ORIGINAL ARTICLE ASIAN JOURNAL OF MEDICAL SCIENCES

Evaluation and management of voice disorders: Our experiences

Rishikesh Thakur[1], Abishesh Jha[2], Sanjeev Kumar Thakur[3]

[1]Lecturer, [2]Speech Therapist and Audiologist, [3]Associate Professor, Department of Otorhinolaryngology and Head Neck Surgery, Nobel Medical College and Teaching Hospital, Biratnagar, Nepal

Submission: 09-12-2021 Revision: 18-12-2021 Publication: 01-01-2022

ABSTRACT

Background: Change in voice is one of the most common complains among patients visiting to ENT outpatient. The causes are numerous and need to be evaluated before approaching to curative intent of treatment. **Aims and Objectives:** The current study was designed with an aim to analyze the spectrum of voice disorders and their management option. **Materials and Methods:** Prospective study conducted between June 25, 2020, and November 30, 2021. Clinical, demographic profiles were recorded. Fiber-optic laryngoscopy was performed in all the cases. Radiology examination computed tomography/magnetic resonance imaging was supplemented only in required cases. Treatment was executed based of etiological profile analysis. Minimum 3 months follow-up was collected post-therapy. Statistical analysis was performed using Statistical Package for the Social Sciences version 24. Pearson Chi-square test was used for see the association between parameters. P-value was considered significant while being <0.05. **Results:** Out of 218 patients, the most patients (approx. 70%) occupied in the age group of 30–50 years. There was male predominance (76.6%). Voice change secondary to laryngopharyngeal reflux was seen in 56.4% of cases. Benign vocal fold lesions (nodule/cyst/polyp) were noticed in 26.5% of cases. Malignant lesions were seen in 1.8% of cases. Benign vocal fold lesions (polyp and cyst) were treated by microlaryngeal surgery (MLS). Pre-malignant lesion (leukoplakia) was treated with MLS stripping. Out of four malignant lesions, one was in early stage and underwent supraglottic laryngectomy while others were in advanced stage (T4) and treated by total laryngectomy. **Conclusions:** Voice disorders comprise wide etiological profile from reflux to malignant lesion. Timely proper evaluation followed by definitive management achieves good treatment outcomes.

Key words: Cyst; Hoarseness; Polyp; Vocal nodule; Voice disorder

Access this article online

Website: http://nepjol.info/index.php/AJMS

DOI: 10.3126/ajms.v13i1.41319

E-ISSN: 2091-0576

P-ISSN: 2467-9100

INTRODUCTION

Voice is the medium through which verbal communication happens. Thus, it reflects the importance.[1] Voice is produced by vibration in vocal cord which is modified by articulation producing speech.[2,3] Voice disorder is defined by change in pitch, quality, and loudness which is inappropriate for the age and gender.[4-7] As per the American Speech Language Hearing Association, its prevalence is 3–9% and is affected by age, gender, and occupation.[4] It is important to know that voice disorder is different from speech disorder which comprises disorder in articulation basically.[8-10]

Voice disorder comprises as one the common complains in patients visiting to otorhinolaryngology outpatient. The common causes for voice change are laryngopharyngeal reflux (LPR), laryngitis, vocal cord paralysis, tumor, vocal nodule/cyst/polyp, and functional.[6,11-13] Detailed history, clinical evaluation, laryngoscopy, and stroboscopic examinations are key components in the evaluation.[14-16] In laryngoscopy, fiber-optic evaluation is most commonly performed in view of rapid, evaluating the larynx in normal anatomic position, option of narrow-band imaging in doubtful malignant cases for suspicion and able to take biopsy.[17,18] Conservative management, voice therapy, and phonosurgery are common methods of treatment depending on the etiology.[19-22]

We aimed the study with intention of revealing spectrum of voice disorders and their management option from

Address for Correspondence:
Dr. Rishikesh Thakur, Lecturer, Department of Otorhinolaryngology and Head Neck Surgery, Nobel Medical College and Teaching Hospital, Biratnagar, Nepal. **Mobile:** +977-9842089844. **E-mail:** drjthakur08@gmail.com

tertiary care center of East Nepal which will be helpful to know its burden and awareness regarding treatment option.

MATERIALS AND METHODS

It is a prospective study conducted between June 25, 2020, and November 30, 2021. All patients visiting to our outpatient with complain of voice change and consenting for the study were enrolled. We enrolled the patients till August 31, 2021, so that minimum 3 months follow-up could be recorded. Clinical, demographic profiles were recorded. Fiber-optic laryngoscopy was performed in all the cases. Radiology examination computed tomography/magnetic resonance imaging was supplemented only in required cases. Biopsy was performed in suspected malignant cases before proceeding definitive treatment. Microlaryngeal surgery (MLS) was performed for vocal cord leukoplakia, polyp, and cyst.

Laryngectomy (total) was performed in advanced stage laryngeal cancer. Anti-reflux medication was prescribed in LPR. Voice therapy and lifestyle modifications were advised in all patients. Minimum 3 months follow-up was collected in all patients post-definitive therapy. Only those patients benefitted from our treatments were included in the study. Ethical approval was obtained from the Institute Ethical Committee before this study. Statistical analysis was performed using Statistical Package for the Social Sciences version 24. Pearson Chi-square test was used for see the association between parameters. P-value was considered significant while being <0.05.

RESULTS

Out of 218 patients, the most patients (approx. 70%) occupied in the age group of 30–50 years and the least common was beyond 60 years of age. There was male predominance (76.6%) (Table 1).

Most of the patients visited with complain of voice change was due to LPR which was noticed in 56.4% of cases. Benign vocal fold lesions (nodule/cyst/polyp) were noticed in 26.5% of cases. Malignant lesions were seen in 1.8% of cases (Table 2).

Benign vocal fold lesions (polyp and cyst) were treated by MLS with cold instruments. Similarly, pre-malignant lesion (leukoplakia) was treated with MLS stripping. Out of four malignant lesions, one was in early stage and underwent supraglottic laryngectomy while others were in advanced stage (T4) and treated by total laryngectomy followed by adjuvant radiation treatment. Since, radiotherapy facility was not available in our center, we have referred them (Table 3).

We had evaluated any association of benign vocal fold lesions with a history of voice overuse, smoking, and alcohol. Nodule was seen in association with voice overuse (P≤0.001) while smoking use and alcohol use were not (Table 4).

DISCUSSION

Voice change complain drives the patients to visit otorhinolaryngology specialist. It can be intermittent or persistent. Intermittent voice change is mainly associated with vocal unhygiene practices such as overuse/misuse or LPR. In our study, reflux (LPR) was noticed in 56.4% while vocal nodule in 21.5% of cases. A study by Koufman et al., LPR was seen in 50% of cases who visited the center with voice change. A study from Nepal by Singh et al., they

Table 1: Demographic profile (n=218)

Parameters	Age groups	Number (n)	Percentage
Age (in years)	≤30	17	7.8
	31–40	71	32.6
	41–50	82	37.5
	51–60	35	16.1
	>60	13	6.0
Sex	Male	167	76.6
	Female	51	23.4

Table 2: Etiological profile

Parameters	Number (n)	Percentage
Nodule	47	21.5
Laryngopharyngeal reflux	123	56.4
Polyp	6	2.7
Cyst	5	2.3
Leukoplakia	5	2.3
Malignancy	4	1.8
Functional	10	4.7
Vocal fold paralysis	Idiopathic – 15	6.9
	Post-thyroid surgery – 3	1.4

Table 3: Treatment profile

Parameters	Treatment
Nodule	Voice therapy Vocal hygiene Reassurance
Laryngopharyngeal reflux	Anti-reflux medication Proton-pump inhibitor Reassurance
Polyp	Microlaryngeal surgery
Cyst	Microlaryngeal surgery
Leukoplakia	Microlaryngeal surgery
Malignancy	Supraglottic laryngectomy – 1 Total laryngectomy – 3
Functional	Laryngeal massage Voice therapy Reassurance
Vocal fold paralysis	Voice therapy – 17 Thyroplasty – 1

Table 4: Association of vocal overuse, smoking, and alcohol to benign vocal fold lesions

Parameters	Voice overuse		Pearson Chi-square test	Smoking		Pearson Chi-square test	Alcohol		Pearson Chi-square test
	Yes	No		Yes	No		Yes	No	
Nodule	45	2	*P*≤0.001	10	37	*P*=0.079	10	37	*P*=0.637
Cyst	4	1		3	2		0	5	
Polyp	3	3		3	3		1	5	

found vocal nodule as a cause for hoarseness in 38.9% of cases.[23,24] The difference in magnitude is may be because of patient enrolled variation. Vocal hygiene practices are key therapeutic approach in vocal nodule management which is noticed in professional voice users. Anti-reflux medication and proton-pump inhibitor (PPI) are needed in treating reflux apart from dietary and lifestyle modification. Mostly, long-term use of PPI for around 8–12 weeks is required. Persistent hoarseness is mainly because of benign vocal fold lesion such as cyst or polyp, premalignant lesion such as leukoplakia or erythroplakia, and neoplastic growth. In our cases, magnitude of these cases was 5.0%, 2.3%, and 1.8%, respectively. Our study is supported by the literatures.[25,26] Benign or premalignant lesions need MLS biopsy for treatment. Malignant lesion is treated by surgery or radiation/chemoradiation or both depending on the stage. In our study, one case was in early stage (T2) and underwent supraglottic laryngectomy for treatment while three cases were in advanced stages (T4a) and treated by total laryngectomy with neck dissection followed by adjuvant radiation therapy. Sometimes, non-organic functional cause is also seen, especially in emotionally labile young women.[27] We noticed in 4.7% of cases. These patients require mostly require mostly placebo like therapy in the form of laryngeal massage, PPI apart from reassurance. Vocal fold paralysis either idiopathic or post-thyroid surgery is also encountered not uncommonly and needs to rule out other causes before assuming as idiopathic.[28] Most of time, it is because of viral infection and reversible. In our cases, 6.9% of cases had idiopathic vocal fold paralysis and 1.4% had secondary to malignant thyroid surgery. We managed all such patients with voice therapy except one in which type 1 thyroplasty was executed.

We kept follow-up for at least 3 months in all cases after treatment and improvement of voice was satisfactory except in malignant cases that underwent total laryngectomy (three cases) who are disease free till now and planned for secondary tracheoesophageal prosthesis for voice rehabilitation.

Our center is being the largest tertiary care center in East Nepal, we encounter huge number of patients with voice change complain. Hence, we conducted the study with intention of revealing spectrum of voice disorders and their management option. The limitation of our study is subjective measurement for voice improvement after therapy and lack of stroboscopic evaluation.

CONCLUSIONS

Spectrum of voice change is wide and comprises reflux to malignant lesion. Hence, proper evaluation with laryngoscopy is pinpointed in deciding the treatment plan. Most of the patients have good response with treatment if properly consecuted. Dietary modification, lifestyle change, and voice hygiene practices with PPI cover the major treatment bulk. Surgical treatment in the form of MLS is usually for benign or premalignant lesion while laryngectomy for malignant lesion. Voice framework surgery has also revealed very promising outcome in those not benefitted with conservative management.

ACKNOWLEDGMENTS

The authors are grateful to the departmental colleagues, residents, and speech therapy unit for accomplishment of this study.

REFERENCES

1. Tiwari M and Tiwari M. Voice-how humans communicate? J Nat Sci Biol Med. 2012;3(1):3-11.
https://doi.org/10.4103/0976-9668.95933
2. Zhang Z. Mechanics of human voice production and control. J Acoust Soc Am. 2016;140(4):2614-2635.
https://doi.org/10.1121/1.4964509
3. Kreiman J, Gerratt BR, Garellek M, Samlan R and Zhang Z. Toward a unified theory of voice production and perception. Loquens. 2014;1(1):e009.
https://doi.org/10.3989/loquens.2014.009
4. Voice Disorders. American Speech-Language-Hearing Association. American Speech-Language-Hearing Association; 2021. Available from: https://www.asha.org/practice-portal/clinical-topics/voice-disorders [Last accessed on 2021 Nov 14].
5. Kost KM and Sataloff RT. Voice disorders in the elderly. Clin Geriatr Med. 2018;34(2):191-203.
https://doi.org/10.1016/j.cger.2018.01.010
6. Reiter R, Hoffmann TK, Pickhard A and Brosch S. Hoarseness-causes and treatments. Dtsch Arztebl Int. 2015;112(19):329-337.
https://doi.org/10.3238/arztebl.2015.0329
7. Pestana PM, Vaz-Freitas S and Manso MC. Prevalence of voice disorders in singers: Systematic review and meta-analysis. J Voice. 2017;31(6):722-727.

https://doi.org/10.1016/j.jvoice.2017.02.010

8. Kaipa R and Peterson AM. A systematic review of treatment intensity in speech disorders. Int J Speech Lang Pathol. 2016;18(6):507-520.
   https://doi.org/10.3109/17549507.2015.1126640
9. Shen T and Sie KC. Surgical speech disorders. Facial Plast Surg Clin North Am. 2014;22(4):593-609.
   https://doi.org/10.1016/j.fsc.2014.07.010
10. Duffy JR. Functional speech disorders: Clinical manifestations, diagnosis, and management. Handb Clin Neurol. 2016;139:379-388.
    https://doi.org/10.1016/B978-0-12-801772-2.00033-3
11. Reiter R, Hoffmann TK, Rotter N, Pickhard A, Scheithauer MO and Brosch S. Etiology, diagnosis, differential diagnosis and therapy of vocal fold paralysis. Laryngorhinootologie. 2014;93(3):161-173.
    https://doi.org/10.1055/s-0033-1355373
12. Reiter R, Heyduck A, Seufferlein T, Hoffmann T and Pickhard A. Laryngopharyngeal reflux. Laryngorhinootologie. 2018;97(4):238-245.
    https://doi.org/10.1055/s-0044-100794
13. Voigt-Zimmermann S, Lampe K and Arens C. Differential diagnosis of hoarseness. Laryngorhinootologie. 2014;93(4):263-284; quiz 285-286.
    https://doi.org/10.1055/s-0034-1370937
14. Simpson B and Rosen C, editors. Principles of clinical evaluation for voice disorders. In: Operative Techniques in Laryngology. Berlin, Heidelberg: Springer; 2008. p. 9-15.
    https://doi.org/10.1007/978-3-540-68107-6_2
15. Koufman JA and Isaacson G. The spectrum of vocal dysfunction. Otolaryngol Clin North Am. 1991;24(5):985-988.
    https://doi.org/10.1016/S0030-6665(20)31062-8
16. Mehta DD and Hillman RE. Voice assessment: Updates on perceptual, acoustic, aerodynamic, and endoscopic imaging methods. Curr Opin Otolaryngol Head Neck Surg. 2008;16(3):211-215.
    https://doi.org/10.1097/moo.0b013e3282fe96ce
17. Davaris N, Voigt-Zimmermann S, Kropf S and Arens C. Flexible transnasal endoscopy with white light or narrow band imaging for the diagnosis of laryngeal malignancy: Diagnostic value, observer variability and influence of previous laryngeal surgery. Eur Arch Otorhinolaryngol. 2019;276(2):459-466.
    https://doi.org/10.1007/s00405-018-5256-1
18. Pliske G, Voigt-Zimmermann S, Glaßer S and Arens C. Objective quantification of the vocal fold vascular pattern: Comparison of narrow band imaging and white light endoscopy. Eur Arch Otorhinolaryngol. 2016;273(9):2599-2605.
    https://doi.org/10.1007/s00405-016-4071-9
19. Olthoff A. Surgery of benign vocal fold lesions. HNO. 2016;64(9):683-694.
    https://doi.org/10.1007/s00106-016-0221-z
20. Kiagiadaki D, Remacle M, Lawson G, Bachy V and van der Vorst S. The effect of voice rest on the outcome of phonosurgery for benign laryngeal lesions: Preliminary results of a prospective randomized study. Ann Otol Rhinol Laryngol. 2015;124(5):407-412.
    https://doi.org/10.1177/0003489414560583
21. Hess M and Fleischer S. Laryngeal framework surgery. HNO. 2021;69(9):726-733.
    https://doi.org/10.1007/s00106-021-01054-9
22. Rendón MD, Ermakova T, Freymann ML, Ruschin A, Nawka T and Caffier PP. Efficacy of phonosurgery, logopedic voice treatment and vocal pedagogy in common voice problems of singers. Adv Ther. 2018;35(7):1069-1086.
    https://doi.org/10.1007/s12325-018-0725-x
23. Koufman JA, Amin MR and Panetti M. Prevalence of reflux in 113 consecutive patients with laryngeal and voice disorders. Otolaryngol Head Neck Surg. 2000;123(4):385-388.
    https://doi.org/10.1067/mhn.2000.109935
24. View of Etiological Spectrum of Hoarseness of Voice in Western Regional Hospital, Pokhara, Nepal; 2021. Available from: https://www.nepjol.info/index.php/mjpahs/article/view/35596/27819 [Last accessed on 2021 Dec 09].
25. Naunheim MR and Carroll TL. Benign vocal fold lesions: Update on nomenclature, cause, diagnosis, and treatment. Curr Opin Otolaryngol Head Neck Surg. 2017;25(6):453-458.
    https://doi.org/10.1097/MOO.0000000000000408
26. Pickhard A and Reiter R. Benign vocal fold lesions. Laryngorhinootologie. 2013;92(5):304-312.
    https://doi.org/10.1055/s-0032-1331162
27. Andrea M, Dias Ó, Andrea M and Figueira ML. Functional voice disorders: The importance of the psychologist in clinical voice assessment. J Voice. 2017;31(4):507.e13-507.e22.
    https://doi.org/10.1016/j.jvoice.2016.10.013
28. Walton C, Carding P and Flanagan K. Perspectives on voice treatment for unilateral vocal fold paralysis. Curr Opin Otolaryngol Head Neck Surg. 2018;26(3):157-161.
    https://doi.org/10.1097/MOO.0000000000000450

Authors Contribution:
RT- Concept, design of the study, preparation of manuscript draft, statistical analysis, result interpretation, and review of literature; **SKT-** Coordination, review of literature, and manuscript preparation

Work attributed to:
Nobel Medical College Teaching Hospital, Kanchanbari, Biratnagar - 567 00, Nepal

Orcid ID:
Dr. Rishikesh Thakur- https://orcid.org/0000-0002-6234-5157
Dr. Sanjeev Kumar Thakur- https://orcid.org/0000-0002-2855-1766

Source of Support: Nil, **Conflict of Interest:** None declared.