

# UNUSUAL CAUSES OF THE ACUTE ABDOMINAL PAIN: IMAGING AND CLINICAL FINDINGS

Ercan Ayaz\*, Ahmet Aktan\* Abdullah Alimoğlu\*, İdris Özdaş\*

\* Bingöl State Hospital, Radiology, İstanbul, Turkey

## Abstract

**Objective:** Acute abdominal pain is a common complaint of patients in the emergency department that needs to be evaluated rapidly and comprehensively. With a wide range of etiologies, acute abdominal pain is still a major diagnostic challenge in the emergency department. Radiological imaging is the corner stone of the diagnostic work up along with clinical and laboratory findings.

**Case Report:** In this case report, we present our 4 cases of acute abdominal pain caused by rare disorders (epiploic appendagitis, omental infarction, mesenteric panniculitis and cecal diverticulitis) that were initially diagnosed mistakenly based on clinical findings. These good mimickers masqueraded themselves as common etiologies of acute abdomen such as acute appendicitis, diverticulitis and cholecystitis.

**Conclusion:** After radiographs, ultrasonography (US) and computed tomography (CT) are the most common imaging modalities that are performed in emergency departments for acute abdominal pain. Both US and CT are highly accurate imaging modalities that commonly reveal the correct diagnosis. However, rare disorders may not be recognized in the acute setting. We present our cases with US and CT images to remind radiologists and emergency physicians of these mimickers of acute abdominal pain in order to prevent unnecessary surgeries.

**Keywords:** acute abdominal pain, emergency radiology, cecal diverticulitis, epiploic appendagitis, mesenteric panniculitis, omental infarction

## Introduction

Acute abdominal pain is a common complaint of patients who apply to the emergency department (1). Almost 10% of presentations at the emergency department are due to acute abdominal pain (2). Acute abdominal pain can be related to a myriad of underlying causes, ranging from benign, self-limiting disorders to life threatening surgical emergencies. Although patient history, physical examination and laboratory findings may narrow the differential diagnosis, radiologic imaging is often required for exact diagnosis and treatment (3).

The most common causes are acute appendicitis, diverticulitis, cholecystitis and bowel obstruction (2). The clinical manifestations of acute abdominal pain are usually not straightforward. The most helpful clue in physical examination is the location of the pain (3). For instance, acute cholecystitis is a primary diagnostic consideration in patients presenting with right upper quadrant pain, likewise acute appendicitis is the leading differential diagnosis of right lower quadrant pain, especially presenting with nausea and vomiting. Similarly, acute sigmoid diverticulitis is the most common cause of left lower quadrant pain in adults (3).

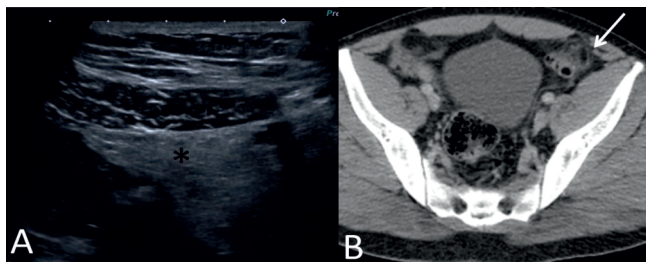
After clinical assessment, the decision can be made to perform additional diagnostic imaging options for a more accurate diagnosis (1).

Despite the increased use of imaging modalities, acute abdominal pain remains a major diagnostic challenge (3). After radiographs, ultrasonography (US) and computed tomography (CT) are the most common imaging modalities that are performed in emergency departments for acute abdominal pain. Although CT is the preferred technique for the diagnosis of acute abdominal pain, except in cases of acute cholecystitis, US is a well-established alternative to CT in the setting of acute abdominal pain (1). Therefore, radiologists and emergency medicine physicians should be familiar not only with typical imaging features of the previously mentioned common disorders but also some rare mimickers that are definitively diagnosed with imaging. In this case report, we present four cases of acute abdominal pain that preliminarily were diagnosed mistakenly based on clinical findings. Ultrasonography and CT imaging revealed the definitive diagnosis and patients were treated medically without need of surgery.

### Case Report

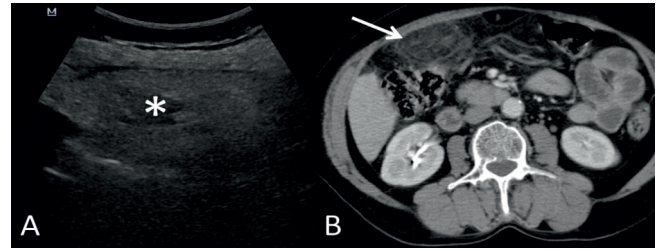
Written informed consents were obtained from all of the patients for publication in this case report.

**Case 1** - A 33 year old male patient came to the emergency department with nausea and left lower quadrant pain for 3 days. His medical history was unremarkable. His abdominal examination revealed tenderness in the left iliac fossa with guarding. His laboratory findings were within normal range (white blood cells (WBC) 9170 / mm<sup>3</sup>, C-reactive protein (CRP) 0,44 mg/dL). His US images demonstrated increased mesenteric echogenicity in a tender area in the left iliac fossa that indicated mesenteric edema (Figure 1A). Further imaging with an intravenous contrast enhanced CT scan of the abdomen showed a hyperdense rim lesion anteriorly, adjacent to the sigmoid colon in the left lower quadrant, along with inflammatory stranding that was consistent with epiploic appendagitis (EA) (Figure 1B). The patient received analgesic treatment and was discharged on the third day of treatment without any further complaints.



**FIGURE 1.** Ultrasound image (A) showing hyperechoic mesenteric fat tissue (asterix) anterior to the sigmoid colon and posterior to the anterior abdominal wall. Intravenous contrast enhanced computed tomography image (B) reveals hyperdense rim adjacent to the sigmoid colon consistent with epiploic appendagitis (arrow).

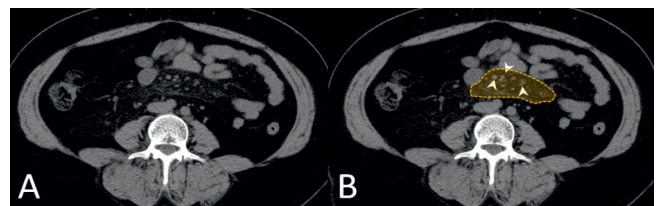
**Case 2** - A 69 year old female patient presented to our outpatient clinic with right upper quadrant pain for 2 weeks. She had a history of hypertension. On physical examination she had a high body mass index with central obesity and her abdomen showed tenderness and guarding in the right hypochondriac region. Blood tests showed normal WBC of 7380 / mm<sup>3</sup> and elevated inflammatory markers with CRP of 6.67 mg/dL. Hepatobiliary function tests were within normal limits. She was initially diagnosed with acute cholecystitis and US was ordered. Ultrasonography showed approximately 8x4 cm sized hyperechoic omental tissue anterior to the gallbladder with some hypoechoic area centrally (Figure 2A).



**FIGURE 2.** Ultrasound image (A) displaying hyperechoic mesenteric fat tissue (asterix) anterior to the ascending colon with centrally hypoechoic area. Intravenous contrast enhanced computed tomography (B) reveals prominent inflammation in the greater omentum (arrow) at the same location.

The gallbladder was mildly hydroptic without any stone or sludge in the lumen. Computerized tomography with intravenous (IV) contrast revealed a focal area of hyperdense fat stranding anterior to the gallbladder with some engorged vessels extending to this region (Figure 2B). Radiologic findings were consistent with omental infarction and medical treatment with analgesia and IV isotonic fluid was applied. The patient's complaints were resolved by the third day and she was discharged. No recurrence was detected at the third month of follow-up.

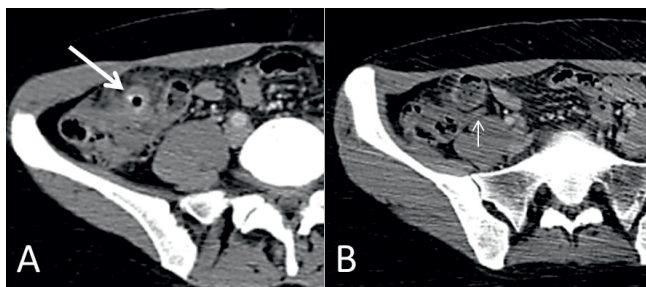
**Case 3** - A 51 year old female patient came to our emergency room with acute flank pain for 2 days. She also suffered moderate epigastric pain for 1 week. She had a history of kidney stones and recurrent urinary infections. On physical examination she had mild tenderness in the epigastric area. Her CRP levels were elevated (4.52 mg/dL). She also came to the emergency department with high CRP levels (5.01 mg/dL) one week previously. Her WBC of 9920 / mm<sup>3</sup> and kidney function tests were normal. Her urine test results were normal except for leucocytes of 364 per high power field. Computerized tomography without contrast was ordered to rule out kidney stones and it demonstrated multiple stones in the both pelvicalyceal systems. There was also a focal area of fat stranding and hazy densities along with lymph nodes at the midportion of the mesentery inferior to the body of the pancreas consistent with mesenteric panniculitis (Figure 3).



**FIGURE 3.** Left ventriculogram revealed basal hyperkinesia and apical ballooning.

This radiological finding elucidated the patient's ongoing moderate epigastric pain. Antibiotherapy and analgesic were applied for urinary infection and pain. No complaints remained at the first week of follow-up.

**Case 4** – A 36 year old female with sudden onset severe right lower quadrant pain and nausea since the previous day presented to our emergency department. Her physical examination revealed tenderness and involuntary guarding. Blood tests demonstrated significantly increased inflammatory markers with CRP of 11.14 mg/dL and WBC of 11,600 / mm<sup>3</sup>. According to the results obtained, her primary diagnosis was acute appendicitis and US was ordered. Ultrasonography displayed some inflammatory findings such as mesenteric hyperechogenicity and lymph nodes around the cecum but could not delineate the appendix clearly. Further imaging with an IV contrast enhanced CT scan of the abdomen not only demonstrated inflammatory changes but also revealed an air containing, thick walled pulsion diverticulum anterior to the cecum, next to the inflamed mesentery (Figure 4A). The appendix was located posterior to the cecum and was unremarkable (Figure 4B). Radiologic findings were consistent with cecal diverticulitis (CD). The patient's oral feeding was stopped and medical treatment was applied. Both her complaints and laboratory findings were resolved on the third day of treatment. She was discharged with oral antibiotherapy and no recurrence was detected at the first week of follow-up.



**FIGURE 4.** Left ventriculogram revealed basal hyperkinesia and apical ballooning.

### Discussion

For the patients with acute abdominal pain, clinical evaluation is generally insufficient to identify the correct diagnosis but valuable for discriminating between urgent and non-urgent cases. Radiologic imaging is often required for definitive diagnosis and treatment (3). Radiography, US and CT are frequently the choices

of imaging in patients with acute abdominal pain (1). Contrast enhanced CT of the abdomen is considered the most appropriate examination for patients with diffuse abdominal pain according to the American College of Radiology appropriateness criteria (4). Non-enhanced CT, US and radiography are considered less appropriate initial imaging examinations for these patients (4).

Radiography is used in patients with acute abdominal pain to exclude major illness such as bowel obstruction and perforated viscus. However, treatment management altered after review of the radiographs, for only 4% of patients (5).

Ultrasonography is a widely available imaging modality that is widely used in emergency departments. It enables a dynamic examination that can reveal the presence or absence of peristalsis and depict blood flow. Also, it is possible to evaluate the point of maximal tenderness more intensely (1). In one study, among 496 patients with acute abdominal pain, the ratio of patients with a definitive diagnosis increased from 70% to 83% after evaluation with US (6).

Computerized tomography has high accuracy in the correct diagnosis and rapid examination can be achieved with use of multidetector CT(7). Intravenous contrast enhanced CT facilitates higher diagnostic confidence, especially in thin patients, with a positive predictive value of 95% for the diagnosis of appendicitis (7). In a cohort study of 1021 consecutive patients with acute abdominal pain, CT was significantly more sensitive than US (89% vs 70%,  $P < .001$ ) (8). The use of initial US, followed by CT, only in negative or inconclusive US cases, yielded the highest sensitivity and reduction in radiation exposure since with this approach CT was needed for only 49% of patients (8).

The most common urgent causes of acute abdominal pain are acute appendicitis, acute diverticulitis and bowel obstruction, while the most common non-urgent causes are non-specific abdominal pain and gastrointestinal diseases (2). Early and accurate diagnosis is required for urgent causes to refer to surgery immediately or to treat conservatively (8). It is important to be familiar with the relatively common mimickers of the most common urgent disorders to avoid unnecessary surgeries.

Epiploic appendagitis is the inflammation of epiploic

appendages due to appendageal torsion or spontaneous venous thrombosis (9). It is a very rare self-limiting disease, with Golash et al. (10) detecting EA in only 8 out of 13,200 patients with acute abdominal pain. Right-sided EA can be confused with acute appendicitis, whereas left-sided EA may be mistakenly diagnosed as sigmoid colon diverticulitis (9). Patients with EA generally have localized lower quadrant pain with sudden onset. On US, EA is seen as well circumscribed, heterogenous hyperechoic masses that contain a peripheral hypoechoic rim, and on CT, round or oval masses on the anterolateral aspect of the colon with a slightly higher density than fat tissue is seen along with a hyperdense peripheral rim around the lesion (9). Epiploic appendagitis is treated conservatively with analgesic and antibiotic use; however 40% recurrence is reported (11).

Although omental infarction is known as a disease of the pediatric age group, it can be seen in older patients, as in our case. Patients commonly have generalized pain at the area of greater omentum which is more pronounced at the inflamed segment. Computerized tomography should be the preferred technique to demonstrate subtle, soft tissue infiltration of the greater omentum or a heterogeneous, hyperdense mass lesion localized on the greater omentum (9). A hyperdense rim on CT, which is a typical finding of EA, is not observed with omental infarction (9).

Mesenteric panniculitis, also known as sclerosing mesenteritis, is a rare condition of inflammation of the bowel mesentery (12). The clinical course may vary from no symptoms to severe disease and common symptoms are usually unspecific, such as abdominal pain, nausea, fever and weight loss (12). Radiology is the most accessible diagnostic modality and the typical findings on CT are a solid fatty mass in the mesentery of the jejunum along with the lymph nodes and a pseudocapsule around the lesion. The prevalence in radiological studies is reported to range between 0.6 and 2.5% (12). Treatment of mesenteric panniculitis is with corticosteroids and other immune modulating agents such as thiopurines and TNF inhibitors (12).

Cecal diverticulitis is an uncommon entity of acute abdominal pain located in the lower abdomen and is often clinically indistinguishable from acute appendicitis. Patients are generally complaining about the colicky pain at the right lower quadrant and a tender

point. Approximately 80% of right colonic diverticula are located in the anterior cecum and are usually asymptomatic (13). The initial imaging method for CD in emergency departments is US due to the much more common preliminary diagnosis of acute appendicitis. Ultrasonography may demonstrate a hypoechoic focus protruding from the segmental thickened colon wall, hyperechoic inflamed mesenteric fat tissue and a normal appendix. In equivocal cases, CT should be performed for a definitive diagnosis, which shows thick walled, contrast enhanced diverticulum and surrounding fat stranding inflamed mesentery (14). Computerized tomography may show complications such as a fistula or abscess. Cecal diverticulitis can be followed-up non-operatively with medication, like other uncomplicated diverticulitis of the gut (13).

### Conclusion

Emergency physicians and radiologists encounter with the patients complaining of acute abdominal pain. Although these patients have common disorders, unusual causes should be always kept in mind when examining and imaging the patient. Ultrasonography should be performed in patients suspected of having acute cholecystitis, which is the most common cause of right upper quadrant pain or patients with right lower pain for thin patients and children (1,3). Computerized tomography with IV contrast enhancement should be considered the primary imaging technique in all other patients with localized acute abdominal pain. Without any salient finding on US, CT should be performed to search for other rare causes of acute abdominal pain, especially when localized at a tender point in the abdomen (1). If there is not any evidence of typical imaging findings of common disorders; mesentery, omentum and epiploic appendages should be evaluated cautiously. This critical evaluation of physicians and radiologists would prevent the delay of diagnosis and avoid unnecessary surgeries.

### References

1. Stoker J, van Randen A, Lameris W, Boermeester A. Imaging Patients with Acute Abdominal Pain. *Radiology* 2009; 253: 31-46.
2. Gans SL, Pols MA, Stoker J, Boermeester MA. Guideline for the Diagnostic Pathway in Patients with Acute Abdominal Pain. *Dig Surg* 2015; 32: 23-31.
3. Cartwright SL, Knudson MP. Diagnostic Imaging of Acute Abdominal Pain in Adults. *Am Fam Physician*. 2015; 91: 452-9.

4. ACR appropriateness criteria, 2006. American College of Radiology Web site.  
[http://www.acr.org/SecondaryMainMenuCategories/quality\\_safety/app\\_criteria/pdf/ExpertPanelonGastrointestinalImaging/AcuteAbdominalPainandFeverorSuspectedAbdominalAbscessDoc1.aspx](http://www.acr.org/SecondaryMainMenuCategories/quality_safety/app_criteria/pdf/ExpertPanelonGastrointestinalImaging/AcuteAbdominalPainandFeverorSuspectedAbdominalAbscessDoc1.aspx). Accessed October 15, 2008.
5. Kellow ZS, MacInnes M, Kurzenecwyg D, Rawal S, Jaffer R, Kovacina B, et al. The role of abdominal radiography in the evaluation of the nontrauma emergency patient. *Radiology* 2008; 248: 887–93.
6. Allemann F, Cassina P, Rothlin M, Largiader F. Ultrasound scans done by surgeons for patients with acute abdominal pain: a prospective study. *Eur J Surg* 1999; 165: 966–70.
7. Mun S, Ernst RD, Chen K, Oto A, Shah S, Mileski WJ. Rapid CT diagnosis of acute appendicitis with IV contrast material. *Emerg Radiol* 2006; 12: 99–102.
8. Lameris W, van Randen A, van Es HW, van Heesewijk JPM, van Ramshorst B, Bouma WH, et al. Imaging strategies for detection of urgent conditions in patients with acute abdominal pain: diagnostic accuracy study. *BMJ* 2009; 338: b2431.
9. Burcu B, Ekinci O, Inan I, Ozyalvac FT, Eren TT, Alimoglu O. An unusual cause of acute abdomen—epiploic appendicitis: report of two cases. *North Clin Istanbul* 2015; 2: 171–4.
10. Golash V, Willson PD. Early laparoscopy as a routine procedure in the management of acute abdominal pain: a review of 1,320 patients. *Surg Endosc*. 2005; 19: 882–5.
11. Sand M, Gelos M, Bechara FG, Sand D, Wiese TH, Steinstraesser L, et al. Epiploic appendagitis—clinical characteristics of an uncommon surgical diagnosis. *BMC Surg* 2007; 7: 11.
12. Nyberg L, Björk J, Björkdahl P, Ekberg O, Sjöberg K, Vigren L. Sclerosing mesenteritis and mesenteric panniculitis – clinical experience and radiological features. *BMC Gastroenterology* 2017; 17: 75.
13. Kyziridis DS, Parpoudi SN, Antoniou ND, Konstantaras DC, Moysidis MG, Christoforidis EC, et al. Cecal Diverticulitis is a Challenging Diagnosis: A Report of 3 Cases. *Am J Case Rep*, 2015; 16: 206-10.