Granuloma of The Vocal Process: Presentation of Technical Variant

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DOI: https://dx.doi.org/10.51244/IJRSI.2025.1215PH000187

Received: 12 October 2024; Accepted: 20 October 2024; Published: 14 November 2025

ABSTRACT

Objective: To present an association of a technical variant combined with clinical and surgical approaches as a treatment for nonspecific vocal process granuloma. Methodology: A literature review was conducted on patients affected by vocal process granuloma and their various therapeutic approaches, including pharmacological therapy, anti-reflux measures, surgical excision, laser application, glucocorticoid injections, and speech therapy. The resolution rate of the therapeutic variant and data relevant to the proposed approach were analyzed. Results: Conservative therapy demonstrated efficacy as the first-line treatment for vocal

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV October 2025 | Special Issue on Public Health

process granuloma. However, for cases with a lack of clinical resolution, a combined clinical and surgical approach was presented, with the use of the blue laser in one of the steps of the surgical therapy, achieving a high therapeutic success rate in 19 out of 20 patients who underwent the proposed method. Conclusion: The interdisciplinary approach combining clinical and surgical treatments for vocal process granuloma demonstrated safety and effectiveness with this technical variant.

INTRODUCTION

Nonspecific Granuloma

Granuloma is an organic lesion with a proliferative appearance, mediated by polymorphonuclear cells, of benign growth, and characterized by hypertrophic granulation. When present in the larynx, it is predominantly an inflammatory process classified as nonspecific, often resulting from peptic etiology. It may also be pyogenic or specific when associated with an identifiable etiological agent, such as tuberculosis. Granulomas exhibit an inflammatory nature, primarily composed of macrophages, but may also include other leukocytes. Their purpose is to isolate bacteria, fungi, or insoluble foreign substances that the body cannot expel. (1) Over time, some granulomas may replace macrophages with fibroblasts (collagen-producing cells), progressively increasing collagen fibers, forming a capsule, and leaving a scar. (1,2)

Vocal Fold Granuloma (Vfg)

Vocal fold granuloma is located at the vocal fold level, specifically in the posterior glottic region, with a predilection for the vocal process. Its main characteristics include being unilateral, most commonly, or bilateral. It develops secondary to ulcerative lesions, can be unilobular or bilobular, and displays a whitish, yellowish, or reddish coloration. It is more prevalent in males due to vocal trauma from abrupt vocal impact, associated with glottic proportions. It is less frequent in females and children due to differences in glottic conformation and, when present, is often linked to prolonged or traumatic intubation.

Chemical trauma from retrograde substances in the digestive tract, inhalation of irritants substances, or surgical scarring, such as after laryngectomy, can also contribute to granuloma formation. Granulomas may have varying locations and etiologies in the larynx, including specific types where the etiological agent is identifiable, such as laryngeal tuberculosis granuloma.

The clinical presentation includes localized, unilateral, and focal dysphagia. Progressive dysphonia, proportional to the granuloma's growth, results in a low-pitched and/or breathy voice. Dyspnea is rare but possible in cases of large lesions obstructing the airway. Hyperfunctional vocal phonotrauma due to laryngopharyngeal reflux-related granuloma is more prevalent in males, typically between 40 and 50 years of age, and in voice professionals, leading to social and professional voice impairments.

Granuloma treatment is primarily clinical and is effective in most cases. Anti-reflux therapy, including proton pump inhibitors, prokinetics, and dietary and lifestyle behavior modification, is commonly employed. Specific speech therapy focusing on relaxation is essential to control vocal impact from phonotrauma, manage pneumo-phonatory-articulatory coordination, and promote smoother vocal emission.

Clinical And Speech Therapy Treatment

There is still no gold standard treatment for nonspecific vocal fold granuloma (VFG). This study analyzed clinical decision-making and therapeutic outcomes in patients, based on the experience of academic laryngologists in the United States. Management options are diverse, ranging from conservative vocal therapy to procedures such as laser vaporization and surgical excision. Within each modality, technical and application variations also influence treatment efficacy. The interaction between these different approaches can be decisive in choosing the most appropriate combination for each case. (3)

Most patients, whether treated with conservative or surgical approaches, showed a favorable response, with a predominance of preference for conservative modalities. Among those who underwent surgical treatment, improvements were observed in the Voice Handicap Index (VHI-10) and Maximum Phonation Time (MPT),

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV October 2025 | Special Issue on Public Health

although only the latter reached statistical significance. Regarding recurrence, conservative treatment showed better outcomes compared to surgical intervention. Collectively, these findings suggest that minimally symptomatic granulomas have a higher response rate and lower recurrence risk with conservative treatment. In contrast, larger and symptomatic granulomas may benefit from surgical excision followed by medical treatment to reduce the risk of recurrence. (4)

Anti-reflux medications and vocal therapy may be the most widely used and effective treatment options. (6) Voice therapy is recommended as the first-line treatment. Surgical intervention should be reserved for selected patients due to the high likelihood of recurrence. Botulinum toxin injections can be used not only for primary cases but also for refractory cases. (5)

Overall, with more higher-powered studies, the complex interplay of treatment modalities can be further untangled to determine the ideal combination treatment for various granulomas. (7)

Surgical Treatment

Treatment options for granuloma are broad and profound, ranging from conservative vocal therapy to laser vaporization and surgical excision. (7)

Office-based procedures utilizing this novel methodology can potentially reduce the risks and costs associated with traditional therapeutic methods. Angiolytic lasers target the proliferative phase of the lesion.

The introduction of fiber-guided lasers was a breakthrough in laryngology practice, opening the path for treating different pathologies with minimally invasive procedures, both in the operating room and in the office. The most recent technology in the area is the blue laser, which combines photoangiolytic and cutting properties, characteristics that make this equipment suitable for its use in upper aerodigestive tract surgery. However, there is not enough experience in this area. The authors present a case series of patients with different pharyngeal, laryngeal, and tracheal pathologies who were treated by means of transoral procedures using fiber-guided blue laser. Following all necessary precautions, blue laser is a reliable tool to perform minimally invasive surgeries in the operating room. (8)

Office-based pulsed KTP laser is an effective treatment option for vocal fold granulomas, as the lesion resolves in most cases. (6) Both ablative and non-ablative laser procedures performed in-office have been described for benign vocal fold lesions. Fiber-based lasers used include KTP and CO_2 lasers.

Intralesional steroid injections performed in-office target the inflammatory process associated with the lesion and may induce regression of polyps, nodules, and granulomas. Botulinum toxin-induced vocal rest has been described as an adjunct treatment for refractory cases. Most office-based techniques aim to induce lesion regression rather than complete lesion removal, as seen in conventional operative microsurgery.

Office-based procedures focus on modulating the wound-healing process, specifically targeting the inflammatory phase. Although numerous case series have demonstrated the potential of these procedures, more comprehensive data comparing their outcomes with those of microlaryngoscopic techniques are needed. (7)

Hydrocortisone – Infiltrative Glucocorticoid: Properties And Indications

The combination of hormonal injections and acid suppression may enhance the curative ratio and expedite the healing time of vocal fold granuloma. (9).

Corticosteroids are potent inhibitors of inflammation and healing processes. Local corticosteroid injections can be used in the larynx, allowing high local drug concentrations with a reduced risk of systemic side effects. The local administration of steroids directly into the larynx has been reported in various laryngeal pathologies involving benign vocal lesions, inflammatory conditions, autoimmune, and chronic laryngeal diseases. The primary goal is to mitigate pre-surgical inflammation or, in some cases, to avoid surgical intervention altogether.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV October 2025 | Special Issue on Public Health

The anti-inflammatory efficacy of corticosteroids is related to the inhibition of the synthesis of numerous cytokines, enzymes, and inflammatory mediators. Additionally, corticosteroids induce the production of anti-inflammatory cytokines and molecules, such as lipocortin, which inhibits the release of vasoactive substances and chemotactic factors. They also reduce collagen deposition during the acute phase of wound healing.

Corticosteroids are thus indicated to minimize scar formation, serving both prophylactic and therapeutic purposes. Their use is recommended at the end of surgery to prevent fibrotic scarring. (4,5,6,10,11).

Speech-Language Pathology Management

Speech-language pathology actively contributes to the rehabilitation treatment of vocal hyperfunction associated with granulomas induced by laryngopharyngeal reflux.

Vocal rehabilitation is widely used as a standard option for managing behavioral dysphonia. In surgical cases, when conducted pre- and postoperatively, it optimizes outcomes and prevents further lesions. (8,12) A recent study evaluating clinical decision-making and treatment outcomes for granuloma patients, based on experiences of academic laryngologists in the United States, concluded that vocal therapy combined with antireflux medication is frequently recommended and highly effective. (14,17)

As with all speech-language pathology interventions, treatment for behavioral dysphonia is individualized. (18) It can be conducted individually or in groups, on a weekly or intensive schedule, pre- or post-laryngeal surgery, and within vocal health programs for professional voice users. Patients with benign laryngeal conditions can benefit from behavioral voice therapy. (16,17)

The primary objective of voice therapy is to restore the balance of laryngeal functions (phonation, respiration, and swallowing) to promote vocal and communicative health. Based on altered parameters identified during the preliminary evaluation, the speech-language pathologist researches techniques supported by evidence and applies them accordingly. (15,16,19)

In Brazil, the methodological framework of the Vocal Rehabilitation Program (PIRV) considers five aspects: body-voice alignment, glottal source, resonance, pneumophonoarticulatory coordination, and communicative attitude, including auditory discrimination and vocal projection. These aspects aim to minimize or eliminate vocal tension and laryngeal irritation. A randomized clinical study demonstrated the effectiveness of PIRV, showing significant improvements in vocal quality, laryngeal function, and the quality of life of patients with behavioral dysphonia. (20)

Vocal Health Interventions

Direct hydration: Utilizing saline solutions with nebulizers.

Indirect hydration: Increasing water intake and performing nasal rinses with saline solution to clean the vocal tract.

Risk factor identification: Addressing routine voice usage, dietary habits, sleep patterns, smoking, alcohol consumption, physical activity, and mental health as they relate to vocal health.

Videonasoendoscopic evaluation is conducted collaboratively with the patient to visualize the laryngeal structures and functions, with or without granulomas or laryngopharyngeal reflux. It helps identify new vocal behaviors during therapy. (21,22,23,24,25)

Advanced Techniques

Photobiomodulation therapy: Low-level laser application on specific anatomical points of the vocal fold and interarytenoid region to reduce inflammation and enhance muscle performance. (26)

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Transcutaneous Electrical Nerve Stimulation (TENS): Low-frequency electrical currents (1–2 Hz) applied to the skin for pain management. It may stimulate sensory or motor responses, promoting rhythmic muscle contractions in the face, neck, and cervical regions, thereby improving voice quality, resonance, and glottic closure. (24)

Laryngeal and cervical massage: Digital manipulation of the thyroid cartilage for muscle balance. (28,29)

Voice and Respiratory Function Training

Breathing techniques: Costodiaphragmatic breathing training and inspiratory phonation.

Semi-Occluded Vocal Tract Exercises (SOVTE): Using fricatives ([f], [v], [z], [ʒ]), lip trills (/br/), tongue trills (/tr/), or straws of varying sizes and materials. These exercises aim to elongate the vocal tract, reduce vocal effort and glottic constriction, promote diffuse resonance, smooth vocal onset, and enhance mucosal wave motion of the vocal folds. They also foster pneumophonic-respiratory coordination and reduce vocal hyperfunction. (29)

Communication and Emotional Support

Techniques include body awareness, expressiveness, conscious communication, and leadership. (30,31) Emotional support for self-regulation is provided, employing active listening and strategies for coping and emotion management.

During voice therapy, the speech-language pathologist monitors the dosage, intensity, frequency, and duration of techniques and tools, respecting the individual's adherence and behavioral changes. Considering human uniqueness, the professional may explore multiple techniques to determine the most effective approach at different therapy stages. Post-execution, the therapist calibrates the perceptual-auditory judgment of the voice between themselves and the patient. (31,32)

METHODOLOGY

A treatment protocol for vocal process granuloma will be presented. Minimally invasive laryngeal microsurgery was performed on patients who did not achieve success with clinical treatment. The surgical steps followed the classical methodology for laryngeal exposure, placing the endotracheal tube upwards or in the interarytenoid region to ensure complete access and visualization of the lesion site. Granuloma vaporization or excision was performed while preserving its base, which was trimmed using cold instruments, with particular care to avoid damage to the perichondrium of the arytenoid cartilage. After hemostasis was achieved with topical 1:1000 adrenaline solution, a 100 mg hydrocortisone infiltration (1.5 ml, divided into 0.5 ml for three perilesional points: anterior, lateral, and posterior) was performed, avoiding direct infiltration into the surgical wound, thus preserving the anatomical structures. A small amount of bismuth subgallate was then applied topically to the raw area of the surgical wound. Figure 1,2,3,4,5. (from the author).

The patient was discharged on the same day as the procedure, with basic instructions for the laryngeal microsurgery and complete vocal rest for 15 days. Prophylactic antibiotic therapy, beclometasone spray for 15 days, and 80 mg proton pump inhibitor for 60 days were prescribed.

Preoperative speech therapy was conducted for all patients as part of conservative treatment. Pre- and postoperative instructions, specific medication prescriptions, complementary voice therapy aimed at smoothing vocal emission, and absolute vocal rest were rigorously followed by all patients. Patient follow-up included symptom monitoring and videolaryngoscopy imaging on the seventh postoperative day, 30 days post-surgery, and at the 3-month control visit. Postoperative intensive voice therapy rehabilitation, consisting of ten daily sessions of 30 to 60 minutes each, was conducted before and after the use of antireflux medications and granuloma excision. The main objective was the control of rough voice, abrupt vocal onset, and medial constriction of the glottic source. This approach aimed to promote vocal health, improve vocal and respiratory function, and provide emotional support for self-regulation of the processes. The collaborative work between

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV October 2025 | Special Issue on Public Health

speech-language pathology and otolaryngology, utilizing scientific evidence, was considered essential for disease management.

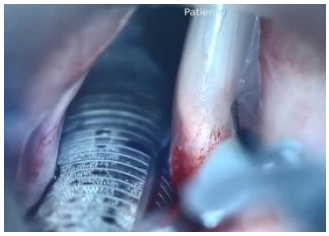

Figure 1

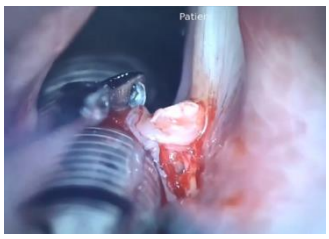

Figure 2

Figure 3

Figure 4

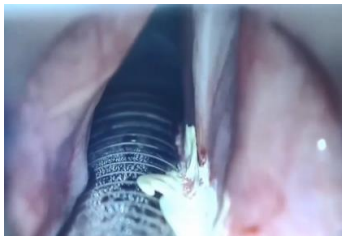

Figure 5

RESULTS

A new clinical-surgical protocol was presented, which was applied to patients who did not succeed with classical clinical treatments for nonspecific vocal fold granuloma. In this study, 22 subjects were evaluated, 3 females and 19 males, with a mean age of 39 years. The sample was collected over a period of twelve years (2010 to 2022) in the city of Aracaju, involving individuals who underwent laryngeal microsurgery for the treatment of vocal process granuloma. The application of this protocol resulted in a resolution in 21 patients,

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV October 2025 | Special Issue on Public Health

with complete remission of the condition. Only one patient experienced a recurrence. This patient was a street vendor who did not undergo adequate speech therapy and did not strictly follow the suggested protocol.

DISCUSSION

Nonspecific vocal fold granuloma is documented in the literature as a complication of uncontrolled reflux disease, associated with phonotrauma. It predominantly occurs in males. Our case series is similar in number and sex distribution to the literature. Due to the lack of control and complete remission of this organic lesion with clinical treatment, and in some cases with surgical treatment, this new therapeutic approach was introduced. Intraoperative care to preserve anatomical structures, especially the perichondrium of the arytenoid process and surrounding area, was crucial in the process. The use of laser at the beginning of the surgery and cold instruments at the end ensured a minimally invasive procedure. The hydrocortisone infiltration at a dosage of 1.5 ml, divided into three perilesional points of 0.5 ml each, facilitated better control of the surgical wound healing, possibly reducing elements such as collagen and fibroblasts in the healing process. These applications promote temporary paresis in the posterior glottic region, thereby reducing the impact of vocal trauma during phonation. Bismuth subgallate is a yellowish substance that is presented in the form of an odorless powder and which undergoes discoloration in the presence of sunlight.1 It is increasingly being used by professionals working in otorhinolaryngology and dentistry because of its astringent and hemostatic properties. Applications include topical treatment of open wounds, treatment of gastroduodenal ulcers, as an antidiarrheal agent, to control colostomy odor, during dental surgery, for management of epistaxis and, empirically, in adenotonsillectomies.(33) We believe in the scar control effect of topical bismuth subgallate. The use of proton pump inhibitors at a daily dosage of 80 mg for 60 days and inhaled beclomethasone (400 mcg, two daily applications for 15 days) are considered crucial factors for controlling the inflammatory healing process. Pre and postoperative speech therapy was essential to soften vocal emission and control the overall behavioral changes in patients. Classical measures for controlling habits and diet were rigorously adopted. In light of these findings and the positive results in disease management, we suggest the implementation of this proposal as a safe and effective therapeutic approach for vocal fold granuloma.

CONCLUSION

The application of the combined technical variant, with clinical and surgical approaches, associated with interdisciplinary care and postoperative control measures, along with the use of proposed medications, demonstrated the effectiveness of this treatment approach for nonspecific vocal process granuloma.

REFERENCES

1. White A, Carding P, Booth V, McGlashan J, Van Stan J, Logan P, et al. Pre- and post-operative voice therapy for benign vocal fold lesions: protocol for a non-randomised, multicentre feasibility trial with embedded process evaluation. Pilot Feasibility Stud. 2024;10(1):84.
2. Behlau M, Almeida AA, Amorim G, Balata P, Bastos S, Cassol M, et al. Reduzindo o GAP entre a ciência e a clínica: lições da academia e da prática profissional – parte A: julgamento perceptivo-auditivo da qualidade vocal, análise acústica do sinal vocal e autoavaliação em voz. CoDAS. 2022;34(5):e20210240.
3. Behlau M, Almeida AA, Amorim G, Balata P, Bastos S, Cassol M, et al. Reduzindo o gap entre a ciência e a clínica: lições da academia e da prática profissional – parte B: técnicas tradicionais de terapia vocal e técnicas modernas de eletroestimulação e fotobiomodulação aplicadas à reabilitação vocal. CoDAS. 2022;34(5):e20210241.
4. Woodard BH, Rosenberg SI, Farnham R, Adams DO. Incidence and nature of primary granulomatous inflammation in surgically removed material. Am J Surg Pathol. 1982;6(2):119–30.
5. Karkos PD, George M, Van Der Veen J, Atkinson H, Dwivedi RC, Kim D, et al. Vocal process granulomas: a systematic review of treatment. Ann Otol Rhinol Laryngol. 2014;123(5):314–20.
6. Campagnolo AM, Tsuji DH, Sennes LU, Imamura R. Steroid injection in chronic inflammatory vocal fold disorders: literature review. Braz J Otorhinolaryngol. 2008;74(6):926–32.
7. Teng TZJ, Zhai C, Ng CHL. Vocal fold granuloma: updates and advancements in treatment. J Voice. 2023; doi:10.1016/j.jvoice.2023.10.005.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV October 2025 | Special Issue on Public Health

8. Campos G, Amaya O, Valencia J, Arango L. Transoral flexible laser surgery of the upper aerodigestive tract with blue laser. Eur Arch Otorhinolaryngol. 2023;280(2):739–48.
9. Clark J, Smith R, Lee J. Granuloma of the membranous vocal fold: a marker of occult malignancy. Otolaryngol Head Neck Surg. 2024;170(3):223–9.
10. Sulica L, Kume K, et al. Patologia laríngea y fonocirurgia. 1st ed. Mexico City: Springer Nature México; 2021.
11. Boyce C, Schmidt KL, Gilbert MR. Management of idiopathic vocal process granuloma: a survey of academic laryngologists. Laryngoscope. 2024;134(2):795–802.
12. Luzzi T, Adilson A, de Lima S, Augusto V, Papalexiou V, Mara S, et al. Use of fibrinolisin/deoxyribonuclease and bismuth subgallate in wound palatine mucosa repair: histological study in rats. Paripex Indian J Res. 2018;7(6):1–5.
13. Couto EV, Ballin CR, Sampaio CPP, Maeda CAS, Ballin CH, Dassi CS, et al. Experimental study on the effects of bismuth subgallate on the inflammatory process and angiogenesis of the oral mucosa. Braz J Otorhinolaryngol. 2016;82(1):17–25.
14. Almeida AA, Iandra B, Zambom F, Behlau M, Veis Ribeiro V, Lopes L. Terapia vocal nas disfonias comportamentais. In: Magalhães H, Lopes L, Benevides S, editors. Intervenção fonoaudiológica em voz e funções orofaciais. Rio de Janeiro: Thieme Revinter; 2024. p. 141–60.
15. De Jesus Batista D, Lopes LW, Almeida AA, Siqueira LT, Ribeiro VV. What factors determine the use of volitional and non-volitional devices in vocal interventions performed by Brazilian speech-language pathologists? J Voice. 2023;S0892-1997(23):00346-6.
16. Pedrosa V, Pontes A, Pontes P, Behlau M, Peccin SM. The effectiveness of the comprehensive voice rehabilitation program compared with the vocal function exercises method in behavioral dysphonia: a randomized clinical trial. J Voice. 2016;30(3):377.e11–377.e19.
17. Souza BO, Santos MAR, Plec EMRL, Diniz ML, Gama ACC. Nebulized saline solution: a multidimensional voice analysis. J Voice. 2023;37(4):634.e1–634.e18.
18. Plec EMRL, Côrtes Gama AC, Souza BO, Santos MAR. Effect of nebulization on laryngeal parameters: analysis using high-speed digital videolaryngoscopy. J Voice. 2024;38(4):970.e1–970.e12.
19. Academia Brasileira de Otorrino Pediátrica. Manual de lavagem nasal na criança e no adulto. São Paulo: ABO; 2023.
20. Moreti F, Zambon F, Behlau M. Conhecimento em cuidados vocais por indivíduos disfônicos e saudáveis de diferentes gerações. CoDAS. 2016;28(4):463–9.
21. Gillespie AI, Yabes J, Rosen CA, Gartner-Schmidt JL. Efficacy of conversation training therapy for patients with benign vocal fold lesions and muscle tension dysphonia compared to historical matched control patients. J Speech Lang Hear Res. 2019;62(11):4062–79.
22. Plec EMRL, Bacelete VSB, Santos MAR, Gama ACC. Laryngeal photobiomodulation: application sites, interferences from body mass index and skin phototype. CoDAS. 2024;36(5):e20230333.
23. Siqueira LTD, Dos Santos AP, Da Silva Vitor J, Hencke DM, Vieira MMR, Antonetti-Carvalho AE, et al. Low-frequency TENS in women with behavioral dysphonia: preliminary data from a randomized clinical trial. J Voice. 2023;S0892-1997(23):00358-2.
24. Roy N, Bless DM, Heisey D, Ford CN. Manual circumlaryngeal therapy for functional dysphonia: an evaluation of short- and long-term treatment outcomes. J Voice. 1997;11(3):321–31.
25. Masic I, Muhamedagic B. Evidence based medicina – new approaches and challenges. Acta Inform Med. 2008;16(4):219–25.
26. Louzada P, Sarti W. Corticosteroides. In: Campos CAH, Costa HOO, editors. Tratado de otorrinolaringologia. São Paulo: Roca; 2002. p. 243–9.
27. Krespi YP, Husain S, Mitrani M, Meltzer CJ. Treatment of laryngeal sarcoidosis with intralesional steroid injection. Ann Otol Rhinol Laryngol. 1987;96(6):713–5.
28. Gulati SP, Sachdeva OP, Sachdeva A, Singh U. Wegener's granulomatosis: a case with laryngeal involvement. Indian J Chest Dis Allied Sci. 1997;39(2):125–8.
29. Gnanapragasam A. Intralesional steroids in conservative management of subglottic stenosis of the larynx. Int Surg. 1979;64(3):63–7.
30. Tateya I, Omori K, Hirano S, Kaneko K, Ito J. Steroid injection to vocal nodules using fiberoptic laryngeal surgery under topical anesthesia. Eur Arch Otorhinolaryngol. 2004;261(9):489–92.

ISSN No. 2321-2705 | DOI: 10.51244/IJRSI | Volume XII Issue XV October 2025 | Special Issue on Public Health

31. Tsurufuji S, Kurihara A, Ojima F. Mechanisms of anti-inflammatory action of dexamethasone: blockade by hydrocortisone mesylate and actinomycin D of the inhibitory effect of dexamethasone on leukocyte infiltration in inflammatory sites. J Pharmacol Exp Ther. 1984;229(1):237–43.
32. Chilla R, Gabriel P. The arthritis of the cricoarytenoid joint, a rare postintubation complication and its novel treatment. Laryngol Rhinol Otol (Stuttg). 1976;55(5):389–92.
33. Brasileiro HM, Lee IW, Rapoport A. Uso do subgalato de bismuto como agente hemostático em tonsiléctomia palatina: estudo de 201 casos. São Paulo: Atha; 2006. p. 181-5. ACTA ORL/Técnicas em Otorrinolaringologia.