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Original Article

The value of the ileocolic vessels in acute appendicitis- a cross sectional study

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Abstract

Aim: To our knowledge, ileocolic (ILC) artery and vein have not been studied or mentioned in the medical literature so far in acute appendicitis. Thus our aim was to evaluate the value of ileocolic (ILC) artery and vein diameters in acute appendicitis.

Material and Methods: Abdominal computed tomography (CT) features of 157 patients complaining of abdominal pain were reviewed retrospectively from our hospital records between January and June in 2015. Patients were divided into two groups as appendicitis-detected group and CT-normal group. We compared ILC artery and vein diameters between the two groups.

Results: In the patients with acute appendicitis, the mean diameter of the ileocolic artery was 3.31±0.69 mm; the mean diameter of the ileocolic vein was 5.21±0.9 mm. In the control group, the mean diameter of the ileocolic artery was 2.75±0.31 mm; the mean diameter of the ileocolic vein was 4.17±0.45 mm. In appendicitis group, diameters of ILC artery and vein were found significantly higher than control group (p values <0.01).

Conclusion: The diameter of the ILC arteries and veins were significantly increased in acute appendicitis.

Keywords: Acute Abdomen; Acute Appendicitis; Computed Tomography; Ileocolic Vessels.

INTRODUCTION

Acute appendicitis is one of the most common causes of acute abdominal pain that requires emergency abdominal surgery (1-2). When it presents with typical symptoms, it is easy to diagnose. An accurate diagnosis can be established in most patients based on history, physical examination, and simple laboratory tests. However, various overlapping clinical features exist between appendicitis and other medical conditions that may result in a clinical misdiagnosis (3-4). Moreover, a significant number of patients do not present with the classical symptoms of acute appendicitis. Atypical signs and symptoms due to different locations of the appendix or concomitant pathologies can also complicate the diagnosis (5). Thus its accurate diagnosis and treatment can be difficult (6-9).

In daily practice, radiologic imaging is often referred to avoid negative laparotomy or conservatively treating a complicated appendix. In general, computed tomography and abdominal ultrasound (US) are the most frequently used imaging technique for the diagnosis of acute appendicitis (10-11). The introduction of CT has dramatically improved the diagnostic accuracy for acute appendicitis, with a sensitivity of 90%-100% and a specificity of 91%-99% (12).

The important CT criteria for acute appendicitis are dilated appendix (>6 mm diameter) with distended lumen, enhancing wall, periappendiceal fat stranding, extraluminal fluid collection, appendicolitis and maximum depth of intraluminal fluid greater than 2.6 mm (13-14).

The primary objective in this study was to evaluate diameter of the ileocolic artery and vein in acute appendicitis. To our knowledge, this has not been studied or mentioned in the medical literature so far.

MATERIAL and METHODS

The data of 157 persons were reviewed retrospectively from the records of our hospital between January and June in 2015. The persons were divided into two groups: the appendicitis group consisted of 68 patients with confirmed CT and pathological examination of acute appendicitis; and control group consisted of 89 persons who had CT results reported as normal.

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CT studies were performed on a 64-slice multislice CT scanner (Aquilion; Toshiba, Japan). Routine abdominal tomography scans and the portal phase images used to interpret the venous structures in the abdomen were obtained 60–70 s after the administration of 70–80 ml non-ionic iodinated contrast material and 40 ml saline at injection rates of 2.5-3 ml/s. The CT scans were evaluated on a workstation (Vitrea; Toshiba, Japan).

The CT evaluation was performed by a single radiologist with a 13 years' experience. The diameter of the ileocolic arteries and veins were measured at the approximately 2 cm from the origin of the superior mesenteric artery in all patients. Optimal axial diameters were taken at about the same levels (Figure 1).

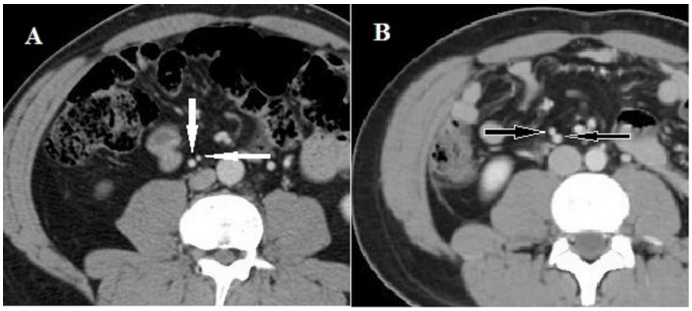

Figure 1. Intravenous contrast enhanced axial CT images. Normal (A) and increased (B) ILC artery and vein diameters are shown

Patients who had inflammatory bowel disease or had colon and/or terminal ileac masses were excluded from the study.

We assessed the mean age, the female/male ratio, the mean diameter of the ileocolic artery and vein, presence of periappendiceal fluid, presence of mesenteric lymph node, the maximum depth of intraluminal fluid, appendiceal wall enhancement, presence of appendicolitis, presence of periappendiceal fat stranding, the mean diameter of appendix, the mean appendix wall thickness.

Statistics

Statistical analysis was performed using the SPSS for Windows (version 21.0; SPSS/IBM, Chicago, IL). Normality was tested using the Kolmogorov Smirnov Test. The descriptive statistics, Student t test, Mann Whitney U test were used when appropriate. The statistical significance level was accepted as a p value of less than 0.05.

RESULTS

Of patients with acute appendicitis, the mean diameter of the ileocolic artery was 3.31±0.69 mm, the mean diameter of the ileocolic vein was 5.21±0.9 mm, the mean age was 31.5±15.2 (min-max: 16-80), the female/male ratio was 20/48 (29.4%/70.6%). The presence of periappendiceal fluid was 22.1%, presence of mesenteric lymph node was 32.4%, presence of intraluminal fluid was 77.9%, presence of the appendiceal wall enhancement was 95.6%, presence of the appendicolitis was 25%, presence of the periappendiceal fat inflammation was 89.7%, the mean diameter of appendix was 10.6±2.1 mm, the mean appendix wall thickness was 3.3±0.69.

In the control group, the mean diameter of the ileocolic artery was 2.75±0.31 mm, the mean diameter of the ileocolic vein was 4.17±0.45 mm, the mean age was 30.2 (min-max: 18-62), the female/male ratio was 29/60 (32.6%/67.4%). These results are summarized in Table 1.

Table 1. Demographic and CT features of the Appendicitis group

Parameters	n% or mean±SD
Age	31.5± 15.2
Gender (M/F)	48/20 (70.6%/29.4%)
ILC artery diameter (mm)	3.31±0.69
ILC vein diameter (mm)	5.21±0.9
Periappendicular fluid	15 (22.1%)
Mesenteric lymph node	22 (32.4%)
Intraluminal fluid	53 (77.9%)
Appendixdiameter (mm)	10.6±2.1
Appendix wall thickness (mm)	3.3±0.69
Appendicolitis	17 (25%)
Periappendiceal fat inflammation	61 (89.7%)

The diameter of ILC artery and vein of patients with acute appendicitis were significantly higher than control group (p values <0.01). The mean age was not significantly different between the groups (p=0.54). The gender was not significantly different between the groups (p=0.67) (Table 2).

Table 2. Comparisions of the ILC vessels between the groups

Parameters	Appendicitis group	Control group	P value
Age (year)	31.5±15.2	30.2±10.04	0.54
Gender (Male/Female)	48/20	60/29	0.67
ILC artery diameter (mm)	3.79±0.7	2.75±0.31	<0.01
ILC vein diameter (mm)	5.21±0.9	4.17±0,45	<0.01

DISCUSSION

Appendix is a part of the digestive tract which lies in right lower quadrant of abdomen. It has a worm-like structure and arises during embryological life from the posteromedial wall of the cecum, about 2 cm below the ileocecal valve (15).

Blood supply of appendix; come from appendicular artery which is a branch of the ileocolic artery and drains to the portal venous system by ileocolic vein (16).

Acute inflammation has three major components: Alterations in vascular caliber that lead to an increase in blood flow, structural changes in the microvascular structure that permit plasma proteins and leukocytes to leave the circulation; and emigration of the leukocytes from the microcirculation, their accumulation in the focus of injury and their activation to eliminate the offending agent (17). Because of infection, the blood supply in the appendix wall and periappendiceal tissue will increase.

We hypothesized that the diameter of the ileocolic artery

and vein might be increased in acute appendicitis because of increased blood flow in the wall of the appendix in case of acute appendicitis.

The diagnosis of acute appendicitis classically is based on reliable history and physical examination. The accuracy of the diagnosis also depends on the surgeon's experience. Use of imaging modalities such as US and CT has helped to decrease the rates of perforation, morbidity and mortality, in addition to shortening the length of hospital stay (18-19). The overall negative appendectomy rate, or rate of normal appendix at pathologic examination, was 20% prior to the use of cross-sectional imaging (20). In a study conducted on acute appendicitis Balthazar et al. found that the CT reduced the negative appendectomy rate (from 20% to 4%) (21). CT is an extremely accurate and effective cross-sectional imaging technique for the diagnosis of acute appendicitis (22). The introduction of CT has dramatically improved the diagnostic accuracy for appendicitis, with a sensitivity of 90%-100% and a specificity of 91%-99%.

In a study of Balthazar et al. the sensitivity for CT was 96% versus 75% for US. However, their specificities were nearly the same (12). CT criteria for acute appendicitis, include appendiceal diameter of more than 6 mm, an appendicolitis, an appendiceal wall thickness of more than 3 mm, periappendiceal stranding, extra luminal air, adjacent adenopathy, adjacent bowel wall thickening, focal cecal wall thickening and maximum depth of intraluminal fluid greater than 2.6 mm (14).

In this present study, the mean diameter of appendix and wall thickness was 10.6 mm and 3.3 mm, respectively, in the appendicitis group.

The presence of a calcified appendicolitis associated with periappendiceal inflammation is one of the CT criteria used to diagnose acute appendicitis. It has been reported in literature that 28% of adult and 30% of pediatric patients with acute appendicitis have appendicolitis (23). In our study, presence of an appendicolitis was found in 25% of the patients with acute appendicitis.

In the medical literature, CT is an excellent tool for the accurate diagnosis of appendicitis. This accuracy mainly arises from the presence of periappendiceal stranding (14). However, in a study conducted by Jacobs et al, it is found that 22% of the cases with appendicitis did not have periappendiceal stranding on CT (24). In our study, this finding was absent in only 10.3%.

In a study conducted by Moteki and Horikoshi, maximum depth of 2.6 mm or more of fluid in the appendiceal lumen was found important for the diagnosis of appendicitis (14). In our study, its visibility was found in 77.9%. This study also demonstrated the unreliability of conventional specific criteria CT, when an appendix shows a diameter of more than 6 mm without periappendiceal stranding. Thus, another specific CT criterion is needed to perform such differentiation.

Herein we found that the diameters of ILC artery and vein were significantly higher in patients with acute appendicitis compared to the control group (p value <0.01 for artery and <0.01 for vein).

And we indicated for the first time that the diameter of ileocolic artery and vein significantly were increased in acute appendicitis.

The diameter of the ileocolic artery and vein may vary according to the patient's body mass index, and hence could be a limitation to our study. In addition, we have excluded children and patients younger than 18 years, a population with a significant incidence of acute appendicitis. Also single radiologist's assessment was another limitation of our study.

CONCLUSIONS

Herein we found out that the diameter of the ILC vessels were significantly increased in appendicitis.

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