A Child with Acute Appendicitis Secondary to Blunt Abdominal Trauma: A Case Report and Review of the Literature

Künt Batın Travmasına İkincil Akut Apandisit Gelişen Bir Çocuk Olgu: Olgu Sunumu ve Literatürün Taraması

Abstract

We present a child with abdominal pain and vomiting after blunt abdominal trauma (BAT). He had tenderness, guarding and rebound on the bilateral lower quadrant of the abdomen. He had no abrasion on the abdominal skin surface. He had marked leukocytosis and increased C-reactive protein level. Contrast-enhanced abdominal computed tomography revealed inflamed appendicitis. He was operated by pediatric surgeons and, a perforated appendix was illustrated on pathological examination. BAT and acute appendicitis (AA) are independently very frequent issues. In pediatric emergency departments, BAT and AA are very frequent issues, however, coexistence of these two condition in the same patient is rare. This case report and review of the literature showed that occurrence of AA after BAT should be considered by emergency physicians.

Keywords: Child, appendicitis, abdominal injuries

Öz

Bu raporda künt batın travması (BAT) sonrasında karın ağrısı ve kusma ile çocuk acil servisine başvuran bir olgu sunulmaktadır. Başvuru anında, hastanın karın muayenesinde yaygın hassasiyet, bilateral alt kadranlarda defans ve rebound mevcuttu. Laboratuvar tetkiklerinde belirgin lökositoz ve artmış C-reaktif protein değeri tespit edildi. Kontrastlı batın tomografisinde akut apandisit görülen hastada, çocuk cerrahisi tarafından ameliyat edildiğinde makroskopik ve mikroskopik olarak perfore apandisit ile uyumlu olduğu belirlendi. BAT ve akut apandisit (AA) acil servislerde birbirinden bağımsız olarak sıkılıkla karşılaşılan durumlar olmasına karşın nadir de olsa aynı anda görülme ihtimali mevcuttur. BAT sonrası AA gelişmişinde bir etken olup olmadığı konusunda literatürde kısıtlı bilgilere sahiptir. Bu olayı sunmaktaki amacımız, acil hekimlerin BAT sonrası AA gelişmesi konusunda farkındalığı artırmaktır.

Anahtar Kelimeler: Çocuk, apandisit, abdominal yaralanma

Introduction

Acute appendicitis (AA) is the most common disease which requires surgical intervention in pediatric emergency settings.1 Although there are various factors in the pathophysiology, the main cause of AA is obstruction of the lumen with stool, food, lymphoid nodules, appendicolitis or neoplasms.2 In the literature, there are limited data on the fact that trauma may cause AA.3 Here, we present a case of perforated appendicitis occurring after blunt abdominal trauma (BAT). We aimed to emphasize that emergency physicians should consider BAT as a rare cause of AA.
Case

A 12-year-old boy was admitted to the pediatric emergency department (ED) with abdominal pain and vomiting. He had a history of fall from a swing that had caused BAT one day before admission. On admission, he was conscious but anxious because of abdominal pain. The body temperature was 36.2 °C, heart rate was 84/minute, and arterial blood pressure was 105/60 mmHg. The chest was clear, breath sounds vesicular and he had a respiratory rate of 22/minute. There was tenderness, guarding and rebound bilaterally on the lower quadrant of the abdomen, and no abrasion on the abdominal skin surface. In the laboratory tests, his leukocyte count was 21020/μL, absolute neutrophil count was 18730/μL, and C-reactive protein level was 3.56 mg/dL. His liver and renal function tests were normal. In the urine sample test, there was ketonuria but no hematuria or pyuria. Plain abdominal x-ray revealed diffuse air-fluid levels (Figure 1). Abdominal computed tomography was performed for traumatic injury and showed that there was no vital organ injury, but inflamed acute appendix and minimal pelvic free fluid (Figure 2). Under general anesthesia, surgical resection of the inflamed and perforated appendix was performed by pediatric surgeons, and no complication was observed. Pathological examination was consistent with AA and also bleeding on the tip of the appendix was noted. The patient healed completely without complication and was discharged three days after operation.

Discussion

Trauma is a rare cause of AA. However, there is still a debate about whether this is a real cause or just a coincidence. Çiftci et al.4 enrolled 554 children in their study and reported that the incidence of BAT as a causative factor for AA was 0.9%. Additionally there are few case reports in the literature. Fowler5 defined five essential criteria for AA caused by BAT in their study which was reported in the 1938. First of all, there must be no history of abdominal pain attack suggestive of AA before trauma and secondly, the mechanism of trauma must be directly related to abdominal region and affect the appendix. The effect of injury must be experienced immediately after the occurrence of AA symptoms. Besides, the traumatic lesion of the appendix must be demonstrated operatively and the pathologic diagnosis of AA must be made. To our knowledge, there are 22 pediatric cases, including our patient, meeting the criteria for BAT-related AA in the literature (Table 1).3,4,6-14 Most of these patients were boys (86.4%), and the mean ± standard deviation age of the patients was 10.0 (3.3) years. The median (interquartile range) time between admission and injury was 4.0 (1.0-12.0) hours. Abdominal tenderness and fever were prominent findings in most of the cases. Our patient had diffuse abdominal tenderness, rebound, and guarding as well but no fever. Leukocytosis was the remarkable laboratory test in all patients as in our patient. Eleven (50%) patients had associated injury. Pathological investigation of all cases had revealed findings of AA. Perforation was noted in six patients (27.2%).

The mechanism of occurrence of BAT-related AA is not clear. There are a few theories. Fowler5 defined that occurrence of BAT-related AA can be caused by direct or indirect pressure on the abdomen. Sharma et al.15 proposed a theory based on LaPlace’s law; when intra abdominal pressure increased instantly, the caecum, the widest part of the intestine, becomes the most susceptible region for the surface tension. An increase in the caecum surface tension can cause obstruction of the orifice of the appendix secondary to the mucosal
straining, hemorrhage, and clot formation. Hennington et al.\textsuperscript{8} reported that edema formation, hematoma, and/or lymph node hyperplasia can result from trauma, and may cause obstruction of the appendix lumen. Our patient’s pathological examination revealed that there was a mucosal hemorrhage on the tip of the appendix which was consistent with the mechanism proposed by Hennington et al.\textsuperscript{8}

In pediatric emergency departments, BAT and AA are very frequent issues. Although rare, they might occur coincidentally in the same patient. This case report and review of the literature showed that occurrence of AA after BAT should be kept in mind by emergency physicians.

### Ethics

**Informed Consent:** Written consent was obtained.

**Peer-review:** Externally and internally peer-reviewed.

### Authorship Contributions

Surgical and Medical Practices: A.Ç., A.E., H.A., Ö.A., PG., S.G., T.Ç., Concept: A.Ç., A.E., H.A., Design: A.Ç., A.E., İ.Ç., Data Collection or Processing: A.Ç., Ö.A., Analysis or Interpretation: A.Ç., A.E., H.A., Ö.A., PG., S.G., T.Ç., Literature Search: A.Ç., A.E., T.Ç., Writing: A.E., İ.Ç.

### Conflict of Interest

No conflict of interest was declared by the authors.

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