

ACUTE APPENDICITIS- SONOLOGICAL AND HISTOPATHOLOGICAL CORRELATIONAnjani M. Reddy¹, Dayananda Kumar R², Anilesh P. Singh³, Chiranth⁴, Anshita Agarwal⁵¹Assistant Professor, Department of Pathology, MVJ Medical College and Research Hospital, Bangalore.²Professor, Department of Radiology, MVJ Medical College and Research Hospital, Bangalore.³Postgraduate Student, Department of Radiology, MVJ Medical College and Research Hospital, Bangalore.⁴Postgraduate Student, Department of Radiology, MVJ Medical College and Research Hospital, Bangalore.⁵Postgraduate Student, Department of Radiology, MVJ Medical College and Research Hospital, Bangalore.**ABSTRACT****BACKGROUND**

The aim of the study is to study the-

1. Correlation between sonological and histopathological diagnosis of acute appendicitis.
2. Prevalence of acute appendicitis in various age groups.

MATERIALS AND METHODS

The study was conducted in the Department of Radiodiagnosis, MVJ Medical College and Research Hospital, Bangalore, for a period of 2 years from March 2013 to February 2015. Data collection was prospective. A computer-assisted search of all the reports of ultrasonography with the diagnosis of acute appendicitis was conducted within the departmental database. A total of 244 patients (128 male patients and 116 female patients) with acute appendicitis were identified and the study was conducted.

RESULTS

In the study, total of 244 patients were diagnosed with acute appendicitis. Out of these, 128 patients were males and 116 patients were females. The incidence of acute appendicitis was most prevalent in age group between 21 to 30 years (36.5%) in our study. The least incidence was noted in age group of above 60 yrs. with only 1 out of 244 patients (0.4%) was diagnosed with acute appendicitis. The histological features noted were suppuration/inflammation, gangrenous, lymphoid hyperplasia and perforation. In our study, 143 inflammation/suppuration (58.6%), 37 gangrenous (15.1%), 24 lymphoid hyperplastic (9.8%) and 1 perforation (0.4%) was noted. Hence, the incidence of inflammation/suppuration was found to be most common and perforation was found to be the least finding. The suppurative/inflammatory feature was most common histological type in all the age groups except for the age group above 60 yrs. The gangrenous features were most commonly seen in the age group between 11 to 20 yrs. followed by 20 to 30 yrs. Faecolith was most commonly found in age group of 21 to 30 yrs. (12 cases) followed by age group of 11 to 20 yrs. (10 cases).

CONCLUSION

It was noted that the incidence of acute appendicitis was most commonly noted in younger age group and its incidence decreases as the age advances. The most cases revealed suppuration/inflammation and perforation was noted to be of the least histological variant.

KEYWORDS

Acute Appendicitis, USG, RIF tenderness, Faecolith.

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BACKGROUND

Acute appendicitis is the most common cause of acute abdomen. Although, the clinical presentation of acute appendicitis is typical in 70% of the cases; about 30% of the patients have an uncertain preoperative diagnosis. Recently, with the availability of high frequency transducers, resolution is considerably improved enabling visualisation

and diagnosis of appendicular pathologies. In experienced hands, graded compression sonography is articulately useful in cases of suspected uncomplicated acute appendicitis.

AIMS AND OBJECTIVES

1. To study the correlation between sonological and histopathological diagnosis of acute appendicitis.
2. To study the prevalence of acute appendicitis in various age groups.

MATERIALS AND METHODS

The study was conducted in the Department of Radiodiagnosis, MVJ Medical College and Research Hospital, Bangalore, for a period of two years from March 2013 to February 2015. Data collection was prospective. A computer assisted search of all the reports of ultrasonography with the

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diagnosis of acute appendicitis was conducted within the departmental database. A total of 244 patients (128 male patients and 116 female patients) with acute appendicitis were identified and the study was conducted.

Transabdominal sonography was carried out with GE Voluson 730 Pro ultrasound machine using 3.5 and 5 MHz curvilinear and linear transducers. Scanning in transverse, oblique and sagittal planes were carried out.

Recognised as image, appendiceal identification of a tubular structure in the right iliac fossa with closed distal tip, its wall arranged in layers and the cross section presents target sign. The graded compression technique allowed differentiation between an incompressible inflamed appendix and compressible and displaceable normal small-bowel loops. One of the anatomical relationships that we considered for appendix localisation is the place of external iliac vessels as the appendix maybe directly related to them, above the artery and vein and surrounded by oedematous mesenteric fat. In thin patients, we identify the muscular plane of the oblique and transverse muscle immediately above the image appendix. Measurements of the thickness of the caecal appendix and its wall, the presence of free fluid in the peritoneal cavity, presence of appendicoliths, e.t.c., were performed.

The final diagnosis of each case was based on surgical findings, histopathological results or clinical outcome. All data are loaded into a matrix table for the subsequent statistical analysis.

Inclusion Criteria

All patients admitted with clinical diagnosis of acute appendicitis were included in this study.

Exclusion Criteria

Patients found to have appendicular lump or diagnosis other than appendicitis were excluded from this study and patients not subjected to ultrasonography after diagnosis of acute appendicitis.

RESULTS

In the study, total of 244 patients were diagnosed with acute appendicitis. In this, 128 patients were males and 116 patients were females. The incidence of acute appendicitis was most prevalent in age group between 21 to 30 years (36.5%) in our study. The least incidence was noted in age group of above 60 yrs. with only 1 out of 244 patients (0.4%) was diagnosed with acute appendicitis (Table 1).

The histological features noted were suppuration/inflammation, gangrenous, lymphoid hyperplasia and perforation. In our study, 143 inflammation/suppuration (58.6%), 37 gangrenous (15.1%), 24 lymphoid hyperplastic (9.8%) and 1 perforation (0.4%) was noted. Hence, the incidence of inflammation/suppuration was found to be most common and perforation was found to be the least finding (Table 2).

The suppurative/inflammatory feature was most common histological type in all the age groups except for the age group above 60 yrs. The gangrenous features were

most commonly seen in the age group between 11 to 20 yrs. followed by 20 to 30 yrs. Faecalith was most commonly found in age group of 21 to 30 yrs. (12 cases) followed by age group of 11 to 20 yrs. (10 cases).

Age Group	Number of Patients	Percentage
1-10	12	4.9%
11-20	51	20.9%
21-30	89	36.5%
31-40	31	12.7%
41-50	16	6.5%
51-60	4	1.6%
>60	1	0.40%

Table 1. Age Wise Distribution of Patient

Histopathology Feature	Number of Patients	Percentage
Suppurative/inflammatory	143	58.6%
Gangrene	37	15.1%
Lymphoid hyperplasia	24	9.8%
Perforation	1	0.4%

Table 2. Histopathology of Appendicitis

Age Group	Necrosis	Perforation	Gangrene	Faecalith
1-10	4	0	3	1
11-20	11	0	12	10
21-30	10	0	6	12
31-40	2	0	2	1
41-50	5	0	6	0
51-60	0	0	0	0
>60	1	1	0	0

Table 3. Histopathology of Appendicitis in Different Age Groups

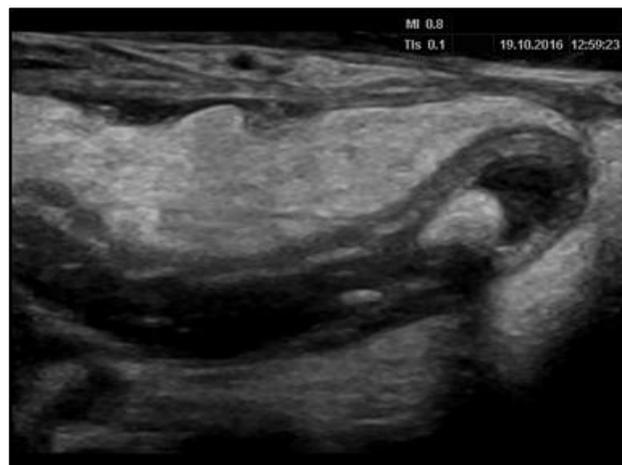


Figure 1. Case of Acute Appendicitis - USG Shows Dilated Appendix with Appendicolith and Positive Gut Signature Sign

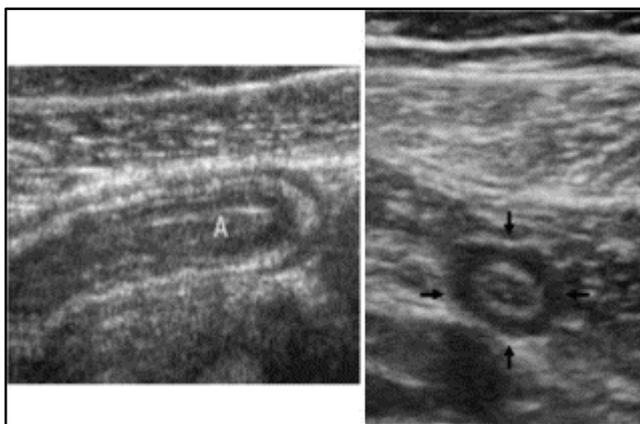


Figure 2. Case of Acute Appendicitis with Positive McBurney's Point Tenderness. USG Shows Dilated Appendix, Distinct Appendiceal Wall Layers and Positive Target Sign

DISCUSSION

Acute appendicitis is the most common cause of acute abdomen,¹ although the clinical presentation of acute appendicitis is typical in 70% of the cases. About 30% of the patients have an uncertain preoperative diagnosis. Consequently, the rate of unnecessary laparotomy is as high as 20-25%. The rate is even higher (35-45%) in women of childbearing age, because of the female pelvic organs and complications of pregnancy in this group.² The rate of perforation is increasing with an average high of 23%, which is partially because of delayed surgery caused by uncertain diagnosis.³ Plain film diagnosis depending on the occasional demonstration of appendicolith or ureteric calculus is neither sensitive nor specific. The diagnosis of acute appendicitis by the barium enema studies is mainly based on the demonstration of non-filling of the appendix. It is not frequently used and it has an accuracy that ranges from 50-85%. White cell and anti-granulocyte scintigraphic scans have also been used in the diagnosis of right lower quadrant pain, but are expensive, time consuming and are not very sensitive. Computed tomography is considered to be sensitive and specific for the diagnosis of acute appendicitis. It is a relatively expensive test that often requires introduction of oral and intravenous contrast agents. Besides CT is neither sensitive nor specific for the diagnosis of gynaecologic disease, a frequent mimicker of acute appendicitis.⁴

Diagnosis of acute appendicitis is not always straight forward. Sometimes, presentation is so atypical that even the most experienced surgeon may remove normal appendix or sit on the perforated one.^{5,6,7,8} Clinical decision to operate leads to removal of 20% of normal appendices to avoid the complications of missed or delayed diagnosis. This was said to be the optimum balance between negative appendectomy and rate of perforation, which were thought to be reciprocally related. This traditional concept is however being questioned recently.⁶ Incorporation of new diagnostic modalities in clinical decision making, low negative appendectomy rate can be achieved without increasing the rate of perforation.

Ultrasound has also been shown to be highly sensitive and specific for the diagnosis of not only acute appendicitis, but also other conditions that cause right lower quadrant pain.³ Till the development of high-resolution real time sonography, it was not possible to evaluate acute appendicitis routinely. Recently with the availability of high frequency transducers, resolution is considerably improved enabling visualisation and diagnosis of appendicular pathologies. In experienced hands, graded compression sonography is particularly useful in cases of suspected uncomplicated acute appendicitis.²

Obvious advantages of ultrasound are, 1) It does not employ any ionising radiation, noninvasive; 2) There is minimal discomfort to the patient; 3) Its easy availability, portability and repeatability; 4) No specific patient preparation is required. In many centres, sonography has become the procedure of choice for the initial evaluation of acute appendicitis with equivocal clinical features, particularly in paediatric and women of childbearing age group.⁹

Sonological criteria for acute appendicitis- Eliciting sonographic McBurney's point tenderness, blind ending immobile, non-compressible tubular structure in the right iliac fossa, bull's eye or target lesion with diameter of >6.0 mm, presence of appendicolith, complex appendiceal mass or abscess, other associated findings like integrity of the submucosal layer, periappendiceal fluid collection, pericaecal increased echogenicity, hypo/hyper peristaltic loops in the right iliac fossa, enlarged mesenteric lymphnodes.¹⁰

Usefulness of US in the diagnosis of acute appendicitis is now established. When Puylart first introduced his graded compression method, he reported sensitivity of 89% and specificity of 100%. There are certain drawbacks in ultrasonography for acute appendicitis. The foremost important is the experience of the sonologist as the procedure is highly operator dependent.^{11,12,13}

CONCLUSION

It was noted that the incidence of acute appendicitis was most commonly noted in younger age group and its incidence decreases as the age advances. The most cases revealed suppuration/inflammation and perforation was noted to be of the least histological variant.

REFERENCES

- [1] Wilson SR. Gastrointestinal tract. In: Rumack CM, Wilson SR, Charbneau JW, eds. Diagnostic ultrasound. Vol. 1. 2nd edn. St. Louis, MO: Mosby 1998:303-306.
- [2] Abu-Yousef MM, Bleicher JJ, Waher JW, et al. High resolution sonography of acute appendicitis. *AJR* 1987;149:53-58.
- [3] Kozar RA, Roslyn JJ. The appendix. In: Schwartz SI, Shires GT, Spencer FC, et al, eds. Principles of surgery. New York: McGraw-Hill 1994:1385-1394.
- [4] Berry J, Malt RA. Appendicitis near its centenary. *Ann Surg* 1984;200(5):567-575.

- [5] Lewis FR, Holcroft JW, Boey J, et al. Appendicitis: a critical review of diagnosis and treatment in 1,000 cases. *Arch Surg* 1975;110(5):677-684.
- [6] Al-Hashemy AM, Seleem MI. Appraisal of the modified Alvarado score for acute appendicitis in adults. *Saudi Med J* 2004;25(9):1229-1231.
- [7] Abu-Yousef MM. Ultrasonography of right lower quadrant. *Ultrasound Quarterly* 2001;17(4):221-225.
- [8] Rettenbacher T, Hollerweger A, Macheiner P, et al. Outer diameter of the vermiform appendix as a sign of acute appendicitis: evaluation at US. *Radiology* 2001;218(3):757-762.
- [9] Ellis BW. *Hamilton Bailey's emergency surgery*. 12th edn. Oxford: Betternwarth-Heinemann 1995:438-451.
- [10] Bhutta IA, Nawaz F, Mustafa J, et al. The role of high resolution sonography in diagnosis of acute appendicitis. *J Rawal Med Coll* 2004;8:87-89.
- [11] Balsano N, Cayten CG. Surgical emergencies of the abdomen. *Emerg Med Clin North Am* 1990;8(2):399-410.
- [12] Pearson RH. Ultrasonography for diagnosing appendicitis. *BMJ* 1988;297:309-310.
- [13] Sadiq M, Amir S. Efficacy of modified Alvarado scoring system in the diagnosis of acute appendicitis. *J Postgrad Med Inst* 2002;11:72-77.