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AORTOPEXY FOR SYMPTOMATIC TRACHEOMALACIA IN A POST-OPERATED CASE OF TRACHEA-ESOPHAGEAL FISTULA WITH REMOTE REPAIR OF TRACHEO-OESOPHAGEAL FISTULA AND BRONCHOSCOPICALLY MANAGED TRACHEAL DIVERTICULUM: A CASE REPORT

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ABSTRACT Long-term respiratory and airway complications after neonatal repair of tracheooesophageal fistula (TEF) include tracheomalacia and bronchiectasis; these sequelae can complicate airway management for later thoracic surgeries. In this case report we discuss a 19-year-old female (37 kg) with history of neonatal TEF repair and multiple oesophageal dilatations who presented with cough , dysphagia and recurrent vomiting for >1 month. She had prior pulmonary tuberculosis (2 years earlier) with right sided bronchiectasis. Bronchoscopy identified a posterior tracheal diverticulum; bronchoscopic glue injection into the diverticulum was performed in January 2026. Preoperative blood tests showed Hb 9.8 g/dL; 2D echo was within normal limits; baseline ABG was normal; PFT demonstrated a mixed ventilatory defect with poor effort. She was posted for aortopexy for symptomatic tracheomalacia. Anaesthetic management included TIVA with preservation of spontaneous ventilation for rigid bronchoscopy and intubation (McCoy blade, 6.5 mm microcu! ETT), maintenance with sevoflurane and atracurium, invasive arterial and central venous monitoring, and dexmedetomidine infusion. Estimated blood loss was 60mL. Intraoperative ABGs remained within normal limits. She was reversed, extubated on table and transferred to CCU hemodynamically stable. Multidisciplinary perioperative planning, preoperative bronchoscopic assessment and a tailored anaesthetic strategy allowed safe aortopexy in this complex post-TEF patient.

KEYWORDS : Tracheomalacia; Tracheal Diverticulum; Tracheoesophageal Fistula; Aortopexy; Anesthesia

INTRODUCTION

Survivors of neonatal tracheo-oesophageal fistula (TEF) repair may develop long-term airway and respiratory sequelae, including tracheomalacia, recurrent aspiration, bronchiectasis and dysphagia, which can persist into adolescence and adulthood and complicate subsequent airway management. Posterior tracheal diverticulum is an uncommon late finding that may contribute to secretion retention and create hazards during endotracheal tube positioning; endoscopic options (including bronchoscopic sealant or cautery-based techniques) have been described for selected symptomatic lesions. Aortopexy (open or thoracoscopic) remains an established intervention for severe symptomatic tracheomalacia when conservative measures fail. This report was prepared in accordance with the CARE case report guideline.

Case Presentation

A 19-year-old female weighing 37 kg, diagnosed with severe tracheomalacia, was scheduled for aortopexy. She had undergone primary repair of tracheoesophageal fistula at 2 days of life, followed by multiple esophageal dilatations for recurrent strictures. She also had a history of pulmonary tuberculosis 2 years earlier, complicated by right-sided bronchiectasis, for which she had completed a 6-month course of antitubercular therapy (AKT). She now presented with persistent productive cough and dysphagia associated with vomiting for one month. Rigid bronchoscopy was done a month ago which revealed trcheomalacia and posterior tracheal diverticulum In view of persistent and severe symptoms, a multidisciplinary team planned for aortopexy.

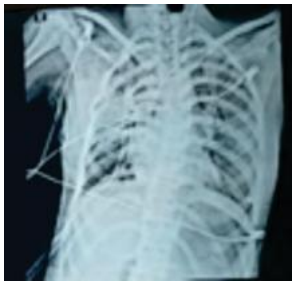

Figure 1. Bronchoscopic Image Showing Posterior Tracheal Diverticulum (label Pre/Post Glue as Appropriate).

During pre-anesthetic evaluation, relevant investigations, including chest radiography, arterial blood gas analysis, and two-dimensional echocardiography, were within normal limits. Auscultation revealed crepitations with reduced air entry on the right side. Pulmonary function testing demonstrated a mixed ventilatory defect with poor effort. Preoperative optimization included nebulization with salbutamol and budesonide.

Standard monitoring with electrocardiogram (ECG), non-invasive blood pressure (NIBP), oxygen saturation (SpO_2), end-tidal carbon dioxide ($EtCO_2$), and temperature was instituted. Sedation was initiated with dexmedetomidine infusion, followed by total intravenous anesthesia (TIVA) using incremental doses of fentanyl (60 µg), propofol (120 mg), and ketamine (30 mg) to facilitate rigid bronchoscopy. Spontaneous respiration was maintained to allow dynamic assessment of tracheomalacia. Rigid bronchoscopy was performed with oxygen insufflation through the side port of the bronchoscope.

Figure 2. Preoperative Chest Radiograph or CT Demonstrating Right Basal Bronchiectasis and Kyphoscoliosis.

The procedure was subsequently converted to general anesthesia, and endotracheal intubation was performed using a 6.5-mm microcuff endotracheal tube. Following which ,neuromuscular blockade was achieved with atracurium and controlled positive pressure ventilation was initiated. Particular attention was paid to optimal tube depth and positioning to avoid inadvertent entry into the posterior diverticulum. Anesthesia was maintained with 2% sevoflurane in oxygen, supplemented with intermittent boluses of atracurium and a continuous infusion of dexmedetomidine.

In view of the anticipated prolonged surgical duration and potential

fluid shifts, invasive hemodynamic monitoring was established. A central venous catheter was inserted on the left side for central venous pressure (CVP) monitoring, and an arterial line was secured for continuous blood pressure monitoring and hemodynamic management.

A left anterior thoracotomy was performed through the second and third intercostal space, followed by thymectomy and aortopexy. Intraoperatively, manipulation of the aorta resulted in significant fluctuations in blood pressure, which were managed conservatively.

At the end of surgery, neuromuscular blockade was reversed with intravenous glycopyrolate 0.5 mg and neostigmine 2.5 mg. Intravenous steroid (Dexamethasone 8mg) was administered to decrease airway edema and reactivity owing to repeated airway manipulations. A multimodal analgesic regimen comprising fentanyl (100 µg), acetaminophen (1000 mg), and diclofenac (75 mg) facilitated smooth and early extubation after confirming adequate respiratory effort. Throughout the intraoperative period, SpO_2 remained above 96%, and serial arterial blood gas analyses were within normal limits.

The immediate postoperative course was uneventful. The patient received chest physiotherapy and pulmonary toileting. Outpatient follow-up with the pulmonology team was arranged, with repeat imaging and pulmonary function testing planned as clinically indicated.

DISCUSSION

Tracheobronchomalacia is a rare disorder characterized by weakened or deficient tracheobronchial cartilage, leading to airway lumen narrowing [1]. Primary (congenital) tracheomalacia is commonly associated with esophageal atresia and tracheoesophageal fistula (TEF). The condition may affect the entire trachea or limited segments of the tracheobronchial tree, resulting in variable airway obstruction. Aortopexy remains the most frequently performed intervention for severe tracheomalacia due to tracheal compression [2]; however, anesthetic considerations for this procedure are sparsely described in the literature.

We present a case which highlights considerations relevant to perioperative management of airway pathology in patients with a remote history of TEF repair. Tracheomalacia and bronchiectasis are recognised long-term complications and may progress to symptoms requiring operative intervention such as aortopexy. Although uncommon, posterior diverticula can be symptomatic and may be managed with endoscopic approaches (e.g., sealant, cautery-based techniques, or resection) depending on lesion characteristics and patient factors; prior endoscopic intervention should be incorporated into airway planning. Since tracheomalacia is best assessed in a spontaneously breathing patient, it is an anesthetic challenge to maintain an adequate depth of anesthesia while allowing the patient to breathe spontaneously. The perioperative objectives in this case were to preserve spontaneous ventilation during airway instrumentation, minimise the risk of endotracheal tube (ETT) entry into the diverticulum, provide adequate analgesia and haemodynamic monitoring, and anticipate postoperative respiratory support if required.

Close coordination among the anaesthesia, surgical, and interventional pulmonology teams is essential. Ventilation should be adjusted to ensure adequate oxygenation and ventilation while providing optimal surgical exposure. The widest endotracheal tube that comfortably fits the glottis should be chosen to facilitate effective ventilation and bronchoscope passage without causing tracheal mucosal ischemia [3]. The ventilatory strategy must maintain adequate oxygenation and acceptable CO_2 levels [4]. Furthermore, dissection near the heart and major vessels may result in hemodynamic instability; therefore, adequate preload and sufficient depth of anaesthesia are crucial to prevent hypotension and bradycardia [5].

Table 1 — Timeline

Event	Date / approximate period
Neonatal TEF repair	neonatal period (exact date)
Multiple oesophageal dilatations	childhood/adolescence (dates)
Last oesophageal dilatation	[a few months prior]
OGD showing no further dilatation	[1 month prior]
Pulmonary tuberculosis	2 years prior
Bronchoscopic glue injection	January 2026
Admission for current complaints	December 2025
Aortopexy	February 2026

Table 2 — Key Investigations

Investigation	Result
Haemoglobin	9.8 g/dL
2D echocardiography	Within normal limits
Baseline ABG	Within normal limits
PFT	Mixed ventilatory defect (poor e!ort)
Bronchoscopy	Posterior tracheal diverticulum

Item	Detail
Anaesthesia technique	TIVA for bronchoscopy; sevoflurane maintenance; atracurium relaxant
Sedation	Dexmedetomidine loading + infusion (0.5–0.8 µg/kg)
Induction drugs	Propofol total 120 mg; Ketamine 30 mg (incre mental)
Airway	Rigid bronchoscopy → McCoy #3 → 6.5 mm microcu! ETT
Vascular access	Left radial arterial line; left IJ central venous line
Fluids	RL 500 mL; NS 200 mL; IV paracetamol 100 mL
Estimated blood loss	60 mL
Extubation	On table, spontaneous breathing, stable transfer to CCU

CONCLUSION

Multidisciplinary planning, preoperative bronchoscopic assessment and a tailored anaesthetic strategy enabled safe aortopexy in a patient with prior TEF repair, bronchiectasis. Awareness of tracheal diverticula and prior endoscopic interventions may meaningfully inform perioperative airway strategy for subsequent thoracic procedures.

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