

Original Research Article

Study to establish fiberoptic laryngoscopy as a diagnostic and investigation tool for laryngotracheal stenosis and to use the same for prognosis of the disease: retrospective analysis

T. Thenappan*, B. Vivekanandan, L. Somu

Department of ENT, Sri Ramachandra Institute of Higher Education and Research, Porur, Chennai, Tamil Nadu, India

Received: 22 March 2023

Revised: 14 April 2023

Accepted: 18 July 2023

*Correspondence:

Dr. T. Thenappan,
E-mail: tt070901@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Laryngotracheal stenosis is a common benign condition of airway obstruction in both the pediatric and adult age group. This could either be acquired or congenital, in which there is narrowing of either the portions of the larynx or trachea making it difficult to breathe. This condition can be managed by several operative and endoscopic procedures. Flexible fiber optic laryngoscope is an excellent tool in the diagnostic investigation of laryngotracheal stenosis.

Methods: This is a retrospective study that was done with data collected from the medical records department of patients diagnosed with laryngotracheal stenosis in a tertiary care hospital in the last 10 years.

Results: A total of 22 patients who underwent FFL exam were taken for this retrospective study and the results were analyzed.

Conclusions: This study proves that Fiberoptic laryngoscopy is a single modality diagnostic tool, which is useful in diagnosing, and localizing stenotic lesions in the Laryngotracheal region. It is cheap, less invasive and trained Otolaryngologist can perform this as an outpatient procedure. This therefore reduces the exposure to harmful radiation caused by repeated computed tomography scans.

Keywords: Laryngotracheal stenosis, Fiber optic laryngoscope, Visualization of larynx

INTRODUCTION

Laryngotracheal stenosis is a common benign condition of airway obstruction in both the pediatric and adult age group. This could be either acquired (Trauma, Infection process, feeding via naso/orogastric tube while on intubation) or congenital (Laryngeal atresia, Laryngeal webs, Laryngeal clefts, Complete or absent tracheal rings), in which there is narrowing of either the portions of the larynx or trachea, thereby causing difficulty in respiration.¹ This condition can be managed by several operative and endoscopic procedures. Flexible fiberoptic

laryngoscope is an excellent tool in diagnostic investigation of laryngotracheal stenosis, which is an office procedure.¹ The objective of this study is to establish Fiberoptic laryngoscopy as a diagnostic and a prognostic investigation in the management of patients with laryngo tracheal stenosis

METHODS

This is a retrospective study performed at Sri Ramachandra medical college and hospital a tertiary care hospital between October 2022 to December 2022. The

details of the patients for the past 10 years were retrieved and the study was carried out. The Larynx and trachea were visualized by trained ENT specialist using a DC powered Atmoscope (Diameter 3.9 mm, working length-300mm and Resolution 800 x 800 Pixel). Results were presented in simple charts and tables, utilizing descriptive statistics of frequency and percentages and Microsoft Excel software for graphical presentations.

Sample size

Information from 22 patients were collected for this retrospective study.

Inclusion criteria

Patients with laryngotracheal stenosis who underwent fiberoptic laryngoscopy, the cause of stenosis being iatrogenic, idiopathic and traumatic were included.

Exclusion criteria

Patient whose records were not complete, the cause of stenosis being malignancy and patients whose stenosis was of the grade 4 of cotton Myer were excluded.

RESULTS

A total of 22 patients who underwent FFL exam were taken for this retrospective study the results were analyzed.

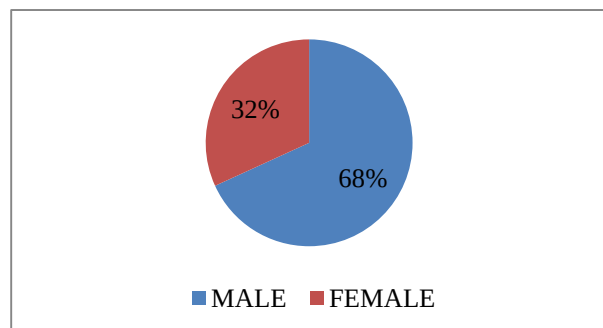


Figure 1: Prevalence in different sex.

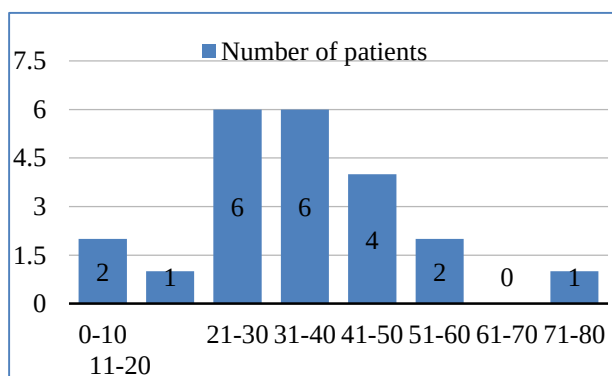


Figure 2: Prevalence of Laryngotracheal stenosis in different age groups.

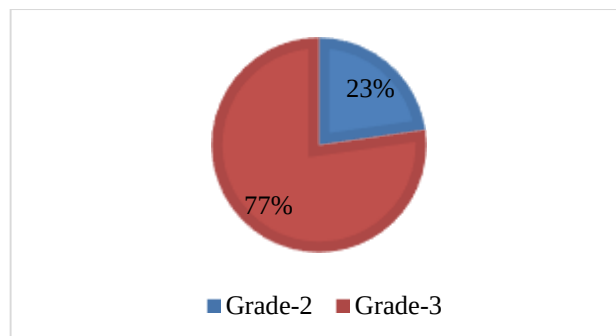


Figure 3: Cotton-Myer grading.

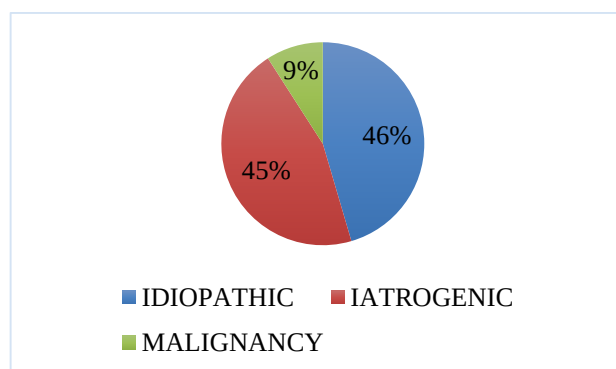


Figure 4: Causes of laryngotracheal stenosis.

There were 15 (68%) Males and 7 (32%) Females as shown in (Figure 1). The most common age of occurrence was between 21-30 and 31-40 with 6 patients in each of these age groups, followed by the group 41-50 with 4 patients. The groups aged 51-60 years and 0-10 years had 2 patients each, followed by the group 11-20 years and 71-80 years which had 1 patient each as shown in (Figure 2). The average age of occurrence is 34.66 years. Out of the total cases-17 of were Grade 3 (77%) and 5 of them Grade 2 (23%) using the Cotton Myer scale as shown in (Figure 3). The cause of Laryngotracheal stenosis was Idiopathic in 10 (45%) patients, Iatrogenic in 10 (45%) patients and Malignancy in 2(9%) of the patients as shown in (Figure 4). Supraglottic stenosis was in 13 (59%), Subglottic stenosis was in 5 (23%) patients, Suprastomal in 2 (9%) patients, Tracheal and Stomal in 1 (5%) patients each as shown in (Figure 5).

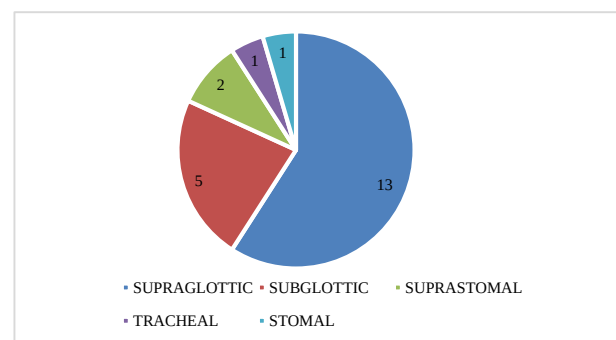


Figure 5: Levels of laryngotracheal stenosis.

DISCUSSION

The transnasal fiber optic laryngoscope has advantages and disadvantages which have been explained by standard textbooks and many journals, which has also been proven by our study.² A number of optical instruments are used by the otolaryngologist for examination in awake and anaesthetized patients.² The flexible fiberoptic laryngoscope was developed and introduced into clinical use by Shigeto Ikeda in the 1960's.³ In paediatric patients the scope was introduced by silberman in 1976.⁴ It is an important instrument when compared to other instruments for the diagnosis or exclusion of laryngeal diseases as it is mandatory to visualize the larynx.^{5,6} FFL plays an important role in initial airway evaluation in a clinically stable patient.⁷ Their effective use in outpatient diagnosis and management of laryngeal pathology has come from continuous improvement in the design and application and has proven to be useful and safe to use in all age groups.⁸⁻¹¹ It has excellent flexibility and viewing capability which aids in excellent viewing in either direction.¹² In children it is a well-tolerated modality for examination of the laryngotracheal area, as cooperation from children is excellent.¹² Under topical anesthesia office based FFL demonstrates a good tolerance from the patient. In awake patients it gives a sustained view of the vocal cords and reliable information about the mobility and symmetry of the vocal cords.^{8,9,13} FFL is simple safe easy to use in clinic in both anesthetized and conscious patients. As stated by some authors it is convenient and expeditious for obtaining a biopsy specimen by using flexible endoscopes with a channel sheath.⁸ FFL is a procedure with no major complications and is safe.^{14,15} Its introduction has paved the way for these procedures to be performed in the office thus avoiding hospitalization and facilitating immediate discharge after the procedure. This enhances the safety of frail patients by preventing the risks associated with general anesthesia and significantly reducing the cost.¹⁴ Further the dental damage and limitations in exposure of direct laryngoscopy can be overcome with FFL as it is a relatively noninvasive procedure.^{14,16} FFL is excellent for the evaluation of supra glottic structures and is also good for the evaluation of vocal cords, the Subglottic area can be seen adequately by an experienced examiner.¹⁶ This study shows that, it is not true that fiberscopes have limited usefulness in pediatric age group as stated by one author and can be performed in pediatric patients to evaluate the larynx after extubation.^{1,7} FFL can also be done in children less than 3 years of age either while awake or under mild sedation. Though fiberoptic laryngoscope has its own limitations and disadvantages.

CONCLUSION

Fiberoptic laryngoscopy is a single modality diagnostic tool, which is useful in diagnosing, and localizing stenotic lesions, therefore reduces the exposure to harmful radiation caused by repeated computed tomography.

ACKNOWLEDGEMENTS

Authors would like to thank all who supported the study.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Smith MM, Cotton RT. Diagnosis and management of laryngotracheal stenosis. *Expert Rev Respir Med.* 2018;12(8):709-17.
2. Omokanye HK, Alabi SB, Idris SO. Diagnostic accuracy of flexible fiberoptic laryngoscopy: experience from a tertiary health institution in Nigeria. *Eur Arch Otorhinolaryngol.* 2021;278:2937-42.
3. Prakash UB. Advances in bronchoscopic procedures. *Chest.* 1999;116:1403-8.
4. Silberman HD, Wilf H, Tucker JA. Flexible fiberoptic nasopharyngolaryngoscope. *Ann Otol Rhinol Laryngol.* 1976;85:32-8.
5. Bejamin CP, Si Chen BS, Shaum S, Yixin F, Milan RA, Ryan CB. Diagnostic accuracy of history laryngoscopy and stroboscopy. *Laryngoscope.* 2013; 123(1):215-9.
6. Boudewijn ECP, Bernard FAMV, Jan W, György BH, Frederik GD. Distal chip versus fiberoptic laryngoscopy using endoscopic sheaths: diagnostic accuracy and image quality. *Eur Arch Otorhinolaryngol.* 2014;271(8):2227-32.
7. Wood RE. Spelunking in the pediatric airways: explorations with the flexible fiberoptic bronchoscope. *Pediatr Clin North Am.* 1984;31:785-99.
8. Cohen JT, Safadi A, Fliss DM, Gil Z, Horowitz G. Reliability of a transnasal flexible fiberoptic in-office laryngeal biopsy. *JAMA Otolaryngol Head Neck Surg.* 2013;139(4):341-5.
9. Thorne MC, Garetz SL. Laryngomalacia: review and summary of current clinical practice in 2015. *Paediatr Respir Rev.* 2016;17:3-8.
10. Cutler JL, Cleveland T. The clinical usefulness of laryngeal video stroboscopy and the role of high-speed cinematography in laryngeal evaluation. *Curr Opin Otolaryngol Head Neck Surg.* 2002;10(6):462-6.
11. Smith MM, Kuhl G, Carvalho PRA, Marostica PJC. Flexible fiber-optic laryngoscopy in the first hours after extubation for the evaluation of laryngeal lesions due to intubation in the pediatric intensive care unit. *Int J Pediatr Otorhinolaryngol.* 2007;71:1423-8.
12. Cleveland T. Examination of child larynx by flexible fiberoptic laryngoscope Tetsuzo Inouye. *Int J Pediatr Otorhinolaryngol.* 1983;5:317-23.
13. Muehlberger T, Kunar D, Munster A, Couch M. Efficacy of fiberoptic laryngoscopy in the diagnosis of inhalation injuries. *Arch Otolaryngol Head Neck Surg.* 1998;124(9):1003-7.
14. Filauro M, Vallin A, Fragale M, Sampieri C, Guastini L, Mora F, et al. Office-based procedures in

- laryngology. Acta Otorhinolaryngol Ital. 2021;41(3):243-7.
15. Gil Z. Flexible fiber-optic laryngoscopy in the first hours after extubation for the evaluation of laryngeal lesions due to intubation in the pediatric intensive care unit. Int J Pediatr Otorhinolaryngol. 2007;71:1423-8.
 16. Hawkins DB, Clark RW. Flexible laryngoscopy in neonates, infants, and young children. Ann Otol Rhinol Laryngol. 1987;96(1):81-5.

Cite this article as: Thenappan T, Vivekanandan B, Somu L. Study to establish fiberoptic laryngoscopy as a diagnostic and investigation tool for laryngotracheal stenosis and to use the same for prognosis of the disease: retrospective analysis. Int J Adv Med 2023;10:607-10.