

Tracheal rupture caused by fall from a height

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Abstract

Follow-up and treatment of multiple lesions in intensive care units are arranged within the discipline of approach to a case of injury. Herein, we present a 38-year-old female patient who had head trauma caused by a fall from a minibus. The patient was presented to our intensive care unit with epidural hematoma; however, tracheal rupture was found during the follow-up. Tracheal injuries and especially ruptures are not frequently encountered events even in cases with severe traumas. In traumatic events, it is difficult to diagnose tracheal rupture because of serious problems related with many organ systems. After establishment of diagnosis, it is possible to encounter relevant neurological and infectious problems because of longer treatment process. As in the case with our patient, in patients without any additional previously experienced respiratory problems while intubated development of respiratory distress hours after recurrent periods of intubation and extubation should suggest the presence of tracheal rupture.

Keywords: Tracheal rupture, fall from a height, injury.

Özet: Yüksekten düşmenin neden olduğu trakea rüptürü

Yoğun bakım ünitelerinde birden fazla lezyonun izlem ve tedavisi, bir yaralanma olgusuna yaklaşım disiplini kapsamında düzenlenir. Bu yazıda, bir minibüsten düşüşün neden olduğu kafa travmasına maruz kalmış 38 yaşındaki bir kadın hastayı sunduk. Hasta yoğun bakım ünitemize epidural hematomla gelmesine karşın, izlem sırasında trakea rüptürü saptanmıştır. Trakea yaralanmaları ve özellikle rüptürlere ağır travmalarda bile sıklıkla rastlanmamaktadır. Travmatik olaylarda, birçok organ sistemiyle ilgili ciddi sorunlar nedeniyle trakea rüptürüne tanı koymak zordur. Tanı konduktan sonra daha uzun tedavi süreciyle ilgili nörolojik ve enfeksiyon sorunlarına rastlamak mümkündür. Hastamızda olduğu gibi entübe iken ilave solunumsal sorunlar yaşamayan hastalarda yinelenen entübasyon ve ekstübasyon dönemlerinden saatler sonra solunum sıkıntısının gelişmesi trakea rüptürünün varlığını düşündürmelidir.

Anahtar sözcükler: Trakea rüptürü, yüksekten düşüş, yaralanma.

We encounter multiple cranial, thoracic, abdominal, and extremity lesions caused by traffic accidents and fall from a height. Follow-up and treatment of these cases in intensive care units (ICUs) are arranged within the discipline of approach to a case of injury. In the present case, we are dealing with a 38-year-old female patient who had head trauma caused by a fall from a minibus. The patient was presented to our ICU with tracheal rupture.

Case Report

A 38-year-old female patient who had an extravehicular traffic accident was sent to an external medical center and then her cerebral computed tomography (CT) was obtained because of head trauma. The patient with normal tomographic findings was admitted to ICU. When she was

admitted in ICU her conscious was open; however, she was somnolent. She was consulted to neurosurgery department, which suggested her follow-up with cervical and cerebral CTs. She was spontaneously breathing through her intact respiratory tract and received oxygen ventilation at a rate of 3 L/min. Later on, she suffered from respiratory distress and underwent noninvasive intermittent mechanical positive pressure ventilation (NIMV). Control CT revealed right parieto-occipital epidural hematoma and then intracranial pressure catheter was implanted for drainage of the epidural hematoma. On the 9th day of her ICU stay when she was cooperative with improved general health state and open conscious, she was transferred from ICU to the service of neurosurgery. During her transfer to the service, she had intermittent fits of coughing which we thought to be related to airway irritation during her transfer to the service.

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One day after her transfer to the service, she was readmitted to our ICU because of high fever and respiratory distress. Due to increase in the severity of respiratory distress and decrease in SPO₂ concentration, orotracheal intubation (OTI) was performed. Then she was connected to mechanical ventilation device and started to be sedatized. Cranial CT and thorax CT were performed to exclude cranial and thoracic pathologies. The patient was consulted to the department of infectious diseases; however, any pathology was not detected. Since she had sufficient respiratory exertion with normal blood gas parameters while intubated, her OTI was terminated. However, because of development of respiratory failure one day later she was re-intubated. ENT consultation requested for the evaluation of vocal chords could not detect any abnormal finding and endoscopy was recommended for the patient. Meanwhile, hematemesis developed and endoscopy performed during requested gastroenterology consultation did not reveal any important abnormality. The patient, whose respiratory functions were satisfactory while on OTI, was re-extubated. Following extubation, NIMV was applied intermittently at PS mode. Our patient tolerated NIMV for nearly 4–5 days. However, because of persistence of her respiratory distress and requirement for continuous NIMV, she underwent OTI again. Because of inadequate swallowing reflex and frequent trials of intubation–extubation, percutaneous endoscopic gastrostomy and tracheostomy were planned. *Staphylococcus aureus* was grown on the culture media of her tracheal aspirate and at cardiology consultation requested for infective endocarditis any abnormality was not detected. The patient was started on linesolide and ampicillin-sulbactam therapy. Following trial of percutaneous tracheostomy performed on the 25th day of her hospitalization, the patient suffered from respiratory problems and the air delivered leaked out through mouth which necessitated re-intubation. Bronchoscopic evaluation could not identify effaced tracheal rings and cryothyroidal membrane of the patient. Tracheal region was inflamed and edematous. Tracheostomy of the patient was closed and OTI was repeated. Consultation from the Department of Otorhinolaryngology (ENT) was requested and open surgery was planned for tracheostomy. One day later, surgical tracheostomy was performed by ENT department in the operating room. However, her ventilation was still problematic and her examination revealed nearly a 3 cm long tear on the anterior aspect of the trachea. The tear was sutured. Tracheostomy incision opened by the surgery team was also sutured and closed. OTI was performed and the patient was hospitalized in the ICU. Based on the decision of the consultation council, stent implantation was planned with the aid of the bronchoscopy for the management of the tracheal rupture.

The patient was brought into the operating room by the Departments of ENT and Thoracic Surgery and tracheal avulsion was seen on the presumably ruptured tracheal region. Primary repair with end-to-end anastomosis was performed and chin was sutured to the chest wall so as to place the neck in flexion. Orotracheally intubated patient was hospitalized in ICU. During this monitorization process, the patient was sedatized and curarized (infusion therapy with midazolam 3 mg/h and vecuronium chloride 2 mg/h). On the 35th day of her hospitalization *Acinetobacter baumannii* was grown on her blood culture media. Colimycin, B-lactam and meropenem therapy was initiated. On the 40th day of her hospitalization, a posttraumatic pocket hematoma extending from sacral region to the left gluteal region was detected. The wound was debrided by plastic surgeon and VAC (vacuum assisted closure) was performed. During weaning process, she could not move her painful extremities, which suggested the presence of critical illness neuro/myopathy. She underwent electromyography (EMG) in the department of neurology and diagnosis of Gullian-Barré syndrome (AMAN form) was established. For 5 days, intravenous immunoglobulin treatment was applied and physical therapy was initiated. Fifteen days after the last operation (on the 55th day of her hospitalization), tracheostomy was opened by ENT department. Nearly one month after establishment of the diagnosis of neuropathy, she started to move her hands and arms; however, neuropathy of extremities persisted. Control thoracic and lumbar MR could not detect any abnormality responsible for the existing condition. EMG results were thought to be consistent with ICU polyneuropathy. The patient with tracheostomy was monitored under room air conditions. She was transferred to the service with open conscious, full cooperation and stable vital signs at 3rd month of her hospitalization. Myositis ossificans developed in her right leg and she received physical therapy for nearly 2 months in the service before her discharge. The patient was followed up for approximately 4 months at home; then, her tracheostomy was closed. The patient underwent a reoperation for the repair of her tracheal rupture in another center, while she was receiving physical therapy and rehabilitation and maintaining her daily life with minimal support. The patient died nearly 6 months after her discharge from our hospital because of postoperatively developed sepsis.

Discussion

In their retrospective series of 23 patients, Hwang et al. could not detect any significant difference between prognoses of patients diagnosed within or 48 hours after penetrating and blunt injuries. Since patients who applied to the

emergency services were mostly polytraumatic cases, the authors revealed difficulties in making a diagnosis. In addition, they attributed cause of death of the patients who were brought to the emergency services to possibly overlooked diagnosis of tracheal rupture.^[1] We also could hardly diagnose tracheal rupture of our patient. However, in a case presented by Gorosh et al., the authors described diagnostic difficulties and treatment of spontaneous tracheal rupture in a 3-year-old baby boy who had been brought to the emergency service with the initial diagnosis of anaphylaxis and rapidly deteriorated with progressive edema and respiratory distress. Bronchoscopy could not demonstrate the preexisting pathology. On computed tomograms, a defect extending proximally along the posterior wall of the trachea up to the end point of the endotracheal tube was detected. In conclusion, the authors indicated that spontaneous tracheal rupture can be overlooked and its diagnosis might be challenging.^[2] We also had difficulty in making a diagnosis with the aid of computed tomography and bronchoscopy. However, during surgical procedure, tracheal avulsion could be detected. In a case presentation Austin et al. detailed airway management strategy in patients whose tracheas had been perforated during endotracheal intubation. They emphasized that the clinicians could be able to use at least more than one airway devices and be prepared to face these types of unexpected conditions.^[3] In the present case, we experienced difficulties in the detection of anatomical variations of trachea. In their case report on spontaneous tracheal rupture caused by vomiting, Stevens et al. presented a 14-year-old girl with type I DM and respiratory distress who had very severe vomiting bouts for 4 days and diagnosed as diabetic ketoacidosis. Her examination revealed presence of tachypnea, subcutaneous emphysema in her neck and upper chest. Pneumomediastinum was observed on her chest X-ray. Any evidence of esophageal rupture was not encountered. On chest CTs, a rupture of 3.5 cm in length extending distally to the cricoid cartilage on the posterior aspect of the trachea had been observed. In conclusion, in this first published case of tracheal rupture secondary to vomiting, the authors indicated that in cases with subcutaneous emphysema, pneumomediastinum and similar diagnoses, esophageal and tracheal rupture should be ruled out.^[4] In our case, we also ruled out this diagnosis by performing endoscopy so as

to exclude esophageal rupture or perforation which might be related to tracheostomy. In their study entitled "Surgery of traumatic tracheal and tracheobronchial injuries". Palade and Passlick indicated that these injuries had been rarely seen. It has been also indicated that successful treatments of these injuries require rapid and direct diagnostic evaluation. Despite requirement of surgical procedure in cases with posttraumatic injuries is conceived, recently conservative treatment in iatrogenic injuries outweighs all other alternatives.^[5] In our case, we have observed that rare diagnosis of tracheal avulsion could be treated only with surgical method and long-term monitorization in ICU. During this process, we encountered infections which can be seen associated with long-term ICU stay. In addition, in our patient critical illness neuro/myopathy developed secondary to sedation and use of steroids and neuromuscular blockers.

Tracheal injuries and especially ruptures are not frequently encountered events even in cases with severe traumas. In traumatic events, it is difficult to diagnose tracheal rupture because of serious problems related with many organ systems. After establishment of diagnosis, it is possible to encounter relevant neurological and infectious problems because of longer treatment process. As in the case with our patient, in patients without any additional previously experienced respiratory problems while intubated development of respiratory distress hours after recurrent periods of intubation and extubation should suggest the presence of tracheal rupture.

Conflict of Interest: No conflicts declared.

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