Case Report / Olgu Sunumu

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Ileus and Late-onset Traumatic Diaphragmatic Hernia Presenting with Vomiting and Dyspnea: A Case Report

Kusma ve Dispne ile Başvuran İleus ve Geç Başlangıçlı Travmatik Diyafragma Hernisi: Olgu Sunumu

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Abstract

Diaphragmatic hernia is defined as the passage of abdominal organs through the diaphragmatic muscle and can be congenital or acquired. Motor vehicle accidents are the most common cause of acquired hernias in children. Commonly seen complaints include breathing difficulties and abdominal pain. Diagnosis and treatment delay is important causes of morbidity and mortality. Regardless of the time of trauma, a diaphragmatic hernia may develop in blunt or penetrating chest trauma. Here, we present a 14-year-old male patient who was admitted to the pediatric emergency room due to abdominal pain and was diagnosed with ileus together with a diaphragmatic hernia. He was treated and was inserted chest tube due to penetrating thoracic trauma 17 months ago.

Keywords: Ileus, penetrating thoracic trauma, traumatic diaphragmatic hernia

Öz

Diyafragma hernisi, abdominal organların diyafragma kasından geçişi olarak tanımlanmaktadır. Konjenital veya edinsel olabilir. Edinsel olanların çocuklardaki en sık nedeni motorlu araç kazalarıdır. Hastaların en sık başvuru yakınması nefes almada zorluk ve karın ağrısıdır. Gecikmiş tanı ve tedavi morbidite ve mortalitenin önemli bir nedenidir. Travmanın oluş zamanına bakılmaksızın, künt veya penetran göğüs travmalarında diyafragma hernisi gelişebileceği düşünülmelidir. Bu çalışmada penetran toraks travmasına bağlı toraks tüpü uygulamasını takiben 17 ay sonra çocuk acil servise karın ağrısı ile başvuran ve ileus ile beraber geç başlangıçlı travmatik diyafragma hernisi tanısı alan 14 yaşında bir erkek olgu sunuldu.

Anahtar Kelimeler: İleus, penetran toraks travması, travmatik diyafragma hernisi

Introduction

Diaphragmatic hernia is defined as the congenital or acquired passage of the abdominal organs to the thoracic cavity through a gap in the diaphragmatic muscle. Although usually congenital, cases of herniation secondary to trauma may occur. Lung laceration and liver and spleen injuries can accompany diaphragmatic injuries secondary to trauma with a frequency of approximately 75%.[1] Diaphragmatic injury accounts for 1% of all trauma cases in adults.[2] The incidence in the pediatric population is unknown; however, retrospective studies revealed that diaphragmatic injury occurred in 4% of cases after thoracic and abdominal trauma.[3] Diagnostic delays are due to the rare occurrence of traumatic diaphragmatic herniation (TDH) in the pediatric population, despite innovations in diagnostic imaging methods. Thus, strangulation may develop in the herniated structures, with mortality of 20-80%.[4] Herein, we present a patient with a history of a penetrating thoracic injury, diagnosed with a TDH in the pediatric emergency department (ED), emphasizing the importance of early diagnosis.

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Case Report

A 14-year-old boy presented to the ED with complaints of abdominal pain, vomiting, and difficulty breathing. He had sustained a penetrating injury at the level of the ninth rib in the posterior axillary region, with a related hemopneumothorax, 17 months before admission. After the chest tube insertion, he was hospitalized for 5 days and discharged without any sequelae.

At admission, the patient described repeated bouts of increasing abdominal pain and recent bilious vomiting. He was unable to pass stool for the past 24 h. Thoracic examinations revealed equal lung sounds in both hemithoraces and no bowel sounds in the thorax. Abdominal examinations indicated distention, generalized tenderness, and guarding. Laboratory tests revealed an elevated C-reactive protein level and white blood cell count. Blood biochemistry tests were normal. Urinalysis was negative for protein, occult blood, and leukocytes. A prominent air-fluid level in the abdominal X-rays and a suspicious bowel loop in the thorax at the level of the left diaphragm in posteroanterior chest X-rays were observed (Figure 1). Abdominal ultrasound results were normal. He underwent thoracic and abdominal computed tomography (CT) for a definitive diagnosis. The CT showed air-fluid levels in the left hemithorax and distended distal bowel segments in the abdominal cavity that is compatible with the ileus (Figures 2, 3). After diagnosis, he underwent surgery. The intestinal loops showed excessive dilation but the circulation was maintained. The diaphragm had a defect of almost 4 cm to the left of the hiatus, and through this defect, the colon and omentum had passed into the thoracic cavity. The herniated loops and omentum could not be detached since it is highly adherent and strangulated. The surgeons enlarged the defect by 1 cm and released the 15-20 cm intestinal loop from the thorax. The omental circulation was impaired and the patient underwent an omentectomy and diaphragmatic repair. A drainage tube was inserted and was removed on the second postoperative day. The surgical team discharged the patient on the sixth postoperative day.

Figure 1. Multiple broad-based air-fluid levels and herniated bowel loops in abdominal X-ray

Discussion

A TDH is a rare surgical diagnosis in children. Motor vehicle accidents are the most common cause in children.[1] Elevated

Figure 2. Intestinal wall edema and herniated bowel loop through the diaphragm in coronal computed tomography section

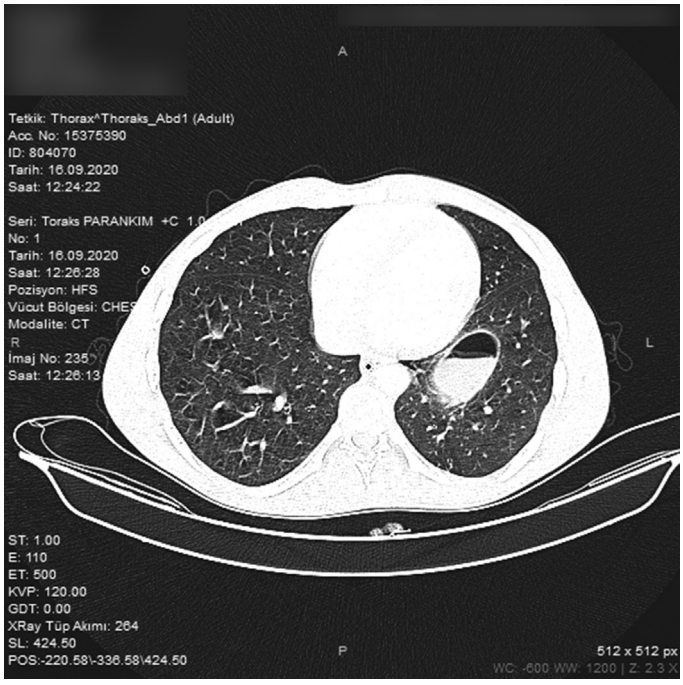

Figure 3. Sagittal computed tomography section images of the herniated segment and dilated loops

pressure of the intra-abdominal contents can result in herniation due to diaphragmatic rupture[5], which is seen on the right, left, or bilaterally. Right-sided diaphragm ruptures are less frequent and are diagnosed later than left-sided because of the buffering and protective effects of the liver and the right kidney.[1,5] Diagnostic delay of an isolated diaphragmatic injury results in more difficult patient management.[6] Our case had a left-sided diaphragmatic rupture 17 months after the original penetrating injury. The herniation was apparent in X-rays because no organs mask the condition on the left side.

TDHs are defined as acute if they occur during trauma, delayed after some time, and chronic if accompanied by visceral incarceration due to abdominal organ herniation.[6] Delayed hernias may have obstructive or ischemic complications.[7] Our patient had a delayed diaphragmatic hernia because the hernia occurred months after the event. Ischemic complications occurred due to the bowel obstruction, and the herniated loop left the omentum ischemic.There may be a male predominance of cases.[6] TDH occurs in 0.07% of all pediatric patients with trauma. This rate rises to 2.95% in blunt abdominal trauma alone.[8] The injury mechanism, in this case, was due to the penetration, not blunt trauma.[9]

Al-Salem[10] reported seven pediatric patients who are followed up between 1992 and 2007; six were males, three were right-sided, three were left-sided, and one had bilateral TDH. Their complaints include dyspnea, chest pain, abdominal pain, nausea, vomiting, and postprandial pain.[4] Upper abdominal pain, dyspnea, and chest pain are the most common symptoms in delayed-type diaphragmatic hernia, and pain is the main complaint in the presence of bowel ischemia.[7]

Although not specific, respiratory distress is also a common finding. Hemothorax is the most common cause of respiratory distress in children with trauma history; however, patients most often present with abdominal and respiratory symptoms.[5] Dyspnea (86%), abdominal pain (13%), and decreased respiratory sounds (73%) on the affected side is observed.[8] Similarly, our patient stated difficulty breathing, as well as vomiting and abdominal pain upon admission. No objective vital signs or examination findings supported the presence of dyspnea. Pain indicated an ischemic bowel loop, which was confirmed by laparotomy.[9] Lung examination results were normal, but this did not exclude the diagnosis of diaphragmatic hernia. Therefore, diaphragmatic herniation should be kept in mind in patients with dyspnea and suspected ileus when the physical examination is normal.

Okan et al.[9] revealed that blunt trauma was the main cause of TDH, and the median time between the diagnosis and the time of trauma was 5.9 years (minimum 4 months-maximum 19 years). Eight patients were diagnosed by X-ray alone, and three had a mechanical intestinal obstruction. The main complaint was respiratory symptoms of varying severity in five patients and abdominal pain in four patients. They concluded that TDH should be included in the differential diagnosis when a patient is admitted to the hospital with abdominal pain, vomiting, and dyspnea with a previous trauma history. Our patient had TDH 17 months after a penetrating injury. His complaints at the presentation suggested ileus. Supported by imaging, the diagnosis was confirmed, and the underlying cause of the obstruction was intestinal loops and omentum that herniated through the diaphragm. Right diaphragm elevation in the chest X-ray was suggestive of a right-sided rupture, thus we diagnosed left diaphragm herniation using a posteroanterior chest X-ray.[10] Although uncommon, patients may have bilateral TDH.[11] The diagnostic sensitivity of chest X-ray in right-sided diaphragmatic rupture is 17%. A previous study revealed normal chest X-ray images in 30-50% of cases, but they were diagnosed using serial X-rays.[3] Our case has left-sided TDH. The patient was diagnosed by observation via X-ray that the bowel loops passed through the left diaphragm to the lung. Patients who cannot be diagnosed via X-ray but are suspected of having a diaphragmatic hernia should undergo CT. Thoracoabdominal CT imaging is the gold standard for TDH, and this method recognizes 80% left- and 50% right-sided hernias. Additionally, it detects associated lesions. Spiral CT has 71% sensitivity and 100% specificity in diaphragmatic rupture diagnosis.[5] We performed thoracoabdominal contrast-enhanced CT to determine any accompanying pathologies and the appropriate surgical method for treatment.

Diaphragmatic injuries are repaired by the abdominal route unless a condition requires thoracotomy.[3] Laparotomy is the preferred surgical technique, and thoracotomy may ensue. Surgical repair types differ in acute and delayed TDH. Associated abdominal injuries are more common in acute hernias, and the abdominal approach is preferred. Thoracotomy is the more prominent technique in chronic hernias, as there may be intense adhesions between the herniated viscera and the pleura.[9,12] Additional complications were reported in 10-20% of patients who require surgery. Mortality associated with concomitant injuries ranges from 0% to 33%.[8] In our patient, surgeons performed a laparotomy to free the adherent intestinal loops.

Conclusion

When a patient with a history of blunt or penetrating chest or abdominal trauma describes vomiting, abdominal pain, and difficulty breathing, we should first consider ileus, the cause of which may be a diaphragmatic hernia caused by the previous trauma, independent of the timing of the trauma. When we diagnose a left-sided hernia by chest X-ray, a right-sided or bilateral hernia may also occur. Delays in diagnosis can cause high rates of morbidity and mortality, thus performing rapid diagnostic methods, such as CT, is important.

Ethics

Informed Consent: An informed consent form was obtained from the patient and patient's family.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: P.E., A.Ö., G.D., G.G., B.T.K., Concept: G.D., Ş.B., A.Ç., G.G., Design: P.E., A.Ö., G.D., G.G., E.B., Data Collection or Processing: A.Ö., Ş.B., A.Ç., B.T.K., E.B., Analysis or Interpretation: P.E., G.D., A.Ç., B.T.K., Literature Search: P.E., A.Ö., A.Ç., Writing: P.E., Ş.B., A.Ç., B.T.K, E.B.

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References

1. Estrera AS, Landay MJ, McClelland RN. Blunt traumatic rupture of the right hemidiaphragm: experience in 12 patients. Ann Thorac Surg. 1985;39:525-30.
2. Feliciano DV, Mattox KL, Moore EF. Trauma 6th ed. NewYork: McGraw-Hill Professional; 2007.
3. Sharma AK, Kothari SK, Gupta C, Menon P, Sharma A. Rupture of the right hemidiaphragm due to blunt trauma in children: a diagnostic dilemma. Pediatr Surg Int. 2002;18:173-4.
4. Payne JH, Yellin AE. Traumatic diaphragmatic hernia. Arch Surg. 1982;117:18-24.
5. Ndour O, Mustapha H, Ndoye NA, Faye Fall AL, Ngom G, Ndoye M. Traumatic right diaphragmatic hernia in children: Diagnostic difficulties. Afr J Paediatr Surg. 2015;12:94-7.
6. Jain P, Kushwaha AS, Pant N, Debnath PR, Chadha R, et al. Isolated post-traumatic right-sided diaphragmatic hernia. Indian J Pediatr. 2009;76:1167-8.
7. da Costa KG, da Silva RTS, de Melo MS, Pereira JTS, Rodriguez JER, et al. Delayed diaphragmatic hernia after open trauma with unusual content: Case report. Int J Surg Case Rep. 2019;64:50-3.
8. Marzona F, Parri N, Nocerino A, Giacalone M, Valentini E, et al. Traumatic diaphragmatic rupture in pediatric age: review of the literature. Eur J Trauma Emerg Surg. 2019;45:49-58.
9. Okan I, Baş G, Ziyade S, Alimoğlu O, Eryılmaz R, et al. Delayed presentation of posttraumatic diaphragmatic hernia. Turkish Journal of Trauma & Emergency Surgey 2011;17:435-9.
10. Al-Salem AH. Traumatic diaphragmatic hernia in children. Pediatr Surg Int. 2012;28:687-91.
11. Ramos CT, Koplewitz BZ, Babyn PS, Manson PS, Ein SH. What have we learned about traumatic diaphragmatic hernias in children? J Pediatr Surg. 2000;35:601-4.
12. El-Yakub AI, Bello UM, Sheshe AA, Naaya HU. Delayed Presentation of Posttraumatic Diaphragmatic Hernia Masquerading as Recurrent Acute Asthmatic Attack. Case Rep Med. 2017;2017:5037619.