Vocal Fold Scar - New Classification Proposal

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SUMMARY

Background: There are several types of scars on the vocal folds, for multiple causes. Strobe videolaryngoscopy is the safest and most elucidative diagnostic method, as it evaluates the mobility of the vocal folds and the tissue analysis of the lesion. Treatments such as speech therapy, topical application and infiltration of substances, as well as surgeries are proposed alone or in combination. **Objective**: To present a new classification of vocal fold scars, taking into account structural changes within and outside the vocal fold boundaries. **Method:** To characterize scars that exceed the anatomical limits of the vocal folds, such as synechiae and granulomatous lesions, considered hypertrophic and exuberant. Classify the types of granulomas in terms of appearance and location. To classify the different types of synechiae resulting from reflux complication, iatrogenic surgical trauma, and post-radiotherapy. Compare intra-tissue scars with extra-tissue scars. **Result and Conclusion:** Proof of the efficacy of this didactic systematization with the use of videolaryngoscopy and microscopy associated with rigid endoscopy in the intraoperative period, with a better understanding of the disease and programming of the most appropriate therapeutic regimen.

INTRODUCTION

There are several types of vocal fold scars caused by multiple etiologies, including those resulting from infectious and inflammatory processes, external laryngeal trauma, and various iatrogenic events. The literature generally discusses scars in relation to the histopathological ultrastructure of the vocal fold and their impact on vocal function. Intracordal scarring is the most frequently addressed due to the consequent dysphonia, particularly with respect to its effect on professional voice users.

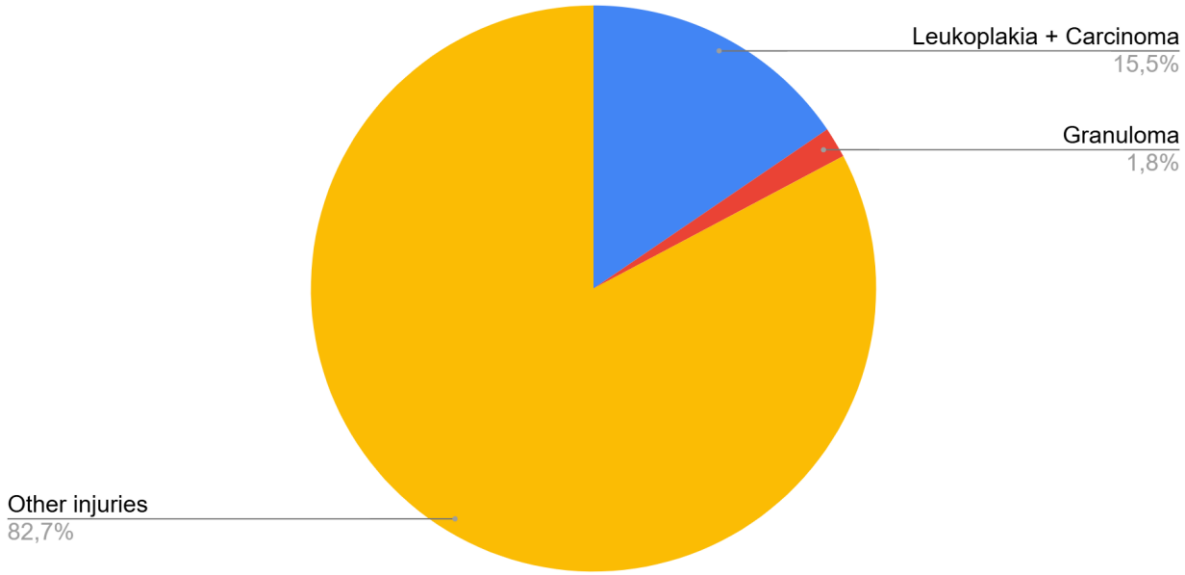
In the reviewed literature, a lack of publications and consensus was observed regarding the classification of vocal fold and glottic region scars. A publication by the American Laryngological Association and the European Laryngological Society in 2019 proposed a shared classification for vocal fold scars with altered histological structure. This work has become a reference for clinical and therapeutic parameters in laryngology. (1)

Furthermore, there is a noticeable scarcity of references addressing extracordal scarring processes organic scars that are visually detectable via endoscopic examination and their related classification systems. (2,3).

European and American Classification of Vocal Cord Scar

The consensus among academic societies is that vocal fold scarring is initially regarded as a challenging benign laryngeal disorder. The classification proposed is based on the depth and lateral extent of the scar, comprising four types: type I, characterized by atrophy of the superficial lamina propria with or without epithelial involvement; type II, in which the epithelium, lamina propria, and vocalis muscle are affected; type III, where the scar is located at the anterior commissure; and type IV, which includes extensive scarring along the anteroposterior and rostrocaudal axes, with significant loss of vocal fold mass. This is considered a comprehensive framework, as it objectively encompasses all existing iatrogenic and non-iatrogenic etiologies (1). It establishes that tissue alterations can occur in any layer of the vocal fold, from the epithelium to the vocal muscle. Due to tissue contraction associated with scarring, fixation of structures may occur, leading to reduced movement and vocal fold mobility. Consequently, dysphonia varies depending on the depth and extent of cellular involvement. It is important to note that this study refers exclusively to intratissue scarring, which remains within the anatomical limits of the vocal fold. The vocal characteristics, as assessed using the GRBAS scale, typically include hoarseness due to air escape, roughness caused by fixation of internal structures, breathiness due to lack of glottic coaptation, asthenia resulting from compensatory effort, and absence of strain (1).

Method: Proposal for Clinical Systematization of Vocal Cord Scars



The objective of this study is to present a new progressive proposal that facilitates the understanding of the disease and provides a training tool for laryngology. The clinical evidence of scars extending beyond the anatomical limits of the vocal folds—invading the glottic space and not previously referenced in the reviewed literature—justifies the present investigation. This study will present glottic and vocal fold scarring that exceeds the anatomical boundaries of the vocal folds, including synechiae and various granulomatous lesions, which are hypertrophic and exuberant. These lesions result from iatrogenic surgical trauma and post-radiotherapy effects. (13). A comparison between intratissue and extratissue scarring will also be demonstrated. (3,4,5)

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This classification system was applied over a ten-year period, with analysis of 342 patients who underwent laryngeal microsurgery. Of these, 53 patients (15%) were diagnosed with leukoplakia and carcinoma, and 6 (2%) with granulomas. All of these 59 patients (17%) presented extratissue scars of varying forms and dimensions, indicating that 17% of the total laryngeal microsurgery cases were affected by some type of scar.

A total of 59 extracordal scars were identified, associated with varying degrees of organic-functional dysphonia and motor dysphagia. No cases of dyspnea were identified in the present study. Figure 1.

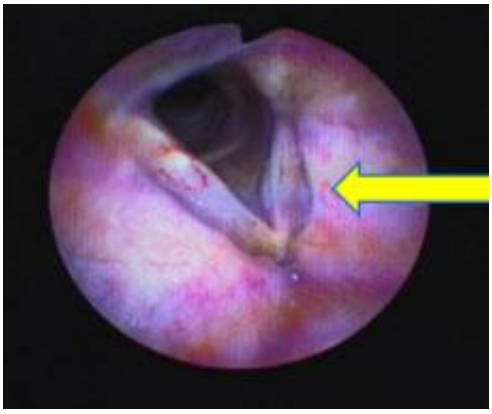

Figure 1 – Intracordal scar. Source: authors

Extrachordal scarring occurs when the scar lesion does not respect the classic anatomical limits, exceeding them and presenting with visible and detectable organic alterations on endoscopic examinations of the larynx, with obstructive potential in relation to the occupation of the glottic cleft. (2,6,7,8,9). Figures 2, 3, 4, 5.

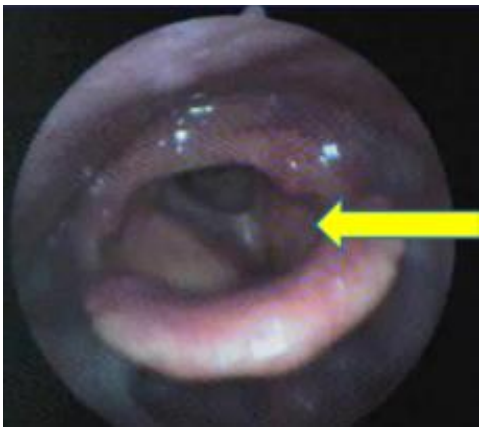

Figure 2 – Anterior Commissure Synechiae – D'Avila Area I. Source: authors

Figures 3, 4, 5 – Posterior Glottic Granulomas. Source: authors

The anatomical regions most affected by synechiae are d'Avila Areas I and II, respectively. Regarding granuloma, d'Avila Area III was the most affected, predominantly located at the vocal process, consistent with the literature. (2,11,12). Figures 6, 7, 8.

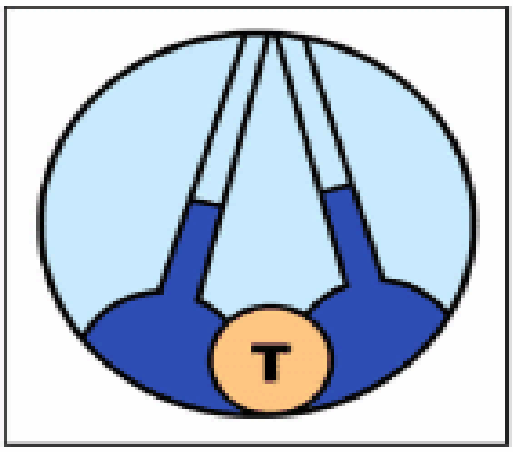

Figure 6 - D'Avila I Area

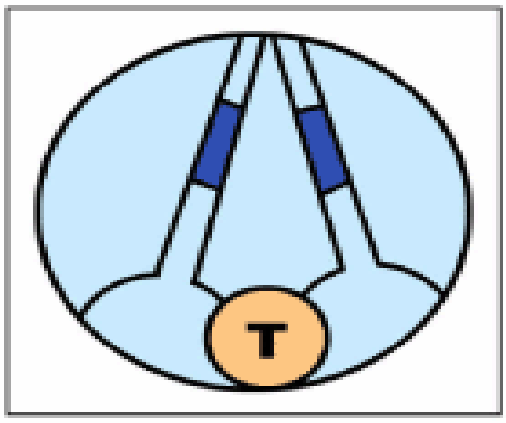

Figure 7 - D'Avila II Area

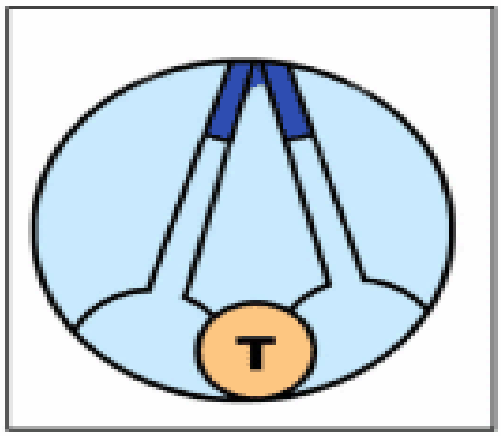

Figure 8 - D'Avila III Area D'Avila et al, 2003

Patients affected by synechiae, who did not present with respiratory insufficiency, were followed for monitoring of the underlying disease as well as the synechiae themselves. Patients diagnosed with granulomas were initially managed through clinical treatment, and in cases of therapeutic failure, they underwent the d'Avila Surgical Technique Variant, which proved effective in resolving the condition (2).

We recognize as limitations of this study the need to increase the sample size and to achieve a more specific differentiation of extracordal scars, so that the protocol can be reproduced with greater reliability by other institutions. (Table 1).

Table 1 presents the basic differences between the classifications.

Table 1 - Classification (New Proposal) – Vocal fold scar

Intra Cordal – European and American Classification	Extra Cordal – New Proposal
Compromised layers: epithelium to muscle	Compromised layers: epithelium, muscle, and ligament
Respects anatomical limits	Does not respect anatomical limits
Tissue retraction and fixation	Synechia and hypertrophic scar
Movement reduction	Limited movement or immobility
Dependent dysphonia: depth	Dependent dysphonia: extent and volume
Dysphagia: non-existent	Dysphagia: present – volume
Dyspnea: non-existent	Dyspnea: present – scar and volume

RESULTS AND CONCLUSION

The application of this methodological systematization in daily practice over a period of 10 consecutive years resulted in a better understanding of the disease's pathophysiology and the development of the safest therapeutic regimen. Therefore, the routine application of this new diagnostic systematization in clinical and surgical practice is recommended.

REFERENCES

1. Vocal fold scars: a common classification proposal by the American Laryngological Association and European Laryngological Society. Hantzakos A, Dikkers FG, Giovanni A, Benninger MS, Remacle M, Sjögren EV, Woo P.Eur Arch Otorhinolaryngol. 2019 Aug;276(8):2289-2292. doi: 10.1007/s00405-019-05489-3. Epub 2019 May 29.
2. Variation of the Laryngeal Microsurgery Technique in Cases of Difficult Laryngoscopy. Int Arch Otorhinolaryngol. Antonio Roberto Ferreira Setton , Jeferson Sampaio D'avila , Ricardo Queiróz Gurgel , Domingos Hiroshi Tsuji, Daniel Vasconcelos D'Ávila, Carlos Rodolfo Tavares de Góis , Ana Taise de Oliveira Meurer, Helaina Peixoto Gurgel. January 2019;23(1):18-24. doi: 10.1055/s-0038-1660825. Epub 2018 August 9.
3. A Systematic Review on Surgical Treatments for Sulcus Vocalis and Vocal Fold Scar. Medeiros N, Castro MEM, van Lith-Bijl JT, Desuter GRR.Laryngoscope. 2022 Apr;132(4):822-830. doi: 10.1002/lary.29665. Epub 2021 May 31.PMID: 34057225 Review.
4. Endoscopic Preoperative Assessment, Classification of Stenosis, Decision-Making. Filauro M, Mazzola F, Missale F, Canevari FR, Peretti G.Front Pediatr. 2020 Jan 8;7:532. doi: 10.3389/fped.2019.00532. eCollection 2019.PMID: 31970144
5. Angiogenesis, fibrinogenesis and presence of synechiae after exeresis of a swine vocal fold mucosal microflap and use of topical mitomycin-C. Fonseca VR, Malafaia O, Ribas Filho JM, Nassif PA, Czeczko NG, Marcondes CA, Nascimento MM.Acta Cir Bras. 2010 Feb;25(1):80-5. doi: 10.1590/s0102-86502010000100017.PMID: 20126893
6. Surgical treatment of laryngeal stenosis. Padovan IF.J Otolaryngol. 1976 Apr;5(2):131-7.
7. The adhesion separation operation with CO_2 laser combined with triamcinolone acetonide vocal cord submucosal injection for the treatment to vocal cord adhesion] [Article in Chinese] L H Li [1], W P Hu [2], Z L Zhang [1], J G Liu [1], G Luo [1], Y H Liu [1]
8. Analysis of the reason for the adhesion of vocal cord after CO2 laser laryngeal surgery]. Cai H, Tang A, Xu Z, Su J, Zhou Y, Nong D.Lin Chung Er Bi Yan Hou Tou Jing Wai Ke Za Zhi. 2010 Feb;24(4):147-8, 151.
9. Surgical management of sulcus vocalis and vocal fold scarring. Dailey SH, Ford CN.Otolaryngol Clin North Am. 2006 Feb;39(1):23-42. doi: Tateya I.Curr Opin Otolaryngol Head Neck Surg. 2009 Dec;17(6):424-6. doi: 10.1097/MOO.0b013e3283327d4c.

10. Surgical method to create vocal fold injuries in mice. Yamashita M, Bless DM, Welham NV.Ann Otol Rhinol Laryngol. 2009 Feb;118(2):131-8. doi: 10.1177/000348940911800209.PMID: 19326764 Free PMC article.
11. Proposal for revision of the European Laryngological Society classification of endoscopic cordectomies. Remacle M, Van Haverbeke C, Eckel H, Bradley P, Chevalier D, Djukic V, de Vicentiis M, Friedrich G, Olofsson J, Peretti G, Quer M, Werner J.Eur Arch Otorhinolaryngol. 2007 May;264(5):499-504. doi: 10.1007/s00405-007-0279-z. Epub 2007 Mar 22.PMID: 17377801
12. Endoscopic cordectomy. A proposal for a classification by the Working Committee, European Laryngological Society. Remacle M, Eckel HE, Antonelli A, Brasnu D, Chevalier D, Friedrich G, Olofsson J, Rudert HH, Thumfart W, de Vincentiis M, Wustrow TP.Eur Arch Otorhinolaryngol. 2000;257(4):227-31. doi: 10.1007/s004050050228.PMID: 10867840
13. Cause of vocal fold scar. Allen J.Curr Opin Otolaryngol Head Neck Surg. 2010 Dec;18(6):475-80. doi: 10.1097/MOO.0b013e32833fecd1.PMID: 20861796