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Original Research Article

An Observational Study to Determine the Importance of Oesophago-Gastroscopy in the Diagnostics of Laryngopharyngeal Reflux (LPR)

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Abstract

Aim: The aim of the present study was to determine the importance of oesophago-gastroscopy in the diagnostics of laryngopharyngeal reflux (LPR) induced pathology.

Methods: The present study was conducted in the Department of Gastroenterology, A total of 50 patients (30 women, 20 men) with laryngopharyngeal problems in whom GERD was suspected were included in the study. They were 17 −/78 years old, with a mean of 45 years and a standard deviation of 14.6 years.

Results: The VHI results showed that patients with vocal fold polyps assessed their voice problems as being worse in comparison to the voice problems of the LPR patients, but the significant difference appeared only in the physical subtest of VHI. The subjective VHI test performed in the LPR patients after the treatment showed a significant improvement in the overall results and in the results of all the subtests in comparison to the results of the test performed before the treatment. The acoustic analysis of the voice samples detected almost no change in F0 and JIT and a statistically significant improvement in SH and NHR. On the basis of videoendolaryngoscopy, the lesions of the laryngeal mucosa were evaluated using the BRFS before and after the treatment with esomeprasol. In all the LPR patients the BRFS was more than 7 before the treatment, indicating LPR. After the treatment, the BRFS significantly decreased.

Conclusion: LPR can cause serious voice disorders, globus pharyngeus sensation, or frequent coughing. The voice problems can be compared to the problems of patients with vocal fold polyps. Oesophago-gastroscopy supplemented with a biopsy of the oesophageal mucosa can be a suitable method to prove the occurrence of GER. Videoendolaryngoscopy and the BRFS are superior in the diagnostics of LPR and correlate very well with the histological findings of the oesophageal mucosa specimens. The combination of all three procedures is supposed to be a very successful method in the diagnostics of GERD and especially LPR. Esomeprasol proved to be very effective in the treatment of LPR.

Keywords: laryngopharyngeal reflux, oesophago-gastroscopy, proton-pump inhibitor, videoendolaryngoscopy, vocal fold polyps, voice handicap index

Introduction

Gastroesophageal reflux disease (GERD) is defined as the reflux of stomach contents into the esophagus with pathohistological changes of the mucous membrane. When this reflux affects the laryngeal and pharyngeal mucosa, it is termed laryngopharyngeal reflux disease (LPRD). [1,2] Esophageal mucosa has a protective mechanism against aggressive factors of stomach contents, and it remains intact when physiological reflux happens in the night. The laryngeal lining above the upper esophageal sphincter is not as strong a protective lining and so when acidic contents of stomach reflux into the larynx they get irritated and inflamed. [3] Laryngeal and pharyngeal mucosa are very sensitive, and the acid peptic reaction of the stomach contents rapidly leads to mucosal injury. LPRD commonly occurs in daytime due to upper esophageal sphincter dysfunction. [4] The most common part of larynx affected is the posterior half including the arytenoids, interarytenoid junction, and post 1/3 of vocal cords. The esophageal reflux manifests as heartburn, belching, frequent clearing of throat, regurgitation, and bitter taste. The most typical extraesophageal manifestation includes hoarseness of voice. Others include persistent cough, choking episodes, and breathing difficulty. [5]

In day-to-day practice, LPRD is mostly not recognized as it is a silent reflux and diagnostic and

therapeutic protocols are insufficient. Due to the high prevalence of disease and varied clinical manifestations, most patients report to family physicians. Improper clinical evaluation and inadequate diagnostic options are the biggest challenges in treating reflux effectively. Proper understanding of the etiopathogenesis plays a significant role in treating GERD and LPRD. Untreated LPRD can lead to laryngeal cancer. [6] The development of the disease can be life threatening considerably affecting the quality of life.

LPRD is known to contribute to posterior acid laryngitis, laryngeal contact ulcers or granuloma formation, epithelial dysplasia and laryngeal cancer, chronic hoarseness, pharyngitis, sore throat, globus sensation, dysphagia, buccal burning, asthma, pneumonia, nocturnal choking, and dental diseases. These manifestations are believed to be caused by direct contact of the gastric content and injury to the pharyngeal or laryngeal mucosal surfaces. Acid reflux inside the distal esophagus itself also stimulates vagally mediated reflexes, leading to bronchospasm and coughing disorders. [7]

The aim of the present study was to determine the importance of oesophago-gastroscopy in the diagnostics of laryngopharyngeal reflux (LPR) caused pathology.

Materials and Methods

The present study was conducted in the Department of Gastroenterology,Mediversal Hospital, Patna, Bihar, India for one year and a total of 50 patients (30 women, 20 men) with laryngopharyngeal problems in whom GERD was suspected were included in the study. They were 17 −/78 years old, with a mean of 45 years and a standard deviation of 14.6 years.

A total of 50 patients (28 women, 12 men) with vocal fold polyps served as the control group for a subjective estimation of the voice problems. They were 24 −/62 years old, with a mean of 39 years and a standard deviation of 9.8 years. In these patients conservative treatment was not successful and surgery was necessary for the solution of their voice problems.

The diagnosis of LPR-caused pharyngolaryngeal disease was made on the basis of the patient's history and videoendolaryngoscopy using a rigid 908 Hopkins 8707 DA laryngoscope (Karl Storz GmbH & Co. KG). The lesions of the laryngeal mucosa were evaluated using the Belafsky Reflux Finding Score (BRFS). [8] All the LPR patients were treated with esomeprasol (40 mg) once a day for eight weeks in combination with appropriate dietary and lifestyle changes.

The acoustic analysis of the voice samples was performed in the LPR group before and after the treatment. The voice samples of a sustained vowel /a/ at a habitual pitch and loudness, for duration of 3 seconds, were analysed with a Multi-Dimensional Voice Program (Kay Elemetrics, USA). The average fundamental frequency (F0), jitter (JIT), shimmer (SH) and noise-to-harmonic ratio (NHR) were determined for every voice sample. JIT gives an evaluation of the very-short-term variability of the pitch period. SH gives an evaluation of the very-short-term variability of the peak-to-peak amplitude (loudness) within the analysed voice sample. NHR is an average ratio of the energy of the inharmonic components in the range 1500 −/4500 Hz to the harmonic components' energy in the range 70 −/ 4500 Hz, and represents a general evaluation of noise presence in the analysed signal. According to the recommendation of the European Laryngological Society, JIT and SH are used to estimate the phonation quality. [9] All the patients from both groups subjectively evaluated their voice problems using the Voice Handicap Index (VHI) questionnaire before the treatment. The LPR patients also filled in the VHI questionnaire after the treatment. [10]

Before the treatment, the oesophago-gastroscopy and the biopsy of the mucosa in the lower third of the oesophagus were performed for all 43 LPR patients by the first author. Typical oesophagitis above the lower oesophageal sphincter, hiatal hernia or dysfunctional lower oesophageal sphincter indicated the possibility of GER. Intraepithelial eosinophils, basal zone thickening and papillary lengthening in the oesophageal biopsy specimen were supposed to be an indicator of the prolonged acid reflux. [11,12] The biopsy was marked as positive when all three criteria were fulfilled. The results of the histologic examination of the oesophageal specimens were compared to the results of the oesophagoscopy and videoendolaryngoscopy. After the treatment, the LPR patients estimated the improvement of their symptoms using the visual analogue scale (VAS). The videoendolaryngoscopy with a rigid 908 laryngoscope and the assessment of the laryngeal mucosa using BRFS were also performed. All pre-treatment and post-treatment assessments of laryngeal mucosa were performed by the second author.

In the LPR patients the results of the videoendolaryngoscopy, VHI questionnaire and the acoustic analysis were compared, before and after the treatment with esomeprasol. In order to determine the seriousness of the voice problems in the LPR group, the results of the VHI questionnaire were also compared for the two groups: the LPR group and the group of patients with vocal fold polyps. The statistical analysis was performed using the t -test, the WilcoXon Signed Ranks test, the paired t -test and the paired non-parametric test.

Results

Table 1: VHI questionnaire in the patients with vocal fold polyps and the patients with LPR

	Patients with vocal fold polyps (mean / SD)	Patients with LPR (mean / SD)	*p*
VHI	42.2 / 18.0	36.4 / 18.2	0.220
VHI-F subtest	10.5 / 6.2	8.7 / 6.4	0.242
VHI-P subtest	20.4 / 7.0	16.4 / 6.9	0.007
VHI-E subtest	9.7 / 8.2	10.4 / 7.4	0.634

The VHI results showed that patients with vocal fold polyps assessed their voice problems as being worse in comparison to the voice problems of the LPR patients, but the significant difference appeared only in the physical subtest of VHI.

Table 2: VHI questionnaire, the BRFS and the acoustic analysis of voice samples in the LPR patients before and after the treatment with esomeprasol

	Before treatment (mean / SD)	After treatment (mean / SD)	*p*
VHI	36.4 / 18.2	25.5 / 20.8	0.000
VHI-F subtest	8.9 / 6.6	6.4 / 6.1	0.032
VHI-P subtest	16.9 / 6.7	13.6 / 9.6	0.003
VHI-E subtest	10.4 / 7.3	6.12 / 7.6	0.000
BRFS	13 / 2.8	5.8 / 1.7	0.000
F0	198 / 58.6	199 / 55.5	0.743
JIT	1.1 / 1.1	1 / 1.1	0.180
SH	3.8 / 2.3	3.2 / 2.1	0.049
NHR	0.12 / 0.05	0.10 / 0.05	0.034

The subjective VHI test performed in the LPR patients after the treatment showed a significant improvement in the overall results and in the results of all the subtests in comparison to the results of the test performed before the treatment. The acoustic analysis of the voice samples detected almost no change in F0 and JIT and a statistically significant improvement in SH and NHR.

Table 3: The assessment of the laryngeal mucosa lesions using videoendolaryngoscopy in the LPR patients before and after the treatment with esomeprasol

	Before treatment (N)	After treatment (N)
Subglottic oedema (absent / present)	32 / 18	46 / 4
Ventricular obliteration (absent / partial / complete)	12 / 32 / 6	42 / 8 / 0
Hyperaemia (absent / arytenoids only / diffuse)	0 / 22 / 28	16 / 32 / 2
Vocal fold oedema (absent / mild / moderate / severe)	1 / 24 / 21 / 4	20 / 24 / 4 / 2
Diffuse laryngeal oedema (absent / mild / moderate / severe)	4 / 26 / 18 / 2	28 / 22 / 0 / 0
Posterior commissure hypertrophy (absent / mild / moderate / severe)	0 / 3 / 27 / 20	3 / 35 / 11 / 1
Granuloma (present)	2	1
Excessive endolaryngeal mucus (absent / present)	12 / 38	26 / 24
BRFS] 7	50	20
Vocal fold nodules	2	1
Vocal fold polyp	0	0

On the basis of videoendolaryngoscopy, the lesions of the laryngeal mucosa were evaluated using the BRFS before and after the treatment with esomeprasol. In all the LPR patients the BRFS was more than 7 before the treatment, indicating LPR. After the treatment, the BRFS significantly decreased.

Discussion

The backflow of gastric content into the oesophagus is termed gastroesophageal reflux (GER). GER that travels proximally and penetrates the upper oesophageal sphincter to enter the laryngopharynx is called extra esophageal or laryngopharyngeal reflux (LPR). [13] The number of occurrences of GER is increasing; in India, The prevalence of GERD in India ranges from 7.6% to 30%, being < 10% in most population studies, and higher in cohort studies. [14] The typical symptoms of GERD are heartburn and acid regurgitation. Extra esophageal reflux disease often results in atypical manifestations with oral, pharyngeal, laryngeal, and pulmonary disorders.

LPR is known to contribute to posterior acid laryngitis, laryngeal contact ulcers or granuloma formation, epithelial dysplasia and laryngeal cancer, chronic hoarseness, pharyngitis, sore throat, globus sensation, dysphagia, buccal burning, asthma, pneumonia, nocturnal choking and dental diseases. These manifestations are believed to be caused by direct contact of the gastric content and injury to the pharyngeal or laryngeal mucosal sur- faces. Acid reflux inside the distal oesophagus itself also stimulates vagally mediated reflexes leading to the disorders of bronchospasm and coughing. [15]

The VHI results showed that patients with vocal fold polyps assessed their voice problems as being worse in comparison to the voice problems of the LPR patients, but the significant difference appeared only in the physical subtest of VHI. The subjective VHI test performed in the LPR patients after the treatment showed a significant improvement in the overall results and in the results of all the subtests in comparison to the results of the test performed before the treatment. The acoustic analysis of the voice samples detected almost no change in F0 and JIT and a statistically significant improvement in SH and NHR. The several studies proved that evident signs of LPR can be detected, even in patients with negative 24-hour pH-monitoring. [16] It was also proved that pepsin is activated, even in values of pH higher than 4. [17] The examination is also un- pleasant for the patient. In Bihar, the long duration of the 24-hour pH-monitoring and the high incidence of GER have an effect on accessibility to the examination. These were the reasons why we tried to find a quick and simple diagnostic method that can be easily tolerated by patients.

On the basis of videoendolaryngoscopy, the lesions of the laryngeal mucosa were evaluated using the BRFS before and after the treatment with esomeprasol. In all the LPR patients the BRFS was more than 7 before the treatment, indicating LPR. After the treatment, the BRFS significantly decreased. Extraesophageal reflux can cause damage to the laryngeal mucosa from coughing, voice abuse, intubation, or lower respiratory tract infection. LPRD has been implicated as being causative or contributory in laryngeal pathologic states such as vocal nodules, Reinke's edema, and scar formation as in idiopathic subglottic stenosis, functional laryngeal movement disorders such as muscular tension dysphonia, paradoxical vocal fold motion, and paroxysmal laryngospasm. LPRD also lowers the cough threshold. [18] In GERD patients, the occurrence of extraesophageal symptoms is as high as 67%. [19] There are many patients with voice disorders who have LPRD as the main or one of the important reasons for their dysphonia. An endoscopic examination of the larynx usually reveals the signs of LPRD with arytenoids congestion, axed vocal cords gap, but the scenario requires a combination of more diagnostic procedures to confirm the clinical suspicion of GERD and LPRD. The results of our study confirmed that the treatment with esomeprasol was very successful. Our patients assessed that their problems (dysphonia, globus pharyngeus sensation, throat clearing, etc.) decreased after the two-month therapy. The BRFS also showed significant improvement by the end of the two-month therapy. In about two- thirds of the patients the BRFS was below 7. Further improvement is expected with prolonged esomeprasol treatment.

Conclusions

LPR can cause serious voice disorders, globus pharyngeus sensation, or frequent coughing. The voice problems can be compared to the problems of patients with vocal fold polyps. Oesophago-gastroscopy supplemented with a biopsy of the oesophageal mucosa can be a suitable method to prove the occurrence of GER. Videoendolaryngoscopy and the BRFS are superior in the diagnostics of LPR and correlate very well with the histological findings of the oesophageal mucosa specimens. The combination of all three procedures is supposed to be a very successful method in the diagnostics of GER and especially LPR. Esomeprasol proved to be very effective in the treatment of LPR. Subjective and objective voice-assessment methods demonstrated an improvement by the end of the two-month therapy. LPR appears to have an important negative influence on voice quality and should not be over- looked in the treatment of dysphonic patients.

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