Case Report

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A Case of Severe Tracheal Stenosis After Short-Duration Endotracheal Intubation

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Abstract

Post-intubation tracheal stenosis is a rare but severe condition that occurs after long-term intubation. In this study, we highlight the case of a male patient who experienced severe tracheal stenosis after a brief period of endotracheal intubation. A 37-year-old man presented to the emergency department complaining of difficulty breathing with stridor; upon examination, the patient was noted to have stridor during both inspiration and expiration. It was discovered that ten weeks ago, he was admitted to the hospital following a motor vehicle accident and required mechanical ventilation for nine days. Given this medical history, a contrast-enhanced CT imaging of the neck was performed, which revealed grade III tracheal stenosis. The patient was transferred to a specialized center, where he underwent successful tracheal stenting. This case report underscores the importance of inquiring about tracheal intubation history in patients who present to the emergency department with respiratory symptoms.

Keywords: Tracheal stenosis, endotracheal intubation, stridor, medical history

Introduction

Tracheal stenosis is a medical condition characterized by the abnormal narrowing of the trachea, often as a complication following intubation. Research indicates that tracheal stenosis post-intubation can vary from 10% to 22%, with severe symptoms occurring in only 1% to 2% of cases (1). The etiology of post-intubation tracheal stenosis is multifaceted. Notably, elevated cuff pressures surpassing the mucosal capillary perfusion pressure (20–30 mm Hg) are a significant contributor. This can precipitate ischemic insult within as little as fifteen minutes post-intubation, contributing to ulceration and subsequent fibrotic changes within a period of three to six weeks (2). The condition typically manifests as a gradual onset of dyspnea and dry cough, with additional symptoms including shortness of breath, difficulty speaking, and stridor (3). Here, we present a case study detailing the experience of a male patient who developed severe tracheal stenosis following a brief period of endotracheal intubation.

Case

A 37-year-old man presented to the emergency department with complaints of experiencing difficulty in breathing accompanied by stridor on inhalation and exhalation. Upon examination, it was noted that the patient who had stridor was facing challenges in both inspiration and expiration and was in moderate respiratory distress, with limited ability to speak. The patient reported a history of being hospitalized ten weeks prior due to a car accident, during which he required invasive mechanical ventilation for a period of 9 days. Considering this statement, the patient's hospitalization history was accessed from the personal health record system (e-Nabız, Republic of Türkiye Ministry of Health) profile by the patient himself. It was learned that the patient was intubated with a cuffed endotracheal tube (ETT) size of 8.0 mm. The patient denied experiencing any complications during intubation and stated that this was his only encounter with a ventilator. Upon admission, the patient's peripheral oxygen saturation (SpO2) was measured at 91% on room air. The initial course of treatment involved

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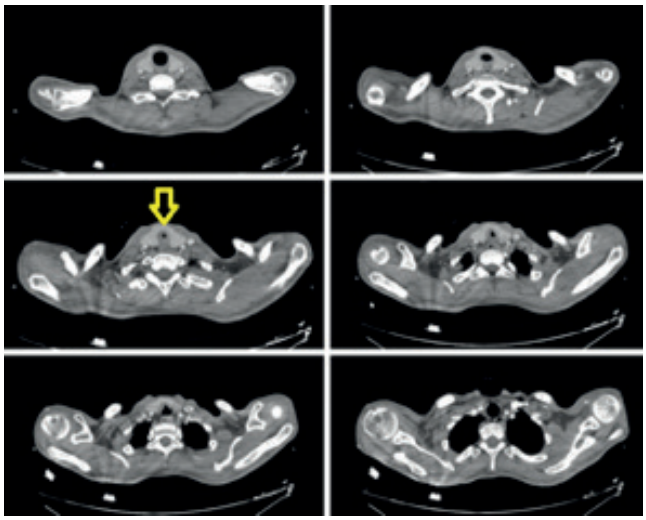

Figure 1. A contrast-enhanced CT imaging of the neck

the administration of nebulized salbutamol, adrenaline, intravenous dexamethasone, and antibiotics. As the patient's SpO2 levels improved to above 95%, a contrast-enhanced CT imaging of the neck revealed a 3 cm long tracheal stenosis located 5 cm below the vocal cords, with a minimum diameter of 3.3 mm (Figure-1). Due to the unavailability of a tracheoscopy, the patient was transferred to the intensive care unit and subsequently to an advanced medical center. A tracheoscopy performed at the advanced medical center revealed severe narrowing, categorized as Grade III, with a reduction of the tracheal lumen exceeding 71%. The stenosis was successfully managed with tracheal stenting.

Discussion

Post-intubation tracheal stenosis, a rare yet severe condition, arises subsequent to prolonged intubation and can lead to significant implications. This stenosis results from compression by the ETT cuff, causing ischemia in the tracheal mucosal tissue and subsequent fibrotic scarring. Ramalingam et al. have identified multiple factors contributing to tracheal stenosis, includingthe patient's age and sex, steroid use, ETT size relative to the tracheal lumen, ETT material, intubation duration, hemodynamic state, and tube movement (3). Although information on cuff pressure is not available, the size of the ETT may be relatively disproportionate, explaining the tracheal stenosis in our case. Frioui et al. reported an estimated incidence of 4.9 cases of tracheal stenosis per million post-intubation (4). The onset of tracheal stenosis typically occurs 2 to 24 weeks after extubation. The likelihood of stenosis increases with more prolonged intubation, but it is rare when intubation lasts less than one week (5, 6). In our case, tracheal stenosis emerged following a 9-day intubation period, similar to cases considered rare in the literature. There are a few reported cases in the literature where post-intubation tracheal stenosis took 28 days to 6 months to develop (7). Following endotracheal intubation, it is common for most patients to experience a certain level of stenosis. Interestingly, patients with this condition often do not display symptoms until the tracheal narrowing reaches approximately 70% of its original lumen (8, 9). In a study conducted by Stauffer JL et al., it was noted that 11% of patients subjected to intubation using high-volume, low-pressure cuffed tubes exhibited tracheal stenosis, manifesting as a 50–90% constriction of the tracheal lumen, specifically at the cuff site (10). In our case, there was grade III tracheal stenosis, in which the tracheal lumen reduction is between 71% and 99%, which explains the respiratory symptoms. Diagnosing tracheal stenosis can be challenging, necessitating a multidisciplinary approach to management. Bronchoscopy serves as the gold standard for diagnosis, with computed tomography scans also proving beneficial. Stenosis can typically be prevented by employing low-pressure cuffs. The available treatment modalities encompass surgical tracheal reconstruction, tracheal dilation, stenting, and laser bronchoscopy (3). These therapeutic options are integral to addressing tracheal pathologies and necessitate careful consideration based on individual patient presentations.Our case is significant as it exemplifies Grade III tracheal stenosis despite a brief intubation period. Furthermore, it serves as a compelling example of the critical necessity to promptly address acute respiratory distress, conduct thorough medical history assessments, minimize unnecessary tests, and concentrate on targeted examinations and interventions.

Conclusion

In order to provide optimal patient care, a thorough assessment of any prior intubation history is imperative when patients present to the emergency department with respiratory symptoms. Additionally, it is vital to include the possibility of tracheal stenosis in the differential diagnosis for patients with a history of intubation who exhibit respiratory symptoms upon presentation to the emergency department.

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