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# A Clinical Assessment of Throat Manifestations of Laryngopharyngeal Reflux Disease with Special Reference to Video Endoscopic Findings

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***Abstract:***
***Background****: Patients with laryngopharyngeal reflux (LPR) have different symptoms and a different patho-physiologic mechanism than do patients with Gastroesophageal Reflux Disease (GERD). Diagnosis of reflux remains a controversial area. Double-probe pH testing, although it is the current standard for diagnosis, will not positively identify LPR in every case.*
***Objective:*** *To assess laryngopharyngeal reflux (LPR) patients by taking proper history and thorough clinical examination, and to record the video laryngoscopic findings of LPR patients.*
***Method****: Belafsky et al developed an eight-item clinical severity scale for judging laryngscopic findings, the Reflux Finding Score (RFS), which is found to be useful for assessment and follow-up of LPR patients. Also they developed a 9-item, self-administered, disease-specific outcome instrument for LPR, the Reflux Symptom Index (RSI). This study is aimed at assessing the common manifestations in patients with LPR using these two scales.*
***Results:*** *The average score of RSI was 19.304 with a standard deviation of 5.672 in this study. Belafsky et al found the mean pretreatment RSI was 19.9±11.1SD. In the present study it was found that in patients the mean RFS was 11.857 which have been found to be similar to that of Belafsky in his study.*
***Conclusion:*** *RSI and RFS developed by Belafsky et al were used in the present study. They were also highly reproducible as described by Belafsky. It was found that the mean RFS and RSI in this were similar to that found by Belafsky in his study*.
***Keywords:*** *Laryngopharyngeal reflux, Reflux Finding Score, Reflux Symptom Index.*

## I. Introduction

Laryngopharyngeal reflux is the result of retrograde flow of gastric contents to the laryngopharynx, where it comes in contact with tissues of the upper aero-digestive tract [1]. LPR is commonly identified in otolaryngologist offices and diagnosed in almost 10% of their patient population [6]. Patients with laryngopharyngeal reflux (LPR) have different symptoms and a different patho-physiologic mechanism than do patients with Gastroesophageal Reflux Disease (GERD) [2]. The reason that LPR is often underdiagnosed is that traditional diagnostic tests for reflux are essentially tests for esophagitis[4]. Ambulatory double-probe pH monitoring, with pharyngeal reflux events detected by a second probe in the hypopharynx, has become the gold standard for the diagnosis of LPR. Yet patients with LPR often have lifestyle related or intermittent reflux events, and their reflux may not occur at the time of the pH probe test. The second reason that LPR is underdiagnosed is that clinicians have not agreed on the examination findings most suggestive of the diagnosis of LPR [5]. In laryngoscopy non-specific signs of laryngeal irritation and inflammation are usually seen, but several findings are highly suggestive of LPR. Although not pathognomonic, thickening, redness, and edema concentrated in the posterior larynx—"posterior laryngitis"—is a common finding. Other laryngoscopic findings have a strong association with LPR. Contact granuloma was found to be associated in 65% to 74% of patients of LPR [7]. Since there is no pathognomonic LPR finding, Belafsky et al[5] developed an eight-item clinical severity scale for judging laryngscopic findings, the Reflux Finding Score (RFS), which is found to be useful for assessment and follow-up of LPR patients. Also they developed a 9-item, self-administered, disease-specific outcome instrument for LPR, the Reflux Symptom Index (RSI). It is easily administered and highly reproducible [8]. If left untreated, LPR can lead to severe complications such as contact ulcers, granulomas and stenosis. Also some researchers associate LPR with increased incidence of adenocarcinoma of the larynx. In order to avoid the complications stated above treatment should be initiated once the diagnosis is made.

This study is aimed at assessing the common manifestations in patients with LPR. It is not 0ur intention to confirm the validity of the RSI and RFS as methods for diagnosing LPR since there is already medical literature on the subject which supports this [8, 9] In our study we have taken utmost care to diagnose LPR using reflux finding score and reflux symptom index in a sample of patients possibly having LPR and also discuss the symptoms and signs by means of clinical assessment, questionnaires and endoscopy [10].

## II. Materials And Methods

It is a cross-sectional study. The study was carried out in the Department of Otorhinolaryngology, Regional Institute of Medical Sciences (RIMS), Imphal during the tenure of the study. The procedure and data collection was carried out for two calendar years with effect from October 2014 to September 2016. Patients of both sexes (male and female) between the ages of 18 to 65 years with clinical diagnosis of laryngopharyngeal reflux (LPR) who attended ENT OPD (Out Patient Department) of Regional Institute of Medical Sciences, Imphal during the tenure of the study were included.

Inclusion criteria**:**

- All the patients clinically and endoscopically confirmed cases who attended ENT OPD(Out Patient Department) of Regional Institute of Medical Sciences, Imphal.
- Patients who were willing to participate in the study procedure.
- Patients between the ages of 18 to 65 regardless of gender.

Exclusion criteria**:**

- Patients with associated diseases like respiratory and gastrointestinal malignancies.
- Patients who had radiation therapy of head and neck or gastrointestinal tract
- Patients who had undergone gastroesophageal surgery.
- Patient who used H2-receptor antagonists or proton pump inhibitors in previous 1 month.
- Past or present smoker and excessive alcohol consumption
- Chronic cough attributable to known chronic pulmonary or tracheobronchial disease.
- Professional voice users (e.g. singer, teacher); excessive voice use;
- Patients who had tracheal intubation in the previous 1 year.
- Patients who used inhaled corticosteroids.
- Patients with RFS less than 7 and/or RSI less than 13.

All LPR patients who attended OPD in the Department of Otorhinolaryngology and who consented for the study and fulfill all the inclusion criteria in the tenure period were taken up for the study. Data of the patient will be recorded in pre-designed Proforma. The particulars, investigations, treatment, examinations, history and follow-up details etc. will be recorded. All patients will undergo a detailed history and thorough physical examination. The findings will be recorded. A written informed consent will be taken from each patient. All patients with LPR seen during the study period underwent a complete ENT examination. The larynx were examined with video endoscopy, endoscopy or indirect laryngoscopy. The symptoms and findings of patients were assessed using the Belafsky Reflux Finding Score (RFS) and Reflux Symptom Index (RSI). RFS was considered pathological if the score was above 7 and RSI if above 13.

**Within the last month, how did the following problems affect you?**

| *Circle /tick the appropriate response* |
|---|
| 0 = No Problem |
| 5 = Severe Problem |
| 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 you ate 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. Sensation 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 |

**Table 1:** Reflux Symptom Index (RSI) in LPR

| | |
|---|---|
| Subglottic edema | 0= absent, 2= present |
| Ventricular obliteration | 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 Finding Score (RFS) in LPR

For establishing the diagnosis of LPR, patients were subjected to a detailed history and physical examination and recorded in a prescribed Performa. Symptoms of the patients were evaluated on the basis of the reflux symptom index (RSI) which is a self-administered tool developed by Belafskyet al [11,12]. The scale for each individual item ranges from 0 (no problem) to 5 (severe problem), with a maximums core of 45.The nine-item questionnaire consisted of: (i) Hoarseness of voice, (ii) Throat clearing, (iii) Excess throat mucous or postnasal drip, (iv) Difficulty swallowing, (v) Coughing after eating or lying down, (vi) Breathing difficulties or chocking spells, (vii) Troublesome or annoying cough, (viii) Sensation of something sticking or a lump in the throat and (ix) Heart burn, chest pain, indigestion on standing, or acid coming up. RSI score > 13 was defined as abnormal**.** Then laryngeal examination by indirect laryngoscopy and 70% rigid endoscope (Karl Storz-Endoskope, Tutlingen, Germany) with an integrated endoscopy camera system (LCH 01-D, Berlin, Germany) was done by using 10% lidocaine aerosol spray. We used a xenon light source from Karl-Storz, Germany .These findings were judged on the basis of reflux finding score (RFS) which was an 8 item clinical severity scale. According to the RFS 8, LPR associated findings were rated on a variably weighted scale from 0 to 4. These findings included subglottic edema, ventricular obliteration, erythemia / hyperemia, vocal fold edema, diffuse laryngeal edema, posterior commissure hypertrophy, granuloma and thick endolaryngeal mucus. Each item was scored according to severity, location, and presence or absence, for a total score of 26. Patients presenting a score of 7 or higher were classified as having LPR. The results ranged from 0 (normal) to 26 (worst possible score). Written, informed consent had to be provided by the participants before the endoscopic examination.

## III. Results

In the study, reflux episodes were encountered most by patients accounting for 87.5% of patients complaining of morning reflux events. It is followed by hoarseness or dysphonia (64.3%). Other symptoms include cough mainly on lying down, foreign body sensation in throat (globus pharyngeus), painful swallowing and difficulty in swallowing. Few reported incidences of choking (23.2%). This agrees with other studies which stated that sore throat, hoarseness, and choking cough are the most reliable symptoms of LPR. Koufman JA et al in[11] his landmark study found that hoarseness of voice was present in 71%, cough 51%, globus 47%, and throat clearing in 42% subjects. Throat clearing is the most related symptom to LPR. They were followed by dysphagia, hoarseness (68% each), and globus (56%). Belafsky PC et al [11] found the presence of hoarseness symptom was significantly higher in the group with LPR (55.0%). In this study the most common laryngeal finding was found to be hyperemia of laryngeal structures (67.9%). Subglottic-edema or pseudosulcus was also seen in 66.1% of cases. Other findings such as posterior commissure hypertrophy (60.7%), laryngeal mucus (64.7%), and laryngeal oedema both diffuse (44.6%) and localized (31%) were seen. Granuloma was rarely seen. da silva CE et al[59] conducted a study in which the main findings were laryngeal redness, vocal cord (VC) edema, posterior commissure hypertophy and subglottic-edema. The laryngoscopy results revealed thatalmost all patients had posterior commissure hypertrophyand laryngeal diffuse edema. The presence of laryngeal granuloma was not found. RSI developed by Belafsky et al[11] was used in the present study. RSI is a nine item reflux symptom index, a standardized instrument to qualify LPR symptoms. Subjects are asked to grade the symptoms on a scale of 0-5, 0 signifying no problem while 5 signifying severe problem. The score ranges from 0-45. A score of > 13 was taken as abnormal and suggestive of LPR. It was found in my study that RSI was highly reproducible. The average score of RSI was 19.304 with a standard deviation of 5.672 in the study. Belafsky et al[11] found the mean pretreatment RSI was 19.9±11.1SD. Similar to the RSI score the RFS score was used for assessing and grading the laryngeal signs in patients of LPR. This was also developed and validated by Belafsky et al. According to this score 8 item grading system were used to assess the severity of disease. A score of > 7 is considered abnormal. The RFS is also highly reproducible as described by Belafsky. In the present study it was found that in patients the mean RFS was 11.857 which is similar to that found by Belafsky in his study.

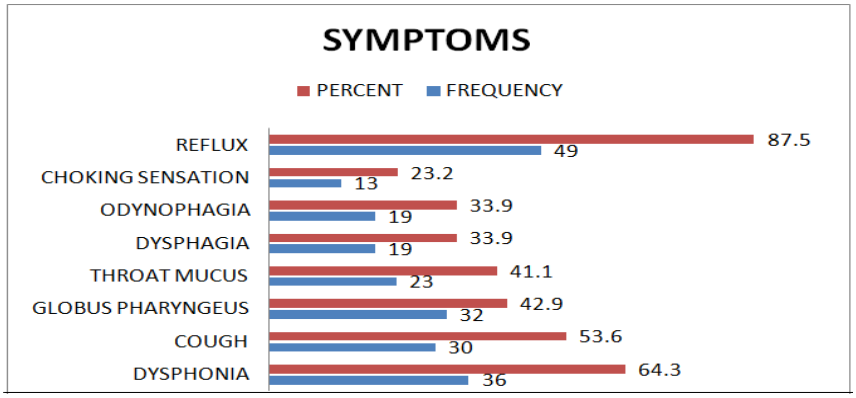


**Fig 1:** Shows major symptoms of patient

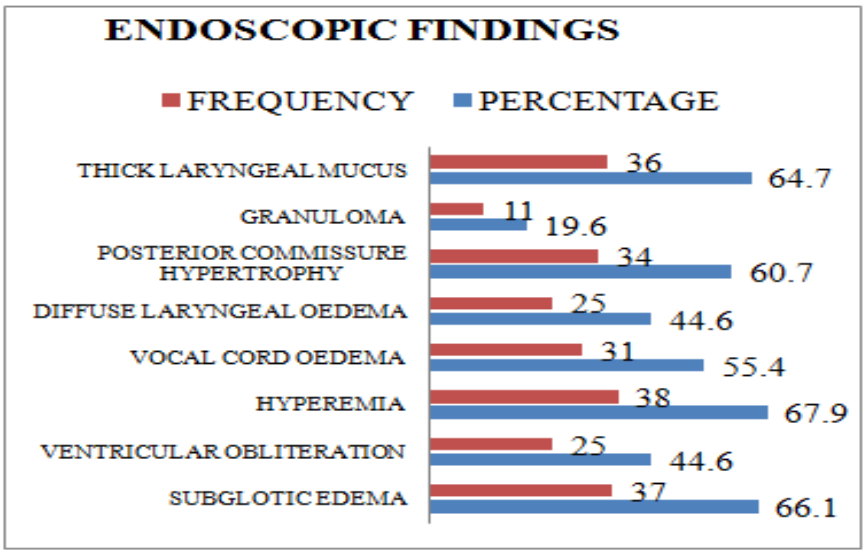


**Fig 2:** Shows 70 degree endoscopic findings of larynx

| RSI | SCORE | 0 | 1 | 2 | 3 | 4 | 5 | TOTAL | MEDIAN |
|---|---|---|---|---|---|---|---|---|---|
| **HOARSENESS** | N | 13 | 2 | 6 | 16 | 14 | 5 | 56 | 3 |
| | % | 23.2 | 3.6. | 10.7 | 28.6 | 25 | 8.9 | 100 | |
| **CLEARING THROAT** | N | 15 | 0 | 5 | 14 | 13 | 9 | 56 | 0 |
| | % | 26.8 | 0 | 8.9 | 25 | 23.2 | 16.1 | 100 | |
| **POST NASAL DRIP** | N | 28 | 0 | 3 | 4 | 13 | 8 | 56 | 0 |
| | % | 50 | 0 | 5.4 | 7.1 | 23.2 | 14.3 | 100 | |
| **DIFFICULTY SWALLOWING FOOD** | N | 34 | 1 | 2 | 5 | 5 | 9 | 56 | 0 |
| | % | 60.7 | 1.8 | 3.6 | 8.9 | 8.9 | 16.1 | 100 | |
| **COUGHING ON LYING DOWN** | N | 18 | 2 | 5 | 17 | 9 | 5 | 56 | 0 |
| | % | 32.1 | 3.6 | 8.9 | 30.4 | 16.1 | 8.9 | 100 | |
| **CHOKING EPISODES** | N | 40 | 1 | 5 | 6 | 3 | 1 | 56 | 0 |
| | % | 71.4 | 1.8 | 8.9 | 10.7 | 5.4 | 1.8 | 100 | |
| **SEVERE COUGH** | N | 19 | 2 | 10 | 13 | 7 | 5 | 56 | 0 |
| | % | 33.9 | 3.6 | 17.9 | 23.2 | 12.5 | 8.9 | 100 | |
| **FOREIGN BODY SENSATION** | N | 23 | 1 | 1 | 7 | 16 | 8 | 56 | 0 |
| | % | 41.1 | 1.8 | 1.8 | 12.5 | 28.6 | 14.3 | 100 | |
| **HEARTBURN** | N | 4 | 5 | 5 | 15 | 16 | 11 | 56 | 4 |
| | % | 7.1 | 8.9 | 8.9 | 26.8 | 28.6 | 19.6 | 100 | |

**Table 3:** Reflux Symptom Index (RSI) Score of the Studied Subjects

In this study, reflux episodes were encountered most by patients accounting for 87.5% of patients complaining of morning reflux events. It is followed by hoarseness or dysphonia (64.3%). Other symptoms include cough mainly on lying down, foreign body sensation in throat (globus pharyngeus), painful swallowing and difficulty in swallowing. Few reported incidences of choking (23.2%). This agrees with other studies which stated that sore throat, hoarseness, and choking cough are the most reliable symptoms of LPR. Koufman JA et al[11] in his landmark study found that hoarseness of voice was present in 71%, cough 51%, globus 47%, and throat clearing in 42% subjects. Ramzy I et al[14] found in their study that postnasal drip and throat clearing were the most prevalent symptoms (96% each). Throat clearing is the most related symptom to LPR. They were followed by dysphagia,hoarseness (68% each), and globus (56%). Belafsky PC et al found the presence of hoarseness symptom was significantly higher in the group with LPR (55.0%). In this study the most common laryngeal finding was found to be hyperemia of laryngeal structures (67.9%). Subglottic-edema or pseudosulcus was also seen in 66.1% of cases. Other findings such as posterior commissure hypertrophy (60.7%), laryngeal mucus (64.7%), and laryngeal oedema both diffuse (44.6%) and localized (31%) were seen. Granuloma was rarely seen. da silva CE et al[13] conducted a study in which the main findings were laryngeal redness, vocal cord (VC) edema, posterior commissure hypertophy and subglottic-edema. The laryngoscopy results revealed thatalmost all patients had posterior commissure hypertrophyand laryngeal diffuse edema. The presence of laryngeal granuloma was not found.

| Rfs | Score | N | % | Total(%) | Median |
|---|---|---|---|---|---|
| **Subglottic Edema** | 0 | 19 | 33.1 | 37(66.1) | 2 |
| | 2 | 37 | 66.9 | | |
| **Ventricular Obliteration** | 0 | 31 | 55.4 | 25(44.6) | 0 |
| | 2 | 10 | 17.9 | | |
| | 4 | 15 | 26.8 | | |
| **Hyperemia** | 0 | 18 | 32.1 | 38(67.9) | 0 |
| | 2 | 16 | 28.6 | | |
| | 4 | 22 | 39.3 | | |
| **Vocal Cord Oedema** | 0 | 25 | 44.6 | 31(55.4) | 0 |
| | 1 | 1 | 1.8 | | |
| | 2 | 4 | 7.1 | | |
| | 3 | 11 | 19.6 | | |
| | 4 | 15 | 26.8 | | |
| **Diffuse Laryngeal Oedema** | 0 | 31 | 55.4 | 25(44.6) | 0 |
| | 1 | 0 | 0 | | |
| | 2 | 5 | 8.9 | | |
| | 3 | 12 | 21.4 | | |
| | 4 | 8 | 14.3 | | |
| **Posterior Commissure Hypertrophy** | 0 | 21 | 37.5 | 34(60.7) | 0 |
| | 1 | 1 | 1.8 | | |
| | 2 | 5 | 8.9 | | |
| | 3 | 15 | 26.8 | | |
| | 4 | 14 | 25 | | |
| **Granuloma** | 0 | 45 | 80.4 | 11(19.6) | 0 |
| | 2 | 11 | 19.6 | | |
| **Thick Laryngeal Mucus** | 0 | 20 | 35.7 | 36(64.7) | 2 |
| | 2 | 36 | 64.3 | | |

**Table 4:** Reflux Finding Score (RFS) in the Studied Subjects

## IV. Discussion

The laryngeal examination by a $70^{o}$ rigid endoscope (Karl Storz-Endoskope, Tutlingen, Germany) with an integrated endoscopy camera system (LCH 01-D, Berlin, Germany) was done by using 10% lidocaine aerosol spray. These findings were judged on the basis of reflux finding score (RFS) which is an 8 item clinical severity. These findings included subglottic edema (66.1), ventricular obliteration (44.6%), erythemia / hyperemia (67.9%), vocal fold edema (31%), diffuse laryngeal edema (44.6%), posterior commissure hypertrophy (60.7%), granuloma (19.6%) and thick endolaryngeal mucus (64.7%). Each item was scored according to severity, location, and presence or absence, for a total score of 26. Patients presenting a score of 7 or higher were classified as having LPR. . The mean score of RSI was 19.304 with a standard deviation of 5.672 in my study and mean RFS was 11.857. Data so collected was checked for completeness and consistency. Then it was entered in SPSS for Windows version 21.0 software. Data was summarized in the form of proportions frequency tables, bar and pie charts for categorical variables. Descriptive statistics like mean, standard deviations, percentages etc were used. The study was carried out only after obtaining approval from Research Ethics Board, Regional Institute of Medical Sciences, Imphal. The observations and results so obtained were tabulated, analyzed and further discussed to come to the final conclusion

LPR should be suspected when the history and laryngoscopy findings are suggestive of the diagnosis and the management should be multidisciplinary. Laryngoscopic observation of laryngeal mucosal changes is of great value in diagnosis and in following up the improvement of the patients. In my study, I did a very stringent selection of the patients to avoid the secondary causes of chronic laryngitis, such as smoking, alcohol, excessive voice use, allergies, or asthma. With the results and observations, my aim and objects have been achieved. Most subjects who took part in this study have to seriously consider some lifestyle modifications such as smoking cessation and alcohol avoidance. Ideal dietary changes would restrict, spicy tomato based products, red wines, caffeine, and late-night meals.The laryngeal symptoms reported by the subjects in sequence of appearing were reflux episodes, dysphonia, cough, globus pharyngeus, throat mucus clearing, dysphagia, odynophagia, choking sensation.The laryngeal signs in association with LPR were hyperemia of laryngeal structures, subglottic-edema or pseudosulcus. Other findings such as laryngeal mucus, posterior commissure hypertrophy, laryngeal oedema both diffuse and localized were seen. Granuloma was rarely seen.Data was summarized in the form of proportions frequency tables, bar and pie charts for categorical variables.

RSI and RFS developed by Belafsky et al[11] were used in the present study. They were also highly reproducible as described by Belafsky. It was found that the mean RFS and RSI were similar to that found by Belafsky in his study. Chi-square analysis of the RSI with a cut-point of 13 and of the RFS with a cut-point of 7 did not yield a statistically significant result ($p>.05$). There was no association between the RSI and RFS .However, for both RSI and RFS one-Sample Test results were found to be significant i.e $p<0.05$ .

## V. Conclusion

The diagnosis of reflux disease as the cause of pharyngo-laryngitis is not simple. Despite the evidence that favors the association, there is no method that demonstrates unequivocally a causal relationship between reflux and laryngitis. Some drawbacks seen in the past and present studies include the lack of consistency, focusing on only younger or older populations and also there might be some mathematical uncertainty in establishing the score. RFS system has been criticized to have high inter- or intra-observer variability and low specificity for reflux laryngitis. Therefore, it is very important to exclude meticulously other potential etiologies that can lead to laryngeal irritation. In our study, a very stringent selection of the patients was done to avoid the secondary causes of chronic laryngitis, such as smoking, alcohol, excessive voice use, allergies, or asthma.

In conclusion, endo-laryngoscopic examination of the larynx is an important and accurate method in the diagnosis of LPR. It is suggested that the majority of patients suspected of having LPR must be referred immediately to the skilled Otolaryngologist. Both RSI and RFS could be helpful in the differential diagnosis of the disease in everyday clinical practice and further validation of the study method could lead to the establishment of a diagnostic algorithm and optimization of the diagnostic clues of LPR.

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