

Thymic bleeding after blunt chest trauma in a child

Bir çocukta künt göğüs travması sonrası timik kanama

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ABSTRACT

Trauma to the pediatric chest, occurring in isolation or with polytrauma, may result in a variety of injuries from minor to life-threatening. Trauma is the first cause of mortality in children over the age of one in industrialized countries. Injury to the thymus and thymic blood vessels is described in rare cases. A nine-year-old male patient was admitted to the emergency department after a traffic accident. The patient was followed up in the pediatric surgery intensive care unit due to the life-threatening condition. Patient had mediastinal widening due to blunt chest trauma. Contrast-enhanced chest computed tomography revealed mediastinal hematoma. A diagnosis of thymic bleeding was established in the operation.

Keywords: Chest trauma; child; imaging; thymic bleeding.

ÖZ

İzole veya multitravma ile meydana gelen pediatrik göğüs travması hafif ila yaşamı tehdit eden çeşitli yaralanmalara neden olabilir. Sanayileşmiş ülkelerde travma bir yaş üstü çocuklarda birinci mortalite nedenidir. Timus ve timik kan damarlarında yaralanma nadir olgularda tanımlanmıştır. Dokuz yaşında bir erkek hasta trafik kazası sonrası acil servise başvurdu. Hasta yaşamı tehdit eden durum nedeni ile pediatrik cerrahi yoğun bakım ünitesinde takip edildi. Hastada künt göğüs travmasına bağlı mediastinal genişleme vardı. Kontrastlı toraks bilgisayarlı tomografisinde mediastinal hematom saptandı. Ameliyatta timik kanama tanısı konuldu.

Anahtar sözcükler: Göğüs travması; çocuk; görüntüleme; timik kanama.

Chest trauma accounts for less than 10% of trauma affecting children. Most chest traumas occur during the first decade of life and the main causes are traffic accidents (70-77%) followed by falls (8-11%).^[1-4] Pediatric chest traumas are generally closed or blunt traumas (80-98%). Of the cases, 2.1-12% were penetrating traumas.^[3] Because of the difference in anatomy, the higher degree of flexibility of the ribs, and the elasticity of the vessels, the pattern of injuries is somewhat different in children compared with adults. Even high-impact trauma does not necessarily cause rib (skeletal) fractures but can lead to severe intrathoracic soft tissue injuries.^[2,3]

The incidence of thoracic injury identified during secondary surveys indicates that pneumothorax/hemothorax and lung contusion are rather frequent in pediatric trauma (from 30 to 50% of patients with

chest trauma), while cardiac contusions and traumatic injuries to the tracheobronchial tree, aorta, esophagus, and diaphragm are relatively infrequent.^[1,3,5]

A widened mediastinum is a nonspecific finding on chest radiographs that has been classically associated with a mediastinal hematoma, an indirect sign of aortic injury. However, it is known that the presence of a mediastinal hematoma is sensitive but not specific for detecting aortic injury. Additional causes for mediastinal hematomas include venous injury, spontaneous hemorrhage, esophageal injury, osseous fractures, and iatrogenic causes.^[6]

The etiology of mediastinal hematomas can be divided into traumatic and nontraumatic. The traumatic causes (majority of patients) can be further subdivided into blunt chest trauma, penetrating chest trauma, and iatrogenic causes. In the setting of blunt thoracic



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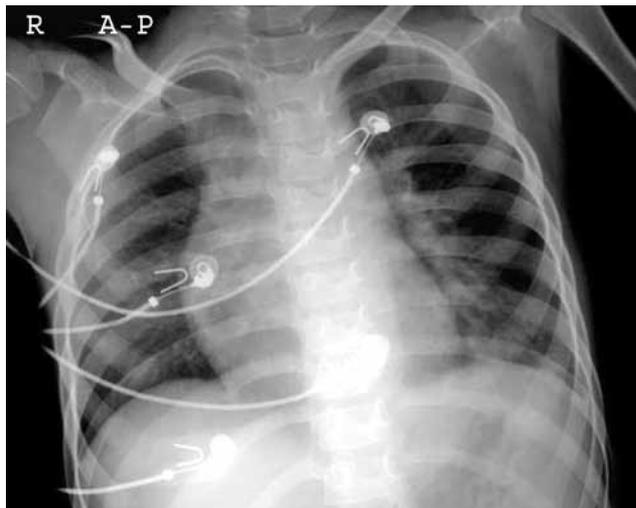


Figure 1. Anteroposterior chest radiograph shows widening of upper mediastinum, although it is not in proper position.

trauma, small venous injury is perhaps the most common cause of mediastinal hematoma.^[6]

The currently available imaging modalities for evaluating chest trauma include chest radiography, ultrasound (US), and computed tomography (CT).

In this article, we report a male patient admitted to the emergency department due to traffic accident. The radiologic sign of mediastinal widening was caused by thymic bleeding after blunt chest trauma.

CASE REPORT

A nine-year-old boy was admitted to the emergency room due to traffic accident. According to his friend's statement, patient was hit by a motorcycle while he was riding his bike. He vomited twice following the accident and there was no loss of

consciousness. Physical examination revealed bilateral periorbital hematoma and ecchymosis, tenderness, and superficial abrasions in the left hemithorax. Abdominal tenderness was also present. Heart rate was 126 beats/minute and blood pressure was 100/60 mmHg. Body temperature was 37 °C and hemoglobin level was 10.7 g/dL.

Cranial CT showed minimally displaced fracture on the midline frontal bone and ethmoid bone. Chest radiography showed mediastinal widening (Figure 1). Contrast-enhanced chest CT revealed smooth contoured slightly hyperdense mass (average of 50-60 HU) filled in the superior and anterior mediastinum which was diagnosed as mediastinal hematoma (Figure 2a). There was no evidence of vascular or cardiac injury. Displaced rib fracture on the left anterior sixth rib and minimal pleural fluid in left hemithorax and bilateral lung contusions were seen.

Abdominal CT showed splenic lacerations. The patient was followed up in the pediatric surgery intensive care unit due to the life-threatening condition. Hemoglobin level decreased from 10.7 g/dL to 9.6 g/dL on second day. Therefore, chest CT was repeated to check the mediastinal hematoma. Chest CT revealed increased sizes (particularly transverse size) of the mediastinal hematoma. In addition, bilateral pleural fluid was detected (Figure 2b). Preoperative diagnosis of mediastinal hematoma was considered. The patient was consulted with thoracic surgery because of progressive mediastinal hemorrhage. Due to the ongoing risk of bleeding, video-assisted thoracoscopic surgery (VATS) was considered. Left thoracotomy was performed to approach cardiac and mediastinal vascular structures.

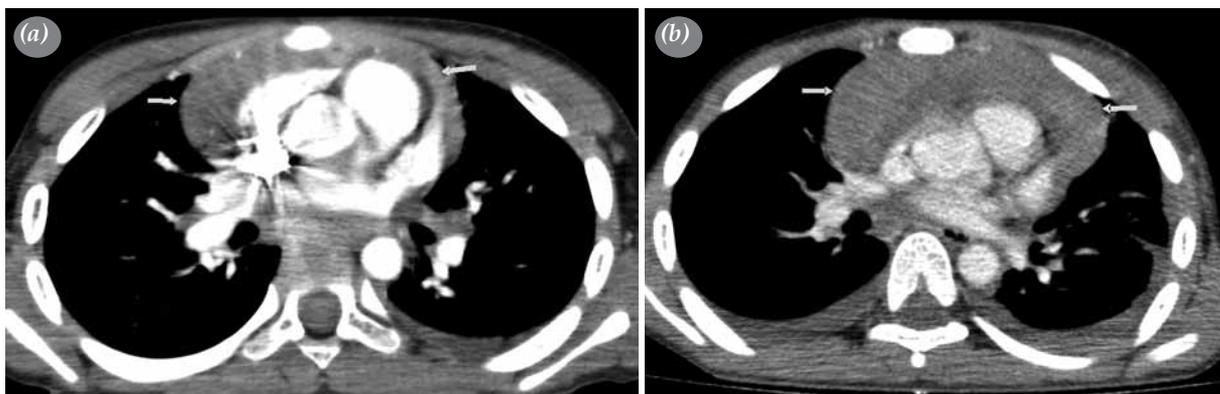


Figure 2. (a) Contrast-enhanced chest computed tomography shows heart surrounded by soft-tissue swelling in anterior mediastinum on day of admission. In addition, minimal pleural fluid in left hemithorax is visible. (b) Repeated chest computed tomography shows increased size of mediastinal hematoma on second day. In addition, bilateral pleural fluid was seen.

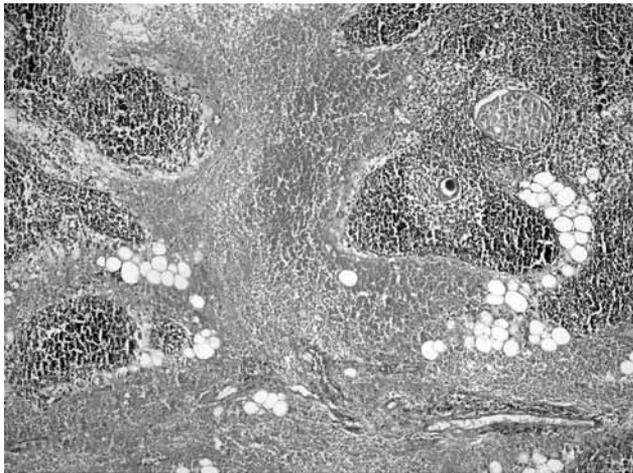


Figure 3. Histologic appearance of significant bleeding areas in thymic tissue (H-E x 200).

Approximately 700 mL blood from the left hemithorax was aspirated in surgery. Also, black-maroon colored lesion surrounding the heart and lying in the paracardiac and anterior mediastinum was detected. The lesion was diagnosed as intrathymic hematoma. Control of bleeding was achieved following partial drainage and biopsy. Pathologic evaluation of surgical biopsy specimens revealed thymic tissue with hemorrhage areas (Figure 3).

The patient was followed up by chest radiography. Given the child's stable clinical condition and improving radiologic findings, the patient was discharged with recommendations for medical therapy.

DISCUSSION

Pediatric chest trauma may cause a wide variety of injuries involving the lungs, pleural spaces, mediastinal structures, and/or chest wall.^[4] Rib fractures and lung contusions are the most frequent injuries of chest trauma. Delayed diagnosis and polytrauma are associated with a high incidence of mortality.^[1,3,5,7,8] Only rarely does pediatric chest trauma require surgical treatment: 3 to 8% of nonpenetrating injuries benefit from thoracotomy at any point of management whereas this proportion amounts to 40% of penetrating injuries.^[1,3]

In 25 to 61% of children, blunt chest trauma is accompanied by the radiologic sign of mediastinal widening that is always highly suspicious for severe chest injury. The following differential diagnoses should be considered: bleeding from injuries to the heart or pericardium; rupture or dissection of the aorta, subclavian artery and superior vena cava; a

posttraumatic development of an aneurysm of the pulmonary artery and of the coronary artery; injury to the thymus with hemorrhage and petechial bleeding within the thymus; sternum fracture; spinal injury; injuries to the esophagus; traumatic rupture of the thoracic duct.^[2]

Thymic bleeding caused by blunt chest trauma is described in rare cases.^[2,9] Injury to the thymus and to thymic blood vessels is described in two of 41 traumatized children in a postmortem study.^[2] Hemorrhage and petechial bleeding within the thymus are seen in neonates shortly after birth with hematologic disorders and in children dying from sudden infant death syndrome or rare cases of bleeding into a thymic cyst in aplastic anemia.^[2]

Rapid diagnosis of thoracic injury is often difficult since the symptoms may not appear until after a few hours. Control of vital signs and a plain chest radiography should be performed immediately.^[2,3] Chest radiography is a relatively low radiation-dose imaging and US does not use ionizing radiation, but they both have limitations in the setting of chest trauma in children.^[2,7]

Although chest radiography remains the standard initial screening examination for detecting critical injuries in the acute trauma setting, CT is the most sensitive and specific imaging modality to confirm or exclude the presence of significant thoracic injuries. Computed tomography is frequently used to identify and characterize clinically or radiographically suspected injuries involving the aorta, tracheobronchial tree, and osseous structures. Computed tomography is superior in diagnosing hemothorax, pneumothorax, lung contusion, pleural effusion, atelectasis, sites of bleeding, skeletal lesions, and pneumomediastinum as well as localization of chest drainage tubes.^[2,10]

In conclusion, mediastinal hematoma is an uncommon finding in blunt chest trauma. Early identification and proper intervention are crucial since the hematoma may cause extrapericardial cardiac tamponade. Although rare, thymic bleeding should be considered as a cause of mediastinal hematoma. Understanding the imaging findings, precise anatomical location, and pathophysiology of these different pathological processes can help narrow the differential diagnosis.

Declaration of conflicting interests

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