

Case report

Tracheo-oesophageal fistula - A disastrous complication of endotracheal intubation!

Shwethapriya R, Anitha Shenoy,* Anuradha Nittala

Email: anitharshenoy@gmail.com

Abstract

A 28-year old man required invasive mechanical ventilation in view of organophosphorus poisoning in a peripheral hospital. His trachea was extubated ten days later following which he presented with dysphagia, voice change, burping, fever and cough. He was referred to our hospital for further management. His barium swallow radiograph showed a large tracheo-oesophageal fistula. Therefore, he was scheduled for oesophageal transection and colonic transposition. Following induction of anaesthesia, despite easy laryngoscopy view (Cormack Lehane grade 1), the tracheal intubation was found to be difficult as the tube tended to pass through the fistula into the oesophagus repeatedly as confirmed by absence of capnogram trace. Attempts to bypass the fistula using a fiberoptic scope and even a double lumen tube also failed. Identification of oesophageal intubation would have been missed or possibly detected late in this case with disastrous consequences but for absence of capnogram. Finally, the tracheal tube was successfully negotiated beyond the fistula with the help of a gum elastic bougie directed anteriorly into the trachea and a good capnogram was obtained. The surgery was uneventful and the trachea was extubated 24 h later in the intensive care unit following which the patient developed stridor requiring permanent tracheostomy. This case report illustrates the novel use for gum elastic bougie during tracheal intubation. This also highlights the importance of repeated measurement of tracheal cuff pressure in patients especially those receiving long duration mechanical ventilation.

Keywords: Gum elastic bougie, Mechanical ventilation; Tracheal intubation; Tracheo-oesophageal fistula.

Introduction

Tracheo-oesophageal fistula (TEF) can be congenital or acquired. Majority of the TEF cases in adults are acquired as a result of malignancy, trauma, infections or ingestion of corrosive poisons.¹ Tracheal tube-related injury occurs in patients with traumatic intubation, prolonged intubation or when the cuff

pressure exceeds the recommended pressures resulting in mucosal necrosis. Here we report a case of TEF as a result of trauma following endotracheal intubation.

Case Report

A 28-year old man required invasive mechanical ventilation in view of organophosphorus poisoning in a peripheral hospital. His trachea was extubated ten days later following which he presented with dysphagia, voice change, burping, fever and cough. He was referred to our hospital for further management. His past history was unremarkable.

He was moderately built and poorly nourished, weighing 45 kg. His pulse rate was 70/minute,

Shwethapriya R, MD

Associate Professor of Anaesthesiology

Anitha Shenoy, MD, FRCA

Professor of Anaesthesiology

Anuradha Nittala, MD

Postgraduate in Anaesthesiology

Kasturba Medical College, Manipal

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and blood pressure was 94/70 mm Hg. Lung fields were clear on auscultation. Examination of other systems was normal. Airway examination showed a Mallampati Class II. No difficulty was anticipated in securing the airway.

Preoperative investigations were all normal. A barium swallow radiograph showed two tracheo-oesophageal fistulae, one on the right anterolateral side of the oesophagus, 4.5 cm from glottis at T₂ vertebral level and another on the left anterolateral side of the oesophagus, 3.5 cm from glottis at T₁ vertebral level. Chest X-ray was normal. The patient was therefore, scheduled for oesophageal transection and colonic transposition.

Patient was shifted to the operating room and baseline monitoring established. Intravenous access was secured. An epidural catheter was inserted at T₈₋₉ level. In view of the fistula, rapid sequence induction was done with thiopentone sodium and rocuronium bromide. Sixty seconds following this, direct laryngoscopy was attempted that revealed a Cormack Lehane grade 1 and a 8.5 mm ID tracheal tube (TT) was passed easily between the cords under vision. However, on positive pressure ventilation, although air entry was heard on both sides of the chest, there was no capnogram that led us to suspect that either the tube has migrated through one of the fistulae into oesophagus or there was significant leak through the fistulae. Considering the second possibility, the TT was pushed further down so as to bypass the fistulae. However, this too did not register a capnogram. The TT was then replaced by a left sided 37 F double lumen tube (DLT) which too failed to register a capnogram. Fibreoptic scopy through the DLT was not helpful as no structure could be identified.

By this time, the oxygen saturation (SpO₂) dropped rapidly from 99% to 60% (approximately 6 minutes of apnoea). Immediately, the DLT was replaced by a conventional cuffed TT which again failed to register a capnogram. SpO₂ was now at 40%. At this juncture, it was realized that the TT was consistently intubating one of the fistulae. Therefore, the tube was removed, a gum elastic bougie was passed

through the vocal cords with the 'J' tip always facing anteriorly feeling for the serial clicks until distal hold up. Now, with the aid of direct laryngoscopy, a conventional TT was railroaded over the bougie. Initiation of positive pressure ventilation now registered a reliable capnogram and the SpO₂ improved to 99% after another minute of positive pressure ventilation and an impending cardiac arrest was averted.

The planned surgical procedure went on unhindered and the patient was shifted to intensive care for elective ventilation. His trachea was extubated after 24 hours under fiberoptic guidance. However, four hours later, the patient was found to be in respiratory distress and unable to maintain SpO₂ > 93% with face mask. Therefore, his trachea was reintubated and subsequently required a tracheostomy. Repeated attempts at decannulation failed as the fistulae reappeared and therefore the patient was discharged home on permanent tracheostomy.

Discussion

The acquired TEF is rare but can occur secondary to malignancy, trauma, infections or ingestion of corrosives.¹ Majority of the acquired TEF are a result of malignancy of the oesophagus or nearby mediastinal structures. Next leading cause is related to the TT. Factors favouring the formation of a TEF are traumatic intubation, high tracheal cuff pressure, prolonged intubation, hypotension, steroids and advanced age. Among these, high intracuff pressure is regarded as the most important factor as this is easily preventable.^{2,3} Trauma during endoscopy or direct tracheal trauma also can lead to the formation of TEF. Infections such as tuberculosis or mediastinitis, necrosis following ingestion of corrosives and surgeries such as oesophagectomy are the other causes for development of TEF.¹

Anaesthetic management of a patient with TEF is quite challenging due to the presence of multiple problems. Most of these patients are malnourished due to poor oral intake resulting in anaemia and hypoproteinemia leading to impaired wound healing postoperatively. Muscle wasting may reduce their ability to cough. Pulmonary aspiration

occurs frequently in these patients resulting in bronchopneumonia. All these may increase respiratory complications postoperatively.

Therefore, anaesthetic management in these patients has to be planned carefully. The presence of fistula can make ventilation and intubation difficult and sometimes impossible. Loss of tidal volume due to the fistula depends on the size of the fistula and compliance of the lungs. If significant leak is suspected, it is advisable to do a fiberoptic guided intubation with the patient being awake or following induction of anaesthesia with preserved spontaneous efforts. If the leak is small, airway can be secured after induction of anaesthesia and paralyzing the patient with neuromuscular blockers that have shorter onset time such as succinylcholine or rocuronium.

The fistula may be overcome with the use of a double lumen tube,⁵ single lumen tube with endobronchial intubation^{4,6} or endotracheal intubation after isolating the fistula with a Fogarty catheter⁷ or maybe even separate endotracheal tube in each bronchus.⁸

Most of these patients are prone for pulmonary aspiration of gastric contents. Positive pressure ventilation before isolating the fistula can further increase the chances of aspiration. Hence, rapid isolation of the fistula is an immediate requirement to prevent loss of tidal volume as well as to prevent soiling of trachea with gastric contents.

Airway assessment in our patient did not suggest difficult intubation apart from the presence of tracheo-oesophageal fistula. It was thought that the fistula could easily be bypassed by the endotracheal tube and hence awake intubation was not chosen. We did not consider inhalation induction and spontaneous ventilation as the history suggested aspiration and repeated burping. We were uncertain of his response to succinylcholine in view of recent organophosphorus poisoning. Since we did not anticipate problems with intubation we chose thiopentone and rocuronium.

The loss of airway was devastating and we assumed that we were not able to bypass the fistula effectively. The problem of intubation of the fistula was realised rather late although not too late. Retrospectively, awake intubation using fiberoptic guidance would have been the best choice.

In conclusion, it is always better to be safe than sorry. Airway management of a tracheo-oesophageal fistula must be carefully planned so that potentially disastrous situations can be avoided.

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