Case Report

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Anaesthesia Section

Anaesthetic Management of an Adult with Acquired Tracheoesophageal Fistula: A Case Report

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ABSTRACT

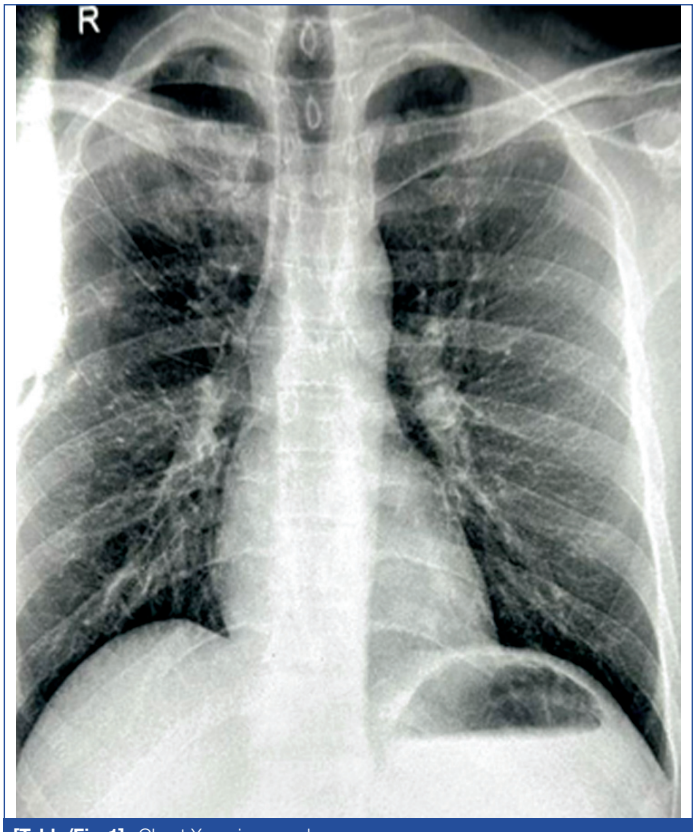
Tracheoesophageal Fistula (TEF) is a life-threatening condition in adults, acquired through prolonged mechanical ventilation, malignancy, trauma, or iatrogenic injury. Diagnosis of TEF is delayed because symptoms such as dysphagia, repeated aspiration, chronic cough, or recurrent chest infections are nonspecific. Prompt diagnosis is dependent on clinical suspicion and established by a combination of imaging scans, Gastrointestinal (GI) endoscopy, and Fibreoptic Bronchoscopy (FOB). Anaesthetic management of TEF is challenging due to the shared airway between the surgical and anaesthesia teams, the risk of aspiration or gastric insufflation, and the potential for air leak through the fistula. The primary objective is to achieve adequate ventilation without insufflation due to the fistula and maintain airway protection. Tube selection must be undertaken carefully and with proper placement distal to the point of the defect. We report a case of a 34-year-old male with a history of prolonged ventilatory support, who developed a mid-tracheal TEF presenting with worsening dysphagia and projectile vomiting. Diagnosis was confirmed by upper GI endoscopy, chest X-ray, and FOB. During surgery, a microlaryngeal tracheal tube was used with distal cuff placement below the fistula. Confirmation of correct placement was ensured through bronchoscopy. Intraoperative course was uneventful under sevoflurane-based anaesthesia with stable haemodynamics and no respiratory distress. This case highlights the importance of individualised anaesthetic plans and multidisciplinary collaboration in the successful management of TEF. Successful anaesthetic and surgical outcomes can be achieved with proper preoperative assessment and airway planning, even in cases with complicated fistula presentations.

Keywords: Airway planning, Dysphagia, Fibreoptic bronchoscopy, Projectile vomiting

CASE REPORT

A 34-year-old male, weighing 72 kg and a height of 175 cm, presented to the emergency department with complaints of gradually increasing dysphagia for the past 10 months, associated with vomiting. He had no significant comorbidities. He had a history of a Road Traffic Accident (RTA) a year ago, with Traumatic Brain Injury (TBI) and loss of consciousness. He had an extended Intensive Care Unit (ICU) course and mechanical ventilation for 15 days. The chronic presentation, along with the history of long intubation, was suggestive of a strong possibility of a TEF. Differentials include TEF, oesophageal stricture, achalasia, oesophageal diverticulum, oesophageal neoplasm, post-TBI neurological dysphagia, and external oesophageal compression.

On flexible FOB, a TEF at the level of about 5 cm distal to the vocal cords was noted. Upper GI endoscopy disclosed a synchronous esophageal orifice at the level of 17 cm from the incisors. A Contrast-Enhanced Computer Tomography (CECT) chest confirmed the diagnosis of a TEF. The etiology was an acquired fistula, possibly due to prolonged tracheal intubation. The patient's preoperative haematological and biochemical laboratory values were within normal limits. Preoperative cardiopulmonary assessment, including a chest X-ray [Table/Fig-1], electrocardiography, and a Two-Dimensional (2D) echocardiogram, was observed to be normal. The airway examination was uncomplicated, and the patient was classified as American Society of Anesthesiologists' (ASA) Physical Status II.



[Table/Fig-1]: Chest X-ray is normal.

Preoperatively, the patient's baseline vitals were stable, with a blood pressure of 118/72 mmHg, a heart rate of 84 beats per minute, and an oxygen saturation of 100% on room air. Nil per os was confirmed, and he was taken into the operating room. Standard ASA monitoring was connected to the patient, and two wide-bore intravenous cannulas were secured. Premedication was given with glycopyrrolate 0.2 mg, midazolam 1 mg, and fentanyl 70 mcg intravenously. Induction was done with intravenous propofol 100 mg and succinylcholine 100 mg. With the aid of a video laryngoscope, endotracheal intubation was done with a size 7.0 (30 cm) Microlaryngeal Tube (MLT). The MLT was used to allow cautious passage over the site of the fistula with minimal risk of mechanical trauma. After intubation, a FOB with a 5 mm diameter scope was

performed through the MLT to confirm the appropriate positioning of the tube. Optically, the tube's cuff was placed 8 cm below the vocal cords and 3 cm away from the fistula, so that the area of the fistula would not be severed due to ventilatory pressure. The tube was fixed at 23 cm at lip level.

Maintenance of anaesthesia was done with sevoflurane in oxygen-air, and for muscle relaxation, intravenous vecuronium was used. Due to the close location of the fistula, the patient had a definitive surgical repair of the TEF through a cervical approach. The surgery included carefully separating the trachea and oesophagus, removing the fistulous tract, and directly sewing both the oesophagus and trachea together end-to-end with interrupted absorbable sutures. To prevent the recurrence of the fistula, a sternocleidomastoid muscle flap was placed between the tracheal and esophageal repairs. The repair was confirmed by leak testing with methylene blue, which was done before closing the incision. The operation was smooth, with no residual fistula or tension at the anastomotic sites. The patient remained haemodynamically stable throughout, and the procedure was smooth. For the protection of the airway and modulation of the stress response, intravenous hydrocortisone 100 mg and dexamethasone 8 mg were given. The clinical rationale for concurrent dual corticosteroid administration is that hydrocortisone is used to mitigate the surgical stress response, while dexamethasone is administered to reduce airway oedema.

Prophylactic antibiotic cover was given with intravenous cefotaxime 1 g. After the procedure, neuromuscular blockade was reversed with 200 mg of suggammadex. After confirming good spontaneous ventilation and return of airway reflexes, extubation was done and was uneventful. The patient was shifted to the postoperative surgical ICU for additional postoperative monitoring.

Postoperatively, vigilant monitoring was done for respiratory distress, aspiration, or airway compromise. Serial monitoring of oxygen saturation, respiratory rate, and haemodynamic status was done. To avoid pulmonary complications, early chest physiotherapy and incentive spirometry were done. The patient was nil per os during the early period, and enteral feeding was postponed until the integrity of the repair was ensured by postoperative imaging. A contrast swallow study on postoperative day 5 was normal for leak or residual fistula, and the patient was then begun on clear liquids and gradually transitioned to a soft diet.

Pain was controlled with intravenous paracetamol 1 g thrice daily. Infection, subcutaneous emphysema, and pneumomediastinum did not occur. The patient had an uncomplicated recovery and was discharged from the ICU to the ward on postoperative day 6. He was clinically stable, tolerated oral intake well, and exhibited no respiratory symptoms. He was discharged home on postoperative day 10 with a plan for outpatient return, nutritional supplementation, and avoidance of maneuvers that increase intrathoracic pressure. On follow-up at one month, he remained asymptomatic with no recurrence of dysphagia or respiratory complications.

DISCUSSION

The TEF is an infrequent but important condition that challenges anaesthetic and surgical management. Adult-onset TEFs are most frequently induced by prolonged mechanical ventilation, malignancy, trauma, or iatrogenic causes like tracheostomy, endotracheal intubation, or tracheal stenting. There was a background history of chronic ventilator dependence after an RTA with concomitant TBI that would have most probably been contributory to the aetiology of the fistula. Chronic dysphagia, vomiting frequently, and retrosternal burning were classic presentations of an oesophageal injury, and diagnosis was established through a combination of upper GI endoscopy, CECT and FOB. The patient's chronic presentation, combined with a history of prolonged ventilation, essentially set up a typical risk scenario for an acquired TEF. This highlights the importance of meticulous airway planning and custom-made intraoperative strategies [1,2]. The results from Dechong Z et al., argue that even during endoscopic TEF closure, airway control should be maintained at all times, implying that the very first step of airway management is crucial in avoiding unintended events in such patients [3]. Ye L et al., echoed that a fistula coupled with an oesophageal cancer situation makes the condition of the patient more unstable and demands careful airway organisation during stenting procedures [4].

Anaesthetic management of TEF repair requires careful planning preoperatively due to the common airway between the anaesthesiologist and surgeon, the risk of aspiration, and the risk of air leak during ventilation. Most concerning is the positioning of the MLT, such that the cuff is placed below the fistula to prevent insufflation of the stomach and aspiration of gastric contents. In the present case, it was done with a size 7 MLT, whose smaller diameter and larger length allowed for the exact positioning of the cuff approximately 3 cm below the TEF. Positioning was verified with FOB after intubation, allowing for controlled ventilation with a secure seal while maintaining an unobscured surgical field [5]. Dechong Z et al., documented a situation where tracheal intubation with a small-bore tube, such as a 5.5 mm inner diameter catheter, provided the most stable oxygenation and haemodynamics. This observation aligns with the preference for intubation over non-invasive methods [3]. Ye L et al., elaborated on the difficulties in adequately sealing a large fistula while placing the Y-stent. They highlighted the problems of gastric insufflation and gas leakage during mechanical ventilation as potential sources of danger. They emphasised that secure ventilation methods, such as the MLT, would be beneficial if the fistula size or its location renders the airway at risk [4].

Yazıcıoğlu H et al., have described a case of a patient with TEF treated with a tracheal stent, in which tracheal resection was performed using an unobstructed, small-cuffed endotracheal tube and apneic ventilation techniques. Their employment of high-flow oxygenation during apnoea and oral reintubation thereafter, facilitated through the retrograde guidewire, is a good example of the amount of flexibility needed in TEF repair. While the method of Yazıcıoğlu H et al., emphasises the readiness to handle situations where cuff positioning is challenging or when surgical access requires airway exposure, the method in the present case focuses on ensuring controlled ventilation through a properly positioned MLT [6]. Dechong Z et al., discovered that when patients were not intubated and were treated with techniques such as high-flow nasal cannula or nasal catheter oxygen, they suffered from hypoxemia and experienced changes in their haemodynamics, thus making a case for stable intubation in cases with complex anatomy [3]. Ye L et al., mentioned different options that could be used, such as Fogarty balloon occlusion and Sengstaken-Blakemore tubes, implying that sealing the fistula before anaesthesia may enhance safety. In their case, the use of a laryngeal mask airway for guided fiberoptic access facilitated the insertion of a Y-stent without any trouble [4].

Horishita T et al., managed a large TEF at the right carina during a pneumonectomy by placing a double-lumen tube in the right main bronchus and maintaining constant surveillance with FOB. Directed aspiration and continuous visual monitoring were highlighted by the authors as essential for providing a clean field of operation and achieving a better postoperative outcome. The present case involved a fistula of the mid-trachea, not the carina; hence, a double-lumen tube would have been less useful if we had chosen that route [7]. Both the work of Dechong Z et al., and this case concur that stable ventilation with a properly sized tube and uninterrupted bronchoscopic guidance is the key to success [3]. Ye L et al., also mentioned the instance of a laryngeal mask airway being used to facilitate the passage of the bronchoscope. The delivery of the stent is quicker, thus illustrating the need for airway choice to be dictated by the requirements of the procedure and the patient's condition, while ensuring maximum control and visibility [4].

Sen IM et al., presented a pediatric case of recurrent TEF after chemotherapy for Hodgkin's lymphoma, with airway management done through a microcuff tube. The challenges in this patient were the site and size of the fistula, as well as the requirement to prevent anaesthetic gas escape while still permitting adequate ventilation. A rigid bronchoscope was initially used to intubate the patient using a Fogarty catheter through the fistula, and a microcuff endotracheal tube was carefully inserted and secured after verifying placement. Despite severe fibrosis and intraoperative complexity, satisfactory mobilisation of the trachea and oesophagus was achieved, and the fistula was closed with a successful muscle interposition graft. Postoperatively, the patient needed elective mechanical ventilation to permit graft healing and was successfully extubated on the eleventh postoperative day. The difference between our case and that one is that the patient required significantly more complex equipment for airway stabilization [8]. Similarly, the authors Dechong Z et al., concluded that hypoxia and hemodynamic instability could result from inadequate airway security during TEF occlusion, thereby creating an argument for the necessity of controlled ventilation during airway distortion [3]. Ye L et al., noted that although LMA can facilitate stent placement, preoperative sealing of the fistula may reduce the risk of the operation. The present case differed from these complicated ones in that we employed a simple and effective technique. We managed to have a smooth perioperative course through careful tube selection, FOB confirmation, and routine anaesthetic induction procedures without the need for more invasive methods like double-lumen tubes, Fogarty catheterisation, or retrograde intubation. Throughout the operation, the patient was haemodynamically stable, and there was no event of desaturation, aspiration, or ventilatory compromise [4].

CONCLUSION(S)

The TEF repair management needs a thorough understanding of the airway anatomy, surgical needs, and patient-specific complications. This case demonstrated that effective and safe anaesthesia can be provided even in the presence of a TEF, provided there is precise preoperative planning, proper tube selection, and intraoperative FOB verification. Experience and adaptability tailored to individual patient anatomy ensure the best outcomes. The absence of a complicated perioperative course and rapid recovery in this patient highlights that imperceptible, noninvasive methods can be as effective as more demanding techniques if used wisely.

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