

## Original Research Article

# A study of phonosurgeries in vocal dysfunction in Salem district

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### ABSTRACT

**Background:** Phonosurgery essentially is surgery defined to improve or restore the voice. The objective of the study was to analyze and categorize the various benign lesions of the vocal cord causing vocal dysfunction requiring phonosurgeries, to analyze the incidence and distribution of cases according to age, sex, and etiology among the patients who require intense medical and voice therapy with surgical intervention.

**Methods:** This prospective study was conducted in fifty patients with vocal dysfunction from the ear, neck and throat (ENT) outpatient department of Otorhinolaryngology, Mohan Kumaramangalam Government General Hospital, Salem in the year September 2018 to October 2019 who failed conservative medical and voice therapy requiring phonological procedure were included in this study. Phonomicrosurgery was done for the patients with benign vocal fold mucosal disorders and medialization laryngoplasty using Gore-Tex was done for the patients with unilateral vocal cord palsy causing vocal dysfunction.

**Results:** The present study on phono surgery concludes vocal polyp is the commonest benign lesion of the vocal cord that constitutes 40% in our study population. Males are affected more than females. Proper investigation of voice and larynx provides the exact pathological nature of the lesion and determines the timing of surgical intervention.

**Conclusion:** Most of the patients who underwent medialization laryngoplasty using Gore-Tex also had a good outcome at the end of the voice therapy.

**Keywords:** Vocal dysfunction, Phonosurgery, Dysphonia

### INTRODUCTION

Dysphonia is the presenting symptom of the phono surgical patient. The pathologic condition may include various benign vocal fold lesions or diseases affecting the neuromuscular function of the larynx.<sup>1</sup> Dysphonia may result also from the normal aging process, smoking, and vocal abuse. There are many surgical approaches in phono surgery and techniques continue to evolve.<sup>2</sup> In this study, phonomicrosurgery and medialization laryngoplasty using Gore-Tex are described and their outcome is analyzed. Although the surgical technique is an important determinant of the outcome, diagnostic assessment, and surgical indication desire equal attention. It is always

necessary to perform a comprehensive voice evaluation, identify the pathologic condition, and recognize the appropriate surgical candidate before surgery.<sup>3</sup> Excellent techniques cannot offset the damage done when surgery is performed on the wrong patient or for a nonsurgical problem. The team consists of a laryngologist and a speech pathologist who are knowledgeable about voice production and pathology.<sup>4</sup> Careful assessment should be done preoperatively to describe and localize the pathological condition. This is essential to treatment planning. Normal voice production requires a timely tuned neuromuscular system and mechanical integrity of the vocal folds.<sup>5</sup> Some dysphonia can be corrected with voice therapy. However, when there is a structural abnormality or irreversible neuromuscular damage, phonosurgical

intervention is indicated.<sup>6</sup> Phono surgery should correct the mechanical problem without producing a substantial secondary problem.<sup>7</sup> Avoidance of secondary intention healing in the membranous vocal fold and appreciation of the histoarchitecture of the vocal fold will help the phonosurgeon avoid the disastrous result. Vocal fold paralysis may be treated by voice therapy, implant, injection, framework surgery, and restoration.<sup>8</sup> The results depend on the technique, materials, and physiological and psychological status of the patient. In this study of phonosurgeries in vocal dysfunction, the patients who failed conservative therapy are categorized based on their lesions and the outcomes of various phonosurgical techniques (including phonomicrosurgery and medialization laryngoplasty) are analyzed.<sup>9,10</sup>

**METHODS**

This prospective study was conducted in fifty patients with vocal dysfunction from the Ear, neck and throat (ENT) outpatient department of otorhinolaryngology, Mohan Kumaramangalam Government General Hospital, Salem in the year September 2018 to October 2019 who failed conservative medical and voice therapy requiring phonosurgical procedure were included in this study. Phonomicrosurgery was done for the patients with benign vocal fold mucosal disorders and medialization laryngoplasty using Gore-Tex was done for the patients with unilateral vocal cord palsy causing vocal dysfunction. Adult patients with benign vocal fold lesions and vocal cord palsy who failed with conservative medical and voice therapy, requiring phonosurgical procedures to correct their voice dysfunction were included in this study.

**Exclusion criteria**

Exclusion criteria was as follows: Patients who had a good response to conservative therapy, malignant lesions of the larynx causing vocal dysfunction, vocal cord palsy caused by neoplasms, medically ill patients.

All the patients with vocal dysfunction were examined and their pathological lesion was identified. The patients with benign vocal fold lesions were given intense medical and voice therapy. Patients who failed conservative therapy underwent phonosurgical procedures. Informed written consent was obtained from all the patients. Phonomicrosurgery was done for the patients with benign vocal fold mucosal disorders and medialization laryngoplasty using Gore-Tex was done for the patients with unilateral vocal cord palsy causing vocal dysfunction. The incidence and distribution of cases among the patients who require surgical intervention were analyzed and categorized. The outcomes & prognosis of the various phonosurgical procedures were analyzed.

**Statistical analysis**

The data are reported as the mean±standard deviation (SD) or the median, depending on their distribution. The

differences in quantitative variables between groups were assessed using the unpaired t-test. A comparison between groups was made by the nonparametric Mann-Whitney test. The Chi-square test was used to assess differences in categoric variables between groups. A p value of <0.05 using a two-tailed test was taken as being of significance for all statistical tests. All data were analyzed with a statistical software package for social sciences. (SPSS, version 16.0 for windows).

**RESULTS**

In our study, the order of frequency of various benign lesions of the vocal cord causing vocal dysfunction was vocal cord polyps (40%), vocal cord nodules (16%), vocal cord cyst (8%), vocal cord papilloma (8%), Reinke’s edema (6%), intubation granuloma (4%), recurrent respiratory papillomatosis (4%), keratosis larynx (2%). Unilateral vocal fold palsy constitutes 12% among the lesions (Table 1).

**Table 1: Causes of local dysfunction.**

Causes of local dysfunction	No.	Percentage
Vocal cord polyp	20	40
Vocal cord nodule	8	16
Vocal cord cyst	4	8
Vocal cord papilloma	4	8
Reinke’s edema	3	6
Intubation granuloma	2	4
Recurrent papillomatosis	2	4
Keratosis larynx	1	2
Vocal cord palsy	6	12

**Table 2: Age incidence.**

Age group (in years)	No.	Percentage
11-20	3	6
21-30	10	20
31-40	17	34
41-50	10	20
51-60	6	12
61-70	4	8

Most of the patients fall into the age group of 21-50 years (Table 2). The number of affected males was 52% and females were 48% in our study. The main aggravating factors were vocal abuse, smoking and alcohol. Thyroidectomy was a common cause of unilateral vocal cord paralysis in 5 patients (83%) and idiopathic in 1 patient 17% (Table 3).

**Table 3: Causes of unilateral vocal cord paralysis.**

Causes	No.	Percentage
Thyroidectomy	5	83
Idiopathic	1	17

**Table 4: Side of lesion of nerve paralysis.**

Side of lesion	No.	Percentage
<b>Right recurrent laryngeal nerve</b>	2	33
<b>Left recurrent laryngeal nerve</b>	4	67

Left recurrent laryngeal nerve paralysis was observed in 4 patients 67%, right recurrent laryngeal nerve observed in 2 patients is 33% (Table 4).

**Table 5: Postoperative GRBAS score.**

Scores	No.	Percentage
<b>0 (Normal)</b>	45	90
<b>1-2 (Mild to Moderate deficit)</b>	5	10
<b>3 (Severe deficit)</b>	0	-

0 (normal) in 45 patients (90%) 1-2 (mild to moderate deficit) in 5 patients (10%) 3 (severe deficit) was none of cases (Table 5). Good outcome was observed in 45 cases (90%), fair in 5 cases (10%) failure in none of the cases (Table 6).

**Table 6: Outcomes of phonosurgery.**

Outcome	No.	Percentage
<b>Good</b>	45	90
<b>Fair</b>	5	10
<b>Failure</b>	-	-

**Table 7: Outcomes of medialization laryngoplasty.**

Outcome	No.	Percentage
<b>Good</b>	5	83
<b>Fair</b>	1	17
<b>Failure</b>	-	-

Good outcome was observed in 5 cases (83%), fair in 1 case (17%) failure in none of the cases (Table 7). Laryngospasm is seen in 3 cases (6%), tongue numbness 11 (22%), loose tooth 4 cases (8%) (Table 8).

**Table 8: Complications of phonomicrosurgery.**

Complications	No.	Percentage
<b>Laryngospasm</b>	3	6
<b>Tongue numbness</b>	11	22
<b>Loose tooth</b>	4	8

## DISCUSSION

In our study, the order of frequency of various benign lesions of the vocal cord causing vocal dysfunction was vocal cord polyps (40%), vocal cord nodules (16%), vocal cord cyst (8%), vocal cord papilloma (8%), Reinke's edema (6%), intubation granuloma (4%), recurrent

respiratory papillomatosis (4%), keratosis larynx (2%). Unilateral vocal fold palsy constitutes 12% among the lesions.<sup>11</sup> In a study by Hoffman et al vocal nodules constitute 55% followed by polyps 19%, cysts 18%, ectasias 3%, keratosis larynx 2%, granuloma 0.5%, Reinke's edema 0.5%, papilloma 0.5%. Most of the patients fall into the age group of 21-50 years. The number of affected males was 52% and females were 48% in our study. The main aggravating factors were vocal abuse, smoking and alcohol. In our study, 12% of the patients with vocal dysfunction requiring phonosurgical correction had unilateral vocal cord palsy caused by recurrent laryngeal nerve palsy as their etiology. Totally six patients had unilateral vocal cord palsy. Five of them (83%) had developed cord palsy following thyroidectomy procedure.<sup>12</sup> One of the patients had no relevant history to identify the cause for vocal cord palsy. He underwent a pan-endoscopy and computed tomography (CT) scan from the skull base to upper mediastinum. With all these studies proved normal, the patient was categorized as having idiopathic cord palsy. Malignant lesions causing vocal cord palsy were excluded from the study.<sup>13</sup> Jako et al showed that trauma (including surgery) as the commonest cause of unilateral vocal cord palsy followed by neoplasm and idiopathic cause. In our study, 49% of the patients fall under the age group of 31-40 years. 83% of the females were affected by the male: female ratio of 1:4.8. All the patients, before the surgical procedure, underwent intense medical and voice therapy. They were detailed about the vocal hygiene (including reduction of vocally abusive behaviors such as throat clearing, frequent hard glottal attacks, yelling or speaking incorrectly, a condition such as dehydration and gastroesophageal reflux) and postoperative voice therapy.<sup>14</sup> The importance of vocal hygiene, smoking and alcohol cessation, reflux control, nature, and risks of surgery were elaborated. Phonomicrosurgical procedures are done with an operating microscope with 400 mm objective lens. During the procedure, maximal importance was given to preserving the layered microstructure of the vocal folds. Epithelial cordotomy incision was made for most of the lesions and after removal of the lesion, the mucosal flap was re-draped, serving as a biologic dressing. Small lesions were amputated with micro scissors.<sup>15</sup> Avulsion of the mucosal layer was maximally avoided. After the surgery, complete voice rest for one week was given for all the patients. Antibiotics, steroids, and proton pump inhibitors were prescribed selectively. After one week, a gradual increase in voice use with voice therapy was given over 3 to 6 weeks. All the patients were examined at the end of six weeks and their outcomes were analyzed. The auditory perceptual assessment was made with GRBAS scale (G-grade or overall quality, R- roughness, B-breathiness, A-asthenia, S-strain) that was developed by the committee for the phonatory function of the Japanese Society of Logopedics and Phoniatics. It is a 4-point scale: 0 is for no deficit; 1 is for the mild deficit; 2 is for the moderate deficit, and 3 refers to a severe deficit. Patients with score '0' were categorized as having a good outcome, those with scores 1-2 were categorized as having a fair outcome, and

those with scores 3 were categorized as failed surgery. The videoendoscopic evaluation was done to look for the structure and mobility of the cords, regularity of the vocal folds, and presence or absence of the phonatory gap.<sup>16</sup> In our study, 90% of the patients who underwent surgery had a good outcome and 10% of the patients had a fair outcome. All the patients with unilateral vocal fold paralysis underwent medialization laryngoplasty surgery after an average duration of 12 months after the onset of nerve paralysis.<sup>17</sup> The voice assessment was made after the completion of voice therapy at the end of 6 weeks. In our study, 83% of the patients had a good outcome and 17% of the patients had a fair outcome. The fair outcome in one patient was due to inadequate medialization of the vocal cord.<sup>18</sup> The merits of Gore-Tex evident from our study are its ease of handling, ease of adjustability of the implant inside the larynx, reduced operative time, and its biocompatibility.<sup>19</sup>

## CONCLUSION

Our study concludes that successful phonomicrosurgical resection of most commonly encountered lesions can be achieved and 90% of the patients had a good outcome. The success reported herein is the result of improvement in our understanding of the micro layered structure of the vocal folds underlying the vibration and availability of phonomicrosurgical instruments that help in preserving the layered microstructure of vocal fold. Most of the patients who underwent medialization laryngoplasty using Gore-Tex also had a good outcome at the end of voice therapy. Only one patient had a fair outcome due to inadequate medialization of the vocal cord. A team approach including good vocal rehabilitation is of paramount importance in obtaining satisfactory outcomes in phono surgery. The patient and the surgeon must approach phono surgery collaboratively so that there is a mutual responsibility for the decision to operate.

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## REFERENCES

- Bastian RW, Richardson BE. Postintubation phonatory insufficiency: an elusive diagnosis. *Otolaryngol Head Neck Surg.* 2001;124:625-33.
- Bouchayer M, Cornut G, Witzig E, Loire R, Roch JB, Bastian RW. Epidermoid cysts, Sulci, and mucosal bridges of the true vocal cord; a Review of 157 cases. *Laryngoscope.* 1985;95:1087-94.
- Carrau RL, Myers EN. Localization of true vocal cord for medialization laryngoplasty. *Laryngoscope.* 1995;105:534-6.
- Coleman JR, Smith S, Reinisch L. Histomorphometric and laryngeal video stroboscopic analysis of the effects of corticosteroids on micro flap healing in the dog larynx. *Ann Otol Rhinol Laryngol.* 1999;108:119-27.
- Courey Ms, Gardner GM, Stone RE. Endoscopic vocal fold micro flap. A three-year experience. *Ann Otol Rhinol Laryngol.* 1995;104:267-73.
- Cummings CW, Purcell LF, Fluit PW. Hydroxylapatite laryngeal implants for medialization. Preliminary report. *Ann Otol Rhinol Laryngol.* 1993;102:843-51.
- Desrosiers M, Ahmarani C, Bettez M. Precise vocal cord medialization using an adjustable laryngeal implant: A preliminary study. *Otolaryngol head neck surg.* 1993;109:1014-9.
- Ford CN. Magnetic resonance imaging assessment of vocal fold medialization surgery. *Laryngoscope.* 1992;102:415-21.
- Gray SD. Vocal evaluation of thyroplasty surgery in the treatment of unilateral vocal fold paralysis. *Laryngoscope.* 1992;102:415-21.
- Hirano M. Laryngeal histopathology. Colton RH, Casper JK eds. In *Understanding voice problems. A physiological perspective for diagnosis and treatment.* Baltimore: Williams & Wilkins. 1990:51-69.
- Hochman, Zietels SM, Heaton JT. Exposure and visualization of the glottis for phonomicrosurgery. *Operative techniques in otolaryngology. Head and neck surgery.* 1998;9:192-5.
- Hoffman HH, McCulloch TM. Medialization laryngoplasty with expanded polytetrafluoroethylene: Surgical technique and preliminary results. *Ann Otol Rhinol Laryngol.* 1998;107:427-32.
- Ishii N. Thyroplasty as a new phonosurgical technique. *Acta Otolaryngol.* 1974;78:451-7.
- Jako GJ. Laryngoscope for microscopic observation, Surgery, and Photography. *Arch Otolaryngol.* 1970;91:196-9.
- Kleinsasser O. Mikrochirurgie in Kehlkopf. *Arch Ohrenheilk.* 1964;183:428-33.
- Liu Ay, Yousem DM, Chalian AA, Langlotz CP. Economic consequences of diagnostic imaging for vocal fold paralysis. *Acad Radiol.* 2001;8(2):137-48.
- Maisel RH, Ogura JH. Evaluation and treatment of vocal cord paralysis. *Laryngoscope.* 1974;84:302-16.
- Merati AL, Andrews RJ, Courey MS. Phonosurgical management of intracordal cysts. *Operative techniques in Otolaryngology. Head and neck surgery.* 1998;9:230-7.
- Mietels LZ, Lin PT, Wenk EJ. An anatomic study of the external laryngeal framework with surgical implication. *Otolaryngol Head Neck Surg.* 1992;106:235-40.

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