

Clinical Profile of Hoarseness and its Management Options: A 2 years Prospective Study of 145 Patients

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ABSTRACT

Aim: This study was undertaken to study the clinical profile of hoarseness and the role of conservative (nonsurgical) and surgical modes of intervention.

Materials and methods: A prospective cohort analysis was carried out in Department of ENT, Government Medical College, Srinagar, in 145 cases of change in voice for 2 years duration. All cases were analyzed for detailed history and pre- and postoperative fiber optic laryngeal examination. The cases were managed by conventional conservative methods or underwent phonosurgery in nonresolving cases.

Results: Total 145 cases with M:F ratio of 1.37:1 were analyzed. Patients' age ranged from 5 to 80 years and majority of patients equally presented in 4th and 6th decade and about 75% had duration of hoarseness of more than 3 months. A voice demanding profession was present in 34% of cases. Vocal abuse was the commonest predisposing factor (about 40%) followed by laryngopharyngeal reflux disease (26%). Functional voice disorders were found in 15.85% of cases while 62.06% of patients had a definite organic disorder. Conservative treatment (primary) was employed in 103 cases (71%), surgical treatment (primary) in 42 cases (29%) and surgical treatment after failure of conservative was given in 22 cases (15%).

Keywords: Hoarseness, Phonosurgery, Voice disorders, Vocal polyp.

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INTRODUCTION

For successful life of an individual, communication skills are of paramount importance. Among other ways of communication, ability to share ideas via the medium of spoken words using any language is the most important communication skill. The physical, mental, financial, social and semotional constraints suffered by an individual having voice disorder can be easily estimated.

Voice disorder may be defined as a voice quality which has one or more of the following features:

- Is inaudible
- There is age and gender discordance with speaker
- Is incapable of fulfilling linguistic and paralinguistic features
- Is easily fatigable and is associated with pain and discomfort with phonation.

Voice disorders may be divided into four major categories (Rosen's classification) which include functional, organic, neuromuscular and systemic disorders.¹

AIM AND OBJECTIVES

- To study the incidence of voice disorders in hospital attending Kashmiri population.
- To study the role of conservative (nonsurgical) treatment in management of voice disorders.
- To study the role of various surgical procedures in the management of voice disorders.

MATERIALS AND METHODS

This prospective study was carried out in Department of ENT, Government Medical College, Srinagar and associated SMHS Hospital from July 2009 to September 2011 in a period of 2 years. Acute onset (duration <1 month) voice disorders and malignant diseases were excluded from this study. After taking detailed history and clinical examination, patients were subjected to assessment of voice quality by auditory perceptual rating (GRBAS), aerodynamic (measurement of maximum phonatory time) and patient self-reporting (Voice handicap index with score ranged from 0-40). Treatment was decided based on actual voice disorder type. The data collected was analyzed by applying standard statistical methods.

OBSERVATION AND RESULTS

Incidence and Age/Sex Distribution of Voice Disorders

A total of 30,194 cases attended ENT OPD (15,088 males and 15,106 females) during the study period. Out of these 145 patients (84 males and 61 females) presented with voice disorders. The incidence calculated per 100 OPD attending Kashmiri population in males is 0.55 and in females is 0.40. The overall incidence of voice disorders per 1000 OPD attending Kashmiri population is 4.8. The male: female sex ratio was 1.37:1. The patient age ranged from 5 to 80 years and about one-half of total patients presented in 3rd and 4th decade (15.86 + 32.41%) of their life.

Clinical Profile of Voice Disorders

About three-fourth (75%) patients had duration of voice disorders of more than 3 months, and about 35% patients

had symptoms persistent for more than 12 months. Out of the 145 patients in the study group, 87 (60%) exhibited diurnal variation with worsening of symptoms during either morning hours in 60 (41%) or evening hours in 27 (19%). Effortful vocalization was seen in 99 out of 145 patients (68%).

A voice demanding profession, notably teaching, preaching, etc. was present in 49 (34%) patients. However, housewives (46%) comprised the largest group followed by students (20%), businessman (15%), teachers (11%) and farmers/laborers (3%).

Classification and Diagnosis of Voice Disorders

Functional voice disorders comprised 23 cases (15.85%) and include muscle tension dysphonia and mutational falsetto (Table 1). Neuromuscular control abnormalities comprised 22 cases (15.15%) and included vocal cord palsy and spasmodic dysphonia. Organic disorders comprised 90 cases (62.06%) and include vocal nodule, vocal polyp, vocal cyst, chronic laryngitis, atrophic cord, papilloma, vocal congestion and Reinke's edema. Systemic disorders affecting voice includes reflux laryngitis (6.89%).

Pretreatment Vocal Parameters

Auditory perceptual ratings were grade 1.90 (± 0.29), roughness 1.51 (± 0.66), breathiness 0.69 (± 0.90), asthenia 1.00 (± 0.89), strain 0.60 (± 0.65) (Table 2). Aerodynamic measure, i.e. maximum phonatory time (in seconds) was 10.3 (± 4.27) and patients self-reporting (vocal handicap index-10) was 12.7 (± 8.43).

Treatment of Voice Disorders

Conservative treatment which included voice therapy and medical treatment was offered to 103 cases (71%), while

42 cases (29%) were treated surgically (Tables 3 to 5). Surgical treatment after failure of conservative was given in 22 cases (15%).

Voice therapy was given in the form of vocal hygiene, vocal exercises and behavior modifications. Medical treatment was given in form of proton pump inhibitors, prokinetics, mucolytics and anti allergics. Surgical treatment included thyroplasty and microlaryngeal surgery (MLS). In MLS, usually truncation method was employed except in few cases where microflap method was used.

Pre- and Posttreatment Vocal Parameters

Table shows pre- and posttreatment vocal parameters in patients managed conservatively (Tables 6 and 7). The p-value was significant in all parameters (< 0.05). Paired t-test was used to find the final results.

Table shows pre- and posttreatment vocal parameters in patients treated surgically. p-value was significant (< 0.05) in all parameters except in breathiness having p-value of 0.122.

Table shows pre- and posttreatment vocal parameters in patients with vocal nodule, vocal polyps, functional voice disorders, chronic laryngitis, vocal cord palsy and reflux laryngitis. For vocal nodules treated conservatively p-value was significant ($p < 0.05$) in all except in MPT (in seconds) having p-value of 0.529. However, comparison after surgical treatment in vocal nodules showed a significant ($p < 0.05$) p-value in all the three parameters (GRBAS, MPT, VHI). Pre- and postsurgical vocal parameters in patients with vocal polyps were significant ($p < 0.05$) in all the three parameters. Pre- and postconservative treatment vocal parameters in patients with functional voice disorders showed that p-value was significant ($p < 0.05$) in all parameters except in GRBAS having a value of 0.68. In case of chronic laryngitis following conservative treatment p-value was significant ($p < 0.05$) in all except in MPT. P-value was significant

Table 1: Classification and diagnosis of voice disorders

Rosen's classification	Diagnosis	Number of cases	Percentage
A. Functional voice disorders	Muscle tension dysphonia	19	13.10
	Mutational falsetto	4	2.75
B. Neuromuscular control abnormality	Vocal cord palsy	18	12.41
	Spasmodic dysphonia	4	2.75
C. Organic voice disorders	Vocal nodule	34	23.44
	Vocal polyp	40	27.58
	Vocal cyst	4	2.75
	Chronic laryngitis	7	4.82
	Atrophic cord	2	1.37
	Papilloma	1	0.68
	Vocal congestion	1	0.68
	Reinke's edema	1	0.68
D. Systemic disorders affecting voice	Reflux laryngitis	10	6.89
Total		145	

Table 2: Overall preoperative vocal parameters in patients with voice disorders

A. Auditory perceptual rating (GRABS)	
Vocal parameters	Mean (standard deviation)
Grade	1.90 (± 0.29)
Roughness	1.51 (± 0.66)
Breathiness	0.69 (± 0.90)
Asthenia	1.00 (± 0.89)
Strain	0.60 (± 0.65)
B. Aerodynamic measures	
Maximum phonatory time (MPT in seconds)	10.3 (± 4.27)
C. Patient self-reporting	
Vocal handicap index-10 (VHI-10)	12.7 (± 8.43)

($p < 0.05$) in all parameters for both conservative as well as surgical treatments in cases of vocal cord palsy.

Complications of Surgical Treatment for Voice Disorders

There were 2 cases of wound infection and one case of recurrence of hoarseness. No airway compromise or excessive bleeding was noted. After 3 to 12 months of follow-up, no implant migration or extrusion was found in patients in whom thyroplasty was done.

DISCUSSION

The incidence of voice disorder among new OPD cases was found to be 0.48%. In a study done by Sambu Baitha et al incidence of voice disorders among new cases was found 0.66%.² Hansa Banjara et al also found incidence among new cases 0.64%.³ Our study showed slightly less incidence than Baitha and Hansa et al reason for that may be our exclusion criteria.

Table 3: Treatment given to patients of voice disorders

Treatment	Number of cases	Percentage
Conservative (primary)	103	71
Surgical (primary)	42	29
Surgical (after failure of conservative)	22	15

Table 4: Nonsurgical (conservative) management in voice disorders

	Diagnosis	Number of cases	Treatment given
1	Muscle tension dysphonia	17	Voice therapy + medical
2	Mutational falsetto	4	Voice therapy
3	Spasmodic dysphonia	4	Voice therapy
4	Vocal cord paralysis	18	Voice therapy
5	Reflux laryngitis	10	Voice therapy + medical
6	Vocal nodule	34	Voice therapy + medical
7	Vocal polyp	2	Voice therapy + medical
8	Vocal cyst	2	Voice therapy
9	Chronic laryngitis	7	Voice therapy + medical
10	Atrophic cord	2	Voice therapy
11	Vocal congestion	1	Medical
12	No finding	2	Medical
	Total	103	

Table 5: Surgical treatment given to patients of voice disorder

Diagnosis	No. of cases	Procedure
Vocal cord palsy	9	Thyroplasty
Vocal nodule	13	MLS
Vocal cyst	38	MLS
Vocal polyp	2	MLS
Papilloma	1	MLS
Reinke's edema	1	MLS
Total	64	

Table 6: Overall pre- and posttreatment (conservative) vocal parameters in patients with voice disorders

Parameter	Pretreatment (conservative)	Post-treatment (conservative)	p-value
Grade	2.0 (± 0.00)	0.47 (± 0.59)	0.000
Roughness	1.42 (± 0.79)	0.66 (± 0.56)	0.000
Breathiness	0.98 (± 0.90)	0.22 (± 0.45)	0.000
Asthenia	1.17 (± 0.75)	0.22 (± 0.41)	0.000
Strain	0.79 (± 0.74)	0.03 (± 0.17)	0.000
MPT (in seconds)	9.8 (± 4.3)	13.6 (± 5.2)	0.000
VHI-10	14.8 (± 9.5)	2.9 (± 4.1)	0.000

Table 7: Overall pre- and postsurgical vocal parameters in patients with voice disorders

Parameter	Presurgical scoring	Postsurgical scoring	p-value
Grade	1.80 (0.39)	0.8 (0.47)	0.000
Roughness	1.60 (0.49)	0.6 (0.54)	0.000
Breathiness	0.41 (0.81)	0.2 (0.45)	0.122
Asthenia	0.83 (0.99)	0.06 (0.35)	0.000
Strain	0.41 (0.49)	0.03 (0.17)	0.000
MPT (in seconds)	10.9 (4.1)	15.15 (5.4)	0.000
VHI-10	10.6 (5.9)	1.2 (1.7)	0.000

Male/female ratio of 1.37:1 with male predominance was observed in present study and our finding is exactly in confirmation with that of other studies done by Sambu Baitha et al, K Batra et al and Hansa Banjara et al which also showed male predominance.²⁻⁴

In present study, majority of patients were seen in the age group of 31 to 40 years (32.41%) followed by age group 21 to 30 years (15.86%). S Baitha et al also found majority of patients (28.18%) in the age group of 31 to 40 years.² Ghosh et al found majority of patients in the age group of 21 to 30 years.⁵ Since, majority of patients (approximately one-half) presented in third and fourth decade of life, the reason for that may be more sensitiveness to voice changes in these years of life.

In present study, children up to age of 15 years comprised about 13% of total patients. Silverman EM reported that 6 to 23% of 5 to 18 years old have some form of voice problem.⁶ In present study, boys were twice in number as compared to girls. Since, boys are more involved in outdoor games and sports, shouting and other forms of voice misuse are common in boys as compared to girls and this may explain higher percentage of voice disorders in boys. A Connelly et al found that voice abuse as most common (45%) diagnosis in children.⁷ Carding PN et al also found dysphonia more common in boys.⁸

Presenting Complaints and Duration

In present study, change in voice was the most common presenting complaint. Duration of voice disorders ranged from more than 1 month to many years. A total of 68% of patients presented within the first year of appearance of symptoms. Chopra and Kapoor who had similar exclusion criteria as this study found 68.65% of patients with duration of hoarseness less than 1 year.⁹

Diurnal Variation

About 41% of patients complained voice disorder worsened in the mornings and improved as day progressed. It is postulated that gastrolaryngeal reflux is intensified during sleep because of increased effort involved in snoring or sleep apnea.

Profession

Majority of cases (46%) were housewives followed by students (20%). Similar results are found in other studies.^{3,5} S Baitha found that majority of patients (36.36%) were laborers followed by housewives (21.81%).² Differences in findings in different studies may be because of location of hospital and different professional percentage in general population. Voice use demands and vocal techniques are central to trauma and pathogenesis of vocal fold masses. In present study, we found 50 cases (i.e. 34%) having voice demanding profession (e.g. teachers, religious preachers, hawkers, etc). Batra et al (2004) also found approximately 31.4% patients having voice demanding profession (elite vocal performers and professional voice users, 15.7% each).⁴ But major portion (66%) of patients, in present study, do not have any voice demanding profession. This shows that voice disorders are more common in nonvoice demanding professions and presence of other predisposing factors may explain this observation. Herrington-Hall et al (1988)¹⁰ found that the presence of laryngeal pathologies tend to reflect both the amount of voice use and the conditions under which voice was used (including noise and stress). So population working in noisy stress-full environment can have voice disorder despite nonvoice demanding profession.

Predisposing Factors

In present study, predisposing factors which we found are vocal abuse in 58 cases (40%), LPR in 39 cases (26%), addiction (smoking) in 28 cases (19%) and in 25 cases (17%) no predisposing factors were present. Hansa Banjara et al found vocal abuse in 31% cases and Swapan KG in 72% of cases.^{3,5} LPR as a cause of voice disorder was studied by Joan Kuhn, Block BB, Koufman JA.¹¹⁻¹³ In present study, smoking is less frequent than other studies^{2,3} and the reason for that may be more housewives and students among these patients, and the absence of alcohol intake in present study is because of religious prohibitions in concerned population.

Diagnosis

In present study, total 13 entities were diagnosed in 145 patients and in most of cases, diagnostic fibro-optic

laryngoscopy was done. Woo et al performed stroboscopic examination in 146 patients and 11 different entities were observed.¹⁴ Sataloff et al performed strobovideolaryngoscopy on 352 patients and 40 (56) entities were observed.¹⁵

Classification

In present study, we used Clark A Rosens (2000) classification for distribution of voice disorders into functional, neuromuscular control abnormalities (movement disorders), organic and systemic diseases.¹ Another classification divides voice disorders into two major groups: Functional and organic voice disorders.³ In present study, functional voice disorders were found in 21 cases (14.48%) and included muscle tension dysphonia and mutational falsetto. Vocal cord palsy was found in 18 cases (12.41%) and spasmodic dysphonia in 4 cases (2.75%). Vocal cord polyps were found in 40 cases (27.58%) and comprised largest group in organic voice disorders. Vocal nodules were found in 34 cases (23.44%) and chronic laryngitis in 7 cases (4.82%). Systemic diseases affecting voice (e.g. LPR) was found in 10 cases (6.89%). According to Koufman functional voice disorders may account for up to 40% of the cases of dysphonia referred a multidisciplinary voice clinic.¹⁶ Present study shows lesser number of patients in functional group, the reason for that is inclusion of vocal nodule and vocal polyp under functional group (as these are secondary to vocal abuse/misuse) in the study by Batra et al.⁴ Present study shows male:female ratio is 9:1 for cases of vocal palsy, while S Baitha et al² found a ratio of 9:1 and Hansa et al³ of 2.5:1.

Voice Assessment

In present study pre- and posttreatment vocal parameters were taken in form of auditory perceptual rating (grade, roughness, asthenia, breathiness, strain - GRBAS), aerodynamic measures (maximum phonatory time in sec), and patients self-reporting tool (vocal handicap index-10). GRBAS is most commonly used auditory perceptual rating scale because of simplicity and easy reproducibility.^{17,18} This scale is a subjective perceptual evaluation of five vocal characteristics assigned a value between 0 and 3, where 0 is normal and 3 is extreme. The five elements are grade (G), a description of degree of hoarseness, roughness (R), perceptual irregularity of vocal fold vibrations, usually the result of the change in the fundamental frequency or amplitude of vibration. Breathiness (B) or the assessment of the air leakage through the glottis is the third component of the scale. Esthetic (A) voice denotes weakness and lack of power. Strain (S) reflects a perception of vocal

hyperfunction. Maximum phonatory time (MPT) is an aerodynamic measure whereby a patient is asked to take a deep breath and phonate a steady state vowel sound EE/AA for maximum time possible. Three such readings are taken and the highest among them is MPT for that particular patient. Values below 10 are regarded as pathological.¹⁹ Patient self-reporting tool (VHI-10) is easily self-administered and scored quickly at the time of evaluation while preserving original VHI's utility and validity.²⁰ Mean score were grade 1.90, roughness 1.51, breathiness 0.69, asthenia 1.00, strain 0.60, MPT in sec 10.3 and VHI-10 was 12.7. PN Grading et al used GRABS scoring for voice evaluation in patients of voice disorders.¹⁷ N Nererkar et al used MPT in secs for aerodynamic measures in patients with voice disorders and Rosen CA, has developed and validated VHI-10 as patient self-reporting tool.^{20,21}

Management

In present study, 103 patients were treated conservatively in form of voice therapy and/or medical treatment. The voice disorders in which conservative treatment was given are muscle tension dysphonia, mutational falsetto, spasmodic dysphonia, vocal cord paralysis, reflux laryngitis, vocal nodule, vocal cyst, chronic laryngitis, atrophic cord, vocal congestion. Out of these 103 patients, 22 patients (15%) needed surgical treatment because of poor response to conservative treatment given almost for 3 months. Forty-two patients were treated surgically (primarily) in form of MLS and thyroplasty. Postoperatively, these patients were also given voice therapy. The voice disorders which were treated surgically are vocal polyp, vocal nodule, vocal palsy, vocal cyst, papilloma, reinkes edema. All the patients with functional disorder (n = 21) were treated with voice therapy, psychotherapy along with vocal conservation and vocal hygiene. Posttherapy vocal parameter (MPT in seconds, VHI-10) showed significant change ($p > 0.05$) GRABS score changed from 4.2 (pretreatment) to 4.0 (posttreatment). Similar conclusion was drawn by James A Koufman who studied 52 patients with functional disorders and concluded that voice therapy is beneficial for patients with functional voice disorders. Roy N advocated laryngeal manipulation in treatment of MTD. MTD secondary to inflammatory and structural conditions usually settled once primary disorder was treated. Patients with mutational falsetto were taught larynx-depressing exercises to produce vegetative voice. These patients achieved normal voice with voice therapy, no surgical intervention was needed. Same conclusion was drawn by M Dagli et al.²² Botulinum toxin injection into cricothyroid muscle have been shown to be effective in resistant cases.²³

Patients with reflux laryngitis were treated with proton pump inhibitor (PPI) ± prokinetics and showed significant improvement in vocal parameters with VHI-10 almost approaching to zero in few patients. Most patients were given twice daily omeprazole. Similar results were noted by Noordzij et al (2011) in treatment of reflux laryngitis by omeprazole.²⁴ In addition to prescribing PPI, patients in present study were given voice therapy in the form of vocal hygiene, diet and life style modifications. We also used prokinetic drugs in severe LPR.

Patients with vocal cord palsy were given either voice therapy or surgical management in the form of type I thyroplasty followed by voice therapy. About 50% patients with vocal paralysis responded to voice therapy. Voice therapy was given in form of vocal exercises, e.g. hard glottal attacks and pushing. Significant improvement in vocal parameters was noted. GRABS and VHI-10 significantly changed and there was significant increase in MPT. Similar results were noted by LD Alatri who concluded in 90 patients of unilateral vocal fold paralysis that early vocal therapy may enable significant improvement in vocal function.²⁵ Isshikii type I thyroplasty was performed in remaining patients with vocal cord paralysis (U/L). All cases were done under local anesthesia and silastic block was used. Intraoperative steroids and antibiotics were used in all cases. There was significant improvement in MPT in all cases. GRABS and VHI-10 also decreased. Numerous studies have been done on the same procedure by different authors.^{7,26,27} In present study, one patient who had vagal palsy due to glomus jugulare was having aspiration as a main symptom in addition to dysphonia. Silastic medialization was done and there was significant improvement in both symptoms. All patients were also advised about postsurgical voice therapy. S Miller also advocated voice therapy after medialization to improve intrinsic laryngeal muscle strength and coordination of respiration and phonation.²⁸ No patient developed complication leading to airway compromise in immediate postoperative period. There were two patients who had wound infection which resolved with antibiotics. No implant extrusion and recurrence of hoarseness of voice was noted in present study after 6 to 12 months follow-up. D Bray et al has studied incidence and timing of post-operative complications in type I thyroplasty.²⁹

Spasmodic dysphonia presented with difficult therapeutic challenge in our study. In few cases it was difficult to differentiate adductor spasmodic dysphonia from primary muscle tension dysphonia and voice therapy alone was not fully effective in its management. An antianxiety drug (clonazepam) was given along with voice therapy but

results were not rewarding. Abductor spasmodic dysphonias were also given voice therapy along with antianxiety drugs. Since botulinum toxin is main treatment protocol in these patients but due to economic factors (because of cost and repeated injections), our patients cannot afford this treatment. Nelson Roy et al used phonatory break analysis in differentiating adductor spasmodic dysphonia from muscle tension dysphonia. Adductor spasmodic showed higher number of phonatory breaks than MTD.²³ The mainstay of symptomatic treatment remains botulinum toxin injection into specific intralaryngeal muscles, although the results are not always predictable and poorer for those with the abductor form and those with tremor.³⁰

In the present study, patients with vocal nodule were given either surgical treatment or conservative treatment in the form of pharmacological treatment and voice therapy. Drugs which were used are proton pump inhibitors and anti-allergics (occasionally). Voice therapy in form of voice rest, vocal hygiene, proper vocal techniques was given. Voice use demands and other contributing factors were also addressed. Soan Kuhn suggested role of pharyngeal acid reflux events with patients of vocal cord nodule.¹¹ Allergic causes have also been included in etiopathogenesis of laryngeal mucosal lesions.³¹ Hence, antihistamine will work in these circumstances. In children with early vocal nodules, mostly conservative treatment was used. In about 13 cases, microlaryngeal surgery was done. MLS was done in patients with well-formed vocal nodule having duration greater than 3 months or those who had given poor response to conservative management. Postoperative voice rest and voice therapy was given in all patients in whom MLS was done. Postoperative vocal parameters were significantly changed. Kenneth W Altman also advocated MLS in longstanding nodule.³²

About 38 cases out of 40 vocal polyps were treated surgically (MLS). Truncation method was usually used. Microflap method was used occasionally. Usually polyps were pedunculated and truncation method was relatively easier than microflap. Adrenaline infiltration was given in few cases and mostly microscope was used. In few cases, 0-degree endoscope was used. Postoperative PPI and voice therapy was also given. Out of 40, 1 patient had self-resolution of polyp with conservative treatment. Srirompotang et al also found that small polyps might completely resolve with conservative nonsurgical treatment.³³ Another patient with vocal polyp had self-expulsion of vocal polyp during violent cough. There were two episodes of hemoptysis and finally on examination no polyp was found on vocal cords.

In present study, about 7 cases (4.82%) of chronic laryngitis were found. All were given conservative treatment

in the form of PPI, mucolytics and antiallergics and voice therapy. There was noticeable change in vocal parameters. Four patients with vocal fold cyst were diagnosed. In two of them, conservative treatment was given and in rest of two MLS was done. Two out of four were children and were treated conservatively. Otherwise, MLS (microflap) is recommended for the vocal cysts.³⁴ Reinke's edema (1 case) was operated using microflap technique. Smoking cessation and PPI were also advocated. Another patient with papilloma (on HPE of first operative specimen) was operated again for recurrence of hoarseness using microsurgical techniques.

REFERENCES

- Clark A, Rosen, Thomas Murray. Nomenclature of voice disorders and vocal pathology. *Otolaryngologic Clinics of North America* 2000;33(5).
- Sambu Baitha, et al. Clinical profile of hoarseness of voice. *Indian J Otolaryngol Head Neck Surg* 2002 Jan-March;54(1): 14-18.
- Hansa Banjara, et al. Hoarseness of voice: A retrospective study of 251 cases. *Int J Phonosurg Laryngol* 2011 Jan-June;1.
- Kadambari Batra, et al. Functional voice disorders and their occurrence in 100 patients of hoarseness as seen in fiberoptic laryngoscopy. *Indian J Otolaryngol Head Neck Surg* 2004 Apr-June;56(2):91-95.
- Swapan K Ghosh, et al. Microlaryngoscopic study of 100 cases of hoarseness of voice. *Indian J Otolaryngol Head Neck Surg* 2001 Oct-Dec;53(4):270-72.
- Silverman, et al. Incidence of chronic hoarseness among school age children. *J Speech Hear Disord* 1975;40:211-15.
- Connelly A, et al. Management of dysphonia in children. *J Laryngol Otol* 2009;123:642-47.
- Carding PN, et al. The prevalence of childhood dysphonia: A cross-sectional study. *J Voice* 2006;20:623-30.
- Chopra H, Kapoor M. Study of benign glottic lesions undergoing MLS. *Indian J Otolaryngol Head Neck Surg* 1997;49(3): 276-79.
- Herrington Hall, et al. Description of laryngeal pathologies by age, sex and occupation in a treatment seeking sample. *J Speech Hear Disord* 1988;53:57-64.
- Soan Kuhn, et al. Pharyngeal acid reflux events in patients with vocal cord nodules. *Laryngoscope* 1998;108:1146-49.
- Block BB, Brodsky L. Hoarseness in children and role of LPR. *Int J Pediatric Otorhinolaryngology* 2007;71:1361-69.
- Koufman JA. Gastroesophageal reflux and voice disorder. Diagnosis and treatment of voice disorders. *New York-Tokyo* 1995;161-75.
- Woo P, et al. Diagnostic value of stroboscopic examination in hoarse patients. *Journal of Voice* 1991;5(3):231-38.
- Sataloff RT. Stroboscovideolaryngoscopy: Results and clinical value. *Annals of Otolaryngology, Rhinology and Laryngology* 1991 Sep;100(9):725-27.
- Koufman JA. The spectrum of vocal dysfunction. *OCNA*. 1991 Oct;24(5):985-88.
- Garding PN, Wilson JA. Measuring voice outcome: State of science review. *J Laryngol Otol* 2009;123:823-29.
- Webb AL, Garding PN. Optimizing outcome assessment of voice intervention. *J Laryngol Otol* 2007;121:763-67.
- Hirano M. Clinical examination of voice. 1st edition. Vienna: Springer-Verlag, 1981.
- Rosen CA. Development and validation of voice handicap index-10. *Laryngoscope* 2004;9:1549.
- Nerukar N, et al. Vocal outcome following subepithelial infiltration technique in microflap surgery: A review of 30 cases. *J Laryngol Otol* 2007;121:768-71.
- Dagli M, et al. Mutational falsetto: Intervention outcome in 45 patients. *J Laryngol and Otol* 2008;122:277-81.
- Roy N. Manual circumlaryngeal techniques in the assessment and treatment of voice disorders. *Opinion in Otolaryngology and HNS* 1998;6:151-55.
- Noordzij JD, et al. Evaluation of omeprazole in treatment of reflux laryngitis: A prospective, Placebo controlled, randomized, double blind study. *Laryngoscope* 2001;111:2147-51.
- Alatri LD, Galia S, Rigatte M, et al. Role of early voice therapy in patients affected by unilateral vocal fold paralysis. *J Laryngol Otol* 2008;122:936.
- James A Koufman, et al. Laryngoplasty for vocal cord medialization: An alternative to Teflon. *Laryngoscope* 1986 July;96.
- Wanamaker JR, et al. Phonosurgery: Sialastic medialization for unilateral vocal fold paralysis. *Operative Tech. Otolaryngol Head Neck Surg* 1993;4:207-17.
- Susan Miller. Voice therapy for vocal fold paralysis. *OCNA* 2004;37:115.
- Bray D. Complications after type one thyroplasty. *ILO* 2008.
- Blitizer A, et al. Botulinum toxin in management of spasmodic dysphonia. A 12 years experience in more than 900 patients. *Laryngoscope* 1998;108:1435-41.
- Hocevar, et al. Role of allergy in etiopathogenesis of laryngeal mucosal lesion. *Acta Otolaryngol (Stockh)* 1997.527(supple).
- Kenehter W Altman. Vocal fold masses. *OCNA* 2007;40:101.
- Sriromptang, et al. Small vocal cord polyps completely resolved with conservative treatment. *South Asian I Trop Med Public Health* 2004;35(1):169-71.
- James A Burns, et al. Phonomicrosurgical treatment of intracordal vocal fold cyst in singers. *Laryngoscope* 2009; 119:419-22.

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