

Complication - A Learning Experience Trachea-oesophageal Fistula Following Prolonged Intubation

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SUMMARY

The occurrence tracheo-oesophageal necrosis leading to bilateral tension pneumothorax following prolonged intubation is reported. A young male of 15 years, remained intubated for 28 days after which an elective tracheostomy was done. The patient developed bilateral tension pneumothorax on the operating table and died. Postmortem endoscopy showed tracheo-oesophageal wall necrosis. If not suspected prior to surgery and measures are not taken to prevent such an event, it can result in drastic outcome.

INTRODUCTION

Tracheostomy is one of the earliest surgical procedures performed and was known by the Indian and Egyptian civilizations, over 3000 years ago¹. Alexander the Great saved the life of one of his soldiers from suffocation by making an opening in the trachea using the tip of his sword². By the end of first century AD, tracheostomy was well recognized in India. Uptill year 1825 only 28 successful tracheostomy were verified in the literature². During the 19th century diphtheria epidemics tracheostomy was widely employed as a standard procedure to relieve upper airway obstruction³. In early 20th century Chevalier Jackson standardized the indications, techniques and instrumentation for tracheostomy, making the procedure practical and relatively safe¹. In The past, it has been considered a method of choice for upper airway obstruction⁵. in 4th and 5th decade of this centuries, tracheostomy were done during poliomyelitis epidemic in Denmark, to aspirate the tracheobronchial secretion and to administer positive pressure ventilation².

The development of endotracheal tube in the 20th centuries, and its use for respiratory support of critically ill patients has changed the management of airway obstruction. Endotracheal intubation is the most rapid method of establishing the airway in the

emergency situation. This procedure has now acquired a wide range of therapeutic applications⁷. Endotracheal intubation has gained more acceptance as the emergency management of the airway, while tracheostomy is still the procedure of choice for prolonged airway control. The choice between tracheostomy and endotracheal intubation in a given situation is a matter of judgement and there exists a controversy regarding the duration of intubation before resorting to tracheostomy. We present our experience with a young adult who remained intubated for 28 days in the ICU. During the tracheostomy, the developed bilateral tension pneumothorax. Postmortem examination of trachea showed tracheo-oesophageal wall necrosis. This was not identified at the time of surgery and resulted in this drastic outcome.

PATIENT AND METHODS

A 15 year old male was admitted in the neurosurgery service with complains of headache, diplopia, left hemiparesis and right sided facial weakness. His CT scan and MRI were suggestive of an intraventricular tumor filling mainly the right lateral ventricle. He underwent surgery and the tumor was reported to be an oligodendoglioma.

Post-operatively the patient remained intubated for 28 days before an elective tracheostomy was performed. This procedure was performed under general anaesthesia. A horizontal incision was used and the trachea was anaesthetized. A horizontal incision was used and the trachea was opened below the third tracheal ring. A size 7 portex tube with cuff was inserted into the trachea. The tracheostomy tube was connected to the anaesthesia machine but the patients could not be ventilated. The tracheostomy tube was rechecked and was found to be in trachea. Attempts to ventilate the patient continued in vain. The tracheostomy tube was finally removed and replaced with an endotracheal tube. This could still not resume ventilation. In the meanwhile, massive surgical emphysema of the neck was noticed. Large bore needles were placed in the 2nd intercostal space on suspicion of pneumothorax. This was followed by bilateral chest intubation. Air came out under pressure and ventilation improved. However, the patient failed to maintain blood gases and went into cardiac arrest. CPR was instituted but failed to revive the patients. Fiberoptic endoscopy of the upper airway was performed and tracheo-oesophageal wall necrosis with fistula was found at the place where cuff of endotracheal tube was in place for 4 weeks.

DISCUSSION

Endotracheal intubation is the most rapid method of controlling the airway. It may be performed transorally or transnasally². Endotracheal intubation is performed to control the airway in emergencies, if the threat to airway is suspected then elective tracheostomy may be performed.

Endotracheal intubation impairs the clearance of secretions and diminishes the sensitivity of laryngeal reflexes due to presence of a foreign body (endotracheal tube). The normal mucociliary transport is disrupted by the presence of a cuffed tube. The cuff pressure applied to the trachea for only one hour can disrupt mucociliary transport for several hours. The presence of tube and cuff may cause a tracheal lesion, which may vary from simple mucosal inflammation to frank ulceration and necrosis⁹. Significant changes can occur after as little as 6 hours of intubation and positive-pressure ventilation. The incidence and severity of tracheal and laryngeal lesions are related not only to the

duration of intubation but also to other factors such as cuff shape, cuff pressure and tissue compatibility of the tube and cuff material¹⁰. Four areas of the larynx and trachea are especially vulnerable to injury; the posteromedial portion of the true vocal cords, the posteromedial surface of arytenoid cartilages, the posterolateral aspects of the cricoid cartilage and the mucosa overlying the third through seventh tracheal rings. In general, these injuries occur where the airway is under the greatest pressure from the endotracheal tube or cuff¹¹.

Tracheo-oesophageal fistula as a complication of intubation is uncommon. It is thought to result from mechanical impingement of the tracheal tube and nasogastric tube against the posterior wall of the trachea and anterior wall of the oesophagus. The catabolic state, the associated injuries and the infection play a part¹². Late occurrence of tracheo-oesophageal fistula is a consequence of tracheal necrosis caused by a poorly fitting tube or excess cuff pressure¹³.

Berbank suggested oral or nasal intubation as the method of choice when artificial airway is required for the period of upto 3 weeks, with low-pressure, high volume cuffed tubes. The incidence of tracheal injury from chronic intubation is very low. Gunawardana¹⁴ recommended safe intubation for upto 12-24 days. Weber et al.¹⁵ reported complications like fistula and stenosis in patients with intubation of over 4 weeks duration. Hadi et al.¹⁶ from Pakistan, reported safe period for endotracheal intubation of upto 24 days without any serious complications.

Lesson

In our experience of this case, the tracheo-oesophageal fistula, developed within 28 days. While the tracheostomy tube was being inserted it presumably went through posterior tracheal wall resulting in pneumothorax and pneumomediastinum. At the time of surgery this complication was not identified. The entire nightmare of this complication was preventable.

We recommend that planned tracheostomy should be done earlier in patients in whom long term need of ventilation is anticipated. The tracheostomy tube should be placed carefully to avoid any chance of fistula or damage to trachea. The surgeon should communicate with the anaesthetist. The endotracheal tube should be left just above the tracheostomy opening, till the time the tracheostomy

tube is inserted into the trachea and its correct position confirmed by passing a suction catheter. This should precede the positive pressure ventilation. The endotracheal tube should then be removed.

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