The Reflux Finding Score: Reliability and Correlation to the Reflux Symptom Index

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ABSTRACT

Objective: To evaluate the correlation between the reflux symptom index (RSI) and the reflux finding score (RFS) in the patients with voice-related problems and to investigate the reliability of RFS.

Methods: Fifty-four patients presenting with the complaint of voice abnormality were included in the study. Patients were asked to complete an RSI score sheet, and they were examined by rigid laryngostroboscopy. Laryngostroboscopic examinations of the patients were evaluated and rated with RFS by three different otolaryngologists blinded to patient information in two different sessions to evaluate intra-rater and inter-rater reliability. The correlations between RSI and RFS, for both total RFS and individual variables from RFS, were investigated.

Results: Sixty-three percent were female and 37% were male, with a mean±SD age of 39.09±14.43 years. RSI ranged from 4 to 31, and RFS ranged from 8 to 22. All three raters demonstrated highly consistent intra-rater and inter-rater reliability for both total RFS and individual variables from RFS. There was a highly significant statistical correlation between RSI and total RFS ($r=0.696$; $p=0.0001$). Individual variables from RFS, except the posterior commissure hypertrophy, also demonstrated a significant positive correlation with RSI scores ($p<0.05$).

Conclusion: RFS is a simple scale that could easily be administered with high intra-rater and inter-rater reliability for the evaluation of laryngopharyngeal reflux. RSI is highly correlated with both total RFS and all the individual variables from RFS, except posterior commissure hypertrophy. *(JAREM 2015; 5: 68-74)*

Keywords: Laryngopharyngeal reflux, reflux symptom index, reflux finding score, hoarseness, reliability, correlation

INTRODUCTION

Laryngopharyngeal reflux (LPR) is the retrograde flow of gastric contents to the larynx and pharynx. It is a clinical entity related to, but also distinct from, gastroesophageal reflux disease (GERD). LPR is considered to be the most common extraesophageal manifestation of GERD (1). It causes symptoms such as chronic irritative cough, excessive throat clearing, globus sensation, sore throat, and dysphonia. It has been estimated that 4%–10% of the patients referred to an otolaryngology clinic have symptoms and/or signs related to LPR (2, 3). LPR has been found to be related to chronic pharyngitis and laryngitis, contact ulcer, granuloma, subglottic stenosis, vocal fold nodules, and laryngospasm; it is also suggested to be implicated for premalignant lesions and squamous cell carcinoma of the larynx (1, 4-6).

Twenty-four-hour ambulatory dual-probe pH monitoring is currently considered to be the gold standard for the objective diagnosis of LPR (1). However, it is a time-consuming, relatively invasive, and expensive technique (1, 7, 8). Novel diagnostic techniques such as triple-probe pH monitoring, combined pH and impedance measurement, and pepsin immunoassay detection have recently been introduced, but none of these tests are currently appropriate for routine clinical practice (9-12).

Belafsky et al. (11, 12) developed the reflux symptom index (RSI) and the reflux finding score (RFS) for the assessment of the patients with LPR. RSI is a 9-item self-administered outcomes questionnaire for evaluating symptoms of LPR. Each item is scored between 0 (no problem) and 5 (severe problem), with a maximum total score of 45. An RSI of greater than 13 is considered to indicate LPR (11). he reflux finding score is an 8-item clinical severity scale used to interpret the most common laryngoscopic findings related to LPR, including subglottic edema (pseudosulcus); ventricular obliteration; erythema/hyperemia; diffuse laryngeal edema; vocal fold edema; posterior commissure hypertrophy; granuloma; and excessive, thick endolaryngeal mucus. The scale ranges from 0 (no abnormal findings) to a maximum of 26 (worst score possible). An RFS greater than 7 indicates that the patient has LPR with 95% certainty (12).

Although these two instruments are widely used in clinical practice, there are few reports investigating the correlation between them (13, 14). In this study, we evaluated the correlation between RSI and RFS in the patients with voice-related problems, and we also investigated the reliability of RFS.

METHODS

Patients

After obtaining approval from the Dr. Lütfi Kırdar Kartal Training and Research Hospital's ethics committee, the study started with a group of 105 patients presented to the academic otolaryngology clinic with primarily a voice-related complaint. Patients with

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Received Date: 04.03.2015 **Accepted Date:** 12.04.2015

DOI: 10.5152/jarem.2015.698

Table 1. Reflux symptom index (RSI)

Within the last month, how did the following problems affect you? Circle 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 eat 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 to 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
	Total					

premalignant or malignant laryngeal diseases, chronic pulmonary or sinonasal infections, acute laryngitis were excluded from the study group. The remaining 54 patients were selected to form the study population. Before the procedure, informed consent was obtained from each participant.

Patients were asked to complete the 9-item self-administered RSI score sheet (Table 1). The laryngostroboscopic examination was performed with a 70° rigid endoscope (70° rigid endoscope; Karl Storz, Tuttlingen, Germany) and a stroboscope (Pulsar Stroboscope; Karl Storz, Tuttlingen, Germany), with digital video recording following the same examination protocol.

Raters

The laryngostroboscopic examinations of the patients were evaluated and rated by three different otolaryngologists. They were all working for the study hospital. Two of them (Rater 1 and 2) were full-time attending surgeons, while Rater 3 was a last-year otolaryngology resident. All three raters had viewed various laryngostroboscopic examinations together 2 months before the study started and had agreed on a severity scale of each RFS sign.

Each rater was provided with the laryngostroboscopic examinations of all 54 patients and with RFS rating scales (Table 2). They viewed and rated the 54 videos separately under identical conditions without getting information about the medical history of individual patients, including RSI scores.

However, they were aware that each patient was being evaluated for voice-related complaints. In order to determine intra-rater reliability, laryngostroboscopic examinations were rated again by all the raters 4–6 weeks later in a separate session.

Statistical Analysis

Statistical analysis was performed with NCSS 2007 (NCSS LLC; Kaysville, Utah, USA). One RSI score and six RFSs, resulting from the evaluation of each laryngostroboscopic examination by three raters in two different sessions were obtained for each patient. Inter-rater and intra-rater reliability were determined using the intra-class correlation coefficient (ICC) for a two-way random effects model (15, 16). ICC is used to evaluate the agreement between repeated measurements from the same subject or between measurements of two or more different raters on the same subject. ICC ranges from 0.0 to 1.0. If there is not much variance between the scores assigned by different raters (i.e., if all raters assigned the same or similar scores), ICC would be relatively high (i.e., close to +1) (16).

Correlation Assessment

Based on the percent of agreement between all the raters, a final RFS was established for each variable on laryngostroboscopic examination. Spearman's rank coefficient of correlation was used to evaluate the correlation between RSI and final RFSs. The threshold for statistical significance was set at $p<0.05$.

RESULTS

A total of 54 patients with voice-related complaints were included in the study. Sixty-three percent (34 of 54) were females and 37% (20 of 54) were males, with a mean±SD age of 39.09±14.43 years. RSI ranged from 4 to 31, and RFS ranged from 8 to 22. Of the 54 patients, 28 presented with vocal cord lesions (e.g., nodules, polyps, cysts, Reinke's edema, and granulomas), 14 were diagnosed with functional voice disorders, 10 presented with vocal cord paralysis/paresis, and two had vocal cord atrophy.

The most commonly encountered symptoms from RSI were hoarseness (53 of 54; 98.2%), frequent throat clearing (48 of 54; 92.7%), heartburn (45 of 54; 86.3%), and sensation of a lump in the throat (37 of 54; 71.3%) (Figure 1). The most frequently found findings on laryngostroboscopic examination were vocal fold edema (54 of 54; 100%), posterior commissure hypertrophy (54 of 54; 100%), diffuse laryngeal edema (53 of 54; 98.2%), and laryngeal erythema/hyperemia (53 of 54; 98.2%), followed by ventricular obliteration (37 of 54; 71.3%), subglottic edema (20 of 54; 36.2%), and thick endolaryngeal mucus (11 of 54; 18.2%) (Figure 2). No patient exhibited granuloma.

RFS Reliability Results

All three raters demonstrated highly consistent intra-rater reliability with high agreement between the first and second evaluations. ICCs of the total RFS were more than 0.900 for all the raters. Rater 1 exhibited the highest reliability (ICC=0.918), followed by the Raters 2 and 3 (ICC=0.910 and 0.907, respectively) (Table 3). The inter-rater reliability was also reasonably satisfactory, with ICC be-

Table 2. Reflux finding score (RFS)

Pseudosulcus (infraglottic edema)	0=Absent 2=Present
Ventricular obliteration	2=Partial 4=Complete
Erythema and hyperemia	2=Arytenoids 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	0=Absent 2=Present
Granuloma/granulation tissue	0=Absent 2=Present
Thick endolaryngeal mucus	0=Absent 2=Present

ing 0.907 for the total RFS (Table 4). For all the individual variables from RFS, intra-rater ICCs ranged from 0.712 to 0.973, and inter-rater ICCs ranged from 0.670 to 0.956. All ICCs of the study were found to be considerably high.

RSI-RFS Correlation

Reflux symptom index scores of the patients ranged from 4 to 31 (mean, 18.3±4.4). In 37 patients (68.5%), they were above 13 and suggestive of LPR, ranging from 13 to 31; in 17 patients (31.5%), RSI scores were LPR-negative, ranging from 4 to 12. All of the patients had RFSs suggestive of LPR (>7), ranging from 8 to 22 (mean, 14.2±4.6). There was a highly significant positive statistical correlation between RSI and total RFS (r=0.696, p=0.0001) (Figure 3). Individual variables from RFS, except posterior commissure hypertrophy, also demonstrated a significant positive correlation with RSI scores (Table 5).

DISCUSSION

In daily routine otolaryngologic practice, the diagnosis of LPR is based on the clinical assessment of the patients with dysphonia and on the recognition of associated reflux symptoms and findings through endoscopic examination of the larynx. It is well known that classic symptoms of GERD are not observed in 57%–80% of the patients with significant clinical manifestations of LPR. Therefore, otolaryngologists should inquire regarding specific symptoms of LPR and also acknowledge nonspecific findings of laryngeal irritation and inflammation observed through laryngoscopic examination (17, 18). RSI and RFS, developed by Belafsky et al. (11, 12), have been widely used for the diagnosis of LPR as they are simple, inexpensive, and noninvasive (14, 19).

This study was designed to evaluate the patients with voice-related complaints using both RSI and RFS and to determine the reliability of RFS. The correlation between RFS and RSI was also compared. Both intra-rater and inter-rater reliability results for all three raters were quite high. The ICC was above the acceptance level of 0.70; furthermore, it was even higher than 0.90 for total RFS. In addition, there was a highly significant positive correlation between RSI and RFS (p=0.0001). Our results confirm the results of previous studies and suggest that these two scales can be quite useful for potential LPR patients (13, 14).

The main limitation of our study is the lack of 24-hour pH monitoring in the patients; thus, LPR actually was not confirmed in the patients. However, 24-hour pH monitoring is a relatively invasive technique and has limited use in an outpatient setting (1, 7).

The highest intra-rater and inter-rater agreement in this study was observed for vocal fold edema and for thick endolaryngeal mucus. Laryngeal erythema is significantly dependent on the video-endoscopic equipment; subtle changes in erythema are difficult to quantify. Even though posterior commissure hypertrophy is a frequent finding in LPR, the posterior larynx is the most difficult area for consistent rating and assessment (12, 20). However, we found relatively high intra-rater and inter-rater agreement for both laryngeal edema and posterior commissure hypertrophy.

Among all the individual variables from RFS, only posterior commissure hypertrophy did not exhibit significant correlation with RSI (r=0.98; p=0.152). It has been shown that the exposure of the interarytenoid area to gastric secretions results in some degree of keratinization and epithelial hyperplasia (21). This histopathological transformation could represent an irreversible process. Hill et al. demonstrated no change in the degree of posterior commissure hypertrophy in the patients with LPR on long-term acid-suppressive therapy (22). They concluded that posterior commissure hypertrophy, as an isolated finding, is unreliable in determining the presence of active LPR.

Mesallam et al. (13) determined good intra-rater reliability but low-to-moderate inter-rater reliability for RFS in 40 symptomatically diagnosed LPR patients. There was a strong positive correlation observed between RSI and total RFS. Comparison of individual variables from RFS and RSI demonstrated that hoarseness correlated with vocal fold edema, diffuse laryngeal edema, thick endolaryngeal mucus, and erythema. Throat clearing correlated with thick endolaryngeal mucus and vocal fold edema, and globus sensation correlated with erythema and posterior commissure hypertrophy (13).

Branski et al. (20) investigated the reliability of the assessment of laryngoscopic findings, potentially associated with LPR among otolaryngologists. Five otolaryngologists rated the presence of and the degree of severity of rigid laryngoscopic findings, such as edema, erythema, and interarytenoid pachydermia, for 100 dysphonic patients. Their data showed that both inter-rater and intra-rater reliability for these physical findings were low in the endoscopic assessments of the larynx. As a solution for the problem of unreliability of laryngeal examination findings, they rec-

Table 3. Assessment of intra-rater reliability of the reflux finding score with intra-class correlation coefficient

	Rater 1			Rater 2			Rater 3		
		95% CI			95% CI			95% CI	
Intra-rater	ICC	Min	Max	ICC	Min	Max	ICC	Min	Max
Diffuse laryngeal edema	0.89	0.791	0.953	0.885	0.779	0.924	0.862	0.784	0.916
Erythema and hyperemia	0.875	0.782	0.914	0.864	0.803	0.911	0.852	0.768	0.909
Vocal fold edema	0.911	0.871	0.943	0.923	0.897	0.966	0.929	0.888	0.956
Posterior commissure hypertrophy	0.822	0.712	0.888	0.857	0.712	0.888	0.817	0.712	0.888
Ventricular obliteration	0.834	0.783	0.921	0.863	0.798	0.920	0.852	0.768	0.910
Subglottic edema	0.787	0.764	0.851	0.812	0.765	0.876	0.790	0.762	0.871
Thick endolaryngeal mucus	0.894	0.811	0.952	0.846	0.814	0.935	0.874	0.801	0.922
Reflux finding score	0.918	0.887	0.973	0.910	0.842	0.949	0.907	0.854	0.943

ICC: Intra-class correlation coefficient; CI: confidence interval; Min: minimum; Max: maximum

Table 4. Assessment of inter-rater reliability of the reflux finding score with intra-class correlation coefficient

	Intra-class coefficient		
		95% CI	
Inter-rater	ICC	Minimum	Maximum
Diffuse laryngeal edema	0.862	0.784	0.916
Erythema and hyperemia	0.852	0.768	0.909
Vocal fold edema	0.929	0.888	0.956
Posterior commissure hypertrophy	0.817	0.712	0.888
Ventricular obliteration	0.852	0.768	0.910
Subglottic edema	0.790	0.670	0.871
Thick endolaryngeal mucus	0.874	0.801	0.922
Reflux finding score	0. 907	0.854	0.943

ICC: Intra-class correlation coefficient; CI: confidence interval

Table 5. Relation between the reflux symptom index and individual variables from the reflux finding score

Signs	Spearman's rho	
Diffuse laryngeal edema	r	0.53
	p	0.0001*
Erythema and hyperemia	r	0.442
	p	0.001*
Vocal fold edema	r	0.406
	p	0.002*
Posterior commissure hypertrophy	r	0.198
	p	0.152
Ventricular obliteration	r	0.349
	p	0.01*
Subglottic edema	r	0.276
	p	0.043*
Thick endolaryngeal mucus	r	0.269
	p	0.049*

*p<0.05: statistically significant

ommended to "train" otolaryngologists with a set of standardized examinations (20). In our study, all three raters had viewed and discussed together various laryngostroboscopic examinations 2 months before the study started. This was intended for obtaining consistency among our raters for the scoring of each RFS sign. This practice is similar to recommendation of "training" by Branski et al. (20). We believe that this "training" contributed to our high intra-rater and inter-rater reliability. However, having additional raters for assessing laryngoscopic findings would have strengthened our study.

Preparing standardized video examinations to identify each individual variable of RFS and to rate their degree of severity would be valuable. Training otolaryngologists with this video material could be an appropriate method to obtain reliability in the evaluation of LPR.

RSI was translated into Turkish for use in our study. A translation of RSI has not been validated before, but Habermann et al. (14) used the German translation of RSI and suggested that the translation can be used for identifying the patients with LPR. As in their study, the missing Turkish validation of RSI is a potential bias for our study.

The study in which RFS was originally validated by Belafsky et al. (12) used flexible fiberoptic laryngoscopy to perform laryngoscopic evaluations. Instead, we used rigid laryngoscope in our study. Habermann et al. (14) reported in their multicenter, prospective study that the patients suspected of having LPR could be evaluated with RSI and RFS, and then, they could be selected for the treatment on the basis of abnormal results of these scales. They used a rigid endoscope for the evaluation of the larynx in their study as well. The comparison of findings between flexible and rigid laryngoscopes on healthy volunteers, laryngeal signs such as arytenoid erythema and pseudosulcus were more like-

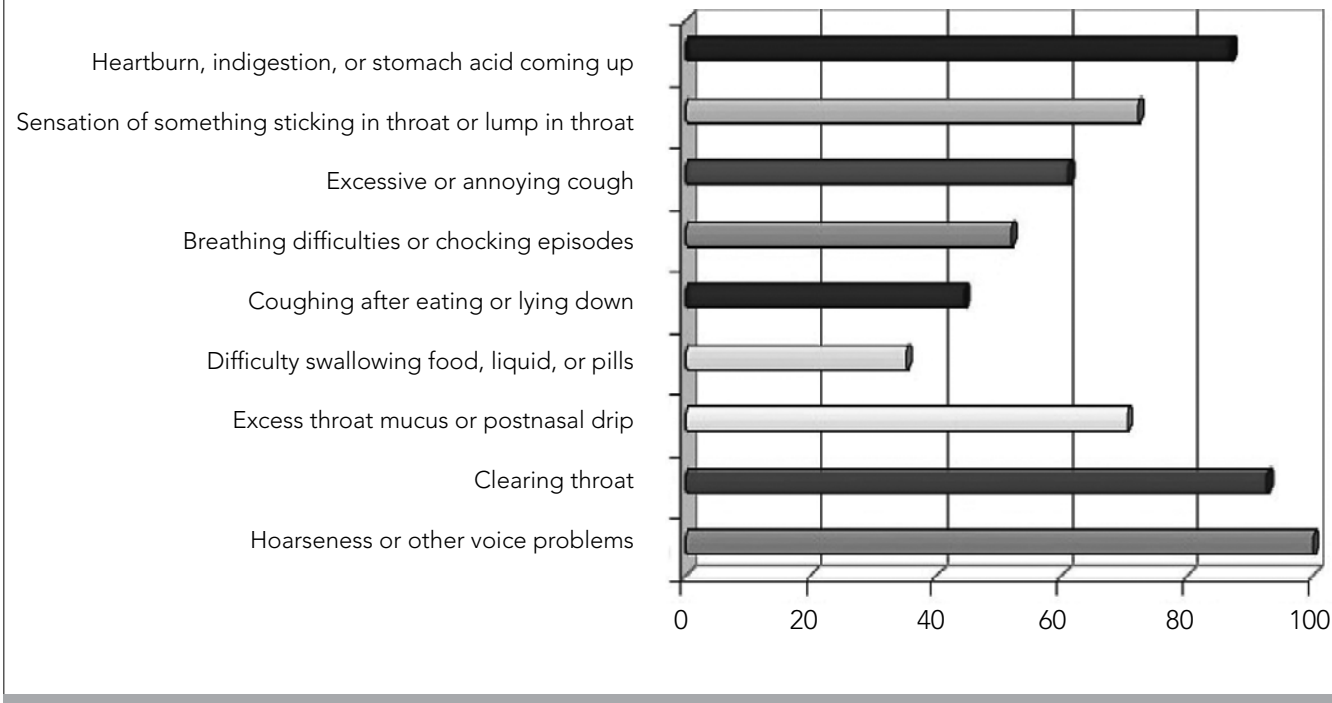

Figure 1. Distribution of the reflux symptom index symptoms

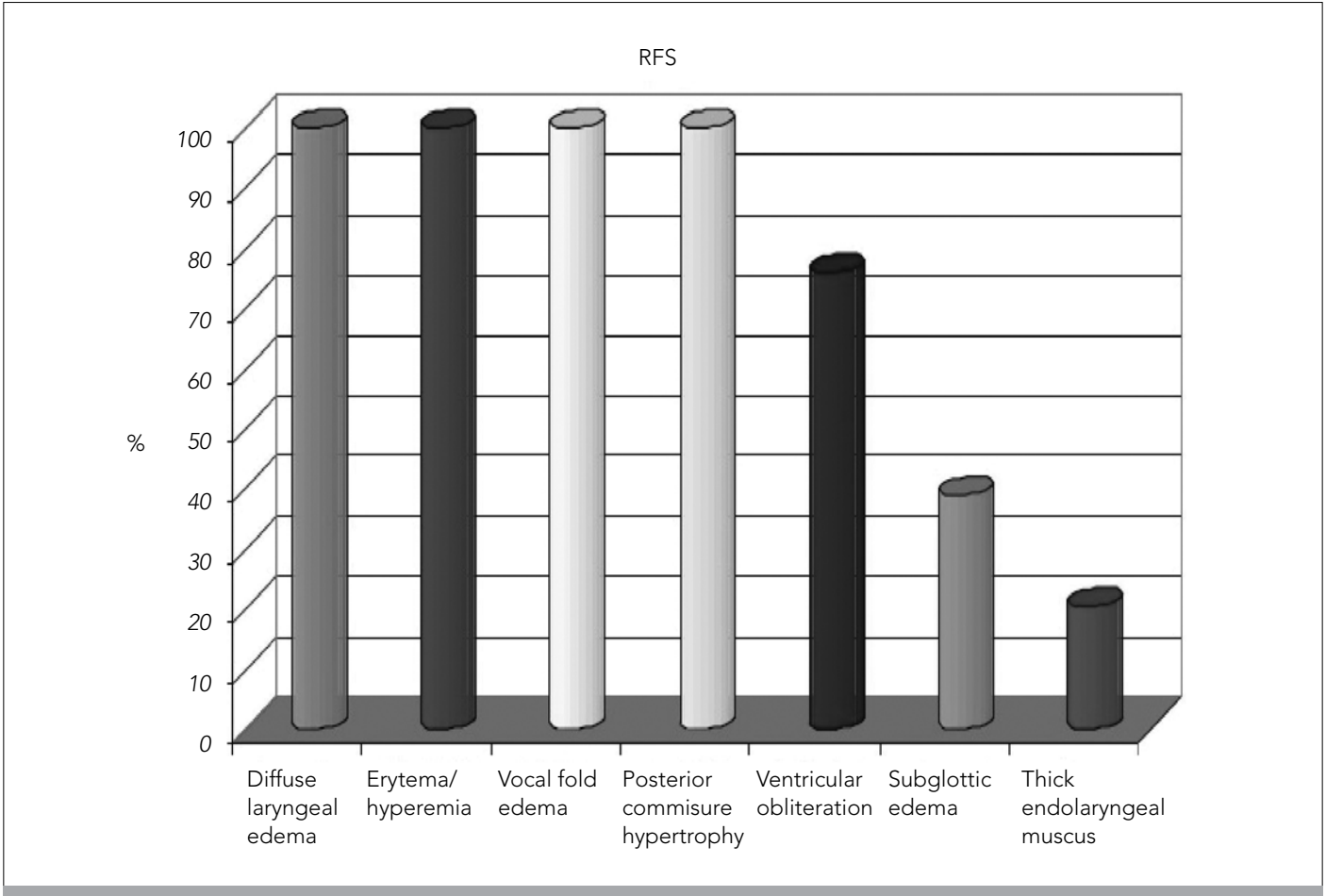

Figure 2. Distribution of the reflux finding score signs

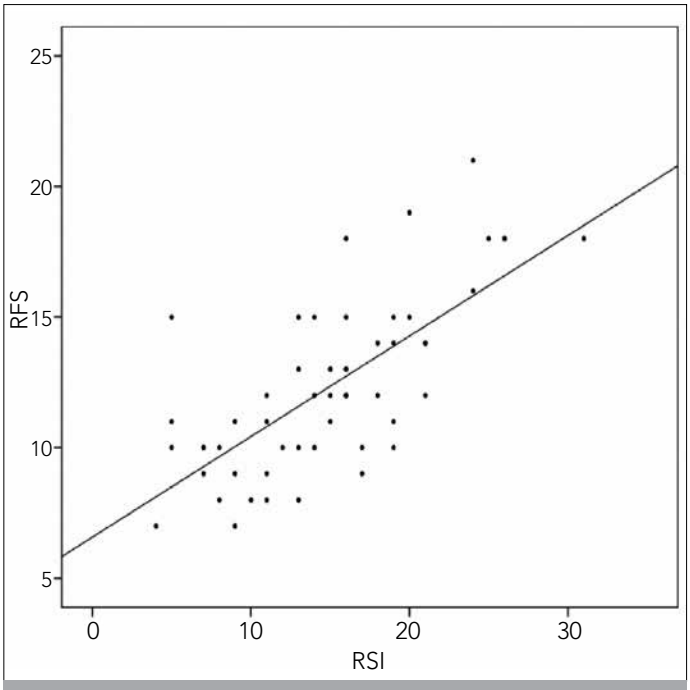

Figure 3. Correlation between the reflux finding score and the reflux symptom index (r=0.696; p=0.0001)

ly to be detected with a flexible rather than a rigid endoscope (23). For this reason, reliability of RFS with flexible laryngoscope should also be investigated with future studies.

In our study, all the patients demonstrated an RFS above the diagnostic score of LPR (>7) (mean, 14.2±4.6), while some of them reported lower RSI scores than the diagnostic value of 13 for LPR. However, these patients also had lower RSI scores ranging from 4 to 12 (mean, 8.4±2.5). This is in accordance with the overall positive correlation observed between RSI and RFS. We did not exclude the patients under current antireflux medication in our study. It is demonstrated that the laryngeal findings of LPR resolve more slowly than the symptoms for 6 months of treatment (24). In our institute, the patients on LPR treatment are routinely examined at 6 weeks and at 3 and 6 months of treatment. Patients who had an RFS of >7 with an RSI of <13 could be the LPR patients under current antireflux medication at the time of the laryngoscopic examination for the study. Nevertheless, these results may also indicate that a positive RFS may not always accompany a positive RSI. Therefore, both of these scales should be accepted as complementary to each other for the evaluation of LPR.

CONCLUSION

Reflux finding score is a simple scale that could easily be administered with high intra-rater and inter-rater reliability for the evaluation of LPR in the patients with voice-related complaints. RSI and total RFS demonstrate a highly significant positive statistical correlation. All individual variables from RFS, except posterior commissure hypertrophy, show a positive correlation with RSI score. It may be appropriate to prepare standardized educational recordings to increase the reliability for RFS. Using these scales for symptoms and findings of the patients in daily practice enables otolaryngologists to develop a common language for LPR.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Dr. Lütfi Kırdar Kartal Training and Research Hospital.

Informed Consent: Informed consent was taken from each participant before the procedure.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - N.E.K., S.A., H.A., M.G.D., N.D., D.B.; Design - N.E.K., S.A., D.B.; Supervision - N.E.K., S.A., D.B.; Resource - N.E.K., S.A., H.A., M.G.D., N.D., D.B.; Materials - N.E.K., S.A., H.A., D.B.; Data Collection and/or Processing - N.E.K., S.A., H.A., M.G.D., N.D., D.B.; Analysis and/or Interpretation - N.E.K., S.A., D.B.; Literature Review - N.E.K., S.A., M.G.D., N.D.; Writer - S.A., N.E.K., H.A., M.G.D., N.D.; Critical Review - N.E.K., S.A., D.B., M.G.D., N.D., H.A.

Acknowledgements: The authors wish to thank Daniel B. Magraw from Johns Hopkins University for editorial assistance in the preparation of this manuscript and Doğan Çakan for his company.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Koufman JA. The otolaryngologic manifestations of gastroesophageal reflux disease (GERD): A clinical investigation of 225 patients using ambulatory 24-hour pH monitoring and an experimental investigation of the role of acid and pepsin in the development of laryngeal injury. Laryngoscope 1991; 101: 1-78.
2. Koufman JA, Wiener CJ, Wu WC, Castell DO. Reflux laryngitis and its sequelae: the diagnostic role of ambulatory 24-hour pH monitoring. J Voice 1988; 2: 78-89. [CrossRef]
3. Toohill RJ, Mushtag E, Lehman RH. Otolaryngologic manifestations of gastroesophageal reflux. In: Sacristan T, Alvarez-Vincent JJ, Bartual J, eds. Proceedings of XIV World Congress of Otolaryngology-Head and Neck Surgery. Amsterdam, the Netherlands: Kugler and Ghedini Publications, 1990. p.3005-9.
4. Cohen JT, Bach KK, Postma GN, Koufman JA. Clinical manifestations of laryngopharngeal reflux. Ear Nose Throat J 2002; 81: 19-23.
5. Galli J, Cammarota G, Calo L, Agostino S, D'Ugo D, Cianci R, et al. The role of acid and alkaline reflux in laryngeal squamous cell carcinoma. Laryngoscope 2002; 112: 1861-5. [CrossRef]
6. Bacciu A, Mercante G, Ingegnoli A, Ferri T, Muzzeto P, Leandro G, et al. Effects of gastroesophageal reflux disease in laryngeal carcinoma. Clin Otolaryngol 2004; 29:5 45-8.
7. Koufman JA, Aviv JE, Casiano RR, Shaw GY. Laryngopharyngeal reflux: Position statement of the committee on speech, voice, and swallowing disorders of the American Academy of Otolaryngology–Head and Neck Surgery. Otolaryngol Head Neck Surg 2002; 127: 32-5. [CrossRef]
8. Issing WJ, Karkos PD, Perreas K, Folwaczny C, Reichel O. Dual-probe 24-hour ambulatory pH monitoring for diagnosis of laryngopharyngeal reflux. J Laryngol Otol 2004; 118: 845-8. [CrossRef]
9. Maldonado A, Diederich L, Castell DO, Gideon RM, Katz PO. Laryngopharyngeal reflux identified using a new catheter design: defining normal values and excluding artifacts. Laryngoscope 2003; 113: 349-55. [CrossRef]
10. Postma GN, Belafsky PC, Aviv JE, Koufman JA. Laryngopharyngeal reflux testing. Ear Nose Thorat J 2002; 81: 14-8.
11. Belafsky PC, Postma GN, Koufman JA. Validity and reliability of the reflux symptom index (RSI). J Voice 2002; 16: 274-7. [CrossRef]
12. Belafsky PC, Postma GN, Koufman JA. Validity and reliability of the reflux finding score (RFS). Laryngoscope 2001; 111: 1313-7. [CrossRef]
13. Mesallam TA, Stemple JC, Sobeih TM, Elluru RG. Reflux symptom index versus reflux finding score. Ann Otol Rhinol Laryngol 2007; 116: 436-40. [CrossRef]

14. Habermann W, Schmid C, Neumann K, Devaney T, Hammer HF. Reflux symptom index and reflux finding score in otolaryngologic practice. J Voice 2012: 26; 123-7. [CrossRef]
15. Shrout P, Fleiss JL. Intraclass correlations: uses in assessing rater reliability. Psychol Bull 1979; 86: 420-8. [CrossRef]
16. Ateş C, Oztuna D, Genç Y. The use of intraclass correlation coefficient (ICC) in medical research: review. Turkiye Klinikleri J Biostat 2009; 1: 59-64.
17. Ulualp SO, Toohill RJ. Larngopharyngeal reflux: state of the art diagnosis and treatment. Otolaryngol Clin North Am 2000; 33: 785-802. [CrossRef]
18. Ford CN. Evaluation and management of laryngopharngeal reflux. JAMA 2005; 294: 1534-40. [CrossRef]
19. Bilgen C, Ogüt F, Kesimli-Dinç H, Kirazli T, Bor S. The comparison of an empiric proton pump inhibitor trial vs 24-hour double-probe pH monitoring in laryngopharyngeal reflux. J Laryngol Otol 2003; 117: 386-90. [CrossRef]
20. Branski RC, Bhattacharyya N, Shapiro J. The reliabitity of the assessment of endoscopic laryngeal findings associated with laryngopharyngeal reflux disease. Laryngoscope 2002; 112: 1019-24. [CrossRef]
21. Kambic V, Radsel Z. Acid posterior laryngitis: Aetiology, histology, diagnosis, and treatment. J Laryngol Otol 1984; 98: 1237-40. [CrossRef]
22. Hill RK, Simpson CB, Velazquez R, Larson N. Pachydermia is not diagnostic of active laryngopharyngeal reflux disease. Laryngoscope 2004; 114: 1557-61. [CrossRef]
23. Milstein CF, Charbel S, Hicks DM, Abelson TI, Richter JE, Vaezi MF. Prevalance of laryngeal irritation signs associated with reflux in asymptomatic volunteers: impact of endoscopic technique (rigid vs. flexible laryngoscope). Laryngoscope 2005; 115: 2256-61. [CrossRef]
24. Belafsky PC, Postma GN, Koufman JA. Laryngopharyngeal reflux symptoms improve before changes in physical findings. Laryngoscope 2001; 111: 979-81. [CrossRef]