Neck Dissection	Single procedure/Completion	Rt IUA	Rt FNE	Lt IUA	Lt FNE
A	Female	9.6	BMT	Total	Level 6	Completion	S/P	Normal	Normal	Normal
B	Female	15.9	Hypothyroidism	Total	Level 6	Completion	Normal	Normal	Normal	Normal
C	Male	16.3	BMT + Chemotherapy	Hemi			Normal	Normal	Normal	Normal
D	Female	14	N/A	Hemi			Normal	Normal	Normal	Normal
E	Male	16.3	N/A	Total	Level 6	Single procedure	Normal	Normal	Normal	Normal
F	Female	9	N/A	Total		Single procedure	Normal	Normal	S/P	Normal
G	Male	12.5	N/A	Hemi			Normal	Normal	Normal	Normal
H	Male	6.1	N/A	Hemi			Normal	Normal	S/P	Paralysis
I	Female	13.8	N/A	Hemi			Normal	Normal	Normal	Normal
J	Male	9.8	Hypothyroidism	Hemi			Normal	Normal	Normal	Normal
K	Female	11.4	N/A	Total	Level 2-4,6	Single procedure	Normal	Normal	Normal	Normal
L	Female	7.9	MEN2A mutation	Total		Single procedure	Normal	Normal	Normal	Normal
M	Female	11.3	N/A	Total	Level 6	Single procedure	Normal	Normal	Normal	Normal

Abbreviations: FNE, Flexible Nasoendoscopy; IUA, Intraoperative Ultrasonographic Assessment; Lt, Left; Rt, Right; S/P, suspected paresis.

3.5 | Statistical analysis

Descriptive statistics was used to quantify different patient demographics and information related to the surgeries, including complications. Receiver operating characteristic (ROC) analysis assessed accuracy of IUA against the gold standard; that is, FNE. Diagnostic tests for test validity included sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV). Multivariate logistic regression analysis assessed different prognostic factors with the level of agreement between IUA and FNE results on POD-1 (either normal function or paralysis).

3.6 | Reporting guidelines

Bossuyt PM, Reitsma JB, Bruns DE, Gatsonis CA, Glasziou PP, Irwig L, Lijmer JG, Moher D, Rennie D, de Vet HCW, Kessel HY, Rifai N, Golub RM, Altman DG, Hooft L, Korevaar DA, Cohen JF, For the STARD Group. STARD 2015: An Updated List of Essential Items for Reporting Diagnostic Accuracy Studies. *BMJ*. 2015;351:h5527.

3.7 | RESULTS

Thirteen children (8 girls, 5 boys) underwent 20 thyroid lobectomies (15 surgeries in total) during the study period. The average age was 11.8 years (6.1–16.5 years). Two children had a history of bone marrow transplantation in early childhood. The indications for surgery were mostly oncologic (primary or completion surgery). Pre-operative cytology for 15 lobes according to Bethesda classification was B1 (13%), B2 (13%), B3 (35%), B4 (27%), B6 (13%). VC function assessed on pre-operative FNE was normal for all children (100%). During COVID-19 era, all patients underwent nasopharyngeal swab test. All patients were COVID-19 negative. Twenty thyroid lobes were resected. Surgeries included 8 hemithyroidectomies (53%), 5 total thyroidectomies (33%) and 2 completion hemithyroidectomies (13%). Four children (31%) underwent bilateral level 6 neck dissection, and one patient (7.7%) underwent lateral neck dissection. The final pathology was papillary thyroid carcinoma (PTC) in 8 lobes (40%), Non-invasive follicular thyroid neoplasm with papillary-like nuclear features (NIFTP) in 2 lobes (10%), Hashimoto or lymphocytic thyroiditis in 3 (15%), one multi-nodular goitre (5%) and the rest were benign cysts (30%). Two cases of PTC had extrathyroid extension (ETE) and one had nodal extracapsular extension (ECE). All 5 children with malignant pathology received post-operative radioiodine therapy (RAI). Post-operative hypocalcaemia was not seen in any of the patients. Results are depicted in Table 1. Malignancy rates according to pre-operative Bethesda classification and final pathology results for B1, B2, B3, B4, B6 were- 50%, 50%, 0%, 25% and 100%, respectively (Table 2).

Vocal cord assessments post-operatively were performed on all patients with IUA and FNE on POD-1. In three children IUA was inconclusive, in whom FNE was normal in two and paralysis was noted

TABLE 2 Patients cytology and pathology results

Patient	Right lobe			Left lobe			Neck Pathology
	Nodule	FNA	Pathology	Nodule	FNA	Pathology	
A		No FNA	Benign	4 cm	B2	PTC	NED
B	3 cm	B4	PTC		No FNA	Benign	NED
C	1.2 cm	B4	Benign				
D	1.8 cm	B4	Benign				
E	1.8 cm	B6	PTC	0.8 cm	B6	PTC	Metastatic PTC
F	1.2 cm	B3	Benign	1.3 cm	B3	Benign	
G	2.5 cm	B3	Benign				
H				3.1 cm	B2	Benign	
I				2 cm	B4	Benign	
J	2.7 cm	B3	Benign				
K	2.8 cm	B6	PTC	1.5 cm	B6	PTC	Metastatic PTC
L	0.3 cm	No FNA	Benign	0.2 cm	No FNA	Benign	
M		B1	PTC	1.3 cm	B1	Benign	NED

TABLE 3 Results of intraoperative ultrasonographic assessments (IUA) of vocal cords, compared to flexible nasoendoscopy (FNE)

IUA	Percentage of VC (n = 20)
Correct assessment	90%
Incorrect assessment	10%
Sensitivity	100%
Specificity	89%
Positive predictive value (PPV)	33%
Negative predictive value (NPV)	100%

in one (patient H). Level of agreement between IUA and FNE was 92%. Area under the curve (AUC) was 96%, and the overall model quality was 0.87, although not meeting statistical significance criteria ($p = .1$). Results were not associated with gender, prior history, VC side, indication for surgery or nodule size. Patient's age demonstrated borderline significance ($p = .08$), as patients older than 10 years had higher levels of agreement. Level of experience was associated with better IUA accuracy, demonstrated by higher levels of agreement between the two modalities in the second half of the study period compared to the first period ($p < .05$). Diagnostic studies for IUA demonstrated sensitivity, specificity, PPV and NPV of 100%, 89%, 33% and 100%, respectively (Table 3).

During the surgery of patient H, a large benign cyst compressed and dislodged the left VC, causing loss of signal on IONM. The IUA of the left VC showed no movement, which was consistent with the Friedman criteria¹⁰ (Figure 1). FNE results on POD-1 were consistent with the diagnosis of UVCP. On the first follow-up visit, six weeks after surgery, a second IUA and FNE assessments in the clinic revealed no change in outcome (VC paralysis), shown in picture 1. The patient exhibited mild hoarseness, with no respiratory distress and no signs or complaints of aspiration.

4 | DISCUSSION

Thyroid surgery is a risk factor for UVCP. The most common clinical presentation of UVCP is stridor in 70% of cases, followed by dysphonia (50%) and aspiration of food (25%).¹⁰ Although rare, in cases of bilateral VC palsy, respiratory distress can develop, which may require re-intubation or tracheotomy.¹¹ The indications for paediatric thyroidectomies vary from benign to malignant pathologies.¹² The incidence of Grave's disease in children 1:10 000 children,¹³ with 70% failure rate under medical treatment, that ultimately require surgical intervention or RAI. Papillary thyroid carcinoma (PTC) is the most common malignant tumour of the thyroid gland, both in adults and in children, and it has a 3% yearly-increase in incidence in children.¹⁴ In a study that assessed UVCP in children undergoing thyroid surgery, Baumgarten et al.¹⁵ found a 2% risk for temporary neuropraxia among 464 participants. In another study, Bussi eres et al.¹⁶ reported 4.2% risk for RLN injury in 118 paediatric thyroidectomies. The use of IONM assists the surgeon in avoiding intraoperative nerve injuries. In the last two decades, it has become the standard of care.¹⁷ In our medical centre, all thyroidectomies are performed using this system.

Assessment of VC function following thyroidectomies is therefore of clinical value. FNE in children can be challenging due to the discomfort nature of the examination.⁶ Still, in our medical centre FNE on POD-1 following thyroid surgery is the standard of care. Otolaryngologists, are at increased risk for contracting the COVID-19 virus when treating patients, especially when performing FNE among other procedures.¹⁸ A need for differentiating between elective and urgent procedures exists, to minimise unnecessary exposure to nasopharyngeal mucosa, and when possible, telemedicine is preferred.¹⁹ If endoscopy is required, remote fibre-optic endoscopy, with the use of personal protective equipment (PPE), either N95 masks or sometimes powered air purifying respirators (PAPR) is required to avoid contamination, and to maintain safety of medical teams.²⁰

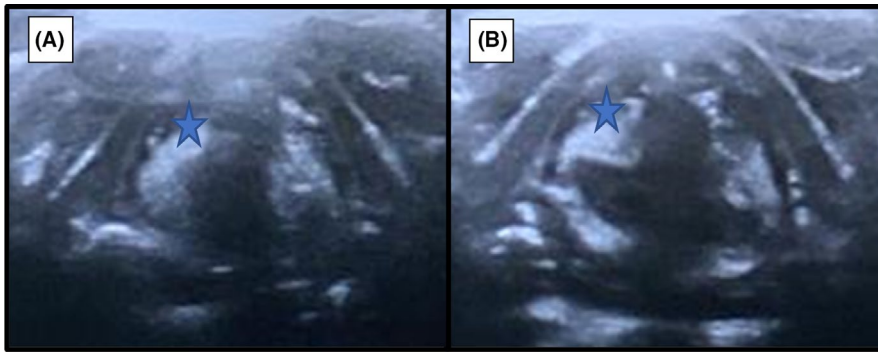


FIGURE 1 US assessment of VC function of patient H during expiration (A) and inspiration (B). Astrix is situated on the left vocal cord which is seen in a paramedian position

Awake transcutaneous ultrasonographic VC examination in the clinic is a safe and non-invasive alternative for FNE, as reported in the literature. Wang et al.²¹ compared the maximal glottis angle (MGA) and vocal fold arytenoid angle (VAA) in 45 normal-functioning VC and known UVCP children. He reported 96% agreement between FNE and awake sonographic findings. Vats et al.⁷ compared FNE results with IUA of VC in 55 children and reported 82% agreement in children over 1 year of age. Shaath et al.²² published results on iatrogenic UVCP following heart surgery diagnosed with IUA, in ten children who developed respiratory distress after extubation. The reported sensitivity and specificity were 100% and 80%, respectively. Similar results were published by Jadcherla et al.²³ In our study of 20 thyroid lobectomies, transient UVCP occurred in 5% of cases, which is consistent with previous reports, mentioned above. Diagnostic tests for IUA in our study demonstrated sensitivity, specificity, PPV and NPV of 100%, 89%, 33% and 100%, respectively. These results are similar to Jadcherla et al.²³ The overall agreement between IUA and FNE results in our study was 92%, which represents a remarkably high accuracy rate of IUA modality. Results were not associated with gender, prior history, VC side, indication for surgery or nodule size with IUA success rates. IUA was more accurate in older patients (more than 10 years), although only borderline significance was seen ($p = .08$). Higher accuracy levels were seen later in the study period highlighting the importance of personal experience of the device operator ($p < .05$).

Neck ultrasound (US) is an important imaging modality for an otolaryngologist in all areas of cervical assessments. By mastering this skill intraoperatively, post-operative FNE can potentially be avoided. Apart from diagnosis, the US is an excellent teaching modality for residents. By recording examinations, residents can later consult with attending physicians and get a second opinion. In the era of COVID-19, there is a need for adjustment in the clinical training of otolaryngology residents worldwide.^{24,25} The use of US, and specifically IUA, is an excellent opportunity to do so. In terms of costs, although US machines are not common in an outpatient clinic, they are commonly used by anaesthesiologists around the world in operating rooms. Therefore, IUA assessments does not require any additional costs or expenses. Furthermore, in clinics where US device is available, the recorded examinations can also be used to monitor UVCP during follow-up visits by comparing images from previous examinations. We would like to emphasise the advantage of performing IUA, with the patient still sedated. This

enables for a better assessment of the entire neck without putting the child nor the parent in any distress, and without recollection of the examination.

5 | LIMITATIONS

The relatively small sample and the low UVCP rate is an important limitation. We believe that future studies with a large number of participants are required.

6 | CONCLUSIONS

To the best of our knowledge, our clinical study is the first to report the use of IUA of VC function following paediatric thyroidectomies by residents. In this era of COVID-19, IUA provides additional benefit compared to the standard FNE, as a valid non-invasive modality with high detection rates of UVCP, without exposing the otolaryngologist to the patient's nasopharynx and without causing inconveniences to the child.

CONFLICT OF INTEREST

The authors have no funding, financial relationships or conflicts of interest to disclose.

AUTHORS CONTRIBUTIONS

Dr Ofir Zavdy was involved in data collection, analysis, project writing, editing and submission. Dr Schwarz assisted in teaching the method of IUA. Dr Dror Gilony, Prof. Gideon Bachar and Dr Hanna Gilat contributed to the results analysis and discussion. Dr Roy Hod was involved in the overall supervision, guidance, discussion and editing.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon a reasonable request.

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REFERENCES

1. Pironi D, Pontone S, Vendettuoli M, et al. Prevention of complications during reoperative thyroid surgery. *Clin Ter.* 2014;165(4):285-290.
2. Caulley L, Johnson-Obaseki S, Luo L, Javidnia H. Risk factors for postoperative complications in total thyroidectomy: a retrospective, risk-adjusted analysis from the National Surgical Quality Improvement Program. *Medicine.* 2017;96(5):5752-5766.
3. Zaat AS, Derikx JPM, Zwaveling-Soonawala N, van Trotsenburg ASP, Mooij CF. Thyroidectomy in pediatric patients with Graves' disease: a systematic review of postoperative morbidity. *Eur Thyroid J.* 2021;10:39-51.
4. Sinclair CF, Bumpous JM, Haugen BR, et al. Laryngeal examination in thyroid and parathyroid surgery: An American Head and Neck Society consensus statement. *Head & Neck.* 2016;38(6):811-819. <https://doi.org/10.1002/hed.24409>
5. De Luca P, Scarpa A, Ralli M, et al. Nasal, pharyngeal and laryngeal endoscopy procedures during COVID-19 pandemic: available recommendations from national and international societies. *Eur arch otorhinolaryngol.* 2020;277(7):2151-2153.
6. Jonas NE, Visser MF, Oomen A, Albertyn R, van Dijk M, Prescott CAJ. Is topical local anaesthesia necessary when performing paediatric flexible nasendoscopy? A double-blind randomized controlled trial. *Int J Pediatr Otorhinolaryngol.* 2007;71(11):1687-1692.
7. Vats A, Worley GA, de Bruyn R, Porter H, Albert DM, Bailey CM. Laryngeal ultrasound to assess vocal fold paralysis in children. *J Laryngol Otol.* 2004;118(6):429-431.
8. Wang CP, Chen TC, Yang TL, et al. Transcutaneous ultrasound for evaluation of vocal fold movement in patients with thyroid disease. *Eur J Radiol.* 2012;81(3):288-291.
9. Friedman EM. Role of ultrasound in the assessment of vocal cord function in infants and children. *Ann Otol Rhinol Laryngol.* 106(3):199-209.
10. Parikh SR. Paediatric unilateral vocal fold immobility. *Otolaryngol Clin North Am.* 2004;37(1):203-215.
11. Scholz S, Smith JR, Chaignaud B, Shamberger RC, Huang SA. Thyroid surgery at Children's Hospital Boston: a 35-year single-institution experience. *J Pediatr Surg.* 2011;46(3):437-442.
12. Breuer C, Tuggle C, Solomon D, Sosa JA. Pediatric thyroid disease: when is surgery necessary, and who should be operating on our children? *J Clin Res Pediatr Endocrinol.* 2013;5(1):79-85.
13. Kaguelidou F, Alberti C, Castanet M, Guitteny MA, Czernichow P, Leger J. Predictors of autoimmune hyperthyroidism relapse in children after discontinuation of antithyroid drug treatment. *J Clin Endocrinol Metab.* 2008;93(10):3817-3826.
14. Qian ZJ, Jin MC, Meister KD, Megwalu UC. Pediatric thyroid cancer incidence and mortality trends in the United States, 1973-2013. *JAMA Otolaryngol Head Neck Surg.* 2019;145(7):617-623.
15. Baumgarten HD, Bauer AJ, Isaza A, Mostoufi-Moab S, Kazahaya K, Adzick NS. Surgical management of pediatric thyroid disease: Complication rates after thyroidectomy at the Children's Hospital of Philadelphia high-volume Pediatric Thyroid Center. *J Pediatr Surg.* 54(10):1969-1975.
16. Bussi eres V, Roy S, Deladoey J. Pediatric thyroidectomy: Favorable outcomes can be achieved by a multidisciplinary team of pediatric providers. *J Pediatr Surg.* 2019;54(3):527-530.
17. Propst EJ, Gorodensky J, Wasserman JD, Glazman EF, Tilis LA. Recurrent laryngeal nerve monitoring with surface electrodes in pediatric thyroid surgery. *Laryngoscope.* 2020;130:1583-1589.
18. Jotz GP, Voegels RL, Bento RF. Otorhinolaryngologists and Coronavirus Disease 2019 (COVID-19). *Int Arch Otorhinolaryngol.* 2020;24(2):e125-e128.
19. Ohlstein JF, Garner J, Takashima M. Telemedicine in Otolaryngology in the COVID-19 Era: Initial Lessons Learned. *Laryngoscope.* 2020;130(11):2567-2573.
20. B Givi BA Schiff SB Chinn, et al. 2020 Safety recommendations for evaluation and surgery of the head and neck during the COVID-19 pandemic. *JAMA Otolaryngol Head Neck Surg.* 2020;146(6):579-584.
21. Wang LM, Zhu Q, Ma T, et al. Value of ultrasonography in diagnosis of pediatric vocal fold paralysis. *Int J Pediatr Otorhinolaryngol.* 2011;75(9):1186-1190.
22. Shaath GA, Jijeh A, Alkurdi A, Ismail S, Elbarbary M, Kabbani MS. Ultrasonography assessment of vocal cords mobility in children after cardiac surgery. *J Saudi Heart Assoc.* 2012;24(3):187-190.
23. Jadcherla SR, Gupta A, Stoner E, Coley BD, Wiet GJ, Shaker R. Correlation of glottal closure using concurrent ultrasonography and nasolaryngoscopy in children: a novel approach to evaluate glottal status. *Dysphagia.* 2006;21(1):75-81.
24. Crosby DL, Sharma A. Insights on otolaryngology residency training during the COVID-19 pandemic. *Otolaryngol Head Neck Surg.* 2020;163(1):38-41.
25. Bandi F, Karligkiotis A, Mellia J, et al. Strategies to overcome limitations in Otolaryngology residency training during the COVID-19 pandemic. *Eur Arch Otorhinolaryngol.* 2020;277(12):3503-3506.

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