

Pneumomediastinum due to Penetrating Neck Injury: A Case Report

Penetran Boyun Yaralanmasına Bağlı Pnömomediastin: Bir Olgu Sunumu

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ABSTRACT

Penetrating neck injuries are rarely encountered, but have a highly mortal course because of the presence of many vital organs in this small region. We reported a tracheal rupture and pneumomediastinum case which occurred due to the penetration of a sharp piece of wood to the neck. The hemodynamically stable patient was evaluated by radiologic and endoscopic procedures and the pneumomediastinum and tracheal defect were found. The tracheal defect was left to heal spontaneously, the laceration was repaired cutaneously and the antibiotherapy was started. The patient recovered and was discharged from the clinic after 10-day follow-up. The unstable patients with active hemorrhages must undergo surgical exploration without any delays, but interventions must be initially avoided in stable patients as in our case. The wide spectrum antibiotics should be started in traumatic pneumomediastinum cases to prevent the development of mediastinitis.

Keywords: Neck injury, pneumomediastinum, tracheal rupture

ÖZ

Penetran boyun yaralanmaları nadir görülür. Ancak bu küçük bölgede birçok hayati organın varlığı nedeniyle oldukça mortal seyretmektedir. Hemodinamik olarak stabil bir hastanın boyununa keskin bir odun parçasının girmesi sonucu radyolojik ve endoskopik ileri görüntüleme yöntemleriyle tespit edilen trakeal rüptür ve pnömomediastinum olgusu raporlamaktayız. Trakeal defekt sekonder iyileşmeye bırakıldı. Lazerle deri alanı onarıldı ve antibiyoterapi başlanan hasta şifa ile taburcu edildi. Unstabil kanayan hastalarda cerrahi eksplorasyon temeldir. Ancak olgumuzda olduğu gibi stabil hastalarda girişimler ilk planda düşünülmemelidir. Mediastinit komplikasyonunu engellemek için geniş spektrumlu antibiyotik başlanmalıdır.

Anahtar Kelimeler: Boyun yaralanması, pnömomediastinum, trakeal delinme

Introduction

Penetrating trauma to the head-neck commonly occurs secondary to stab and gunshot wounds and accounts for 5-10% of all trauma cases that are admitted to the emergency departments (ED) (1). The mortality rate reaches 10% in penetrating neck injuries, which are especially accompanied by massive hemorrhages due to vascular damage (2). Tracheal injury may occur if a wound track crosses the trachea. Pneumomediastinum, subcutaneous emphysema, and paratracheal air can be found in tracheal injury cases (1). The accumulation of air in the mediastinum, spontaneously or post traumatic, is known as pneumomediastinum. Increased alveolar pressure or weak lung parenchyma may result in alveolar rupture and the emerged air moves and accumulates in the mediastinum. This process is the main

mechanism of pneumomediastinum and is called as the "Macklin effect". In addition to this, pneumomediastinum rarely occurs due to post traumatic leakage of air from air containing mediastinal organs, such as trachea, esophagus, and larynx (3).

In this paper, it was aimed to present a pneumomediastinum case resulting from tracheal rupture that occurred after falling on a sharp piece of wood in a construction area.

Case Report

A 8-year-old boy patient was admitted to the emergency service with penetrating neck injury that occurred due to falling on a sharp piece of wood while he was running around a construction zone. He had chest pain and dyspnea at admission. The physical examination of



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the patient revealed a 3 cm laceration on the anterior of neck, below the thyroid gland, and air passage was also detected on that hole (Figure 1). Additionally, swelling and crepitation were found on the chest, neck and face up to the right eye. His initial vital signs were as follows: temperature: 37.2 °C, heart rate: 85 beats per minute, blood pressure: 105/60 mmHg, respiratory rate: 24 breaths per minute, and O₂ saturation: 96%.

In the emergency room, the patient was firstly monitored for hemodynamics, started oxygen via mask, and applied dressing on the laceration. Then, two large-bore vascular lines were opened, blood

samples were taken, and saline infusion was started. No active bleeding was observed and the patient was hemodynamically stable. Computed tomography (CT) of the neck and thorax, which confirmed tracheal rupture, pneumomediastinum and subcutaneous emphysema, was performed (Figures 2,3). Also, the pediatric surgeon and ear nose throat (ENT) physician examined the patient. The nasolaryngoscopy, which was performed by ENT doctor, showed the tracheal defect, too. The first dose of antibiotics (Cefazolin and Ornidazole) was administered in ED because of the high risk of mediastinitis. The first laboratory analyses revealed the following results: 15.4 10³/mL leucocytes, 11.3 g/dL hemoglobin, and 34.1% hematocrit.

In the intensive care unit, the oral feeding was stopped due to the suspicion of esophageal injury and the antibiotherapy (vancomycin and meropenem) and humidified oxygen were continued. On the second day, the ENT physician performed laryngoscopy under general anesthesia and determined a minor defect on the anterior of trachea. The cutaneous laceration was sutured and no intervention was done on the tracheal tear, by leaving for spontaneous healing. Pediatric surgeon performed esophagoscopy at the same session and no esophageal damage was confirmed. On the third day, the patient was still stable and had no new complaints, so oral feeding with liquids was started and he was taken into the pediatric surgery clinic. He was followed up in the clinic by performing routine chest graphics and wound care for ten days until being discharged. At the 3-month follow-up, the patient had no sequelae from his injury and the last chest radiography confirmed no pneumomediastinum. Written informed consent from the patient and approval from the hospital were obtained for presenting this case report.



Figure 1. The 3 cm laceration and air-hissing hole on the anterior of neck

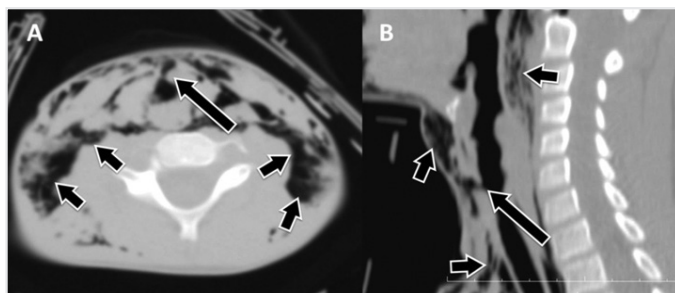


Figure 2. Axial (A) and sagittal (B) series of neck computed tomography. The tracheal defect (long arrow) and subcutaneous emphysema (short arrows) are seen

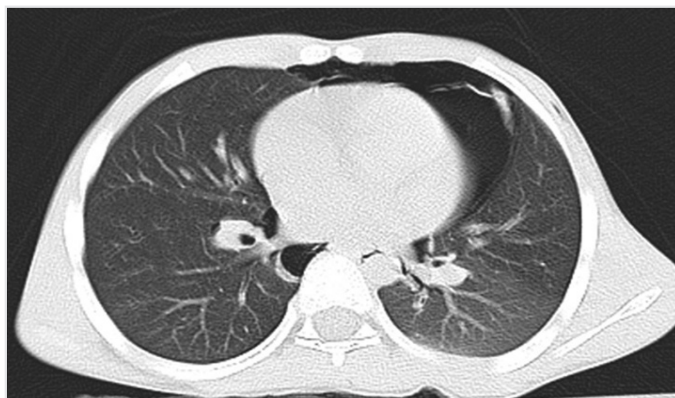


Figure 3. Pneumomediastinum image on axial series of thoracic computed tomography

Discussion

Pneumomediastinum, which has a high mortality rate unless diagnosed on time, was described firstly by Laënnec in a chest trauma patient. Trauma is responsible for 80% of all pneumomediastinum cases and penetrating trauma is seen more rarely than blunt traumas. Generally, it occurs by the moving of air in the lungs to the mediastinum, but in penetrating traumas, air may come outside of the body or from the trachea in the case of tracheobronchial injuries (3). The main complaints of pneumomediastinum patients include chest pain, dyspnea, hoarseness, and foreign body sensation in the throat. Additionally, subcutaneous emphysema on the chest, neck and face may be seen by movement of free air (4). Tracheobronchial injuries rarely occur in traumas to the neck and chest. In such cases, pneumomediastinum, soft tissues injury signs (swelling and ecchymosis), and subcutaneous emphysema may be seen. (5) Fortunately, the incidence of tracheobronchial injuries in children are much lower than in adults due to the shorter neck, larger mandible, and greater pliability of cartilages (6). In our report, the child fell down on a sharp piece of wood while he was running in a construction zone that had no security cordon and had a penetrating injury on the anterior of his neck. There was a 3 cm laceration with air hissing on the injury site and the patient suffered from chest pain and dyspnea.

The diagnostic tests for penetrating neck injuries include radiographics, endoscopic studies, ultrasound (US), CT, and magnetic resonance imaging (MRI). The common roentgen is the first diagnostic tool in

patients with chest pain and dyspnea, but it has a high false negativity rate in pneumomediastinum cases. The US is not the ideal diagnostic technique because of the subcutaneous air that prevents the evaluation of vital structures. The MRI requires a lot of time to perform and the metallic foreign bodies on injury site can preclude the patient from entering the MRI suite. On the other hand, the CT is the ideal diagnostic modality to confirm pneumomediastinum, tracheal injury, paratracheal air, and subcutaneous emphysema. If the patient has no need for urgent surgery, the gold standard diagnostic tool is the CT angiography. Nasolaryngoscopy, bronchoscopy and esophagoscopy can be used to evaluate the aerodigestive organs. The patient should immediately undergo surgical exploration without performing any diagnostic modality if the patient is hemodynamically unstable with active bleeding or any air leakage (1,3). In this report, our patient was stable and had no active bleeding, so CT of the neck and thorax was performed. Tracheal injury, pneumomediastinum, and subcutaneous emphysema were found on CT. The ENT physician performed also nasolaryngoscopy and confirmed the tracheal tear on the anterior wall.

Penetrating neck injuries should undergo surgical exploration without losing time if the patient is hemodynamically unstable with expanding hematoma, frothing/hissing of air, subcutaneous emphysema, hoarseness, and dysphonia signs. However, several diagnostic procedures such as CT, US and endoscopies can be used to avoid unnecessary surgery in stable patients (7). Conservative management consisting of observation, humidified oxygen and antibiotherapy is adequate in hemodynamically stable pneumomediastinum cases that have no aerodigestive tract injuries, but tracheostomy or primary repair may be required in patients with tracheobronchial injuries (5). Antibiotics are not recommended in patients with spontaneous pneumomediastinum, and also, no infection cases secondary to spontaneous pneumomediastinum have been reported in the literature. In cases of traumatic pneumomediastinum and in cases having high risk of mediastinitis, the broad spectrum antibiotics should be administered (3). In our case, the patient had no active hemorrhage and he was hemodynamically stable. The laceration on the anterior neck was cleaned and sutured primarily. No intervention was done to the tracheal tear and it was left to heal spontaneously. An antibiotic was started because of the high risk of mediastinitis.

Conclusions

In penetrating neck traumas, tracheobronchial injuries are seen rarely and we should be careful mostly for vascular injuries with massive

hemorrhages (5). The vital findings of patients should be recorded at admission to evaluate the hemodynamics quickly. The surgical exploration must be performed in unstable patients with active bleeding. The stable patients must be comprehensively evaluated by diagnostic studies to avoid unnecessary surgical interventions because the surgical exploration may not be necessary in these patients, even in the presence of a tracheal injury as in our case. Additionally, the adequate measures should be taken around the construction zones to avoid such accidents.

Informed Consent: Written informed consent from the patient and approval from the hospital were obtained for presenting this case report.

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