Airway Management during Endoscopic Surgery for Laryngotracheal Stenosis

- Abstract Type: Original Research

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Abstract

Was this study was industry sponsored?

Introduction

Patients with laryngotracheal stenosis (LTS) undergoing endolaryngeal procedures often require advanced airway management techniques due to altered airway anatomy and the need for an unobstructed surgical field. Airway management techniques that optimize surgical visualization include endotracheal intubation with intermittent apnea, jet ventilation, and more recently transnasal humidified rapid insufflation ventilatory exchange (THRIVE). The goal of this study is to describe the airway management techniques used during endoscopic management of LTS, and to identify both patient and surgical factors that are associated with success of jet ventilation, THRIVE, and intermittent apnea.

Methods

Retrospective review of electronic medical records was performed for all patients undergoing direct laryngoscopy for LTS by three laryngologists (N.K., N.Y., M.L.) at our Yale New Haven Hospital from October 1st, 2015 through December 30th, 2022. Information was recorded pertaining to patient demographics, patient comorbidities, disease factors, surgical procedures, airway management techniques, intraoperative physiologic parameters, and complications. Univariate chi-squared analyses were performed to compare the patient, surgical, and physiologic factors associated with airway management via endotracheal intubation, intermittent apnea, jet ventilation, and THRIVE. Additionally, subgroup analyses were performed using univariate chi-squared analyses for patients undergoing intermittent apnea and jet ventilation.

Results

A total of 128 cases performed for 57 unique patients were included. Procedures performed included subglottic dilation (n=77, 60.16%); laser cordotomy, medial arytenoidectomy, or glottic dilation (n=37, 28.91%); supraglottic dilation (n=9, 7.03%); and laser scar ablation (n=5, 3.91%). Airway management techniques included endotracheal intubation (n=12, 9.38%), intubation through existing tracheostoma (n=36, 28.12%), intermittent apnea (n=52, 40.62%), jet ventilation (n=22, 17.19%), and THRIVE (n=6, 4.69%). Obese patients were significantly less likely to undergo jet ventilation compared to other airway strategies (p=0.0014). Etiology of stenosis, level of stenosis, and

procedure performed were associated with different rates of endotracheal intubation, intermittent apnea, jet ventilation, and THRIVE (p=0.0255, p< 0.0001, p< 0.0001, respectively). Additionally, the presence of a head and neck specialized anesthesiologist was associated with greater frequencies of jet ventilation and THRIVE (p=0.0002). Intermittent apnea and THRIVE were associated with higher intraoperative end tidal CO2 compared to endotracheal intubation and jet ventilation(p=0.0066). In patients managed with intermittent apnea, longer apnea periods were tolerated in non-obese patients (p=0.0009), patients with glottic rather than subglottic stenosis (p=0.0191), and in patients for whom high-flow nasal cannula was used during apneic periods (p=0.0184). THRIVE was associated with the highest rate of airway management failure, with 50% of patients requiring an alternative airway strategy after THRIVE was attempted initially (p=0.0002). The overall complication rate was 7.61%, however there were no significant differences in complication rates based on airway management strategy.

Conclusion

Patient and surgical factors play an important role in determining the most appropriate method of airway management in patients undergoing endoscopic procedures for laryngotracheal stenosis. The presence of a head and neck anesthesiologist was associated with a more diverse array of airway management options for these patients.

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Airway Management Methods
Table1SAMBA.docx
Airway Management based on Procedure Performed
Table2SAMBA.docx
Airway Management based on Presence of Head and Neck Anesthesiologist
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Failure Rate based on Initial Airway Method Attempted
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