

Cross Sectional Study of Laryngeal Pathology in Dysphonic Patients

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Abstract

Objectives: To determine the frequency of laryngeal pathology in dysphonic patients and the relationship of patient variables with voice disorders.

Background: Voice has been termed disordered when the production of one or more of its perceptual aspects (pitch, loudness, quality and resonance) are audibly dissimilar to those of people of the same sex, age and culture. An alternative definition is that voice is disordered when it no longer meets the requirements previously attained by the individual speaker.

Patients and Methods: The study included 169 patients who consulted with dysphonia at the ear, nose and throat department of Al-Yarmouk teaching hospital from June 2010 to June 2011. Laryngeal examination was done with indirect mirror laryngoscopy, flexible fiberoptic endoscopy and direct laryngoscopy.

Results: Twenty three laryngeal pathologies were reported under 5 main categories of voice problems which were: inflammatory, structural, neoplastic, neuromuscular and psychogenic dysphonia. Pathologies were significantly more common in males (53.3%) than females (46.7%). Inflammatory organic voice disorders were most frequently diagnosed (56.8%). Vocally demanding occupation accounted for (75.3%). Professional voice users accounted for (10.1%) of the workforce population, with teachers (65%) as main category.

Conclusions: The inflammatory organic voice disorders were the most common cause of voice disorders. Significant association was found between age, vocally demanding occupations, smoking and alcohol. Professional voice users represent almost one tenth of the studied group. Teachers being the main subgroup with organic voice disorder as the main cause for their dysphonia.

Key words: Laryngeal pathology, Dysphonia, Laryngoscopy, Flexible fiberoptic laryngoscopy.

Introduction:

The role of the larynx in sound production has been recognized for centuries^[1], although the mechanism of how the larynx generate sound from exhaled air was not clear until the mid 20th century^[2]. The "theory of the mechanism of phonation" in the 1950s by von Leden is now widely accepted^[3]. The critical event that is essential for voice production is the vibration of the vocal folds and Hirano's description of the vocal fold structure accelerated the understanding of normal and pathological voice production^[4]. Actually much has been written about the layered structure of the vocal folds and its importance both to the understanding of disease and the development of phonosurgical treatment^[5].

Traditionally, voice has been termed disordered when the production of one or more of its perceptual aspects (pitch, loudness, quality and resonance) are audibly dissimilar to those of people of the same sex, age and culture. An alternative definition is that voice is disordered when it no longer meets the requirements previously attained by the individual speaker^[6].

There are four main causes of voice disorders: inflammatory, structural or neoplastic, neuromuscular and muscle tension imbalance (MTI). More often than not, patients will have more than one condition contributing to their voice disorder^[7]. Laryngopharyngeal reflux (inflammatory subtype) is one of the commonest causes of voice disorders^[7]. It's getting importance in the last few years. The reflux Symptom Index (RSI) by Belfasky et al (2002)^[8] was developed for assessment of symptoms in LPR.

There are 3 main groups distinguished in the work force population: Professional and non professional

voice users and unemployed or retired group. The professional users those depends on their voice as their main working tool. There are 4 parameters to assess the amount of high vocal strain activity: shouting, throat clearing, coughing and insufficient water intake^[7].

The simplest method of examining the larynx and vocal folds is with a mirror. The images are relatively small, of brief duration and frequently the anterior glottic region is not well visualized. Superior views of the larynx can generally be obtained using flexible fiberoptic and videoscopic endoscopes. Using stroboscope has led to changes in diagnosis in approximately 30 percent of cases when compared to examination with continuous light alone^[9-11].

Aim of the Study: To determine the frequency of laryngeal pathology in dysphonic patients and the relationship of patient variables with voice disorders.

Patient and method:

The current study included 169 patients visited the outpatient clinic of Al-Yarmouk Teaching Hospital from June 2010 to June 2011 complained of voice problem.

Inclusion criteria: any age, both sexes, any patient with voice problem even the pre-diagnosed patients.

Clinical assessment completed in a routine way. Indirect laryngoscopy, flexible fiberoptic laryngoscopy and direct laryngoscopy were all used to visualize the larynx. The patients were categorized into 7 groups according to their age. The significance of difference was tested using Pearson Chi-square test (χ^2 -test). Statistical significance was considered whenever the P value was less than 0.05.

Results:

The mean age of the patients was 42.89 ± 16.46 years. The commonest age groups affected were between 40-49 years, 39 patients (23.1%). Gender

distribution revealed that 90 patients were males (53.3%) and 79 were females (46.7%). Male to female ratio was 1.13: 1.

Table 1: The distribution of patient with different variables and voice disorders

A – with age and Gender

Working Diagnosis		Inflammatory		Structural		Neoplastic		Others		P value
		No	%	No	%	No	%	No	%	
The distribution of patients according to the age										
Age (year)	<10years (n=5)(3%)	-	-	4	80.0	-	-	1	20.0	0.003*
	10- (n=7) (4.1%)	5	71.4	1	14.3	-	-	1	14.3	
	20- (n=21) (12.4%)	13	61.9	7	33.3	-	-	1	4.8	
	30- (n=36) (21.3%)	26	72.2	5	13.9	1	2.8	4	11.1	
	40- (n=39) (23.1%)	23	59	8	20.5	1	2.6	7	17.9	
	50- (n=30) (17.8%)	16	53.3	7	23.4	3	10.0	4	13.3	
	60- (n=20) (11.8%)	8	40.0	2	10.0	8	40.0	2	10.0	
>70y (n=11)(6.5%)	5	45.5	2	18.2	2	18.2	2	18.2		
The distribution of patients according to the gender										
Gender	Male (n=90)(53.3%)	45	50.0	22	24.4	12	13.3	11	12.2	0.067
	Female (n=79)(46.7%)	51	64.6	14	17.7	3	3.8	11	13.9	

B – With vocally demanding occupation and vocal strain

Working diagnosis		Inflammatory		Structural		Neoplastic		Others		P value
		No	%	No	%	No	%	No	%	
The distribution of patients according to vocally demanding occupation										
Demanding occupation	Yes (n=122)(72.2%)	77	63.1	25	20.5	8	6.6	12	9.8	0.023*
	No (n=47)(27.8%)	19	40.4	11	23.4	7	14.9	10	21.3	
The distribution of patients according to the amount of high vocal strain activity										
High vocal strain activity	Yes (n=154)(91.1%)	86	55.8	33	21.4	15	9.7	20	13.0	0.624
	No (n=15)(8.9%)	10	66.7	3	20.0	-	-	2	13.3	
Shouting	Yes (n=101)(59.8%)	64	63.4	22	21.8	6	5.9	9	8.9	0.055
	No. (n=68) (40.2%)	32	47.1	14	20.6	9	13.2	13	19.1	
Throat clearing	Yes (n=101)(59.8%)	50	49.5	23	22.8	14	13.9	14	13.9	0.021*
	No (n=68) (40.2%)	46	67.6	13	19.1	1	1.5	8	11.8	
Coughing	Yes (n=85) (50.3%)	39	45.9	23	27.1	11	12.9	12	14.1	0.022*
	No (n=84) (49.7%)	57	67.9	13	15.5	4	4.8	10	11.9	
Insufficient water intake	Yes (n=97) (57.4%)	55	56.7	18	18.6	10	10.3	14	14.4	0.641
	No (n=72) (42.6%)	41	56.9	18	25.0	5	6.9	8	11.1	

C – With smoking and alcohol intake

Working diagnosis		Inflammatory		Structural		Neoplastic		Others		P value
		No	%	No	%	No	%	No	%	
The distribution of patients according to smoking and alcohol										
Smoking	Non (n=96) (56.8%)	53	55.2	21	21.9	2	2.1	20	20.8	0.0001*
	Passive (n=12) (7.1%)	10	83.3	1	8.3	-	-	1	8.3	
	Ex (n=10) (5.9%)	5	50.0	-	-	5	50.0	-	-	
	Smoker (n=51) (30.2%)	28	54.9	14	27.5	8	15.7	1	2.0	
The distribution of patients according to alcohol intake										
Alcohol intake	Non (n=150) (88.8%)	89	59.3	30	20.0	9	6.0	22	14.7	0.0001*
	Occasional (n=15) (8.9%)	5	33.3	6	40.0	4	26.7	-	-	
	Weekly (n=2) (1.2%)	2	100	-	-	-	-	-	-	
	Daily (n=2)(1.2%)	-	-	-	-	2	100	-	-	

D – With LPR, severity of LPR and associated medical conditions

Working diagnosis	Inflammatory	Structural	Neoplastic	Others	P value
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		No	%	No	%	No	%	No	%	
The distribution of patients according to LPR										
LPR	Yes(n=80)(47.3%)	41	51.3	22	27.5	8	10.0	9	11.3	0.246
	No (n=89)(52.7%)	55	61.8	14	15.7	7	7.9	13	14.6	
Severity of LPR (Acco. To RSI)	Mild (n=22)(27.5%)	10	45.5	6	27.3	3	13.6	3	13.6	0.671
	Mod (n=50)(62.5%)	27	54.0	12	24.0	5	10.0	6	12.0	
	Severe (n=8) (10%)	4	50.0	4	50.0	-	-	-	-	

E – With modality of diagnosis

		Working diagnosis								P value
		Inflammatory		Structural		Neoplastic		Others		
		No	%	No	%	No	%	No	%	
Modality for diagnosis	Previously diagnosed (n=2) (1.2%)	-	-	-	-	2	100	-	-	0.0001*
	Indirect laryngoscopy (n=6) (3.6%)	3	50.0	2	33.3	-	-	1	16.7	
	Flexible laryngoscopy (n=96) (56.8%)	56	58.3	23	24.0	3	3.1	14	14.6	
	Ind. Laryng & Flex. Laryng (n=35) (20.7%)	21	60.0	10	28.6	-	-	4	11.4	
	Flex. laryng & Exam. UGA (n=22) (13%)	12	54.5	1	4.5	6	27.3	3	13.6	
	All (n=8) (4.7%)	4	50.0	-	-	4	50.0	-	-	
	Indirect laryngoscopy	Yes (n=49) (29%)	28	57.1	12	24.5	4	8.2	5	
	No (n=120) (71%)	68	56.7	24	20.0	11	9.2	17	14.2	
Flexible laryngoscopy	Yes (n=159) (94.1%)	93	58.5	33	20.8	13	8.2	20	12.6	0.308
	No (n=10) (5.9%)	3	30.0	3	30.0	2	20.0	2	20.0	
Examination UGA	Yes (n=30) (17.8%)	16	53.3	1	3.3	10	33.3	3	10.0	0.0001*
	No (n=139) (82.2%)	80	57.6	35	25.2	5	3.6	19	13.7	
Histopathology	Yes (n=16) (9.5%)	3	18.8	-	-	12	75.0	1	6.3	0.0001*
	No (n=153) (90.5%)	94	61.4	36	23.5	3	1.8	20	11.8	

*Significant using Pearson Chi-square test at 0.05 level of significance

Table 2: The distribution of lesion subtypes of dysphonia in the patients

Diagnosis	No	%
Inflammatory (n=96) (56.8%):		
Acute Non Specific Laryngitis	42	43.78
Chronic Non specific Laryngitis	28	29.12
LPR Laryngitis	12	12.54
Chronic specific Laryngitis	5	5.28
Subglottic, and Arytenoid Granuloma	4	4.12
Laryngeal Candidiasis	4	4.12
Relapsing Polychondritis	1	1.04
Structural (n=36) (21.3%):		
Vocal Cord Nodules	14	38.88
Vocal Cord Polyp	5	13.88
Reinke's Edema	5	13.88
Glottic and Supraglottic Mass	4	11.11
Vocal Cord Cyst & Para, Pre-Epiglotic Cyst	3	8.33
Juvenile Recurrent Respiratory Pappilomatosis (JRRP)	2	5.55
Combined Laryngocele	1	2.77
Laryngomalacia	1	2.77
Anterior Comissure Laryngeal Web	1	2.77
Neoplastic (n=15) (8.9%):		
Laryngeal Squamous Cell Ca	10	66.66
Laryngeal Non Hodgkin Lymphoma	1	6.66

Laryngeal Leukoplakia	4	26.66
Neuromuscular (n=9) (5.3%):		
VC Palsy	9	100
Psychogenic: (n=8) (4.7%):		
Psychogenic dysphonia	8	100
Combination: (n=5) (3%):		
Gunshot Injury to Upper Neck (Trauma)	5	100

Table 3: The relative number of males and females in vocally demanding occupation

Working diagnosis	Gender			
	Male (n=59)		Female (n=63)	
	No	%	No	%
Inflammatory (n=77)	32	54.2	45	71.4
Structural (n=25)	15	25.4	10	15.9
Neoplastic (n=8)	7	11.9	1	1.6
Neuromuscular (n=6)	1	1.7	5	7.9
Psychogenic dysphonia (n=1)	-	-	1	1.6
Combinations (n=5)	4	6.8	1	1.6

Table 4: The distribution of patients according to occupation

Occupation	No	%
Non professional voice users	124	73.4
Unemployed and retired	28	16.5
Professional voice users	17	10.1
Inflammatory (n=11, 64.7%), VC nodule (n=3, 17.6%), Polyps and cysts (n=2, 11.8%) and Psychogenic (n=1, 5.9%)		

Discussion:

The commonest age group affected were 40 – 49 years (23.1%) followed by 50 – 59 years (17.8%). Van Houtte et al (2010)^[12], Coyle et al (2001)^[13] and Herrington-Hall et al (1988)^[14] all reported that the commonest age group affected were 45 – 64 years, (34.5%), (38.9%), (34.3%) respectively.

Children (1 month–14 years) were least frequently seen at our department compared to previous studies by Coyle et al (2001)^[13] and Herrington-Hall et al (1988)^[14]. In consistency with studies done by Carding et al (2006)^[15], Kilic et al (2004)^[16] and Ben (2008)^[17], the most prevalent pathology in this age group was vocal fold nodules. Once puberty rushes in, we found that the dominant pathology was inflammatory. Psychogenic dysphonia was reported in 7.6% in this age group. Roy (2003) stated that stress, emotion, and psychological conflict are frequently presumed to cause or exacerbate functional symptoms^[18]. Inflammatory lesions continued to be the commonest lesions in adults in the current study especially laryngitis. Mackenzie (2008) stated that nonspecific laryngitis is an extremely common condition and the most common etiological factors are smoking, voice abuse and LPR^[19]. This partly explains the high prevalence of this condition in

young adults. In the current study the total number of females lags just behind that of males, but the percentage of women was higher than that of men in the category of vocally demanding occupation. Generally speaking, males and females were involved nearly to the same extent by the inflammatory disorders. Structural disorders were found more frequently in males than females by about one third while the neoplastic conditions were 4 times more common among males. However, females were more predisposed to neuromuscular and psychogenic disorders. Roy (2003) stated that at the molecular level, women have less hyaluronic acid in the superficial layer of the lamina propria which plays an important role in wound repair and this indicates that there is less protective tissue dampening and, therefore, potentially reduced wound-healing response^[18], this will make women more vulnerable for voice disorders because of the structural differences with less tissue mass to dampen a larger amount of vibrations.

The dominant pathology in inflammatory disorders was acute non specific laryngitis 43.8%. The most prevalent pathology in structural disorders was vocal fold nodules 38.9%. Premalignant and malignant conditions accounted for 9% of the working diagnoses in our study and were mainly found in patients more than 60 years in age. Vocal

cord palsy and paresis represented 5.3% of the overall diagnoses and was mainly found in late adulthood. It was mainly due to surgical causes (iatrogenic). Psychogenic dysphonia was diagnosed in 4.7% of the patients. Van Houtte et al (2010) stated that patients were diagnosed with psychogenic dysphonia when stress, emotion, or psychological conflicts were clearly the cause of the voice disorders and organic pathology was absent. These patients were also aware of the cause of their voice disorder and the focus of their treatment was on psychological counseling rather than on voice therapy^[12]. Al-Azzawi (2003) in his study stated that inflammatory disorders were (42.9%), structural disorders (37.1%), neoplastic disorders (10%), neuromuscular disorders 4.3% and functional dysphonia (5.7%)^[20].

Significant relation was found between vocally demanding group with the inflammatory and structural lesions. While Van Houtte et al (2010) reported that the main pathology in the vocally demanding occupation in both sexes was functional voice disorders with females predominance^[12]. In the current study teachers represent the largest group (65%) in professional voice users with a distinct female dominance (90.9%). Coyle et al (2001)^[13], Katherine et al (2002)^[21], Fortes et al (2007)^[22] and De Jong et al (2006)^[23] all reported that teaching has been identified with increased risk for dysphonia, in females more than males with acute and chronic non specific laryngitis as the dominant pathologies. Van Houtte et al (2010) concluded that 20% of all active individuals visiting the ENT department with dysphonia were teachers and the dominant pathology was functional voice disorder followed by vocal fold nodules, cysts and polyps^[12].

In the current study, inflammatory disorders were 8 times more common, structural 10 times more common and psychogenic dysphonia 3 times more common, in patients with high vocal strain activity. Julian (2008) stated that the significance of this relationship lies in the potentially traumatic effects to the vocal folds of these vocally abusive behaviors which make the vocal system more susceptible for the voice disorders^[7].

About one third of patients in our study were smokers. The significant relationship of smoking with voice disorders in our study was mainly with

the premalignant and malignant conditions. The percentage of these conditions in smokers and ex-smokers was 15.7% and 50%, respectively. On the other hand they represented only 2% in non smokers. A similar relationship was found with alcohol intake. The figures for premalignant and malignant conditions in these categories were 26.7% and 100%, respectively, while they account for 6% in non alcoholics. Birchall and Pope (2008) explained the association of tobacco and alcohol with laryngeal malignancies^[24].

LPR was diagnosed in (7.1%) of the patients in the current study and (70%) of them had an RSI =20 (moderate in severity) with laryngitis as the main pathology. Christine et al (2000) revealed that laryngopharyngeal reflux (LPR) has been implicated in the etiology of many laryngeal disorders^[25]. Belfasky et al (2002) concluded that some degree of reflux is present in normal individuals and RSI of more than 13 to is considered to be abnormal^[8]. LPR was diagnosed in (25.9%) of the patients in the study of Coyle et al (2001)^[13], in (9%) of the patients in the study of Van Houtte et al (2010)^[12]. A possible explanation is the growing knowledge of the impact of reflux on laryngeal complaints, which has led to a more prompt treatment with proton pump inhibitors by the general practitioners. Wong et al (2000) conducted that GERD is increasingly diagnosed and prescriptions for proton pump inhibitors have increased 14-fold^[26].

The main modality that was used to diagnose the various voice disorders in the current study was the flexible fiberoptic endoscope. Successfulness of diagnosis using this device was up to 94% and it was well tolerated by patients.

Conclusion:

The commonest age groups affected by dysphonia were 40-49 years. Males were more involved with dysphonia than females. The inflammatory organic voice disorders were the most common cause of voice disorders. Significant association was found between age, vocally demanding occupations, smoking and alcohol. Professional voice users represent almost one tenth of the studied group. Teachers being the main subgroup with organic voice disorder as the main cause for their dysphonia.

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