

Early postoperative displacement of a Montgomery T-tube: successful rescue with low-pressure bag mask ventilation

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ABSTRACT:

Background: Airway compromise following tracheal reconstruction is uncommon but potentially catastrophic because of the vulnerability of the fresh tracheal anastomosis. Early displacement of a Montgomery T-tube may result in rapid hypoxaemia and presents a complex airway management challenge.

Case presentation: We report a detailed perioperative course of a 39-yr-old female with post-intubation tracheal stenosis who underwent elective tracheal resection with primary end-to-end anastomosis and Montgomery T-tube insertion. Within hours of ICU admission, she developed acute respiratory distress with oxygen saturation falling to 88% and less despite supplemental oxygen. Controlled low-pressure bag-mask ventilation (BMV) was instituted using a two-handed technique with inspiratory pressures limited to <20 cm H₂O.

Results: BMV resulted in rapid restoration of oxygenation (SpO₂ 100%) without haemodynamic compromise. Following stabilisation, the displaced T-tube was removed and a cuffed tracheostomy tube inserted through the existing stoma with minimal disturbance to the anastomosis. No evidence of anastomotic dehiscence or airway injury was observed, and the patient recovered uneventfully.

Conclusions: In early postoperative airway emergencies following tracheal reconstruction, oxygenation remains the primary priority. Carefully applied low-pressure BMV may provide a safe and effective bridging strategy to definitive airway management.

Keywords: *airway emergency; bag-mask ventilation; Montgomery T-tube; tracheal resection; tracheal stenosis*

INTRODUCTION:

Post-intubation tracheal stenosis remains a significant late complication of prolonged endotracheal intubation and tracheostomy. The underlying mechanism involves mucosal ischaemia secondary to cuff pressure exceeding capillary perfusion pressure, resulting in chondritis, fibrosis, and progressive luminal narrowing.^{1,2}

Surgical resection with primary end-to-end anastomosis is considered the gold standard treatment for short-segment tracheal stenosis, offering high success rates and durable long-term outcomes.^{2,3} Adjuncts such as the Montgomery T-tube are frequently employed to maintain airway patency, provide structural support to the healing trachea, and facilitate postoperative airway toileting.⁴ Despite advances in surgical techniques and perioperative care, the early postoperative period

remains a phase of considerable vulnerability. Tissue oedema, increased secretions, reduced airway tone, and tension across the anastomosis predispose to airway instability.^{3,5}

Complications associated with Montgomery T-tubes include obstruction from mucus plugging, migration, granulation tissue formation, infection, and displacement.^{5,6} Among these, early displacement is particularly hazardous, as it may simultaneously compromise airway patency and increase the risk of anastomotic disruption during attempted airway interventions. Airway management in this context presents a unique clinical dilemma. On one hand, rapid correction of hypoxaemia is essential to prevent hypoxic injury. On the other hand, aggressive airway manipulation or excessive positive pressure ventilation may jeopardise the integrity of the fresh anastomosis.^{3,7}

Current airway management guidelines emphasise that oxygenation is the primary objective in any airway emergency.^{7,8} However, evidence guiding optimal management of airway device displacement immediately following tracheal reconstruction is limited.

We present a detailed case of early postoperative T-tube displacement successfully managed with controlled low-pressure bag-mask ventilation, and discuss its implications within the framework of current airway management principles.

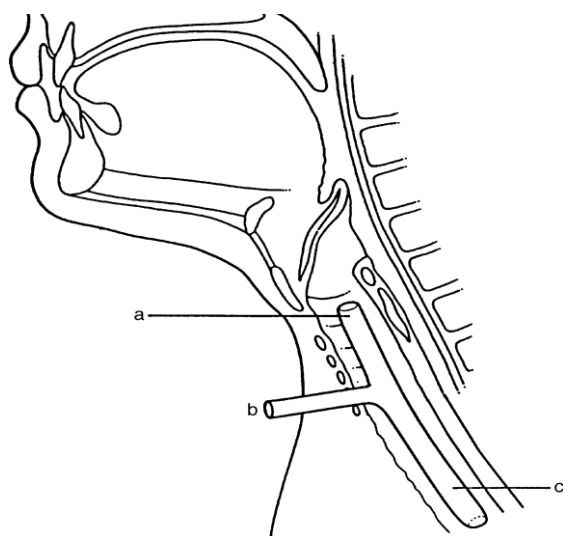


FIG 1: (A) Sagittal section of airway with Montgomery tube in place: ((a)short laryngeal part; (b) extratracheal part; (c) long tracheal part). (B) Photograph of a Montgomery T-tube.

Case Presentation:

Preoperative assessment:

A 39-yr-old female presented with progressive exertional dyspnoea, reduced exercise tolerance, and intermittent inspiratory stridor. She had a history of prolonged mechanical ventilation for approximately 10 days several years earlier, following which she developed persistent respiratory symptoms and was diagnosed with post-intubation tracheal stenosis.^{1,2} She had previously undergone tracheostomy but continued to experience symptomatic airway obstruction. On examination, she was haemodynamically stable but demonstrated audible stridor and increased work of breathing.

Flexible bronchoscopy revealed a short-segment, high-grade stenosis at the previous tracheostomy site. Computed tomography confirmed localised tracheal narrowing without distal airway involvement.² Following multidisciplinary evaluation involving anaesthesia, thoracic surgery, and critical care teams, the patient was scheduled for elective tracheal resection and reconstruction.

Intraoperative management:

General anaesthesia was induced with standard monitoring. Airway management was achieved without difficulty. The stenotic segment measuring approximately 2 cm was resected, and primary end-to-end tracheal anastomosis was performed using meticulous surgical technique to minimise tension and ensure optimal alignment.^{2,3}

A Montgomery T-tube was inserted under direct vision to maintain airway patency and support the anastomosis.⁴ The tube was secured externally to prevent displacement. Neck flexion was maintained using sutures to reduce tension across the anastomotic site.³ Haemostasis was achieved, and the patient was extubated uneventfully at the end of the procedure.

Immediate postoperative course:

The patient was transferred to the ICU for close monitoring. Initial postoperative parameters were stable, with adequate oxygenation on supplemental oxygen and no signs of respiratory distress. However, within a few hours (postoperative day 0), the patient developed sudden onset respiratory distress characterised by: Tachypnoea (respiratory rate >30 breaths min^{-1}), Increased work of breathing, Oxygen desaturation to 88%, Audible air leak. These findings raised strong suspicion of T-tube displacement.^{5,6}

Emergency airway management:

Immediate high-flow oxygen was administered. As hypoxaemia progressed, controlled BMV was initiated using a two-handed technique to ensure an adequate mask seal. Specific precautions included: Limiting inspiratory pressures to $<15\text{--}20$ cm H_2O , Delivering slow, controlled breaths, Avoiding excessive airway pressures.

Adequate chest expansion was observed, and oxygen saturation improved rapidly to 100%. Haemodynamic stability was maintained throughout the intervention.

This approach prioritised oxygenation while minimising the risk of anastomotic disruption, in accordance with established airway management principles.^{7,8}

Definitive airway management:

Following stabilisation and arrival of the surgical team, the displaced T-tube was carefully removed. A cuffed tracheostomy tube was inserted through the existing stoma under controlled conditions. Care was taken to: Avoid forceful instrumentation, Minimise manipulation of the anastomosis, Maintain continuous airway control. Clinical assessment revealed no evidence of subcutaneous emphysema, pneumomediastinum, or anastomotic dehiscence. The patient demonstrated progressive clinical improvement and was discharged home in stable condition.

DISCUSSION:

Airway vulnerability after tracheal reconstruction:

The early postoperative period following tracheal reconstruction is characterised by increased susceptibility to airway compromise. Tissue oedema, altered airway mechanics, and tension at the anastomotic site contribute to this vulnerability.³ Even minor disturbances, such as displacement of an airway adjunct, may lead to rapid deterioration.^{5,6}

Mechanism and implications of T-tube displacement:

T-tube displacement may occur due to coughing, patient movement, inadequate fixation, or changes in airway geometry. Once displaced, the tube may obstruct airflow or create significant air leak, leading to ineffective ventilation. Attempts at repositioning may risk disruption of the anastomosis, making management particularly challenging.

Role of bag–mask ventilation:

The use of BMV in the immediate postoperative period following tracheal reconstruction is often approached with caution due to concerns regarding transmission of positive pressure to the anastomotic site.³ However, this case demonstrates that carefully controlled low-pressure BMV can be safely and effectively employed. The success of ventilation may be attributed to: Partial airway patency despite T-tube displacement, Airflow around the displaced tube, Gentle application of inspiratory pressure.

Maintaining low airway pressures is critical in reducing the risk of anastomotic stress.^{16, 17}

Alternative airway strategies:

Alternative interventions such as oral endotracheal intubation or blind reinsertion of the T-tube carry significant risks, including: Airway trauma, Creation of false passages, Anastomotic disruption^{14, 17}

These approaches should be reserved for situations where oxygenation cannot be achieved by safer methods.

Clinical implications:

This case reinforces several key principles:

- Oxygenation must always take precedence in airway emergencies^{7,8}
- Gentle ventilation strategies can minimise risk to surgical repair¹⁶
- Avoidance of blind airway manipulation is essential¹⁴
- Early multidisciplinary involvement improves patient outcomes³

Large airway audits, including the NAP4 study, have demonstrated that failure to prioritise oxygenation is a major contributor to adverse airway outcomes.¹⁸

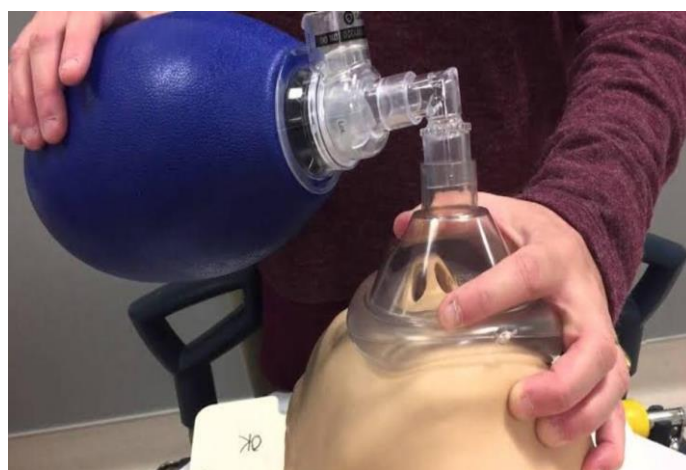


FIG 2: A self-inflating resuscitation bag is connected to a transparent face mask covering the nose and mouth. The operator uses one hand to maintain a tight mask seal (EC grip) while compressing the bag with the other hand to deliver controlled breaths, simulating airway support in a perioperative or emergency setting. This is a safe ventilation technique and includes limiting of inspiratory pressures to protect delicate airway structures such as a fresh tracheal anastomosis.

CONCLUSION:

Early postoperative displacement of a Montgomery T-tube is a rare but potentially life-threatening complication. Prompt recognition and immediate restoration of oxygenation are critical to preventing adverse outcomes.

Controlled low-pressure bag–mask ventilation represents a safe and effective temporising strategy when applied with caution. Adherence to airway management principles and multidisciplinary coordination are essential for successful management.

Conflict of Interest: None declared

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