

Received: 2026.05.19
Accepted: 2026.07.23
Available online: 2026.08.18
Published: 2026.XX.XX

e-ISSN 1941-5923
© Am J Case Rep, 2026; 27: e954178
DOI: 10.12659/AJCR.954178

Image-Guided Cervicotomy and Recurrent Laryngeal Nerve Reinnervation in Zone II Glass Neck Trauma: A Case Report

Authors' Contribution:

Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ABCEF 1 **Rayssa Nanni de Carvalho** 
ACDEF 1 **Vinicius Carlos Jacobs** 
ADEF 1,2 **José Gustavo Parreira** 
ADF 3 **Lucas Ribeiro Tenório** 
ADF 1,3 **Marcelo Benedito Menezes** 
ACDEF 1,3 **Marianne Yumi Nakai** 

1 Faculdade de Ciências Médicas da Santa Casa de São Paulo, São Paulo, SP, Brazil
2 Emergency Department, Irmandade da Santa Casa de Misericórdia de São Paulo, São Paulo, SP, Brazil
3 Department of Head and Neck Surgery, Irmandade da Santa Casa de Misericórdia de São Paulo, São Paulo, SP, Brazil

Corresponding Author: Marianne Yumi Nakai, Department of Head and Neck Surgery, Irmandade da Santa Casa de Misericórdia de São Paulo, Rua Dr. Cesário Motta Jr., 112, São Paulo, SP, 01221-020, Brazil, Phone: +55 11 2176-7711, e-mail: mynakai@gmail.com
Financial support: None declared
Conflict of interest: None declared

Patient: Female, 45-year-old
Final Diagnosis: Penetrating cervical trauma • recurrent laryngeal nerve transection • vocal fold paralysis
Symptoms: Cervical bleeding • dysphonia • penetrating wound
Clinical Procedure: Cervicotomy
Specialty: Otolaryngology • Surgery

Objective: Unusual clinical course
Background: Hemodynamically stable penetrating neck trauma with retained deep foreign bodies can conceal functionally significant neural injury despite absence of major vascular findings on computed tomography angiography. In selected cases, early laryngoscopy may provide decisive functional evidence and help identify occult recurrent laryngeal nerve injury requiring timely surgical exploration.

Case Report: A 45-year-old woman presented with penetrating neck trauma caused by multiple glass fragments, with Zone II entry wounds and a deep transcervical trajectory across zones. She was hemodynamically stable, without airway compromise. Computed tomography angiography demonstrated multiple retained glass foreign bodies in deep cervical compartments, without contrast extravasation, pseudoaneurysm, or hematoma. Flexible laryngoscopy demonstrated left vocal fold paralysis. Given the deep retained foreign bodies, proximity to critical structures, and laryngoscopy-confirmed vocal fold immobility, selective exploratory cervicotomy was performed. Forty glass fragments were removed. Intraoperatively, left recurrent laryngeal nerve transection was identified within the tracheoesophageal groove. After debridement of nonviable nerve ends, primary repair was not feasible; direct reinnervation was performed using the superior root of the ansa cervicalis under 3 × surgical loupe magnification. The postoperative course was uneventful; the patient was discharged on postoperative day 5. At the 12-month follow-up, she demonstrated sustained functional voice recovery, with improvements in maximum phonation time, acoustic parameters, and videolaryngostroboscopic findings.

Conclusions: In selected stable penetrating neck trauma cases, hard sign absence does not exclude functionally important occult neural injury. Deep wound trajectories associated with retained foreign bodies may warrant early laryngoscopy with computed tomography angiography—this assessment can guide selective exploration and enable timely nerve reconstruction when technically feasible.

Keywords: Microsurgery • Neck Injuries • Recurrent Laryngeal Nerve • Tomography, X-Ray Computed • Vocal Cord Paralysis

Full-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/954178>

 1994  —  6  9

Publisher's note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher



Introduction

Penetrating neck injuries are defined as wounds that violate the platysma and represent approximately 5% to 10% of penetrating trauma cases [1]. Their clinical relevance derives from the high density of vital vascular, aerodigestive, and neural structures within a confined anatomic region. Contemporary management has shifted from mandatory exploration based on anatomic zones toward a selective approach guided by hemodynamic status, clinical findings, and computed tomography angiography (CTA) [2,3]. In stable patients without hard signs, CTA is central to defining the wound trajectory, identifying retained foreign bodies, and assessing their proximity to critical structures [4,5].

Although this selective strategy reduces unnecessary cervicotomies, functionally significant neural injuries may remain underrecognized in the absence of hemorrhage, airway compromise, or major vascular injury [2,4]. In the acute setting, diagnostic algorithms usually prioritize vascular and aerodigestive lesions; vagal or recurrent laryngeal nerve injuries may be identified late or treated secondarily. Laryngeal dysfunction should be actively considered in stable patients when the wound trajectory or retained foreign bodies involve the paratracheal, thyroid, or tracheoesophageal region, even in the absence of major vascular or airway signs. In this context, early laryngoscopy may complement CTA by providing functional evidence of laryngeal impairment.

Recurrent laryngeal nerve injury can lead to persistent dysphonia, impaired vocal endurance, glottic insufficiency, and reduced quality of life [7]. When complete transection is recognized early, microsurgical reconstruction may offer a function-preserving opportunity, particularly when tension-free coaptation can be achieved either directly or with an interposition graft [8,9]. The role of early laryngoscopic assessment in stable penetrating neck trauma with retained foreign bodies remains underemphasized in current trauma-oriented decision-making.

We report the case of a 45-year-old woman with stable penetrating neck trauma caused by glass fragments, characterized by Zone II entry wounds and a deep transcervical trajectory across zones. CTA demonstrated multiple deeply retained foreign bodies, and early laryngoscopy identified left vocal fold paralysis. This case illustrates that, in selected stable patients, the combination of CTA-defined anatomic risk and laryngoscopy-confirmed vocal fold paralysis may reveal clinically important occult recurrent laryngeal nerve injury despite the absence of major vascular or airway signs. This report is intended as a hypothesis-generating clinical example, highlighting how integrated anatomic and functional assessment may support selective exploration and facilitate timely nerve reconstruction when early identification permits appropriate surgical planning.



Figure 1. Initial emergency department view showing 2 penetrating wounds in the left Zone II region of the neck.

Case Report

A 45-year-old woman was brought to the emergency department by her brother after being found collapsed and bleeding from the neck following heavy alcohol intake. Her medical history included bipolar disorder, anxiety, and chronic alcohol use. She was taking trazodone, lithium, and olanzapine but was unable to provide reliable information regarding the exact doses or routes of administration of her long-term medications. There was no documented history of tobacco smoking or other substance use. She had no known drug allergies or previous surgical history.

On primary survey, the airway was patent. Breathing was normal, with a respiratory rate of 18 breaths/min and bilateral breath sounds. Circulation was stable, with a blood pressure of 120/80 mm Hg, heart rate of 90 beats/min, and no active external bleeding. She was alert—with a Glasgow Coma Scale score of 15—and had equal, round, reactive pupils. Physical examination revealed 2 penetrating wounds in the left Zone II region of the neck, without evidence of additional traumatic injuries (**Figure 1**). No emergency medications were documented before imaging; the patient was promptly referred for head and neck computed tomography. The initial computed tomography report did not identify retained foreign bodies.

Given the mechanism and anatomic location of the injury, CTA was requested for further evaluation. After review by the trauma surgeon, CTA (**Figure 2**) demonstrated multiple retained glass fragments within the left superficial paramedian,

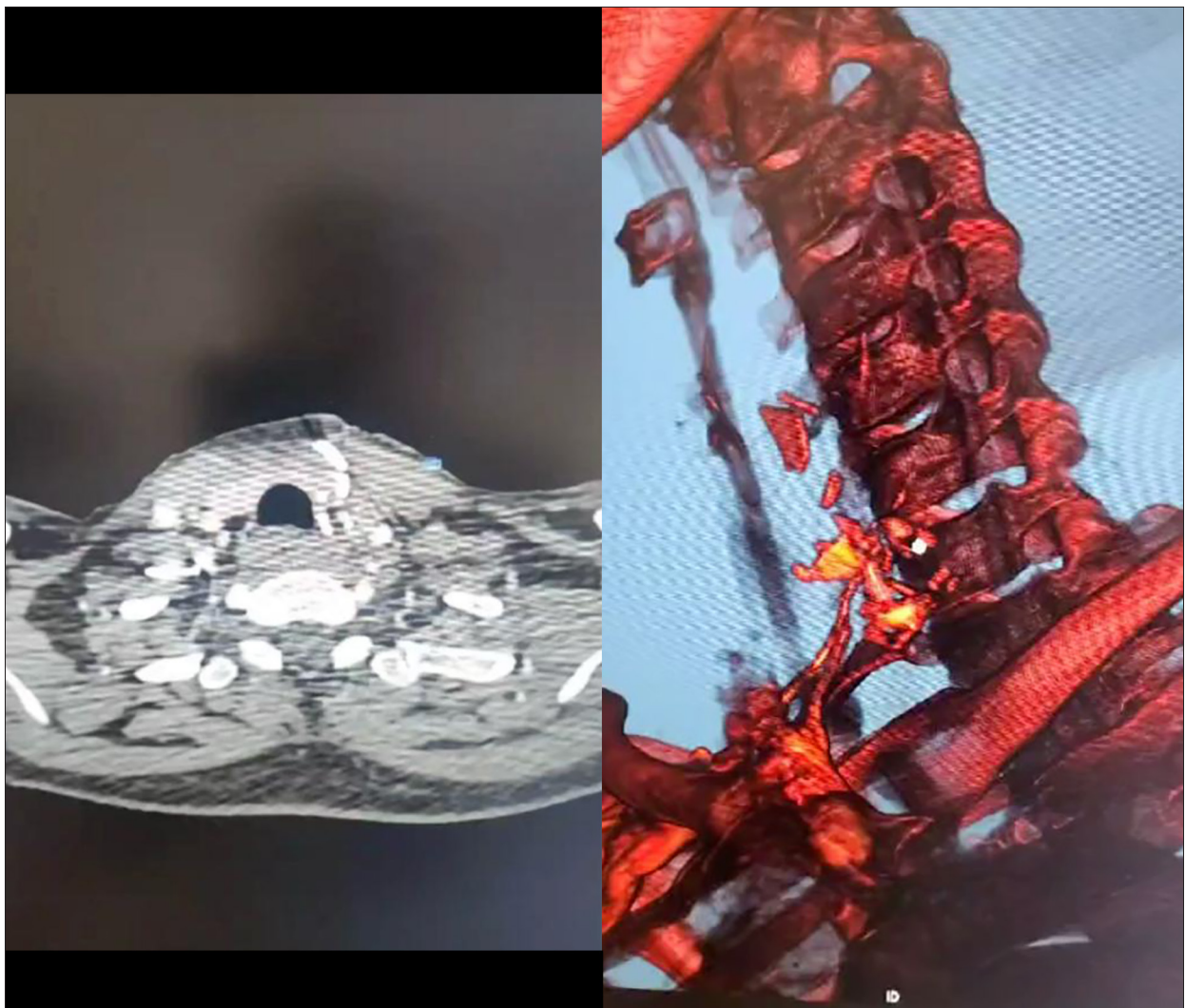


Figure 2. Computed tomography angiography image (**left**) and 3-dimensional reconstruction (**right**) showing multiple glass foreign bodies distributed throughout the cervical compartments.

paratracheal, retropharyngeal, and right prevertebral spaces. Some fragments were located within approximately 3 mm of the left common carotid artery and the left V2 segment of the vertebral artery. No contrast extravasation, pseudoaneurysm, cervical hematoma, or other major vascular injury was identified. CTA findings were jointly reviewed by the radiology and surgical teams before the procedure.

After initial management by the trauma team, the attending head and neck surgeon evaluated the patient and noted dysphonia that had not been previously documented. Flexible nasolaryngoscopy was then performed and reviewed by the head and neck surgeon. The examination revealed an immobile left vocal fold fixed in a lateral position during both respiration and phonation, consistent with complete left vocal fold paralysis. The laryngeal mucosa appeared smooth and pink, without active bleeding or signs of erythema, edema, or

lesions (**Figure 3**). The combination of acute vocal fold immobility, deeply retained foreign bodies, and close proximity to critical cervical structures supported selective exploratory cervicotomy despite the absence of hemodynamic instability, active bleeding, or airway compromise.

Surgical exploration was performed through a collar incision, with elevation of superior and inferior subplatysmal flaps to the mandible and clavicle, respectively. The vascular compartment was accessed along the anterior border of the sternocleidomastoid muscle, allowing systematic exploration and removal of deeply lodged glass fragments, including 1 fragment from the retropharyngeal space. In total, 40 glass fragments were retrieved (**Figure 4**).

During exploration of the inferior left paratracheal region, the recurrent laryngeal nerve was identified along its usual



Figure 3. Flexible laryngoscopy demonstrating left vocal fold paralysis.

anatomic course within the tracheoesophageal groove. The distal stump was identified first and preserved outside the main hematoma field. Further dissection revealed the proximal stump, confirming complete transection of the left recurrent laryngeal nerve at the level of Berry's ligament, immediately inferior to its laryngeal entry point (**Figure 5**). The nerve ends were inspected and trimmed because of nonviable

tissue, with resection of approximately 3 mm from the proximal stump and 5 mm from the distal stump. Intermittent intraoperative laryngeal nerve monitoring was performed using an electrode-equipped endotracheal tube connected to a C2 Inomed Xplore system. Initial vagus nerve stimulation and proximal recurrent laryngeal nerve stump stimulation produced no detectable signal; stimulation of the distal recurrent laryngeal nerve stump elicited a response with a latency of 1.1 ms and amplitude of 1500 μ V. Given the nerve gap after debridement, primary repair of the recurrent laryngeal nerve was not feasible. Reconstruction was thus performed using the superior root of the ansa cervicalis (descendens hypoglossi). Direct coaptation between the distal recurrent laryngeal nerve stump and the ansa cervicalis branch was then performed under 3 $\times$ surgical loupe magnification. The proximal recurrent laryngeal nerve stump was left free, and the remaining ansa cervicalis branches were preserved to minimize functional impairment.

Due to partial involvement of the ipsilateral thyroid lobe by multiple retained glass fragments, a hemithyroidectomy was performed intraoperatively to facilitate safe foreign-body removal and provide adequate exposure of the injured paratracheal region (**Figure 6**). After meticulous hemostasis, the wound was closed in anatomic layers. No intraoperative complications were recorded.

The postoperative course was uneventful. The patient resumed oral intake on postoperative day 3; experienced no respiratory, bleeding, or infectious complications; and was discharged on



Figure 4. Glass foreign bodies removed during exploratory cervicotomy.

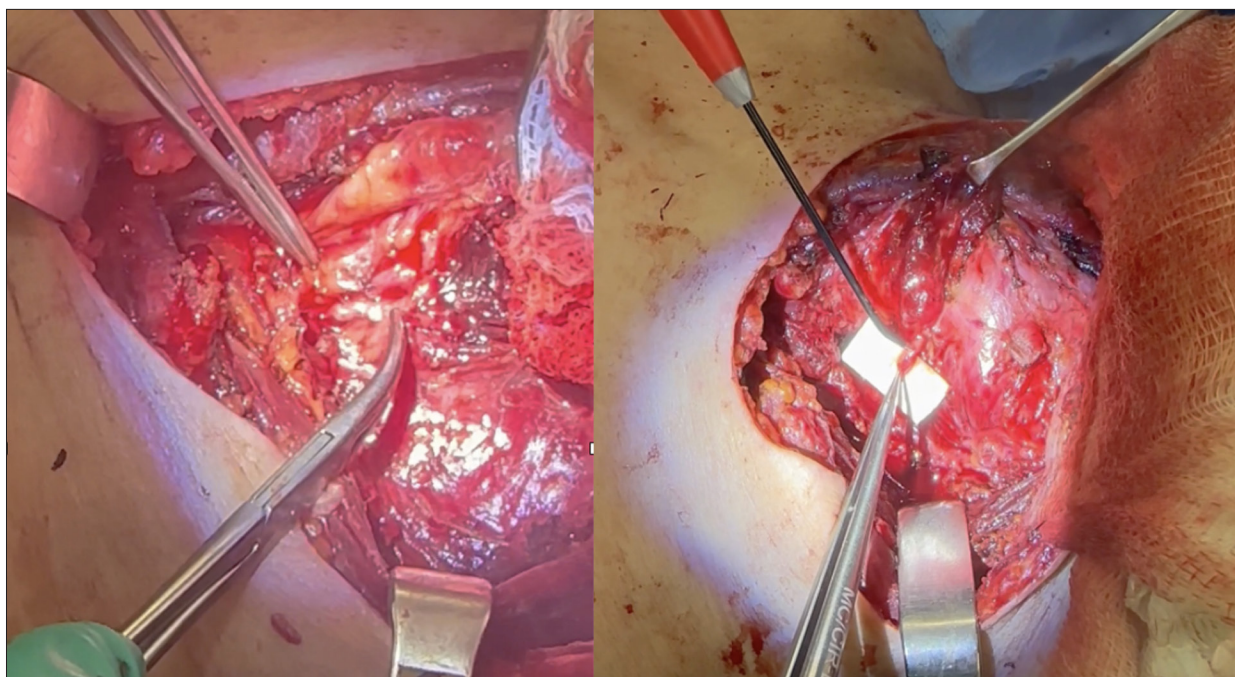


Figure 5. Intraoperative image showing complete transection of the left recurrent laryngeal nerve.



Figure 6. Gross surgical specimen of the ipsilateral thyroid lobe after hemithyroidectomy performed to remove glass fragments involving the thyroid tissue.

postoperative day 5 with voice rest and a structured speech therapy program. Thyroid function remained preserved during follow-up, without clinically significant laboratory abnormalities.

At the 12-month follow-up, compared with the early postoperative baseline voice assessment performed on postoperative day 1 prior to initiation of rehabilitation, maximum phonation time improved from 8.9 to 22 seconds, mean airflow rate decreased from 247 to 128 mL/s, jitter decreased from 3.5% to

1.1%, and shimmer decreased from 9.1% to 5.0%. During follow-up, the patient completed a structured speech therapy program conducted twice weekly during the first postoperative month and weekly through the third month. Videolaryngostroboscopy demonstrated increased mucosal wave amplitude, improved glottic closure, and regular vibratory periodicity, supporting sustained functional recovery. Therefore, the observed improvement should be interpreted as the result of combined surgical reinnervation and postoperative rehabilitation, rather than surgery alone.

Discussion

Penetrating cervical trauma remains a major diagnostic and therapeutic challenge because vital vascular, aerodigestive, and neural structures are concentrated within a restricted anatomic space [2]. In hemodynamically stable patients, the absence of hard signs may suggest a lower immediate risk. However, it does not exclude occult injuries with important functional consequences. The present case illustrates this limitation. Although the patient had no active hemorrhage, airway compromise, or hemodynamic instability, the combination of a deep wound trajectory and multiple retained glass fragments created a clinical scenario that could not be considered reassuring.

In this context, CTA of the neck was essential to define anatomic risk associated with the injury. The examination demonstrated multiple glass fragments traversing deep cervical compartments, several in close proximity to the common carotid

and vertebral arteries. These findings supported a selective operative approach despite the absence of classic hard signs. Rather than reinforcing mandatory exploration based on Zone II anatomy alone, the present case is better understood within the contemporary selective management paradigm guided by physiology and imaging, in which operative exploration is reserved for patients whose clinical or radiologic findings suggest threatened critical structures [3,4].

The educational value of the present case lies not only in the imaging findings but also in the integration of structural and functional assessment. In patients with penetrating neck trauma, laryngeal dysfunction should be actively considered when the wound trajectory involves the paratracheal, thyroid, or tracheoesophageal region. Early laryngoscopic assessment can provide objective evidence of vocal fold immobility, improving risk stratification and strengthening the indication for exploration. In the present case, this combined evaluation helped identify a stable patient in whom observation alone could have delayed recognition of a functionally significant occult neural injury.

Surgical exploration therefore had both diagnostic and therapeutic value. Image-guided cervicotomy enabled safe removal of the retained foreign bodies and allowed direct identification of a complete recurrent laryngeal nerve transection. This finding highlights an important limitation of selective neck trauma management. The absence of life-threatening vascular or airway signs does not rule out injury to structures critical for long-term function. When recurrent laryngeal nerve injury is suspected or documented, timely exploration may be particularly relevant because it provides an opportunity for immediate reconstruction or reinnervation before fibrosis, tissue distortion, and prolonged denervation reduce the feasibility and potential effectiveness of repair [7-9]. Even when airway patency is preserved, persistent vocal fold denervation can lead to chronic dysphonia, reduced vocal endurance, and vocal fatigue during sustained speech. Thus, early intervention should be viewed as a function-preserving strategy aimed at maximizing the likelihood of meaningful voice recovery.

In the present case, immediate reinnervation was followed by sustained improvement in vocal function, documented by aerodynamic, acoustic, and videolaryngostroboscopic parameters. Given the single-case nature of this report, causality

could not be established; the favorable outcome may have been influenced by lesion characteristics, preserved neural responsiveness, surgical expertise, and postoperative speech therapy. Nevertheless, this case provides a useful example of how CTA combined with early laryngoscopic assessment can guide selective operative decision-making in stable penetrating neck trauma [3,6]. More specifically, it suggests that deep retained foreign bodies involving the paratracheal, thyroid, or tracheoesophageal region warrant early functional laryngeal evaluation and specialist involvement, given that timely recognition of occult recurrent laryngeal nerve injury may allow reconstruction or reinnervation aimed at preserving long-term phonatory function.

Conclusions

In stable penetrating neck trauma, the absence of hard signs does not exclude functionally significant occult injury. The present case suggests that early laryngoscopic assessment, in addition to CTA, may be useful in selected patients with deep wound trajectories or retained foreign bodies involving the paratracheal, thyroid, or tracheoesophageal region. In such cases, combined anatomic and functional evaluation can assist clinical decision-making, support timely selective exploration, and facilitate safe foreign-body removal while enabling identification of associated recurrent laryngeal nerve injury.

Department and Institution Where Work Was Done

Department of Head and Neck Surgery, Irmandade da Santa Casa de Misericórdia de São Paulo, São Paulo, SP, Brazil.

Patient Consent

Written informed consent was obtained from the patient for publication of this case report and all accompanying clinical information and images.

Declaration of Figures' Authenticity

All figures submitted have been created by the authors who confirm that the images are original with no duplication and have not been previously published in whole or in part.

References:

1. Reyna-Sepúlveda F, Cantu-Alejo D, Martinez-Fernandez A, et al. 5-year management and outcomes of penetrating neck injury in a trauma center. *Cir Esp (Engl Ed)*. 2022;100(10):629-34
2. Chirukandath R, Sulaiman SV, Sasi T, et al. A paradigm for optimal management: Traumatic neck injuries at a tertiary care centre in South India. *Cureus*. 2025;17(3):e81311
3. Ko JW, Yang H, Jung PY. The efficacy of the "no zone" approach for the assessment of traumatic neck injury. *Ann Surg Treat Res*. 2020;99(6):352-61
4. Siletz A, Inaba K. Diagnostic approach to penetrating neck trauma: What you need to know. *J Trauma Acute Care Surg*. 2024;97(2):175-82
5. Laher N, Monzon-Torres B, Mauser M. Surgical exploration for penetrating neck trauma: An audit of results in 145 patients. *S Afr J Surg*. 2023;61(3):17-20
6. Dudkiewicz D, Tsur N, Yosef E, et al. Proximity matters: Assessing vascular injury and surgical decision-making in penetrating neck trauma. *Injury*. 2025;56(5):112230

7. Matsunaga A, Miyauchi A, Adachi S, et al. Long-term phonation status after recurrent laryngeal nerve reconstruction. *Surgery*. 2026;189:109695
8. Fadhil M, Havas T, Jacobson I. Timing of ansa cervicalis-to-recurrent laryngeal nerve reinnervation: A systematic review. *J Voice*. 2024;38(6):1484-97
9. Lee YJ, Lee SW. Ten-year outcomes of recurrent laryngeal nerve reinnervation for thyroidectomy-related unilateral vocal fold paralysis: A single-surgeon, prospective study. *Am J Otolaryngol*. 2024;45(3):104242