CT EVALUATION OF ACUTE APPENDICITIS

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Abstract: Acute appendicitis is the most common cause of an acute surgical abdomen. In the absence of surgical intervention, it can lead to perforation resulting in peritonitis. In patients with atypical clinical symptoms, further investigations with imaging techniques are needed to avoid delay of surgical procedure. The purpose of this paper is to describe CT aspects in 12 cases of acute appendicitis. We observed parietal thickening, infiltration of adjacent fat, hypodense nodular area with focal hyperdense central area. In all patients we found infiltration of periappendicular fat, a nodular mass with predominantly fatty densities. In 83% of the patients, we identified a punctiform or linear hyperdense central area. Conclusions. CT may be the first imaging means of diagnosing acute appendicitis. Recognizing the CT aspects in acute appendicitis is important for the medical management of the disease, as it can simulate a surgical abdomen.

Cuvinte cheie: apendicita, infiltrarea grăsimii **Rezumat:** Apendicita acută este cea mai comună cauză a unui abdomen acut chirurgical. În absența intervenției ea poate progresa spre perforație rezultând peritonita. La pacienții cu simptome clinice atipice, investigații suplimentare sunt necesare pentru a evita întârzierea actului chirurgical. Scopul acestei lucrări este de a descrie aspectele computer tomografice a 12 cazuri de apendicită acută. Material și metode. Am urmărit îngroșarea parietală, infiltrarea grăsimii adiacente, arie nodulară hipodensă cu o arie centrală hiperdensă, toate pe aspectele CT a 12 pacienți examinați în Departamentul CT al Spitalului Județean Oradea. Rezultate. La toți pacienții am găsit infiltrarea grăsimii periapendiculare, o masă nodulară cu densități predominant grăsoase. La 83% din pacienți s-a identificat o arie centrală hiperdensă. Concluzii. CT poate fi prima modalitate imagistică cu care apendicita acută este diagnosticată. Conștientizarea aspectelor CT în apendicita acută este importantă pentru ca boala să fie manageriată medical, ea putând mima un abdomen chirurgical.

INTRODUCTION

Acute appendicitis is the primary or secondary inflammation of the ileocecal epiploic appendix. Primary acute appendicitis is the most common cause of acute abdominal pain with high incidence for people aged 6-30. About 7% of the population develop appendectomy throughout their life.(1) Primary acute appendicitis is the result of the torsion with subsequent ischemia of the appendix or it is caused by spontaneous venous thrombosis without the torsion of the appendix.(2) Secondary acute appendicitis is the inflammation of the appendix within adjacent pathological processes such as diverticulitis.(3)

Acute appendicitis is the most common cause of an acute surgical abdomen.(4) In the absence of surgical intervention, it can lead to perforation resulting in peritonitis.

Clinical diagnosis is difficult; it is characterized by sudden onset of a pain localized in the right iliac fossa associated with minimal gastrointestinal symptoms that may simulate a surgical clinical picture.(2) In patients with atypical clinical symptoms, further investigations with imaging techniques either ultrasonography or computed tomography are needed to avoid delay of surgical procedure and minimize falsenegative results of laparotomy.(5) Recognizing the imaging aspects of this entity is important to set at a correct diagnosis and to avoid unnecessary surgical procedure or hospitalization.

PURPOSE

The purpose of this paper is to describe CT aspects in 12 cases of acute appendicitis and to review the specialized literature.

METHODS

Next, we shall present the cases of 12 patients who were examined in the CT Department of the County Clinical Hospital from Oradea. Examinations were performed with a GE Optima 16-slice CT Scanner.

Examinations were performed without the administration of oral contrast agents, but with the administration of intravenous contrast agents. We observed parietal thickening, infiltration of adjacent fat, hypodense nodular area with focal hyperdense central area.

RESULTS

There were 12 patients, 75% (9/12) male, aged 22-68 (average age 46 years), no patient febrile at the time of the examination, 58% (7/12) presented moderate leukocytosis.

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All patients presented abdominal pain which matched the locations of the CT changes. Most patients presented pain in the right flank and imaging features characteristic for acute appendicitis in the right lower quadrant.

In all patients we found infiltration of periappendicular fat, a nodular mass with predominantly fatty densities - figures no. 1,2.

Figure no. 1. Infiltration of periappendicular fat



Figure no. 2. Ileocecal swelling; infiltration of fat



In $83\overline{\%}$ (10/12) of the patients, we identified a punctiform or linear hyperdense central area (figures no. 3,4). The caecum was the most affected part of the colon (n = 11 patients), only one patient had the appendix at the level of the sigmoid colon. The most common locations of the inflammatory changes in relation to the colonic lumen were, in descending order: on the anterior wall (n = 5), on the lateral wall (n = 4), on the inferior wall (n = 3). Adjacent thickening of the colonic wall was detected in 33% (4/12- figure no. 2).

Figure no. 3. Punctiform hyperdense image in a swelling appendix



Figure no. 4. Nodular hyperdense image in inflammation appendix



DISCUSSIONS

There are several morphological varieties of the appendix; the appendix has a sinuous shape, most often pediculate, mobile, making it vulnerable to torsion or ischemic changes. Depending on its orientation, the appendix can be: descending appendix (42%) located in the medial part of the iliac fossa, its tip can reach up into the pelvis; lateral appendix (26%) running laterally in the inguinal ligament; medial appendix (17%) in relation to the intestine loops; ascending retrocecal appendix (13%) located behind the caecum and even behind the ascending colon.

Epiploic appendicitis is an inflammatory process resulting from a disruption of the blood supply such as venous thrombosis or torsion of the involved appendix.(2)

Appendicitis tends to be benign, of self-limited nature; most patients tend to present localized abdominal pain, specific clinical symptoms.(6) The pain varies according to the location of the inflammatory process, but it is more common in right lower quadrant.(2,7)

Pathognomonic aspects of acute appendicitis on CT scan include a "target" lesion with a hyperdense central area in a lesion with fatty densities of oval shape and a hyperdense ring due to the perilesional inflammation.(8,9,10)

In agreement with Singh's study, the most common CT aspect of acute appendicitis, also seen in our study, was the presence of a nodular lesion with fatty densities associated with adjacent inflammatory changes usually located on the anterior wall of the ascending colon. The involvement of the descending colon was less frequent.

Although the presence of a hyperdense central focus inside a fatty mass is useful in setting a diagnosis, its absence does not exclude the diagnosis of acute appendicitis. 83% of the patients in our study presented the hyperdense central focus inside the fat. Our study was consistent with the largest study from specialized literature published by Singh.

The hyperdense central focus was thought to represent a thrombosed vessel within the inflamed epiploic appendix.(8,10) In agreement with Hiller and Singh's study, only 4 patients in our study (33%) showed a thickening of the colon wall. This point is important in differentiating acute appendicitis from acute diverticulitis. The localization on the anterior wall is useful in setting a confident diagnosis.

The differential diagnosis of a fatty lesion in the right iliac fossa on CT scan includes acute appendicitis, mesenteric panniculitis, acute diverticulitis, trauma or omental tumour such as liposarcoma.(4,11)

The diagnosis of this pathological condition is based mainly on the inflammatory aspects on CT scan centred on the appendix.(1,12) Although the omental infarct may look similar to appendicitis, the hyperdense ring that is present in epiploic appendicitis does not appear.(4,13)

CONCLUSIONS

CT is often used for acute abdominal pain; it may be the first imaging means of diagnosing acute appendicitis. Recognizing the CT aspects in acute appendicitis is important for the medical management of the disease, as it can simulate a surgical abdomen.

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