



Case Report

Pneumothorax after tracheostomy closure with successful nonsurgical management^{☆,☆☆}



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Abstract A 3-year-old girl presented for routine closure of her tracheostomy site. She was intubated easily for the procedure, and the wound was closed with a drain in place. In recovery, the mother noticed fullness in the patient's submandibular region, and on examination, the girl had subcutaneous emphysema in the neck bilaterally. She returned to the operating room for exploration, and air was released from the surgical site. The wound was again closed with a drain in place, and the patient was extubated uneventfully. After arriving to the pediatric intensive care unit for monitoring, the patient acutely developed respiratory distress and was found to have pneumomediastinum and pneumothorax and was emergently intubated. She was observed closely, and the following day, the pneumothorax improved, and she successfully extubated without further complication.

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1. Introduction

Subcutaneous emphysema in the setting of tracheal manipulation raises concern for airway disruption. Although pneumomediastinum is often characterized as a benign condition [1], progression into pneumothorax can lead to respiratory compromise. The prompt identification and management of these conditions are critical to ensure patient safety. We present the case of a 3-year-old girl who underwent routine tracheostomy closure and subsequently developed pneumomediastinum, pneumothorax, and respiratory distress necessitating intubation. Given the etiology of the

pneumothorax, it was managed successfully without pleural drainage. Consent was obtained from the patient's guardian for presenting the case.

2. Case

A 3-year-old girl presented for routine closure of her tracheostomy site. Her medical history was significant for severe laryngomalacia refractory to supraglottoplasty, and a tracheostomy was performed at 4 months of age. Her airway symptoms improved with time, and she was eventually decannulated after a successful tracheostomy capped sleep study trial. The tracheostomy was in place for 5 months and had been decannulated for a year when she later presented with a persistent tracheocutaneous fistula. The patient did not have upper respiratory infection, underlying pulmonary pathology, chronic cough, or a large defect (>5 mm) and was deemed to be an appropriate candidate for primary surgical closure of the fistula.

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Before tracheostomy closure, anesthesia was induced via inhalational induction, and a spontaneously ventilating bronchoscopy was performed that demonstrated a normal trachea without signs of granuloma or stenosis (Fig. 1). The patient was then easily intubated with a 4.0-mm cuffed endotracheal tube. The tract was then closed loosely over a drain, and extubation was uneventful. Shortly after arriving in the postanesthesia care unit, the patient's mother noticed fullness in the girl's submandibular region. The patient was otherwise comfortable and hemodynamically stable. Evaluation by the anesthesia and otolaryngology teams was significant for subcutaneous emphysema in the neck bilaterally without desaturation or respiratory compromise.

Given the concern for air leaking into the closure site, she was urgently taken back to the operating room for re-exploration and intubated again with a 4.0-mm cuffed endotracheal tube. Upon opening the previous incision, there was immediate release of trapped air from the site. The trachea was examined and appeared intact. Therefore, the wound was irrigated and loosely closed over a larger penrose drain. She was extubated without incident and transferred to the pediatric intensive care unit for monitoring. Shortly after arriving to the pediatric intensive care unit, she was observed to have a gradual increase in her work of breathing with noticeable stridor and was, therefore, treated immediately with empiric albuterol, racemic epinephrine, and increased supplemental oxygen. Because of her work of breathing and intermittent oxygen desaturations, her breathing was also assisted with bag-mask ventilation.

She remained stable with supportive measures, and STAT chest x-ray (CXR) was taken concurrently with airway management and showed pneumomediastinum with a small left pneumothorax. She became more agitated and continued to appear in respiratory distress with retractions and was, therefore, emergently intubated with a 3.5-mm cuffed endotracheal tube. Because her oxygenation and ventilation

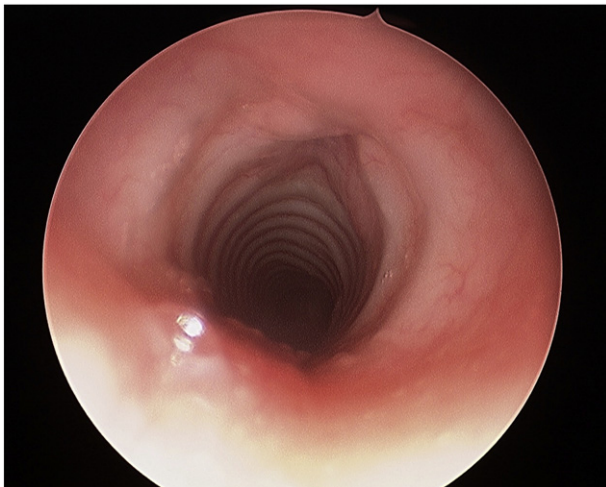


Fig. 1 Intraoperative bronchoscopy was performed prior to tracheocutaneous fistula closure and revealed a normal-appearing trachea.

were adequate without hemodynamic compromise after intubation, the decision was made not to place a tube thoracostomy and to observe the patient's pneumothorax.

Postintubation CXR confirmed the presence of pneumomediastinum and nonexpanding pneumothorax (Fig. 2). She remained intubated overnight on synchronized intermittent mandatory ventilation with tidal volumes of 200 mL, 6 cm H₂O positive end-expiratory pressure, 10 cm H₂O pressure support for spontaneous breaths, respiratory rate of 20 breaths per minute, and 60% fraction of inspired oxygen. She also received dexamethasone given the possibility that edema may have contributed to upper airway obstruction and respiratory failure.

The next day, repeat CXR showed improvement of her pneumothorax and pneumomediastinum (Fig. 3), and she was successfully extubated. After a period of observation, she was eventually sent home in stable condition.

3. Discussion

This case addresses various issues including closure of tracheocutaneous fistulas and sequelae of tracheal manipulation, as well as considerations for pneumothorax and airway management.

Tracheocutaneous fistulas develop from persistent squamous epithelialization of the tracheostomy stoma tract [2]. These fistulas can be associated with skin irritation, weak cough, recurrent aspiration, difficulty with phonation, and decreased airway protection [2,3]. From a surgical standpoint, there are different approaches to tracheostomy closure

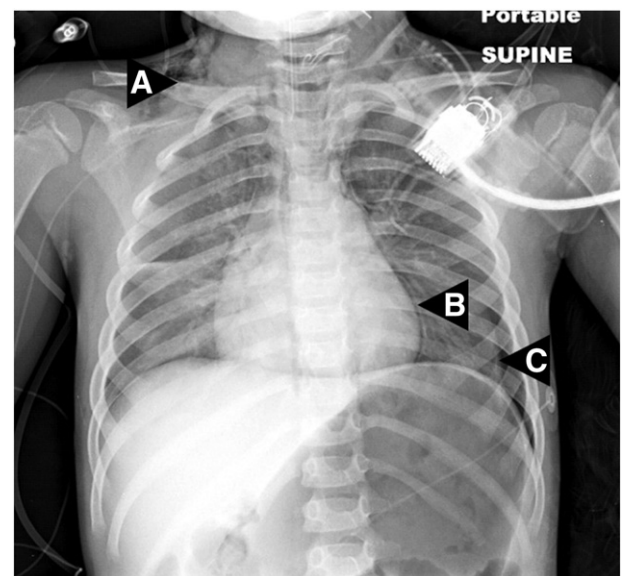


Fig. 2 Patient developed respiratory difficulty upon arrival to the PICU and was emergently intubated. Immediate postintubation CXR reveals subcutaneous emphysema (A), pneumomediastinum (B), and pneumothorax (C).

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