Impact of Rigid Endoscopy on the Diagnosis and Treatment of Vocal Fold Leukoplakia

***Jeferson Sampaio D'Avila, MD, PhD, Post Doc., Antonio Roberto Ferreira Setton, MD, PhD., Daniel Vasconcelos D'Avila, PhD., Carlos Rodolfo Tavares de Gois, MD, PhD., Paulo Sérgio Lins Perazzo, MD, PhD., Lauro Roberto de Azevedo Setton, MD., Davi Vasconcelos D'Avila, Ac.**

Federal University of Sergipe (UFS), Aracaju, Brazil

***Corresponding Author**

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ABSTRACT

Background: Vocal fold leukoplakia is the most prevalent premalignant lesion of the larynx and presents heterogeneous biological behavior. Objective: To clinically present surgically treated vocal fold leukoplakia and evaluate the impact of transoperative rigid endoscopy on diagnosis and treatment. Methods: A transversal 30-year comparative study with and without rigid endoscopy was conducted. Results: Rigid endoscopy significantly improved intraoperative diagnostic accuracy and lesion detection. Conclusion: Rigid endoscopy is an indispensable tool for microsurgical treatment of vocal fold leukoplakia.

Keywords: Vocal fold leukoplakia; Rigid endoscopy; Laryngeal microsurgery; Premalignant lesions

INTRODUCTION

Vocal fold leukoplakia is the most prevalent premalignant lesion of the larynx and remains a diagnostic and therapeutic challenge [1,4]. Although initial management is clinical, refractory cases require surgical intervention. The introduction of rigid and contact endoscopy by Andrea and Dias represented a paradigm shift in laryngeal microsurgery [2,6].

Vocal Fold Leukoplakia

Vocal fold leukoplakia may range from superficial epithelial plaques to deep involvement of the lamina propria, vocal muscle, and cartilage. It is more prevalent in males over 40 years old and is strongly associated with smoking and alcohol consumption [1,5]. Five intraoperative diagnostic rules were established to ensure oncological safety and accurate lesion identification.

Rigid Endoscopy

Rigid Endoscopy Microsurgery (REMS), developed by Mario Andrea and Oscar Dias (1984), employs rigid endoscopes with angulations of 0°, 30°, 70°, and 120°. It allows panoramic visualization of the endolarynx during microsurgery under general anesthesia, improving detection of microscopic and multifocal lesions.

Surgical Treatment of Vocal Fold Leukoplakia

Clinically refractory leukoplakia requires surgical treatment. Laryngeal microsurgery using cold instruments or laser technologies remains the gold standard. The use of rigid endoscopy enhances surgical precision and minimizes unnecessary tissue removal [3].

MATERIALS AND METHODS

A transversal study reviewed surgical and histopathological records of 910 patients who underwent laryngeal microsurgery between 1990 and 2019 by a single surgeon. Patients operated after 2000 underwent transoperative rigid endoscopy using 0°, 30°, 70°, and 120° optics.

RESULTS

Premalignant lesions accounted for 12.96% of cases. Preoperative outpatient evaluation accuracy was 68.8%. Vocal fold cysts were the most frequently associated benign lesions (Figure 1).

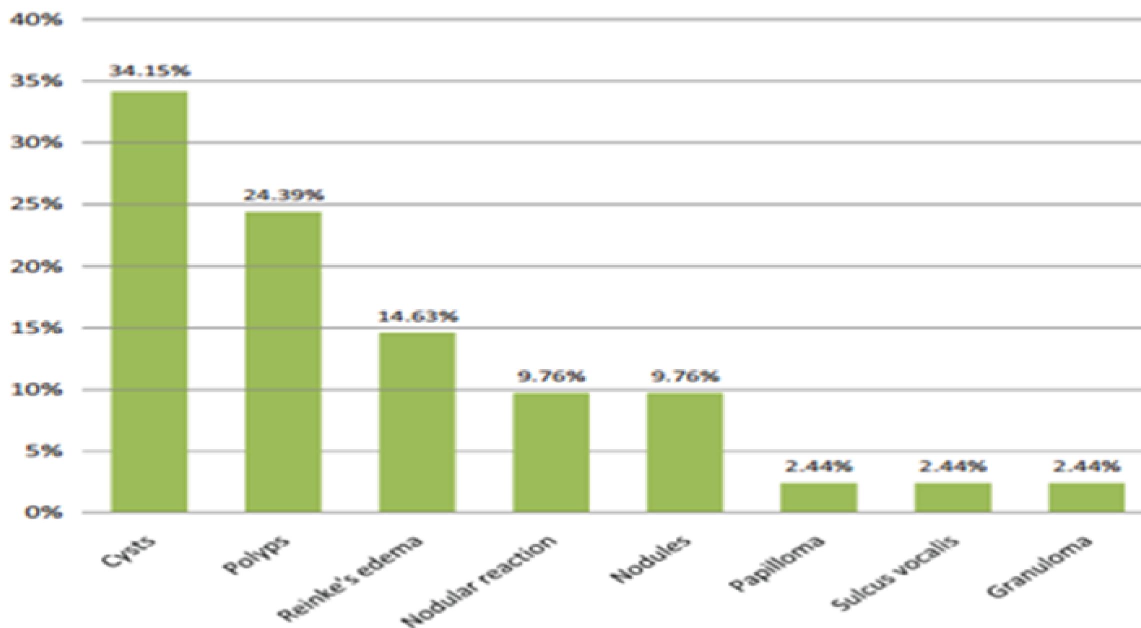


Fig. 1 Concomitant benign lesions of the vocal folds in patients with premalignant laryngeal lesions.

Figure 1. Associated benign vocal fold lesions.

DISCUSSION

Premalignant vocal fold lesions were more prevalent in males over 40 years old, representing nearly 70% of cases, and were strongly associated with smoking, alcohol consumption, and vocal abuse [1,5,10]. These findings are consistent with previously published series.

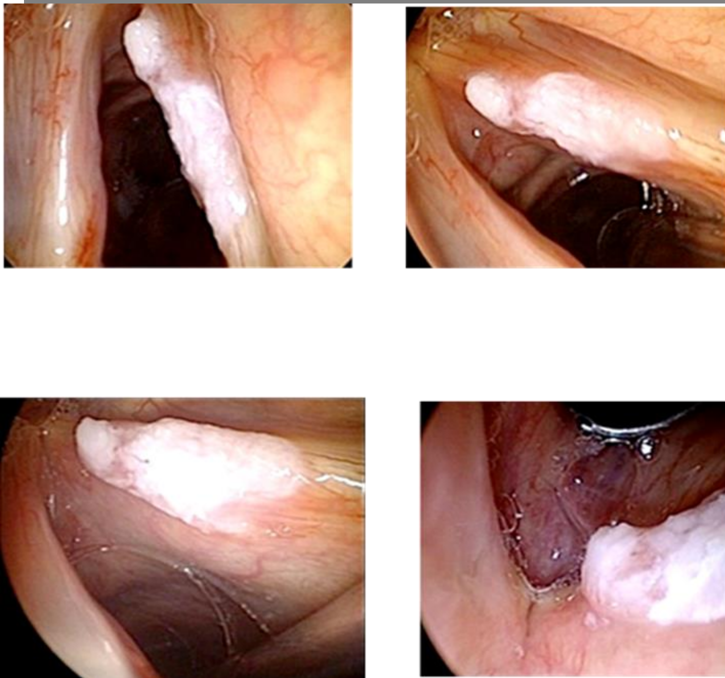
One of the most relevant findings of this 30-year study was the significant increase in the detection of premalignant lesions during the last decade, rising from 9.85% to 18.12%. This increase does not necessarily indicate a true epidemiological rise, but rather reflects improved diagnostic accuracy associated with systematic use of transoperative rigid endoscopy and closer interaction with pathology. Table 1.

Table 1. Leukoplakia over a 30-Year Period

Variable	First 20 Years (1990–2009)	Last 10 Years (2010–2019)	Total
Laryngeal Microsurgeries	568	342	910
Dysplasia with Benign Disease	56 (9.85%)	62 (18.12%)	118 (12.96%)

Values are presented as absolute numbers and percentages relative to the number of laryngeal microsurgeries performed in each period.

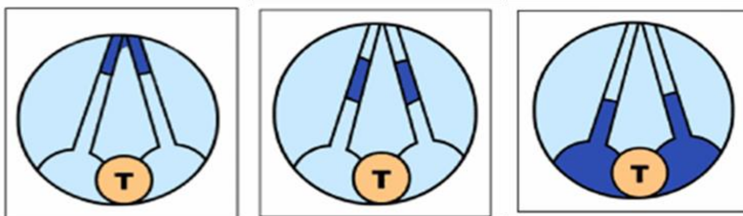
Rigid endoscopy enabled identification of microscopic, multifocal, contralateral, and subglottic leukoplakic lesions that would likely remain undetected using conventional microscopy alone. Angulated optics (30°, 70°, and 120°) provided complementary perspectives of the same lesion, allowing accurate topographic mapping and safer oncological margins (Figures 2–5).



Figures 2–5. Transoperative rigid endoscopy using different angulations.

Another critical observation is the histopathological heterogeneity within a single leukoplakic plaque. Different degrees of dysplasia, including carcinoma in situ or invasive carcinoma, may coexist within the same lesion. This reinforces the importance of guided biopsies and complete lesion assessment, supported by rigid endoscopy and the D'Avila topographic classification (Figures 6–8).

Despite advances in imaging and surgical techniques, demographic characteristics such as sex, age, and etiological factors remained statistically stable over the three decades. This finding supports the notion that diagnostic improvement, rather than population change, explains the increased detection rate observed in recent years.



Figures 6–8. D'Avila topographic areas for vocal fold leukoplakia.

CONCLUSION

Transoperative rigid endoscopy significantly improved the diagnosis and surgical management of vocal fold leukoplakia. Its routine use increased lesion detection rates, enhanced oncological safety, and supported conservative, biologically guided microsurgical treatment.

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