Outcome Analysis by Voice Assessment and Videostroboscopy in Laryngopharyngeal Reflux

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ABSTRACT

Introduction: Change in voice in the patient of laryngopharyngeal reflux is a common symptom. In this study, we are assessing the improvement in severity of the laryngopharyngeal reflux disease by its symptoms, signs, severity, and videostroboscopy to detect even earliest change and document it.

Materials and methods: A prospective study in 50 subjects at a tertiary referral center who were subjected to answer a questionnaire of the voice handicap index, the reflux symptom index, and assessed reflux finding score and vocal fold mucosa changes by videostroboscopy. All subjects were reassessed after 12 weeks of treatment.

Result: Improvement was found statistically significant (<0.05) in all parameters and scales.

Conclusion: Preventing the insult by acid reflux in the laryngeal mucosa by proton pump inhibitors resulted in improvement of symptoms and signs, which proves the efficacy of treatment. Videostroboscopy is a useful tool to early diagnose the lesion.

Keywords: Hoarseness, Laryngopharyngeal reflux, Reflux finding, Reflux symptom index, Voice assessment, Voice handicap index.

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INTRODUCTION

The retrograde movement of gastric contents into the larynx, the pharynx, and the upper aerodigestive tract is called laryngopharyngeal reflux (LPR). It is known to produce symptoms like hoarseness, globus, dysphagia, otalgia, and laryngospasm and may result in contact granulomata, esophageal webs, and pachyderma.¹ Most of the time this phenomenon can result in very subtle findings like arytenoid erythema, which is extremely commonly seen in the laryngology practice.¹ This condition is prevalent in a large number of patients seeking laryngology consult for various indirect symptoms.

The objective of this study is to assess the etiological role of laryngopharyngeal reflux (LPR) in patients with change in voice and analyze the effectiveness of 3 months antireflux medication along with voice therapy.

MATERIALS AND METHODS

This study was conducted at the ENT Department, MGM medical college, Indore. It is a prospective study designed to study objectively the etiological role of LPR in patient presenting with change in voice or hoarse voice and to analyze the effect of antireflux medication using the voice handicap index for the voice prognosis parameter, the reflux symptom index (RSI) for the LPR symptom indicator, and the reflux finding score (RFS) and stroboscopic parameter to assess the signs and improvement objectively.

A total of 50 patients were selected with the chief complaint of change in voice, and clinical diagnosis of laryngopharyngeal reflux was confirmed by the RSI (Table 1) and the RFS (Table 2), both initially developed by Belafsky et al.² patients with RSI >13 and RFS >7 were enrolled. All patients were prospectively evaluated before treatment and 3 months after treatment with proton pump inhibitors twice daily, steam inhalation, and voice therapy.

Each patient underwent a comprehensive history taking, filling a simple questionnaire form for RSI and physical

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examination including rigid laryngoscopy with stroboscopy and laryngeal photodocumentation and determination of the RFS at every visit.

Improvement in RSI, VHI, RFS, and stroboscopic parameters was assessed. The paired sample *t* test and the Chi-square test were used for assessment of the above criteria, respectively.

RESULTS

The mean age of group was 34.4 years with 40% patients were middle-aged between 25 years and 45 years.

Male preponderance with 56% patients were males.

The most common primary complaints were dysphonia ($n = 50$, 100%), throat clearing ($n = 38$, 76%), chest pain/heartburn/stomach disorder(s) ($n = 33$, 66%), and concerned cough ($n = 18$, 36%). The spectrum of laryngeal pathology is shown in Figure 1.

The mean RSI for the pretreatment group was 20.68 ± 5.05 , which was significantly higher than the mean RSI for the posttreatment group (9.32 ± 4.16).

Table 1: Reflux finding score

Subglottic edema	0 = Absent 2 = Present
Ventricular	2 = Partial 4 = Complete
Erythema/hyperemia	2 = Arytenoids only 4 = Diffuse
Vocal fold edema	1 = Mild 2 = Moderate 3 = Severe 4 = Polypoid
Diffuse laryngeal edema	1 = Mild 2 = Moderate 3 = Severe 4 = Obstructing
Posterior commissure hypertrophy	1 = Mild 2 = Moderate 3 = Severe 4 = Obstructing
Granuloma/granulation tissue	0 = Absent 2 = Present
Thick endolaryngeal mucus	0 = Absent 2 = Present

Table 2: Reflux symptom index

<i>Within the last month, how did the following problems affect you?</i>		<i>0 = No problem, 5 = Severe problem</i>					
1. Hoarseness or a problem with your voice		0	1	2	3	4	5
2. Clearing your throat		0	1	2	3	4	5
3. Excess throat mucus or postnasal drip		0	1	2	3	4	5
4. Difficulty swallowing food, liquids, or pills		0	1	2	3	4	5
5. Coughing after eating or after lying down		0	1	2	3	4	5
6. Breathing difficulties or choking episodes		0	1	2	3	4	5
7. Troublesome or annoying cough		0	1	2	3	4	5
8. Sensations of something sticking in your throat or a lump in your throat		0	1	2	3	4	5
9. Heartburn, chest pain, indigestion, or stomach acid coming up		0	1	2	3	4	5

Fig. 1: Spectrum of laryngeal pathology in the study

The mean VHI for pretreatment group was 34 ± 4.6 , which was significantly higher than the mean VHI for the posttreatment group (19.04 ± 3.50).

The mean value of RFS was 10.73 ± 2.24 in the pretreatment group and decreased significantly (4.61 ± 3.20) in the posttreatment group.

The videostroboscopic analysis showed an asymmetric mucosal wave in 23 patients out of which 12 patients had reactive lesions over the vocal fold, 7 had sulcus, 5 patients has nodule, and after treatment the asymmetry was found only in 4 patients. There was focal absence of the mucosal wave in 14 patients; this may be due to extension of insult due to acid reflux involving layers deeper than the vocal fold mucosa or due to bulky lesion restricting mobility of mucosa; after treatment the focal asymmetry of mucosal wave still

found in 4 patients (Figs 2 to 8). Incomplete glottic closure was found in 38 patients mostly due to laryngeal edema result in incomplete touching of vocal folds, reactive lesion elevated margins touching early, nodules making hourglass shape closure, it reduced to only six patients after treatment, which was statistically significant improvement.

Therefore, the clinical assessments demonstrated an important improvement characterized by a significant decrease in VHI ($p < 0.001$), RSI ($p < 0.001$), RFS ($p < 0.001$), and stroboscopic parameters after 12 weeks of treatment (Table 3).

In 50 patients included in the study, 48 (96%) patients had erythema/hyperemia involving the mucosa of the supraglottis mostly arytenoids and posterior commissure. Supraglottic edema was found in 37 (74%) cases involving the mucosa over arytenoids and false vocal folds. Posterior ventricular bands were found in 70% of patients.

Around 46% patients had inflammatory changes over the vocal fold, which include vocal fold edema, leukoplakic patches, nodules, and sulcus. The granulation tissue was found in 20% of patients mostly involving posterior commissure, which is suggestive of chronic insult by the irritant, which is most likely to be acid reflux in this study. Around 18% of patients show thick endolaryngeal secretion.

DISCUSSION

Laryngopharyngeal reflux is a common cause of voice impairment and chronic laryngitis. In past three decades, many studies have investigated the LPR signs and symptoms, diagnosis, medical and surgical treatments, and pathophysiological mechanisms underlying the development. But due to poor and inaccurate documentation and lack of observation by practitioners, voice disorders tend to be prevalent and also disabling for patients. Thus, Lechien et al.³ in his studies demonstrated significant differences in LPR patients concerning subjective (dysphonia and VHI) and objective (aerodynamic and acoustic) voice assessments in comparison with healthy subjects. The study of pH monitoring done by Belafsky et al.⁴ developed RSI and RFS² for the diagnosis and follow-up of LPR signs and symptoms. Park et al.⁵ found both scales are readily

administered, highly reproducible, and exhibit excellent construct- and criterion-based validity. In this study, we found that RSI and RFS improved significantly after 12 weeks of PPIs and steam inhalation and voice therapy. These findings are in accordance with previous studies by Jin et al.,⁶ Masaany et al.,⁷ Naiboglu et al.,⁸ Chun et al.,⁹ and Lechien et al.,³ which observed the decrease in RSI and RFS after PPI and diet treatment.

In this study, we did not use pH meter for confirmation of reflux due to many limitations like inconvenient for large number of subject, cost and availability of equipment, and lack of consent for such test. We took history and chief complains as criteria for subjects and clinical scales proposed by Belafsky et al.

Voice change was one of the chief complaints we consider in this study. We took VHI as a parameter to assess voice improvement

Figs. 2A to D: Generalized hyperemia, edema and granular changes improved after 3 months of treatment

Figs. 3A to D: Reactionary lesion over vocal fold improved after treatment

Fig. 4: Significant laryngeal edema and erythema

Fig. 5: Erythema over vocal folds

Fig. 6: Posterior web and reactive lesion over vocal fold

Fig. 7: Granulation tissue over interarytenoid region

Fig. 8: Thick endolaryngeal secretion

after treatment and found almost 15 score difference in the pretreatment and the posttreatment group (pretreatment group was 34 ± 4.6 , which was significantly higher than the mean RSI for the posttreatment group, 19.04 ± 3.50). Siupsinkiene et al.¹⁰ also reported the interest to use VHI as an outcome of the efficacy of the PPI treatment in LPR patients. Lechien et al.³ reported similar

Table 3: Summarized result of parameters before and after treatment

Scales	Pretreatment	Posttreatment	<i>p</i> value*
RSI	20.68 ± 5.05	9.32 ± 4.16	<0.001
VHI	34 ± 4.6	19.04 ± 3.50	<0.001
RFS	10.73 ± 2.24	4.61 ± 3.20	<0.001
Mucosal wave asymmetry	23	4	<0.001
Absence of mucosal wave	14	4	<0.001
Incomplete glottis closure	18	6	<0.001

*Improvement in patients after treatment

results in VHI in LPR patient after 12 weeks of therapy and diet modification.

Videostroboscopy was used to assess laryngoscopic finding and detect changes in the vocal fold due to LPR disease; RFS was done in the same sitting. Out of 50 subjects in the study, 38 had incomplete glottis closure and 23 of them had impaired mucosal movement.

Arytenoid erythema was the most common finding (97%), followed by vocal cord erythema (94%), arytenoid edema (93%), posterior web (76%), and posterior half vocal fold reactive lesion

(24%). Results are similar to Book et al. arytenoid erythema (97.5%), vocal cord erythema (95.7%) and edema (95.7%), posterior commissure hypertrophy (94.9%), and arytenoid edema (94.0%).¹¹

In this study, we found statistically significant improvement in RFS as well as videostroboscopy measures for LPR. Beaver et al.¹² used the LPRD index, but he reported improvement in LPRD included supraglottic edema and erythema, glottic edema and erythema, and subglottic edema and erythema after 6 weeks of treatment, which is similar to our study.

CONCLUSION

Reflux may be present in up to 50% of patients with voice disorders.² The ability of assessment of improvement after interval in patients with LPR relies on the clinician's ability to record laryngeal findings.¹³ The videostroboscopic assessment in patient with LPR gives a vivid picture of the disease spectrum and diagnoses the changes in the larynx at very early stage. In this digital era with quick availability of previous record, follow-up at frequent intervals gives idea of response to treatment. This study shows that 12-week therapy with PPI along with voice therapy and steam inhalation improves the signs of insults in larynx caused by LPR significantly.

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