

CASE REPORT

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A Rare and Life-Threatening Complication of Short-Term Endotracheal Intubation: Postintubation Tracheal Stenosis

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ABSTRACT Postintubation tracheal stenosis (PITS) is an iatrogenic complication that can often occur due to tracheostomy and prolonged intubation. It can be seen very rarely after short-term intubation. Here, we present a case of PITS that developed in a patient who was operated on twice for subdural and epidural hematoma evacuation. Our case was intubated twice and was followed intubated for a short time (48 hours). Since PITS can often be confused with other respiratory diseases, anamnesis and clinical suspicion are essential in diagnosis. PITS should be considered in patients who are intubated in the intensive care unit, have cardiovascular disease, hypotensive periods, and progressively increasing respiratory complaints. It should be kept in mind that intubation may not be possible in PITS cases with severe tracheal stenosis. Planning the necessary preparations, including emergency front of neck access, to ensure the airway safety of patients is vital in preventing undesirable situations.

Keywords: Complications; dyspnea; intubation; tracheal stenosis

Postintubation tracheal stenosis (PITS) is an iatrogenic complication that can often occur due to tracheostomy and prolonged intubation. High cuff pressure in the intubation tube or tracheostomy cannula leads to ischemic necrosis of the tracheal cartilage mucosa. This condition can lead to granulation tissue and fibrosis over time, leading to tracheal stenosis. Risk factors for PITS include prolonged intubation, tracheal interventions, low blood pressure, tracheal irritation due to frequent aspiration, diabetes, cardiovascular diseases, obesity, radiotherapy exposure to the larynx or pharynx area, and advanced age.¹⁻³

The most common symptoms are dyspnea, cough, and wheezing. Since PITS can often be confused with other respiratory diseases, anamnesis and clinical suspicion are essential in diagnosis. Here, we present a case of PITS, which developed after short-term (48 hours) endotracheal intubation and in which intubation was not possible due to severe tracheal stenosis.

CASE REPORT

Chronic subdural hematoma evacuation was performed on a 52-year-old obese male patient with hy-

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pertension and coronary artery disease. There was no history of surgery or endotracheal intubation in the patient's anamnesis. In the preoperative oropharyngeal examination, neck movements were regular, mouth opening was adequate, and Mallampati score was II. The laryngoscopic evaluation revealed Cormack-Lehane Grade I. He was orotracheally intubated on the first attempt. There were no problems with intubation. Following two-hour operation and uneventful extubation, he was transferred to the intensive care unit (ICU). During follow-up, epidural hematoma and brain edema were detected. Approximately 24 hours after the first operation, epidural hematoma evacuation, and decompressive craniectomy were performed, and the skull bone was placed in the abdomen. The patient was hypotensive and bradycardic in the perioperative period. Vasopressor infusion was started, and he was transferred to the ICU. The patient was followed in the ICU for a total of 5 days, including 48 hours of intubation. A cough, sore throat, and dyspnea developed on the patient's third day in the inpatient service. Minimal pericardial effusion, pleural effusion, and atelectatic areas in bilateral lungs were detected. The patient's complaints decreased slightly after administering respiratory physiotherapy with diuretics and bronchodilators. The patient stayed in the hospital for 15 days and was discharged.

The patient's complaints of dyspnea and wheezing increased after discharge. PITS was diagnosed at the referral center approximately one month after the

first intubation. A total of 3 tracheal dilations and two stent applications were performed at the center to which the patient was referred. A cranioplasty operation was planned for our hospital three months after his first operation. The patient, whose intubation was not difficult in his first surgery, was evaluated preoperatively by a pulmonologist for endotracheal intubation. The pulmonologist recommended intubation with a size 6.5 endotracheal tube. Techniques such as high-frequency jet ventilation/microlaryngeal tubes were not considered because they could not be performed in our hospital. Although placement of supra-glottic airway devices was considered, the surgical team did not request them as they would restrict the operating area. Vocal cords were visible during laryngoscopy. Endotracheal tubes 6.5 and 6 could not be placed in the patient because they could not be advanced after the vocal cords. Vocal cords and trachea were not traumatized, and intubation was possible with a size 5.5 endotracheal tube. However, the operation was canceled because lung pressures were too high, and sufficient tidal volume could not be created. The patient was awakened.

The patient was transferred to the reference hospital for tracheal surgery. Fiberoptic bronchoscopy at the referral center revealed a complex type of stenosis that started 2.5 cm after the vocal cords and continued up to 2.5 cm, obliterating the lumen by 80% (Cotton-Myer Grade III). (Grade I, 0-50% obstruction; Grade II, 51-70%; Grade III, 71-99%; and Grade IV, no detectable lumen).² The diameter of the

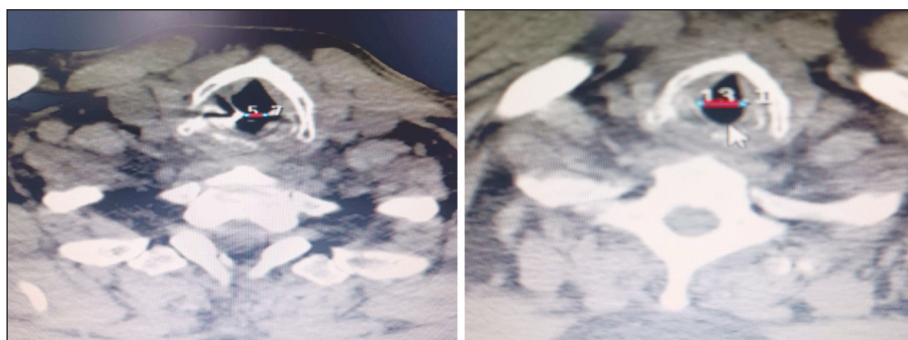


FIGURE 1: Stenosis appearance under the vocal cords before tracheal resection. **A)** In the patient who could not be intubated, a complex type of stenosis accompanied by malacia was detected, which started 2.5 cm after the vocal cords, continued up to 2.5 cm, obliterating the lumen by 80. The widest diameter of the stenotic segment is 5.1 **B)** After tracheal resection and anastomosis, the patient was placed with a size 6.5 endotracheal tube. The widest diameter of the tracheal opening below the vocal cords is 13.1 mm.

stenosis area in the patient was determined to be 5.1 mm (Figure 1A). The patient underwent tracheal resection and end-to-end anastomosis. After tracheal resection, the diameter of the stenosis area in the patient was measured as 13.1 mm (Figure 1B).

A cranioplasty operation was planned 25 days after the tracheal reconstruction operation. The patient was intubated with tube number 6.5, and after the operation was completed, the patient was extubated and discharged.

The patient was informed about the case presentation and sharing the image, and written and verbal consent was obtained.

DISCUSSION

Due to technological developments in the ICU and the increased quality of patient care, the number of orotracheally intubated or tracheostomized patients has increased.^{4,5} Despite the widespread use of high-volume and low-pressure endotracheal tubes, the rate of tracheal stenosis due to prolonged intubation has been reported in the literature to be between 0.6% and 21%.^{5,6} When the intubation tube cuff pressure exceeds 30 mmHg, which is the mucosal capillary pressure of the trachea, ischemia may develop under the cartilaginous mucosa. Tracheal stenosis develops due to ulceration and fibrosis in the tracheal cartilage caused by long-term ischemia.⁷ Symptoms may not be seen until there is a 50% stenosis in the diameter of the trachea. When the tracheal diameter is 25% of its standard size, dyspnea and stridor can be seen even at rest.⁸ Development of PITS after short-term intubation, as in our case, is rare. Intubating the patient twice, observing perioperative hypotension, cardiovascular diseases (hypertension and coronary artery disease), and obesity are risk factors. Our patient was intubated for a very short time (48 hours), and PITS developed despite the use of a high-volume and low-pressure cuff. Cuff pressure measurements of endotracheal tubes are performed in ICU patients. However, cuff measurements may not be possible in patients intubated for short periods, as in our case. Although the cause of PITS could not be determined precisely in our case, the hypotensive period observed 24 hours after the first operation may have

been effective. In our case, there were risk factors for PITS, and cuff pressure control was not performed. Measuring cuff pressure in intubated patients and preventing hypotensive periods in patients may help prevent the development of PITS.

In PITS cases, symptoms may appear in a very short time or may last months or even years.⁹ De and De reported that PITS developed in a 52-year-old male patient who was intubated for four days three months ago.¹⁰ It was stated that the patient had complaints of increasing dyspnea, dry cough, and wheezing for one month. Calik et al. reported a case of PITS in a 17-year-old male who was followed up in the ICU for one week due to a traffic accident one month ago.¹¹ The authors stated that the patient's complaint of dyspnea increased progressively after discharge, and the diameter of the stenosis was measured as 0.6 cm. Ulasan et al. stated that 72% of PITS cases were male, the average age was 34.7 ± 15 years, the average intubation time was 16 ± 7 days, and the most common reason for intubation was trauma.¹² In our case, the respiratory problems that occurred during inpatient service follow-up were thought to be caused by pleural effusion and atelectasis.

Balloon dilatation, diathermic resection, endoscopic laser, and stent applications treat tracheal stenosis. However, it has been reported that resection and end-to-end anastomosis are the most effective treatment methods.^{2,12} In our case, tracheal dilatation and stent application were performed many times, but they did not help eliminate the stenosis. Consistent with the literature, resection, and anastomosis were effective treatment methods.

In conclusion, PITS is rarely observed after short-term endotracheal intubation. PITS should be kept in mind in patients who are intubated in the ICU and whose respiratory complaints do not respond to treatment and progressively increase. Intubation may not be possible in PITS cases with severe tracheal stenosis. In these cases, it is vital to make the necessary preparations, including emergency tracheostomy/tracheotomy, to ensure airway safety and to prevent undesirable situations. Tracheal resection and end-to-end anastomosis are the most effective methods in elective treatment.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Kadir Arslan, Evren Sönmez, Ebru Kaya; **Design:** Kadir Arslan, Evren Sönmez, Ebru Kaya, Ramazan Ahmet Altunbay, Ayça Sultan Şahin; **Control/Supervision:** Kadir Arslan, Ebru Kaya, Ayça Sultan Şahin; **Data Collection and/or Processing:** Kadir Arslan, Evren Sönmez, Ebru Kaya, Ramazan Ahmet Altunbay; **Analysis and/or Interpretation:** Kadir Arslan, Ramazan Ahmet Altunbay, Ayça Sultan Şahin; **Literature Review:** Kadir Arslan, Ayça Sultan Şahin; **Writing the Article:** Kadir Arslan; **Critical Review:** Kadir Arslan, Ebru Kaya, Ayça Sultan Şahin.

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