Airway Management and Endoscopic Treatment of Subglottic and Tracheal Stenosis

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ABSTRACT

Subglottic and tracheal stenoses are inflammatory processes that predominantly occur as complications of prolonged intubation. Other etiologies include trauma from fractures and burns, autoimmune diseases such as Wegener’s granulomatosis, sarcoidosis, or amyloidosis, infections such as tuberculosis or rhinoscleroma, airway neoplasms, and gastroesophageal reflux. There continues to be heterogeneity of management approaches used for endoscopic treatment of airway stenoses as techniques and technologies have evolved.

Fiber-based delivery of CO2 lasers and controlled radial expansion (CRE) balloon dilators are recent technological developments that we have adapted to our practice in management of subglottic and tracheal stenoses. In this report we describe a case series of tracheal and subglottic stenoses managed with radial incisions using fiber-based CO2 laser, CRE balloon dilation, and mitomycin-C application. We also report on the use of the laryngeal mask airway (LMA) for airway management in patients without a tracheostomy and use of a flexible bronchoscope to deliver the laser fiber to the operative site.

Methods:
All cases with isolated symptomatic subglottic and tracheal stenosis treated endoscopically at a tertiary academic medical center over a four-year period were retrospectively reviewed. All cases were treated with radial incisions using a flexible fiber-based CO2 laser, CRE balloon dilation, and topical application of mitomycin-C. Number of dilations, period between dilations, decannulation rate, and operative times were reviewed.

Results:
Twenty patients who underwent the airway intervention over the study period were identified. Average follow-up was 20 months. The etiologies of airway stenosis were intubation injury (n=9), idiopathic (n=6), or autoimmune disease (n=5) and these required average dilations of 1, 1, and 5, respectively. Patients with autoimmune disease required significantly more dilations.

Conclusion:
Isolated subglottic and tracheal stenosis can be managed with long-term success using newer endoscopic technologies such as flexible fiber-based CO2 laser ablation, CRE balloon dilation, and mitomycin-C application.

INTRODUCTION

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DISCUSSION

The treatment of subglottic and tracheal stenosis has challenged airway surgeons for many years. Initially, tracheostomy placement was common, and for many years open procedures such as tracheal resection, cricotracheal resection, and laryngotracheoplasty have been performed for definitive management. Endoscopic management was first described in the 1970’s, although conversion to open procedures was still quite common. Only in recent years, endoscopic procedures have become popular due to improvements in technologies such as operative microscopes and microspot CO2 laser, and increased awareness of post-operative dysphonia seen with open resections such as cricotracheal resection.

CONCLUSIONS

Subglottic and tracheal stenosis are unique airway problems that traditionally were managed with tracheal resection, laryngotracheoplasty, or tracheostomy placement. We present an alternate way of endoscopic management of these lesions using LMA intubation, flexible fiber-based CO2 laser radial incisions, balloon dilation, and adjunctive treatment with mitomycin-C. We demonstrate that longer-term success with minimal morbidity can be achieved. The subgroup of patients with stenosis related to autoimmune mediated medical diseases such as Wegener’s granulomatosis continues to be a clinical challenge.