Blood Vessels of Vocal Folds

A Videolaryngoscopic Study

Noemi Grigoletto De Biase, PhD; Paulo Augusto de Lima Pontes, PhD

Objective: To analyze and compare the incidence and visual characteristics of blood vessels on the superior surface of vocal folds with polyps, nodules, and minimal structural alterations (ie, sulci, cysts, and mucosal bridges).

Design: Cross-sectional study.

Setting: Academic research.

Patients: A total of 280 videolaryngoscopic images were randomly selected and classified into the following 4 groups of 70 patients each: the vocal nodule (VN) group, the polyp group, the minimal structural alterations (MSA) group, and the control group.

Main Outcome Measures: Laryngoscopic images were assessed for visible blood vessels and for the orientation and characteristics of the vessels. Isolated ectasias with clear boundaries were excluded.

Results: The highest incidence of visible vessels was observed in the MSA group (91.4%), followed by the polyp (77.1%), VN (44.7%), and control (31.4%) groups. Longitudinal and transverse vessels were found more frequently in the MSA (74.3% and 37.1%) and polyp (65.7% and 22.9%) groups than in the VN (34.3% and 12.9%) and control (25.7% and 5.7%) groups. Tangled vessels were found only in the MSA group (8.6%). Abrupt changes in the caliber of the vessels and sinuous vessels were observed only in the polyp (21.4% and 5.7%) and MSA (61.4% and 27.1%) groups.

Conclusions: The main differences in the incidence and characteristics of visible blood vessels occurred between 2 pairs of groups: MSA-polyp and VN-control. The incidence was significantly higher in the MSA group than in the polyp group, and the incidence in both the MSA group and the polyp group was also significantly higher than that in the VN and control groups. The greatest variations were found in the MSA group, including the presence of tangled blood vessels (which was observed only in this group).

but also with benign lesions such as nodules, polyps, and MSAs. Vascular dilatations that have been observed by laryngoscopy on the mucosal surface of the vocal folds (referred to as capillary ectasias, angiectasia, or varices) have been reported as being indirect signs of the presence of cysts. Reports have also suggested that the ectasias and varices that sometimes occur in association with other abnormalities could be related to vocal trauma. In fact, the exact correlations between benign lesions, phonotrauma, MSAs of the vocal folds, and the presence of visually distinguishable blood vessels have not been clearly determined to date. The main hypothesis of this study is that the presence of alterations in the caliber and orientation of visible blood vessels (compared with the normal longitudinal disposition and uniformly slender diameter) could be related to histologic modifications of the vocal folds’ layered structure, usually found in MSAs. The goals of this study were to analyze and compare the incidence and visual characteristics of blood vessels on the vestibular surface of the vocal folds through videostrobolaryngoscopic images of patients clearly diagnosed as having MSAs, polyps, and VNs as well as those of a control group with no vocal complaints or laryngeal lesions.

METHODS

A total of 280 videostrobolaryngoscopic examinations were randomly selected from 70 patients (age range, 25-45 years) who were separated into 4 groups: patients with polyps, patients with VNs, patients with MSAs (including epidermoid cysts, sulci, and mucosal bridges), and patients with no vocal complaints or laryngeal lesions (controls). Cases involving concomitant abnormalities were excluded. The diagnoses were exclusively clinical: no surgical inspections or anatomopathologic examinations were performed. Stroboscopy was performed to differentiate between VNs and cysts. We made the diagnosis together and judged the characteristics of the vessels. Cases of uncertain diagnosis were excluded. The VN diagnosis was confirmed by improvement of voice after phonotherapy, with reduction in size or complete absorption of the nodular lesion. Modified hemostat with a traction knot was used to analyze the results, and P < .01 was considered significant.

The following 3 equations were used to summarize the statistically significant results (all P values < .01): (1) MSA (91.4%) > P (77.1%) > VN (45.7%) = Ctrl (31.4%), for visually observable vessels (Table 1); (2) MSA (74.3%) = P (65.7%) > VN (34.3%) = Ctrl (25.7%), for longitudinal vessels (Table 2); and (3) MSA (37.1%) = P (22.9%) > VN (12.9%) = Ctrl (5.7%), for transverse vessels (P and Ctrl represent the polyp group and the control group, respectively). Tangled vessels were found only in the group with MSAs (8.6%).

The presence of abnormal blood vessels associated with laryngeal polyps is widely reported in the literature. The findings of our study are in general agreement with those studies regarding the presence of blood vessels associated with polyps (77% of our cases). According to Hirano and Kambic et al, the vessels associated with polyps exhibit vasodilatation and increased vascular permeability, which helps make them visible. Kleinasser studied the pathogenesis of polyps and suggested that trauma to the walls of the vessel could cause vasodilatation, increased permeability, and even the appearance of raveled and tortuous vessels. In regard to

![Figure 1. Videolaryngoscopic photographs of normal larynges without discernible blood vessels (A) and with longitudinal blood vessels (B, arrows).](image-url)

**RESULTS**

**COMMENT**

The presence of abnormal blood vessels associated with laryngeal polyps is widely reported in the literature. The findings of our study are in general agreement with those studies regarding the presence of blood vessels associated with polyps (77% of our cases). According to Hirano and Kambic et al, the vessels associated with polyps exhibit vasodilatation and increased vascular permeability, which helps make them visible. Kleinasser studied the pathogenesis of polyps and suggested that trauma to the walls of the vessel could cause vasodilatation, increased permeability, and even the appearance of raveled and tortuous vessels. In regard to
MSAs, Bouchayer et al. made reference to the presence of inflammatory cells in histologic laminas of cysts and sulci, suggesting an underlying chronic inflammatory process. We concur with this statement and hypothesize that these intrachordal inflammatory processes may explain the high incidence of visually distinguishable blood vessels associated with MSAs (Table 1).

In our study, the incidence of longitudinally oriented vessels was also significantly higher ($P<.001$) in the MSA and polyp groups than in the VN and control groups.

No statistically significant difference was found between the polyp and MSA groups ($P=.35$) or between the VN and control groups ($P=.35$). Existence of visible lon-
In conclusion, the main difference in the incidence or characteristics of the vessels occurred between 2 pairs of groups: MSA—polyp and VN-control. The incidence was significantly higher in the MSA group than in the polyp group, and the incidence in both groups was also significantly higher than in the VN and control groups. Altered in the caliber and orientation of blood vessels of the vocal folds were more frequent in the MSA group. It is difficult to differentiate between VNs and cysts using clinical resources alone. However, the analysis of the presence and characteristics of visible vessels on the surface of the vocal folds may facilitate the differential diagnosis.

Submitted for Publication: March 11, 2007; final revision received October 15, 2007; accepted October 30, 2007.

Correspondence: Noemi Grigoletto De Biase, PhD, Instituto da Laringe, Rua Doutor Diogo de Faria 171, São Paulo 04037-000, Brazil (ngdebiase@gmail.com).

Author Contributions: Drs De Biase and Pontes had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: De Biase and Pontes. Acquisition of data: De Biase and Pontes. Analysis and interpretation of data: De Biase and Pontes. Drafting of the manuscript: De Biase and Pontes. Critical revision of the manuscript for important intellectual content: De Biase and Pontes. Obtained funding: Pontes. Administrative, technical, and material support: Pontes.

Financial Disclosure: None reported.
REFERENCES


