

ORIGINAL STUDY

MANAGEMENT OF PHARYNGOLARYNGEAL REFLUX AT VOICE PROFESSIONALS

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ABSTRACT

The development of specific programs for preventing dysphonia at voice professionals is necessary, including dysphonia caused by extraesophageal reflux. The purpose of this study was to evaluate the role of pH monitoring and PPI treatment for professional voices with LPR symptomatology. We included in our prospective study 96 patients, professional voices, all of them fulfilled the inclusion criteria and underwent laryngofiberscopy, pH monitoring, before and after 2 month PPI (proton pump inhibitor) treatment (omeprazole). We applied two questionnaires: RFS (Reflux Finding Score) and RSI (Reflux Symptom Index). The distribution according to profession showed a significant predominance of teaching profession, followed by professional singers ($p < 0.05$). For the RFS score, the median value before treatment was $16.9 (\pm 8.9)$ and after treatment was $8 (\pm 6.2)$ ($p < 0.05$). The median value for the RSI score was $20.9 (+/- 9.6)$ before treatment; after treatment was $12.8 (+/- 10.0)$ ($p < 0.05$). (table 7) After two months of PPI treatment, 71.87% of patients registered an improvement of clinical symptoms or even healing of laryngeal lesions. After PPI treatment, the control pH-monitoring revealed a statistical significant change in terms of total time exposure to acid reflux ($p = 0.0571$) and duration of exposure (mean, $p = 0.0617$). The pH monitoring measurements revealed pathological values ($pH < 4$) at 64.58% of patients, demonstrating that not all patients with acid reflux laryngitis also have reflux esophagitis. Even our control group had impaired values of pH monitoring, close to statistical significance. The response rate following the PPI treatment was about 71.87%. In the literature the response rate varies between 60 and 100%. Our study highlights the variability of treatment response in patients with LPR (laryngopharyngeal reflux), the necessity of long term treatment (especially for those patients with severe lesions) and the necessity of increasing the PPI's dosage. The clinical diagnosis of reflux laryngitis is based upon patient's symptoms and fiberoptic laryngeal examination. pH monitoring can be used as a diagnostic tool when there is no improvement in patient condition after 2 months of PPI treatment.

KEYWORDS: reflux laryngitis, proton pump inhibitors, voice professional

1. Introduction

There is a double impact of vocal impairment on patients that use their voice as an occupational instrument; first of all, a negative impact on the

patient's quality of life (vocal troubles affect their efficiency at the work place) and in the second place we find that society has to spend more money on health services. It was estimated that, in the modern society, about one third of the active population has

professions that require using voice as a must in the daily routine.[1] Therefore, the development of specific programs for preventing dysphonia became a necessity for the group of vocal professionals.

The first step in successfully applying these programs is represented by the identification of determinant and bias factors that lead to vocal impairment. GERD (gastroesophageal reflux disease) represents an important factor for dysphonia at vocal professionals, next to smoking and excessive alcohol drinking.

Anyone can be affected by laryngeal reflux, but especially professional singers, for many reasons [2]. First, singing technique implies a support from abdominal muscles, whose force determines thoracic compression and in the same time applies a pressure on the stomach impairing the proper function of inferior esophageal sphincter. Second, the life style of these patients is under the influence of their daily routine: eating irregularly or at late hours in the night. Third, performance in career implies a psychological stress that can be associated with esophageal motility impairment, by raising the amplitude of esophageal contractions and modifying the gastric acid secretion.

Sometimes, an acid reflux pharyngolaryngitis is difficult to diagnose, which leads to increased costs for the society. The typical manifestations of LPR (laryngopharyngeal reflux) are nonspecific and can be induced also by local infections (viral or bacterial), allergies, smoking and alcohol abuse. Those are important reasons why a diagnostic algorithm is needed for this illness caused by extraesophageal acid reflux. The pathology of LPR is dramatically different than GERD's [3]. Unlike GERD, LPR is not frequently associated with heartburn and regurgitation (only 20% of patients with LPR versus 83% in GERD patients that experiment the symptoms) [4] There are no pathognomonic signs and symptoms for recognizing LPR, but the involvement

of the damaging action of acid reflux is sustained by the changes seen on the laryngeal mucosa: erythema, edema, mucosal ulcerations, granular tissue forming over and between the arytenoids. [3,4]

2. Material and methods

The purpose of this study was to evaluate the role of pH monitoring and PPI treatment for professional voices with LPR symptomatology

Inclusion criteria:

- Vocal professionals: teachers, actors, singers, priests
- dysphonia lasting for at least 3 months
- complete absence of benign or malignant lesions (as seen on indirect laryngoscopy)
- the patients hadn't been prescribed drugs that can alter the natural motility of the esophagus or gastric secretion such as anticholinergics, sedatives, potassium or calcium channel blockers, antibiotics.

Exclusion criteria

- active smokers
- heavy alcohol consumers
- upper respiratory tract infections during the month prior to inclusion in our study
- patients who underwent anti-reflux surgery
- prior treatment with proton pump inhibitors
- allergies at PPIs
- asthma

We included in our study 96 patients who met all the inclusion criteria. We used a control group of 89 patients (suitable as age, sex and life style with the study group) evaluated in our department for other symptoms except dysphonia

Every patient was completely informed and agreed to sign the consent form allowing the inclusion in the study group.

The patients underwent fibroscopic examination and esophageal pH monitoring and completed the RFS (Reflux Finding Score) and RSI (Reflux Symptom Index) questionnaires, before and

after 2 months treatment with omeprazole, one pill of 20 milligrams administered twice a day.

Belfasky developed a patient questionnaire [5]: RSI (table I) In this questionnaire the patients are asked to describe the severity of dysphonia, throat clearing, swallowing impairment, cough, fake foreign body sensations in the pharynx, heartburn and regurgitations. We consider a score or 13 as pathological because in all statistic studies effectuated for validation of this score, the confidence limit for the control group was over 13.6 in over 95% of cases [5].

Table I. Reflux Symptom Index

Have you experienced in the last month one of the following symptoms?	0=abs.	1=mod.	2=sev.
Dysphonia	0	1	2
Throat clearing	0	1	2
Post nasal drip	0	1	2
Cough in horizontal position	0	1	2
Breathing difficulties	0	1	2
Irritating paroxysmal cough	0	1	2
Fake foreign body sensation in the pharynx	0	1	2
Heartburns, thoracic pain, regurgitation	0	1	2

The original questionnaire had 5 options but we decided to use for our RSI questionnaire only three options for evaluation of symptoms severity.(0=absent, 1=moderate, 2=severe). We made this choice because we consider that the original questionnaire is subjective and the patients find it difficult to differentiate between mild and moderate or between severe and very severe. The maximal value obtained for this questionnaire in 16. The author of this questionnaire also developed a score for clinical findings induced by acid reflux (reflux findings score- RFS) which quantify the clinical

findings that can be correlated with the presence of LPR.

Reflux finding score (RFS) – the score of changes produced by acid reflux at pharyngo-laryngeal level (tabel II) [6]

Table II. Reflux finding score

Pseudosulcus vocalis	0=absent 2=present
Obliteration of the ventricular band	0=absent 2=partial 4= total
Erythema/hyperemia	0=absent 2=arytenoids 4=diffuse
Edema of vocal folds	0=absent 1=mild 2=moderate 3=severe 4=polypoid
Diffuse laryngeal edema	0=absent 1=mild 2=moderate 3=severe 4=obstructive
Hypertrophy of posterior commissure of larynx	0=absent 1=mild 2=moderate 3= severe 4=obstructive
Laryngeal granuloma	0=absent 2=present
Endolaryngeal mucus	0=absent 2=present

RFS depends on identification of the following findings: ventricular obliteration, subglottic edema, vocal folds edema, diffuse laryngeal edema, laryngeal mucosa hypertrophy in the posterior area, granuloma or granulomatous tissue forming, thickening of endolaryngeal mucosa. The score has a range between 0 and 26, and any value larger than 7 has a diagnostic predictability of 95% for LPR [6]. According to reference datas from the literature we’ve chosen the reference range as following: below 5 points – there are no acid reflux specific findings, any score greater than 11 points - positive diagnosis of acid reflux laryngitis, between 5 and 11 points – supplementary investigations are needed to highlight the presence of acid reflux. RFS is an accurate

instrument for evaluation of effectiveness of treatment in patients with reflux laryngitis [7].

All patients were informed and signed the consent form for their inclusion in our prospective study. The statistical analysis was performed using SPSS version 16, under Windows XP Professional. The results are mean±SD; statistical analysis was performed using Student t test to define improvements resulting from the medical treatment. For the statistical reliability, a value of $p < 0.01$ has been chosen.

3. Results

We observed no demographic (age, sex) differences between the study group and the control group (table III).

Table III. Baseline characteristics of enrolled patients

Characteristics	Clinical group (n=96)	Control group (n=75)	p-value
Age (mean±SD)	38.03± 7.56	42.2± 9.8	ns
Male/female	60.42%/39.58%	65.33%/34.67	ns

SD -standard deviation

ns – not significant difference

The distribution according to profession and sex (table IV) showed a significant predominance of teaching profession, followed by professional singers ($p < 0.05$). For priests and actors, there are no statistical significant differences.

The most frequent laryngeal findings were represented by interarytenoid space edema and erythema ($p, 0.05$) and vocal folds edema ($p=0.011$) (table V)

For the RFS score, the median value before treatment in our study group was 16.9(± 8.9), and

Pearson coefficient =0.83 ($p < 0.05$). The median value after treatment was 8 (±6.2) ($p < 0.05$) (Table VI)

Table IV. Distribution according to profession and sex

Profession	Female	Male	Percentage form study group	p-value
Singers	12	15	27/28.12%	$p < 0.05$
Priests	-	19	19/19.8%	ns
Teachers	17	19	36/37.5%	$p < 0.05$
Actors	9	5	14/14.58%	ns

Table V. The most important laryngeal findings in our study group

Parameter	p	Odds ratio	95%CI
Vocal folds edema	0.011	10.393	1.695-63.707
Interarytenoid edema and erythema	<0.05	21.324	4.375-103.929

For the RSI score we obtained the following results (table VII):

The median value for the RSI score in our study group was 20.9 (+/- 9.6) and Pearson coefficient =0.81 ($p < 0.05$). The median value after treatment was 12.8 (+/-10.0) ($p < 0.05$).(table VII)

For the patients belonging to the control group the median value was 11.6 with a 95% (CI)=9.7-13.6 confidence interval. This value was significantly smaller than the one achieved in our study group before treatment, but statistically similar to the one achieved after treatment.

Only 64.58% from the patients who had acid reflux specific laryngeal findings presented a pathological exposure of esophageal and hypopharyngeal mucosa to the acid reflux, objectivated by pH monitoring.(table VIII)

After PPI (proton pump inhibitor) treatment, the control pH monitoring revealed a statistical significant change in terms of total time exposure to acid reflux (p=0.0571) and duration of exposure (mean, p=0.0617).(table IX)

Table VI. Comparative distribution (control group-study group) according to the results of RFS questionnaire before/after treatment

Parameter		Study group		p<	Control group		p<
		Before treatment	After treatment		Before treatment	After treatment	
RFS	Mean	15.8	6.0	<0.001	7.8	6.2	ns
	Median	16	7.0	<0.001	8.0	7.6	ns

TableVII. Comparative distribution (control group-study group) according to the RSI questionnaire before and after treatment

Parameter		Study group		p<	Control group		p<
		Before treatment	After treatment		Before treatment	After treatment	
RSI	Mean	19.3	10.5	<0.05	11.0	10.6	ns
	Median	20.9	12.8	<0.05	11.6	10.9	ns

Table IX. Comparative distribution of pH monitoring values before and after treatment

Variable	Study group		p	Control group		p
	Before treatment	After treatment		Before treatment	After treatment	
Total time pH<4(%)-mean	4.2	1.3	0.0049	3.0	1.1	0.0571
Nuber of acid reflux episodes mean (n)	50.0	27.8	0.0025	26.7	23.5	ns
The longest episode (n)	9.2	3.5	0.004	3.0	2.9	ns
Duretion of reflux-mean (min)	26.5	9.8	0.0037	12.3	9.2	0.0617

Table VIII. Results for pH monitoring

pH metry before treatment	Number of patients n (%)
positive	62 (64.58%)
negative	34 (35.42%)

After two months of PPI treatment, 71.87% of patients registered an improvement of clinical symptoms or even total healing of laryngeal lesions depending on their severity degree(table X)

Table X. Overall response to PPI therapy

Response to treatment	Number of patients n (%)
Improvement or total healing	69 (71.875%)
No improvement	27 (28.125%)

4. Discussions

Even though PPI's are the election treatment for GERD(8), the LPR response to treatment can be variable. In the literature the response rate varies between 60 and 100%[9]. These studies highlight the variability of treatment response in patients with LPR, the necessity of long term treatment (especially for those patients with severe lesions), the necessity of increasing the PPI's dosage and the rapid recurrences of symptoms if the treatment gets interrupted. This suggests that long term treatment is sometimes required in patients with LPR [10]. In our study, the response rate following the PPI treatment was about 71.87%

After a two months lasting treatment with PPI, we observed improvement and even complete cure of symptoms and remission of laryngeal lesions, observed by larynx direct examination. This results suggests the fact that the 40 mg /day PPI treatment for uncomplicated acid reflux laryngitis (with edema, dysphonia, no stenosis, granulomas, or other esophageal or laryngeal symptoms) and changing of the eating habits, are efficient but not sufficient and require a treatment algorithm and a "gold diagnostic standard".

Many clinical studies considered pH monitoring as a basic investigation tool [11]. In spite of this pH monitoring is not a ideal diagnostic tool, having over 90% specificity in GERD patients, but only 54-67% in LPR patients regardless of the positioning of esophageal catheter (proximal, distal or hypopharyngeal) [12].

The pH monitoring measurements revealed pathological values (pH<4) at 64.58% of patients, demonstrating that not all patients with acid reflux laryngitis also have reflux esophagitis. Even our control group had impaired values of pH monitoring, close to statistical significance, certifying the presence of "physiological reflux" in healthy patients, more precisely, the presence of asymptomatic reflux for GERD or LPR. This finding can have its explanation in the lack of consensus about the precise duration and level of acid reflux which constitute an abnormal laryngeal exposure to acid aggression (values that differ from esophageal exposure) [13].

We can also consider the particularities of every patient, their hypersensitivity to acid aggression, and the fact that the pH value itself is not the only factor involved in reflux laryngitis, but also alkaline reflux [14]. Even more, hypopharyngeal pH monitoring is not a routine investigation and there is no consensus regarding the quantity and number of reflux episodes considered pathological for laryngeal mucosa [15].

5. Conclusions

Although not always efficient, the PPI treatment can be considered to be a first line diagnostic and therapeutic method for the patients suffering form chronic acid reflux laryngitis. The response to treatment is proportional with the severity of laryngeal lesions.

The clinical diagnosis of reflux laryngitis is based upon patient's symptoms and fiber-optic laryngeal examination. pH monitoring can be used as a diagnostic tool when there is no improvement in patient condition after 2 months of PPI treatment.

The causes of FLR are intricated and plurifactorial , being more than a simple aggression of reflux upon laryngeal mucosa. This is why we consider that supplementary studies are necessary for

establishing which patients will benefit most from PPI treatment.

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