

Endotracheal intubation — A life saving procedure, still potential hazardous to upper airway: A case report

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Abstract

Endotracheal intubation plays a key role in the management of upper airway obstruction in emergency situations. It is non-invasive and easily learned technique by medical professionals as compared to other more skilled, surgical procedures, e.g., tracheostomy and cricothyrotomies etc. But prolonged intubation may result in numerous complications, most notorious being tracheoesophageal fistula and narrowing of subglottic area. We report a profile of a patient who had been diagnosed as case of Guillian-Barre Syndrome, had difficulty in breathing due to paralysis of respiratory muscles. The patient was admitted in Medical Intensive Care Unit (MICU) for 40 days and was kept on artificial breathing through endotracheal intubation, which remained in place for 19 days. Later tracheostomy was performed. Patient ultimately developed severe subglottic stenosis and became dependent on tracheostomy tube.

Keywords: Endotracheal intubation, Upper airway obstruction, Emergency situations.

Introduction

Endotracheal intubation is required to establish an airway in critically ill patients needing artificial ventilation for a long period. Tracheostomy is performed when patient needs artificial ventilation for longer period that is more than a week. Traumatic intubation, re-intubation, intubation with endotracheal tube of inappropriate size, and failure to firmly secure the tube may contribute to the development of subglottic stenosis.¹ In addition, a risky circumstance that might be considered important in the development of airway damage is the occurrence of gastroesophageal reflux (GER), particularly in thoracotomy operations, where the patients are placed in the lateral position. The purpose of this report is to describe a patient who developed subglottic stenosis

following several re-intubations of endotracheal tube. The possible causes are macro-trauma due to multiple intubations.¹

Case Report

The patient was in usual state of health until a year back when he developed fever with chills that later progressed to abdominal distension, weakening of both the upper limbs and lower limbs. The patient soon lost consciousness and went into respiratory failure. He was diagnosed with (GBS) and was admitted to Medical Intensive Care Unit (MICU) for 41 days. During the initial 19 days of Medical Intensive Care Unit (MICU) admission he was put on a ventilator for artificial ventilation. After getting fully recovered he was discharged but within a week after the discharge he developed asthmatic symptoms with sputum that would clog the airway. Along with severe respiratory distress he also had 2-3 episodes of complete loss of consciousness. He was tested negative for tuberculosis. Following an episode of severe respiratory distress he was again admitted in a tertiary care hospital where he underwent a fiberoptic bronchoscopy. No masses were found in supra-glottis, glottis or infra-glottis region. After another acute attack of respiratory arrest which was labeled at that time as an acute asthmatic flare, a tracheostomy was performed to clean and remove secretions from the airway. Post tracheostomy CT-Scan showed tracheostomy tube in place with a lumen of 1.5x1.4 cm and no evidence of masses in supra-glottis, glottis or sub-glottis region of larynx. He had tracheostomy tube placed for 19 days during this hospital stay. After 19 days tube was removed and the patient was observed for another 24 hours of having fully regained respiratory function and patent airways. Patient was discharged with orders to return immediately to hospital if he develops even mild degree of respiratory distress. After closure of tracheal tube he again developed shortness of breath on 4th day for which he was again brought to Emergency Room (ER) of a tertiary care hospital. Being suspected for collapse lung as a complication of GBS due to inability to breathe he again had an emergency tracheostomy done. For 2 months and

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3 days patient had a tracheostomy tube placed keeping the patient symptom free. But the patient developed respiratory distress as soon as the tube was closed. The patient then went to another hospital. Fiberoptic laryngoscopy was performed which revealed narrowing of subglottic area. The patient was discharged after some time on conservative management.

The patient could not handle the severity of respiratory distress for another 10 days and was again admitted with similar symptoms. A tracheostomy tube below the subglottis region was replanted. The patient was managed further in Surgical Intensive Care Unit (SICU). Post tracheostomy Magnetic Resonance Imaging (MRI) showed narrowing in sub-glottis portion of larynx with patent lumen measuring just above tracheostomy tube that is 4.0 cm, narrowest segment extended for a distance of 1.3 cm in cranio-caudal direction with no narrowing below the tracheostomy tube.

The patient was finally managed surgically by the department of ENT-Head & Neck Surgery in collaboration with a thoracic surgeon, as post-intubation lesions are the most common indication for tracheal resection and reconstruction. The surgery was conducted under general anaesthesia with patient lying in supine position having a towel roll beneath the shoulder horizontally. After giving horizontal neck incision at the level of tracheostomy tube, subplatysmal skin flaps were raised superiorly to the level of hyoid bone and inferiorly upto suprasternal notch. Strap muscles were retracted laterally to denude the trachea. The stenosed portion of trachea of about 2.5 cm extending from cricoid to the lower edge of tracheotomy opening was resected. Larynx was lowered down by dividing thyrohyoid muscles on both sides. Trachea was freed from surrounding soft tissues by blunt dissection around the trachea. Lower end of trachea was pulled up and sutured with lower edge of cricoid cartilage with 2/0 prolene nonabsorbable suture. A silastic T-Tube was placed inside tracheal and laryngeal lumen, before complete tracheal closure, to keep laryngeal and tracheal lumen patent. An end to end tracheal anastomosis was completed. Two heavy "guardian suture" were applied post operatively between the submental and substernal skin to avoid the extension of neck. The course of disease after the surgery was fine. After the surgery he was shifted to Surgical Intensive Care Unit (SICU) for 3 days for monitoring purposes. After three months MRI neck was obtained which revealed patent subglottic area. T-tube was then removed. Patient initially experienced some difficulty in breathing probably because of prolonged dependency on tracheostomy tube. At present he is breathing comfortably after 2 months of removal of T-

tube, and 5 months after tracheal anastomosis surgery. He is vitally stable having GCS 15/15.

Discussion

Tracheal stenosis after tracheostomy can develop at microscopic and macroscopic levels. Although microscopic stenosis occurs in almost all cases, clinically significant macroscopic stenosis develops when the tracheal stenosis is more than 50% of the tracheal lumen.² Tracheal stenosis is the most serious long term complication of re-intubation and several tracheostomies and can be life threatening. Surgical reconstruction of the tracheal stenosis is effective; however, in some cases subglottic stenosis develops which requires greater surgical skills. Moreover, some cases need lifelong intermittent dilation or permanent tracheostomy.³ These facts indicate that early detection of tracheal stenosis is essential in order to perform more effective interventions.⁴

In etiology of chronic subglottic stenosis post-intubational stenosis is dominant.⁵ Following long-term ventilation and multiple surgical interventions, the patients usually develop a functionally relevant subglottic stenosis.⁶

There is controversy regarding the best modality for diagnosis of tracheal stenosis following tracheostomy.² However, it seems that the combination of fiberoptic bronchoscopy and 64-slice CT scan used in our study is an acceptable approach and was sufficiently accurate to detect subglottic stenosis.³

Among the many therapeutic options for treating tracheal stenosis (e.g. bouginage, laser resection and stenting), segmental resection and reconstruction with end-to-end anastomosis is the method of choice.⁷ In the treatment of tracheal stenosis, there is basically a competition between conservative methods like laser resection, bouginage, cryosurgery, and stents with tracheal segment resection. Multi-stage methods like laryngofissure and stiffening operations with rib or cartilage substitutes rightfully belong to the past. Laser resection is indicated in case of web-shaped, short stenosis as a primary remedy for recurrences, and resection is preferable in all other forms of short, scarred stenosis. Above all, laser resection is superior in the palliative recanalization of tumours. Stents are indicated for long tracheomalacic stenosis and for inoperable patients and as a temporary measure for patients in poor condition until resection can be carried out.⁸

Conclusion

In conclusion, the present study revealed that tracheal

stenosis occurs in the long-term which may partly be due to tracheal cartilage damage. The stenosis is generally subglottic in nature and may be mild asymptomatic and/or life-threatening clinical manifestations. Early removal of Endotracheal tube is highly recommended. Which may be replaced by skilled tracheostomy with low pressure cuff, if patient still requires artificial ventilation

Long-term endotracheal intubation is the probable cause of tracheal stenosis in this patient. During prolonged ventilation via a tube, the perfusion of the tracheal mucosa with blood can be so severely reduced by the cuff that constrictive perichondritis occurs due to mucosal necrosis; after endotracheal intubation or tracheostomy. Highly fibrotic scarring then leads to ring-shaped tracheal stenosis.

Longer-segment stenosis can sometimes be treated using dilation, laser therapy, bronchoscopic stent insertion and segmental resection and reconstruction. Short-segment tracheal stenosis is often treated by segmental resection and end-to-end anastomosis.

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