ORIGINAL ARTICLE

Computed tomography findings of primary epiploic appendagitis as an easily misdiagnosed entity: Case series and review of literature

Rabia Ergelen, M.D.,[1] Ruslan Asadov, M.D.,[1] Burcu Özdemir, M.D.,[1] Derya Tureli, M.D.,[1] Baha Tolga Demirbaş, M.D.,[2] Davut Tuney, M.D.[1]

[1]Department of Radiology, Marmara University Faculty of Medicine, İstanbul-*Turkey*
[2]Department of General Surgery, Marmara University Faculty of Medicine, İstanbul-*Turkey*

ABSTRACT

BACKGROUND: Primer epiploic appendagitis (PEA) is an uncommon condition.

METHODS: We retrospectively reviewed the clinical records and computed tomography (CT) findings of 45 patients with PEA.

RESULTS: On the basis of physical examination and pain localization, presumptive clinical diagnosis was acute appendicitis (n=13), acute cholecystitis (n=2), acute diverticulitis (n=19), renal colic (n=7) and ovarian pathology (n=4).

CONCLUSION: Although it has no characteristic clinical and laboratory features, CT is the best modality for accurate diagnosis of PEA.

Keywords: Appendagitis; epiploic; tomography.

INTRODUCTION

Epiploic appendages are peritoneal pouches that arise from the serosal surface of the colon, and they are composed of adipose tissue and blood vessels. Primary epiploic appendagitis (PEA) is an inflammatory condition that may arise from torsion, spontaneous venous thrombosis, or inflammation of the epiploic appendage.

The term epiploic appendagitis was introduced in 1956 by Lynn et al.,[1] and the computed tomography (CT) features were initially described in 1986 by Danielson et al.[2] This condition is a self-limiting local inflammation of epiploic appendages and patients can be successfully treated in the outpatient setting. Before the advent of CT, it was often diagnosed during surgical exploration.[3] With the increasing use of CT in the evaluation of acute abdominal pain, PEA, a relatively uncommon and benign condition, can now be identified by characteristic radiological findings, thus obviating the need for hospitalization, further studies, or surgical exploration. Today, CT is used with increasing frequency for the assessment of acute abdominal pain in adult patients at the emergency department.

The benefit of CT is that it is possible to identify the cause of acute abdominal pain in a short time, which aids in the optimal management of pain because the patients can be referred either for medical treatment or surgery. In addition, CT helps in avoiding unnecessary hospital admission of patients who can be treated successfully as outpatients, and it provides information when to plan image-guided percutaneous treatment.

There are many intraabdominal pathological entities that enable CT-based diagnosis of acute abdominal emergencies as appendicitis, diverticulitis, bowel obstruction, pancreatitis, perforated peptic ulcer, abscess, pyelonephritis, and obstructive urolithiasis. However, rarer causes of acute abdomen, such as PEA, need to be kept in mind for differential diagnosis in case of acute abdominal pain.

This article aims to review our experience in diagnosing and

Address for correspondence: Rabia Ergelen, M.D.
Marmara Üniversitesi Tıp Fakültesi, Radyoloji Anabilim Dalı, İstanbul, Turkey
Tel: +90 216 - 505 48 29 E-mail: drergelen@yahoo.com

Submitted: 21.05.2016
Accepted: 06.04.2017

Ulus Travma Acil Cerrahi Derg
2017;23(6):489–494
doi: 10.5505/tjtes.2017.99894

Table 1. Demographic, clinical and laboratory findings of all patients

Patient	Age	Genders	Presenting complaint	Site	Localization	Presumptive diagnosiss	WBC (x10⁹/L)
1	29	Female	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	11.1
2	51	Male	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	10
3	32	Female	Abdominal pain	RLQ	Ascending colon	Acute diverticulitis	12.9
4	70	Female	Abdominal pain	RLQ	Ascending colon	Acute diverticulitis	23.1
5	35	Male	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	11.9
6	45	Male	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	11.8
7	40	Female	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	9.1
8	38	Male	Abdominal pain	RLQ	Ascending colon	Acute diverticulitis	9.8
9	82	Female	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	8.1
10	65	Female	Abdominal pain	LLQ	Descending colon	Acute diverticulitis	8.5
11	30	Male	Abdominal pain	LLQ	Descending colon	Acute diverticulitis	10.4
12	36	Male	Abdominal pain	LLQ	Descending colon	Acute diverticulitis	11.1
13	39	Male	Abdominal pain	LLQ	Descending colon	Acute diverticulitis	9.9
14	55	Female	Abdominal pain	LLQ	Descending colon	Acute diverticulitis	12.9
15	48	Male	Flank pain	LF	Descending colon	Renal colic	9.6
16	29	Male	Flank pain	LF	Descending colon	Renal colic	6.3
17	23	Male	Flank pain	LF	Descending colon	Renal colic	11.5
18	19	Female	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	10.1
19	51	Male	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	4.5
20	34	Female	Abdominal pain	RUQ	Ascending colon	Acute cholecystitis	9.8
21	45	Female	Abdominal pain	LLQ	Sigmoid colon	Acute diverticulitis	6.4
22	64	Female	Abdominal pain	LLQ	Sigmoid colon	Acute diverticulitis	9.6
23	39	Male	Abdominal pain	LLQ	Sigmoid colon	Acute diverticulitis	9.4
24	20	Female	Abdominal pain	LLQ	Descending colon	Ovarian pathology	10.3
25	70	Female	Abdominal pain	LLQ	Descending colon	Acute diverticulitis	6.2
26	35	Male	Abdominal pain	RUQ	Ascending colon	Acute cholecystitis	9.3
27	26	Male	Flank pain	LF	Sigmoid colon	Renal colic	8.3
28	33	Male	Abdominal pain	LLQ	Sigmoid colon	Acute diverticulitis	10
29	28	Male	Abdominal pain	LLQ	Sigmoid colon	Acute diverticulitis	10.1
30	19	Male	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	10.8
31	11	Male	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	10.7
32	31	Male	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	12.8
33	65	Female	Abdominal pain	LLQ	Descending colon	Acute diverticulitis	12.4
34	34	Female	Flank pain	LLQ	Descending colon	Acute diverticulitis	9.5
35	26	Male	Abdominal pain	LLQ	Sigmoid colon	Acute diverticulitis	11.9
36	41	Female	Abdominal pain	LLQ	Descending colon	Ovarian pathology	8.5
37	43	Female	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	14
38	78	Female	Abdominal pain	LUQ	Transverse colon	Acute diverticulitis	21.8
39	21	Male	Abdominal pain	LLQ	Sigmoid colon	Acute diverticulitis	6.5
40	68	Male	Flank pain	RF	Ascending colon	Renal colic	8
41	55	Male	Flank pain	LF	Descending colon	Renal colic	7.5
42	51	Female	Abdominal pain	LLQ	Descending colon	Ovarian pathology	10.6
43	52	Female	Abdominal pain	RLQ	Ascending colon	Acute appendicitis	10.6
44	50	Female	Flank pain	LF	Descending colon	Renal colic	6.7
45	49	Female	Abdominal pain	LLQ	Descending colon	Ovarian pathology	12.8

RLQ: Right lower quadrant; LLQ: Left lower quadrant; RUQ; Right upper quadrant; LUQ; Left upper quadrant; WBC: White blood cell; LF: Left flank; RF: Right flank.

managing PEA case in a large study population in Marmara University Hospital.

MATERIALS AND METHODS

We retrospectively reviewed the clinical records and CT images of 45 patients diagnosed with PEA in Marmara University Hospital during 2014–2016. All patients were admitted to the emergency department of our hospital with suspected acute abdomen. A detailed medical history taking and physical examination were the initial diagnostic steps for these patients. On the basis of the results of this clinical evaluation and laboratory investigations, the clinicians considered imaging examinations to help arrive at a definitive diagnosis. As an imaging investigation, intravenous contrast-enhanced abdominal CT was performed with triplanar reformatted images (Somatom Definition Flash, 256-slices, Siemens, Erlangen, Germany) for each patient as a part of the evaluation of acute abdomen. CT was performed with 2.5-mm detector collimation and 5-mm slice thickness. Intravenous contrast material was injected at a rate of 3 ml/s, and portal venous phase images were obtained with a 60–70 ml/s delay after the initiation of contrast injection.

Patients diagnosed with PEA on CT were included in this study and CT findings were reviewed by an experienced radiologist (ER) with 10 years of experience. CT images are reviewed according to diagnostic criteria of PEA. The criteria of CT findings specific for PEA are as follows: I. oval shaped, well-defined focus of hypodense fat tissue; II. thickened peritoneal ring (ring sign III. periappendageal fat stranding (inflammatory change); IV. the central dot sign (thrombosed vessel).[4,5]

The patients' medical records were examined with regard to demographics, initial associated symptoms, white blood cell (WBC) count, presumptive diagnosis, and treatment. This study was approved by the ethical committee of our hospital.

RESULTS

Demographic, clinical, and laboratory findings of 45 patients are depicted in Table 1. Patients evaluated included 24 males and 21 females, with a mean age of 42.3 years (range 11–88 years) diagnosed with PEA on CT.

All patients presented with acute-onset abdominal pain localized as follows: right lower quadrant in 16 patients (35%), right upper quadrant in two patients (0.4%), left lower quadrant in 19 patients (41%), and left upper quadrant in one patient (0.02%). Therefore, presumptive clinical diagnosis after medical history taking and physical examination, on the basis of physical examination findings and pain localization, was acute appendicitis (13 cases), acute cholecystitis (two cases), acute diverticulitis (19 cases), renal colic (seven cases), and ovarian pathology (four cases). presumptive diagnosis of patients according to the pain localization is shown in Figure 1. On physical examination, all patients had diffuse tenderness around the anatomical localization of PEA and six of them had additional rebound tenderness. Three patients (0.06%) presented with fever and 21 (46%) with elevated WBC counts (>10×10^9/L). None of the patients had constipation or diarrhea.

Characteristic CT findings of criterion I, II, and III were present in all 45 patients (Fig. 2). Twelve patients had the central dot sign indicative of central venous thrombosis (Fig. 3). The lesions were located in the ascending colon in 19 patients (42%), in the descending colon in 17 patients (37%), in the transverse colon in one patient (0.2%), and in the sigmoid colon in eight patients (17%). Presumptive diagnosis of the patients according to the localization of PEA is shown in Figure 4. Lokalization of PEA was mostly on the anterior wall of the colon (41/45), and only four patients had PEA at the lateral the wall of the colon (0.08%).

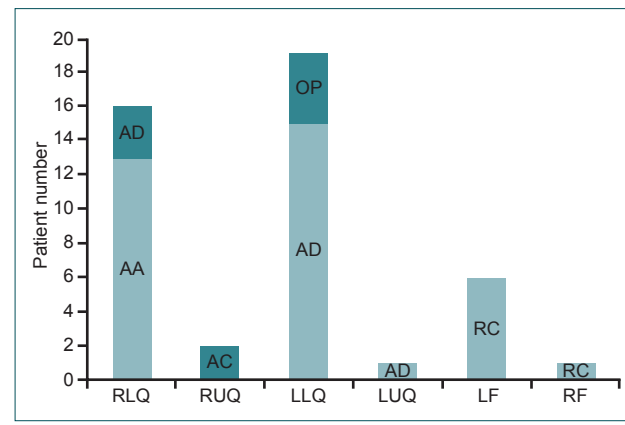

Figure 1. Presumptive diagnosis according to the pain localization is shown (AA: Acute appendagitis; AD: Acute diverticulitis; OP: Ovarian pathology; AC: Acute cholecystitis; RC: Renal colic; RLQ: Right lower quadrant; RUQ; Right upper quadrant; LLQ: Left lower quadrant; LUQ; Left upper quadrant; LF: Left flank; RF: Right flank).

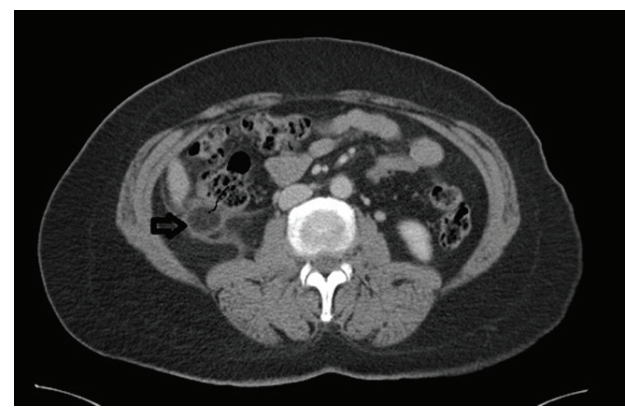

Figure 2. Contrast-enhanced axial computed tomography images show well-defined focus of hypodense fat tissue (black arrow), thickened peritoneal ring. and periappendageal fat stranding (white arrow).

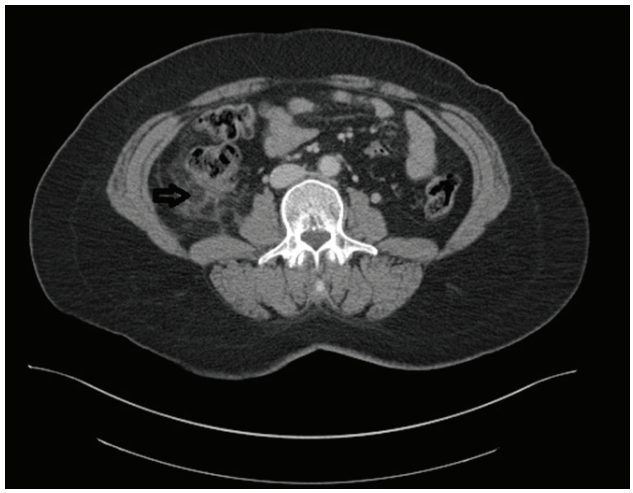

Figure 3. Contrast-enhanced axial computed tomography images show the central dot sign, indicative of central venous thrombus (arrow).

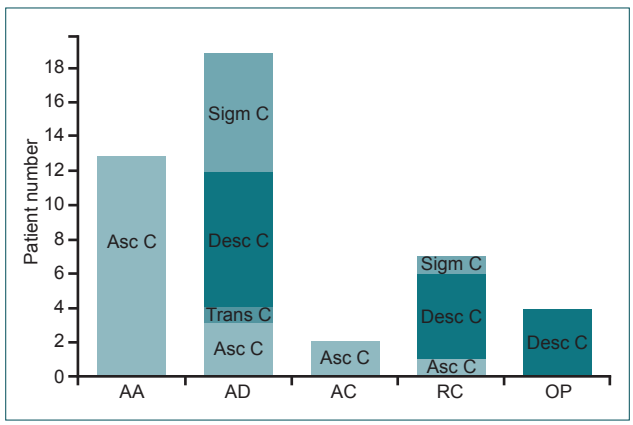

Figure 4. Presumptive diagnosis of the patients according to the localization of PEA is shown (Asc C: Ascending colon; Sig C: Sigmoid colon; Desc C: Descending colon; Trans C: Transverse colon; AA: Acute appendagitis; AD: Acute diverticulitis; AC: Acute cholecystitis; RC: Renal colic; OP: Ovarian pathology).

The treatment for all patients was conservative based on their CT findings (such as analgesics and antibiotics). No recurrence of symptoms was documented during any of the follow-up visits during their hospital stay, as defined in the medical records.

DISCUSSION

Appendices epiploicae are pouches of subserosal fat lining the entire length of the colon attached to the colonic wall by a vascular stalk, and appearing in two parallel rows next to the anterior and posterior tenia coli. The epiploic appendages vary in shape and size but usually measure about 3 cm in length, each. An average person has approximately 50–100 appendages clustering most prominently in the cecal and sigmoid region. Each epiploic appendage has one or two small supplying arteries from the colonic vasa recta and has a small draining vein with narrow peduncle.

Primary epiploic appendagitis is a rare, benign, localized, and sterile inflammation of the appendix epiploica, resulting from torsion or spontaneous venous thrombosis of the draining vein, usually involving the sigmoid colon or cecum.[6,7] These appendages are susceptible to torsion because of their pedunculated shape with excessive mobility and limited blood supply.[8,9]

Several studies with limited number of patients were reported in the literature. Chen et al.[10] reported 21 patients and Saad et al.[11] reported 18 patients diagnosed with PEA in their case reports. Thus, our study seems to have one of the largest study population in the literature.

Patients with PEA frequently present with sudden onset of abdominal pain over the affected area, more often in left lower quadrant.[4,7,10,12] In our study, pain was localized for 16 patients in the right lower quadrant (35%), for two patients in the right upper quadrant (0.4%), for 19 patients in the left lower quadrant (41%), and for one patient in the left upper quadrant (0.02%); the distribution was similar to that in previous reports. Therefore, the presumptive clinical diagnosis on the basis of pain localization was acute appendicitis in 11 cases (24%), acute cholecystitis in three cases (0.06%), acute diverticulitis in 19 cases (42%), renal colic in eight cases (17%), and ovarian pathology in four cases (0.08%). Some patients even reported flank pain in our study; therefore, presumptive diagnosis was renal colic for each of these patients, as rarely described previously. None of the 45 patients in the study was clinically suspected to have PEA.

PEA can occur at any age with a peak incidence in the fourth to fifth decades, and men are slightly more affected than women.[7,13] In the current study the mean age of patients with PEA was 42.3 years, and there was a slight male predominance (24 males vs. 21 females). This is an important point of view in the differential diagnosis of PEA with acute diverticulitis and omental infarction, because they are frequently seen in elderly patients. Our results were consistent with those reported in the literature.[4,14]

There are no characteristic diagnostic laboratory findings in PEA. The WBC count is normal or moderately elevated.[5,7,13,14] In the current study, the WBC count was slightly elevated in only 46% of patients; thus, this is not a reliable finding for the differentiation of acute colonic diverticulitis and PEA as defined in the literature.[14]

In the previous reports, a profound abdominal swelling was reported in 10%–30% patients diagnosed with PEA, and fever and nausea were also common presenting complaints.[5,14,15] In our study, only three patients (0.06%) had fever and none of them had nausea, vomiting, or a palpable mass in contrast to previous studies; thus, PEA should still be kept in mind in the differential diagnosis of acute abdomen in the absence of fever, nausea, and vomiting.[7,14]

The diagnosis of acute epiploic appendagitis primarily relies on cross-sectional CT, although ultrasound (USG) and MRI are occasionally used. PEA has nonspecific USG findings usually indicative of an inflammation particularly around the location of pain.[16] MRI is not used in evaluation of acute abdomen during routine practice. In our hospital, patients presenting with acute abdomen were routinely evaluated with CT; therefore, our diagnosis of PEA were all on CT. Patients did not undergo USG examinations; thus, we have no experience about the USG findings of patients with PEA.

Because of the increasing use of CT in acute abdominal pain, radiologists are likely to define PEA.[4,6] Its characteristic findings are; oval shaped, well-defined focus of hypodense fat tissue, thickened peritoneal ring (ring sign), and periappendageal fat stranding (inflammatory change).[4,9] We confirmed all the characteristic findings of PEA;[1–3] in our study patients 11. In addition, central dot sign indicative of central venous thrombus is defined in the literature in changing frequencies[4,6] n current study, 12 of the patients had the central dot sign (26%), which is less frequent than what is reported in the literature.[15,17] Therefore, the central dot sign is useful for diagnosis, but the absence of this sign cannot preclude the diagnosis of PEA. The weak point in this report is lack of pathological confirmation because of the self-limiting disease course and conservative treatment used in PEA.

The following are our concluding points. PEA, although not as rare as it was once thought, is an uncommon condition, but it still should be kept in mind in the evaluation of acute abdomen. The awareness of the clinicians and radiologists regarding the diagnosis of PEA will prevent unnecessary hospital admission and operative treatment of patients with acute abdomen. Although PEA has no characteristic clinical and laboratory features, CT is the best modality for accurate diagnosis.

Funding/Support

None.

Conflict of interest: None declared.

REFERENCES

1. Dockerty MB, Lynn TE, Waugh JM. A clinicopathologic study of the epiploic appendages. Surg Gynecol Obstet 1956;103:423–33.
2. Danielson K, Chernin MM, Amberg JR, Goff S, Durham JR. Epiploic appendicitis: CT characteristics. J Comput Assist Tomogr 1986;10:142–3.
3. Carmichael DH, Organ CH Jr. Epiploic disorders. Conditions of the epiploic appendages. Arch Surg 1985;120:1167–72. [CrossRef]
4. Singh AK, Gervais DA, Hahn PF, Sagar P, Mueller PR, Novelline RA. Acute epiploic appendagitis and its mimics. Radiographics 2005;25:1521–34. [CrossRef]
5. Legome EL, Belton AL, Murray RE, Rao PM, Novelline RA. Epiploic appendagitis: the emergency department presentation. J Emerg Med 2002;22:9–13. [CrossRef]
6. Ng KS, Tan AG, Chen KK, Wong SK, Tan HM. CT features of primary epiploic appendagitis. Eur J Radiol 2006;59:284–8. [CrossRef]
7. Son HJ, Lee SJ, Lee JH, Kim JS, Kim YH, Rhee PL, et al. Clinical diagnosis of primary epiploic appendagitis: differentiation from acute diverticulitis. J Clin Gastroenterol 2002;34:435–8. [CrossRef]
8. Carmichael DH, Organ CH Jr. Epiploic disorders. Conditions of the epiploic appendages. Arch Surg 1985;120:1167–72. [CrossRef]
9. Ross JA. Vascular loops in the appendices epiploicae; their anatomy and surgical significance, with a review of the surgical pathology of appendices epiploicae. Br J Surg 1950;37:464–6. [CrossRef]
10. Chen JH, Wu CC, Wu PH. Epiploic appendagitis: an uncommon and easily misdiagnosed disease. J Dig Dis 2011;12:448–52. [CrossRef]
11. Saad J, Mustafa HA, Elsani AM, Alharbi F, Alghamdi S. Primary epiploic appendagitis: reconciling CT and clinical challenges. Indian J Gastroenterol 2014;33:420–6. [CrossRef]
12. Vázquez GM, Manzotti ME, Alessandrini G, Lemos S, Perret MC, Catalano HN. Primary epiploic appendagitis: clinical features in 73 cases. Medicina (B Aires) 2014;74:448–50.
13. 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. [CrossRef]
14. Hwang JA, Kim SM, Song HJ, Lee YM, Moon KM, Moon CG, et al. Differential diagnosis of left-sided abdominal pain: primary epiploic appendagitis vs colonic diverticulitis. World J Gastroenterol 2013;19:6842–8.
15. Rioux M, Langis P. Primary epiploic appendagitis: clinical, US, and CT findings in 14 cases. Radiology 1994;191:523–6. [CrossRef]
16. Almeida AT, Melão L, Viamonte B, Cunha R, Pereira JM. Epiploic appendagitis: an entity frequently unknown to clinicians-diagnostic imaging, pitfalls, and look-alikes. AJR Am J Roentgenol 2009;193:1243–51.
17. Rao PM, Novelline RA. Case 6: primary epiploic appendagitis. Radiology 1999;210:145–8. [CrossRef]

ORİJİNAL ÇALIŞMA - *ÖZET*

Kolaylıkla atlanabilen bir antite olan epiploik apandisitin bilgisayarlı tomografi bulguları: Olgu serisi ve literatürün gözden geçirilmesi

Dr. Rabia Ergelen,[1] Dr. Ruslan Asadov,[1] Dr. Burcu Özdemir,[1] Dr. Derya Tureli,[1]
Dr. Baha Tolga Demirbaş,[2] Dr. Davut Tuney[1]

[1]Marmara Üniversitesi Tıp Fakültesi, Radyoloji Anabilim Dalı, İstanbul
[2]Marmara Üniversitesi Tıp Fakültesi, Genel Cerrahi Anabilim Dalı, İstanbul

ARKA PLAN: Primer epiploik apandisit (PEA) nadir görülen bir hastalıktır.
GEREÇ VE YÖNTEM: Bu yazıda PEA tanısı alan 45 hastanın klinik verileri ve bilgisayarlı tomografi (BT) bulguları geriye dönük olarak değerlendirildi.
BULGULAR: Fizik muayene bulguları ve ağrının lokalizasyonuna göre hastalar akut apandisit (n=13), akut kolesistit (n=2), akut diverkülit (n=19), renal kolik (n=7) ve over patolojisi (n=4) öntanılarını aldılar. Bu hastalara BT incelemesi sonucunda PEA tanısı konuldu.
TARTIŞMA: Primer epiploik apandisit patogonomik olmayan klinik ve laboratuvar bulgularına sahiptir ve akut karın hastalıklarının değerlendirilmesinde akılda tutulması gereken bir klinik antitedir.
Anahtar sözcükler: Apandisit; epiploik; tomografi.

Ulus Travma Acil Cerrahi Derg 2017;23(6):489–494 doi: 10.5505/tjtes.2017.99894