

Introduction

Why is tracheal stenosis so challenging to study, manage and cure? It is a complex disease with a highly variable etiology and clinical course. The exact incidence is difficult to quantify because many patients are critically ill and die before decannulation or are lost to follow-up. Symptoms only present once significant stenosis has occurred and we may be biased by seeing those patients who are on the most extreme end. Finally, there is a high rate of recurrence and a fair number of patients remain tracheostomy dependent.

The goal of this study is to investigate the causes and identify risk factors for the development of tracheal stenosis. Furthermore we discuss the outcomes of both endoscopic and open surgical approaches.

Methods

A retrospective chart review of patients assigned a diagnosis code of tracheal stenosis (J39.8 based on ICD-10) from November 2016 to January 2018 was performed. All individuals were treated at Thomas Jefferson University Hospital by the Otolaryngology Department. Approval of the institutional review board was obtained.

There were 92 patients assigned the diagnosis code of tracheal stenosis. Of those, 43 patients were excluded (9 had no evidence of stenosis documented, 11 had subglottic stenosis, 12 with laryngectomy stoma stenosis, 4 had laryngeal stenosis only, 6 had a tracheal mass, and 1 with granulation tissue). The remaining 49 patients' medical records were analyzed for demographic data, disease descriptions, treatment history and outcomes.

Results

The most common etiology of tracheal stenosis was previous tracheostomy, which occurred in 29/49 (59%) of patients. The second most common cause was prolonged intubation (9/49 or 18%). There were 5 patients diagnosed with idiopathic tracheal stenosis, 4 with unknown origins and 1 due to amyloidosis. Diabetes mellitus was the most prevalent comorbidity.

90% (44/49) of patients underwent surgical intervention. The remaining cases were neither symptomatic nor surgical candidates. The majority of patients underwent endoscopic treatment (78%) and the remainder had an open procedure.

The table below shows the success and recurrence rates for each surgical approach. Success was defined as observation without an artificial airway for at least one year.

The average number of surgeries for patients with tracheal stenosis due to prior tracheostomy was more than double compared to those with a history of prolonged intubation. Those with a prior tracheostomy underwent an average of 2.6 procedures while those intubated averaged 1.2 surgeries.

Unfortunately, 32% of patients remained tracheostomy-dependent and 7% relied on a Montgomery T-tube. There were no complications associated with either surgery.

Surgery type	Success rate	Recurrence rate
Endoscopic	76%	69%
Open	80%	70%

Discussion

The success rate of surgical treatment for tracheal stenosis at our institution is similar to those cited in the literature. Nouraei et al reported 72% of patients being endoscopically cured of their postintubation tracheal stenosis¹. Deshmukh et al cited an 80% success rate with bronchoscopic laser and balloon dilation².

Our data shows that iatrogenic injury is the most common cause of tracheal stenosis. In particular, prior tracheostomy was significantly associated with a higher incidence of the disease and number of surgeries. It has been shown that iatrogenic stenosis presents with a greater disease burden and higher risk of tracheostomy dependence when compared with other etiologies³.

While the recurrence rate remains high for both groups, the emphasis on close follow-up becomes critical as a majority of patients are ultimately cured of their disease.

Conclusion

Our study shows that over 75% of those patients suffering from tracheal stenosis will respond to surgical management. Preliminary treatment should focus on prevention and control of concurrent medical conditions. For those patients with recalcitrant disease, open techniques were previously the treatment of choice but evolution of the endoscopic approach is promising.

References

- ¹Nouraei, S., Ghufour, K., Patel, A., Ferguson, T., Howard, D., & Sandhu, G. (2007). Outcome of Endoscopic Treatment of Adult Postintubation Tracheal Stenosis. *Laryngoscope*, 117(6), 1073-1079.
- ²Deshmukh, A., Jadhav, S., Wadgoankar, V., Takalkar, U., Deshmukh, H., Apsingkar, P., . . . Antony, P. (2018). Airway Management and Bronchoscopic Treatment of Subglottic and Tracheal Stenosis Using Holmium Laser with Balloon Dilatation. *Indian Journal of Otolaryngology and Head and Neck Surgery*, 1-6.
- ³Gadkaree, S., Pandian, V., Best, S., Motz, K., Allen, C., Kim, Y., . . . Hillel, A. (2017). Laryngotracheal Stenosis: Risk Factors for Tracheostomy Dependence and Dilatation Interval. *Otolaryngology-Head and Neck Surgery*, 156(2), 321-328.