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Original Research Article

Study of Ultra-Sonographic Diagnosis of Appendicitis in Andhra Pradesh Population

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Conflict of interest: Nil

Abstract:

Background: The appendix is the most constricted part of the GIT and is a lymphatic organ. It is more likely to be inflamed and infected.

Method: 300 patients with acute appendicitis (AA) of different age groups were studied using the USG machine. 5-12 MHz linear transducer was used. Longitudinal and transverse images of the right lower quadrant were obtained. Compression sonography was performed with documentation of the appearance of the appendix, including the tip. USG findings were retrospectively graded using five-point scales. Grades I and II were classified as negative, and grades 3–5 to 5 was as positive sonographic diagnoses. Surgical and pathological findings were compared.

Results: In 11–20 years, the highest 5th grade was 43 and the least 5th grade was 16 in > 50 years of age. USG findings: 197 positive, 103 negative, and surgical; 88 negative and 212 positive; 152 (50.6%) AA proved histopathologically; 198 (66%) were true positive; 77 (25.6%) were true negative; 20 (6.6%) were false positive; and 2 (0.6%) were false negative in USG studies.

Conclusion: The ultrasonographic study is a first-line imaging modality. The sensitiveness of USG has a limited range but is preferable in children and young patients. The USG technique is easily affordable for lower-middle-class patients.

Keywords: acute appendicitis (AA), Mac Burny's point, ultrasonography (USG), MHz Linear transducer.

Introduction

The pharynx and appendix are the most constricted parts of the GIT; hence, they are more likely to get inflamed. Acute appendicitis is the most common indicator of an emergency in abdominal surgery. Early appendicitis may present itself atypically, and it is difficult to distinguish from a myriad of gastro-intestinal, genitor-urinary, and gynaecological conditions [1].

The most common symptom of appendicitis is abdominal pain. Typically, symptoms begin as peri-umbilical or epigastric pain migrating the right lower quadrant of the abdomen [2,3]. Later, worsening progressive pain, along with vomiting, nausea, and anorexia, is described by the patients.

It is reported that the negative appendectomy rate has been relatively constant, but the rate of perforated appendicitis seems to be increased in day today clinical practice. [4,5]. It is an established fact that CT scans are the choice of imaging in acute appendicitis with acute abdomen pain, but due to increasing awareness of radiation, they are costly for middle-income patients. The ultrasonography is safer and less expensive. Hence, an attempt is made to evaluate the grades of appendicitis in different age groups of patients.

Material and Method

300 patients of different age groups admitted to Nimra institute of medical sciences, Nimra Nagar, Ibrahim patnam, JupudiVijayawada NTR district-521456, Andhra Pradesh were studied.

Inclusive Criteria: All patients, irrespective of age and sex, clinically suspected of having acute appendicitis were included in the study.

Exclusion Criteria: The patients who needed urgent surgery were excluded as no image was possible due to the urgent need for surgery.

Method

Out of 300 patients, 17 were between 1 to 10 years of age, 121 were aged between 11-20 years, 62

were aged between 21-30 years, 58 were aged between 31-40 years, 26 were aged between 41-50 years, and 16 were above 50 years of age, after a detailed history and clinical examination. The USG of the abdomen was done based on the American Institute of Ultrasound in Medicine practice guideline [5] which includes an imaging appendix. USG machine, 5-12 MHz linear transducer, 4.12 MHz, and a standardized protocol involving graded compression techniques described by Puylaet [6]. Longitudinal and transverse images of the right lower quadrant were obtained. Compression sonography was performed, with documentation of the appearance of the appendix during compression. A normal appendix compresses. The complete appendix was visualised, including the tip. Doppler imaging was helpful to evaluate for hyperacemia; however, a necrotic appendix had decreased or no blood flow. The maximal outer wall diameter and wall thickness were measured along with the course of the appendix. The ultrasonographic (USG) findings were retrospectively graded using a 5 (five) point scale.

Scale-I: Represented normal appendix

Scale-II: indicated that the appendix was not seen, but no inflammation or free fluids were evident.

Scale-III: It was indicated that the appendix was not seen, but secondary signs of appendicitis were present, such as faecolith, periceacal fluid, or increased pericecal echogenicity consistent with infiltration of the mesenteric.

Scale-IV: Fat represents the identification of an appendix of border line enlarged size (5-6 mm).

Scale-V: Indicated acute appendicitis (AA) is defined as an enlarged, non-compressible appendix with an outer diameter greater than 6 mm.

Findings graded 1 to 2 were classified as negative and 3 to 5 were graded as positive for AA. The original reports were reviewed and graded using the same criteria. USG findings were compared with subsequence and pathological findings to determine the sensitivity and specificity of the sonographic examination.

The duration of the study was June 2022 to May 2023.

Statistical analysis: Various findings of USG, grading comparison with surgery, or pathological findings were classified. The statistical analysis was carried out in SPSS software, and the ratio of males and females was 2:1.

Observation and Results

Table-1: US grade – 1st

- 1-10 years 0-1st grade 7, 2nd grade 5, 3rd grade, 0-4th grade, 5-5th grade – Total 17 patients
- 11-20 years – grade-I 0, 46-IInd grade, 19-IIIrd grade, 13 IVth grade, 43-Vth grade – Total 121 patients
- 21-30 years – 0-1st grade, 26-2nd grade, 0-3rd grade, 6-4th grade, 30-5th grade – Total 62 patients
- 31-40 years – 0 1st grade, 27-2nd grade, 3-3rd grade, 9-4th grade 19-5th grade – Total 58 patients
- 41-50 years – 0-1st grade 14-2nd grade, 0-3rd grade, 0-4th grade, 12-5th grade – Total 26 patients
- 50 > - 0-1st grade, 8-2nd grade, 2-3rd grade, 0-4th grade, 6-5th grade – Total 16

Table 2: Comparison of sonographic diagnosis with surgical pathological findings in who had undergone surgical

- Ultra sonographically19.7 positive, 103 negative
- Surgically – 88 negative, 212 positive

Table 3: Results of sonographic studies on acute appendicitis

Out of 300 – 152 (50.6%) proved histo-pathologically positive, 198 (66%) were true positive, 77 (25.6%) true negative, 20 (6.6%) false positive, 2 (0.6%) were false negative.

Table 1: Ultra sonographic grading of acute appendicitis with reference to age

US grade	1-10	11-20	21-30	31-40	41-50	>50
1st	0	0	0	0	0	0
2nd	5	46	26	27	14	8
3rd	5	19	0	3	0	2
4th	0	13	6	9	0	0
5th	7	43	30	19	12	6
Total	17	121	62	58	26	16

Findings graded 1 to 2 were classified as Negative grade 3 to 5 were classified as positive

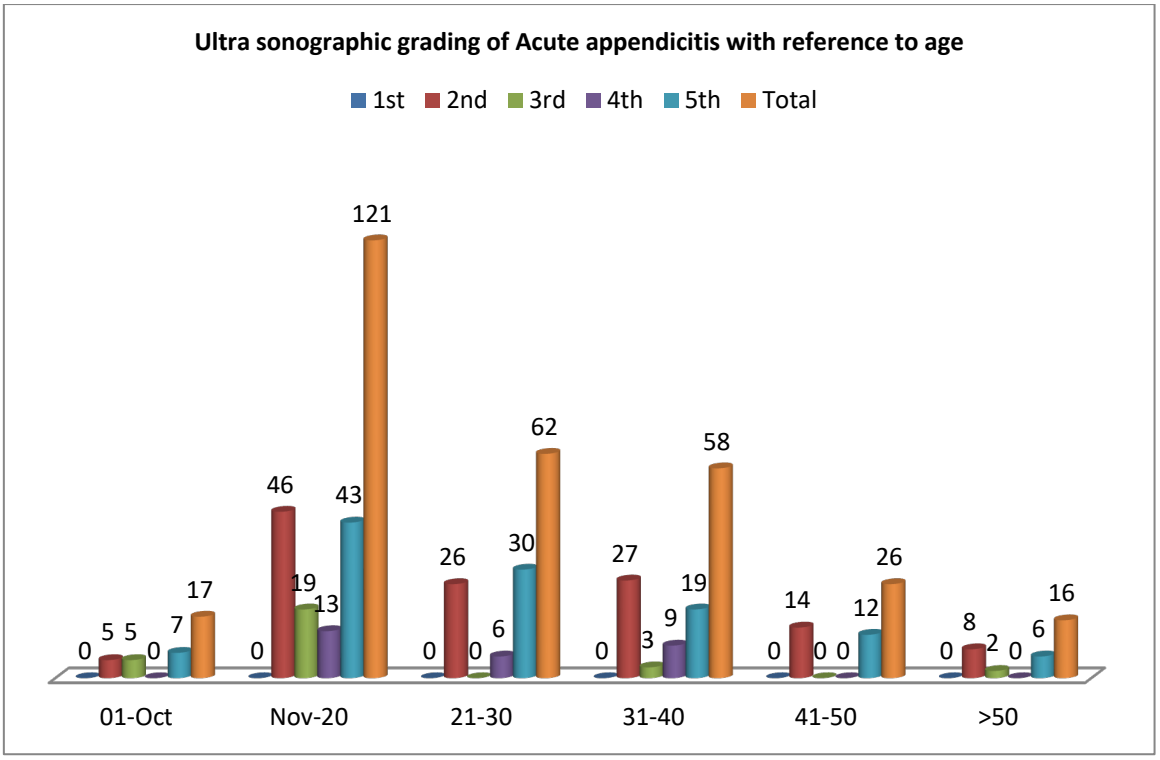

Figure 1: Ultra sonographic grading of Acute appendicitis with reference to age

Table 2: Comparison of sonographic diagnosis with surgical pathological findings in who had underwent surgery

Sonography	Surgery		Total
	Negative	Positive	
Positive	3	194	197
Negative	85	18	103
Total	88	212	300

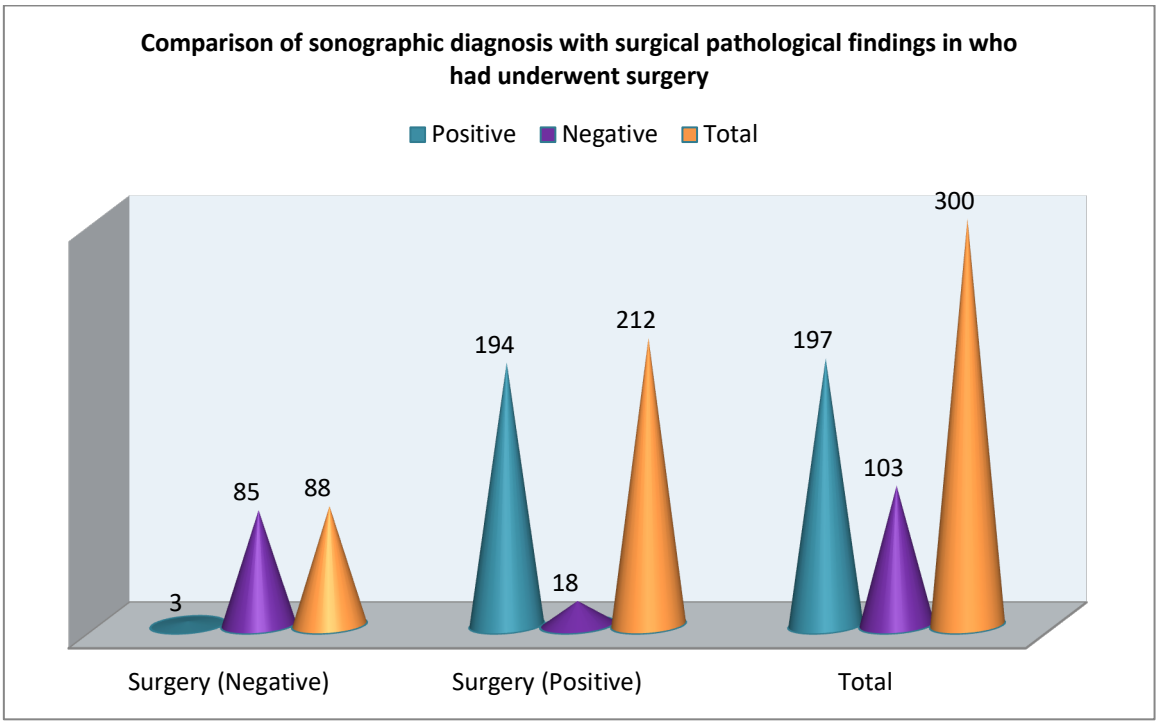

Figure 2: Comparison of sonographic diagnosis with surgical pathological findings in who had underwent surgery

Table 3: Results of sonographic studies on acute appendicitis

Total No. of patients	Proved Histo pathology	True Positive	True Negative	False Positive	False Negative
300	152 (50.6%)	198 (66%)	77 (25.6%0	20 (6.6%)	2 (0.6)

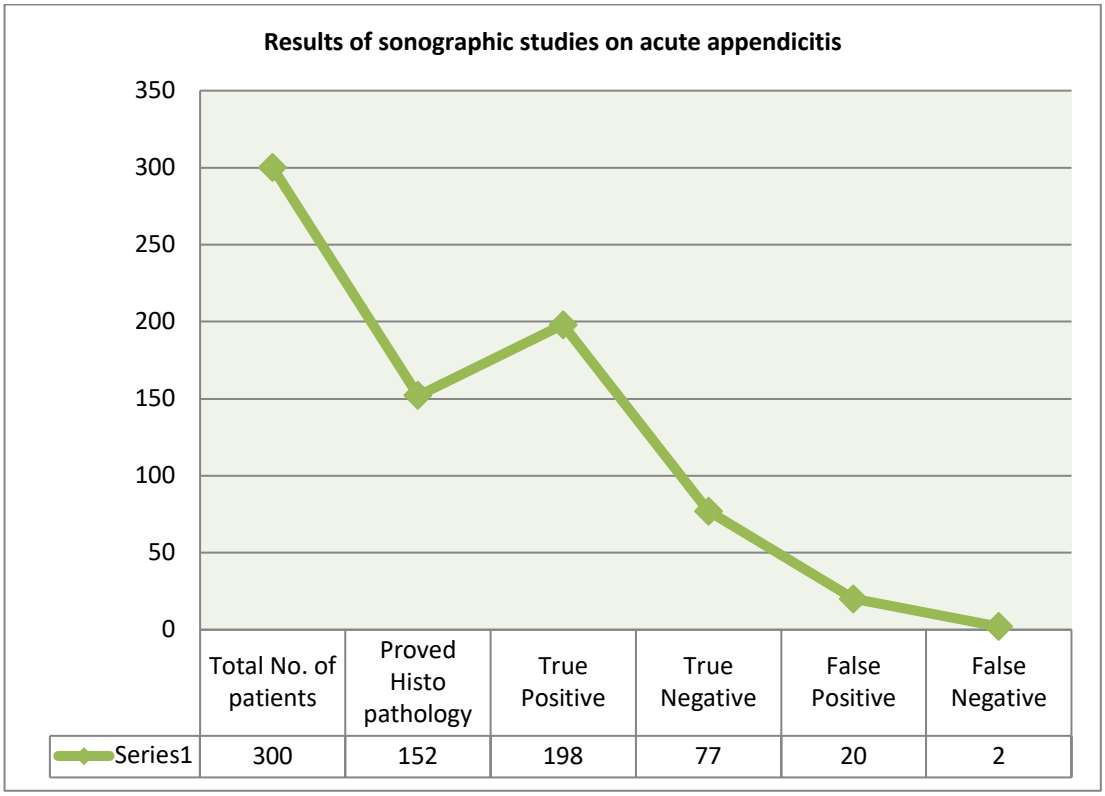

Figure 3: Results of sonographic studies on acute appendicitis

Discussion

The present study of the ultrasonographic diagnosis of appendicitis in the Andhra Pradesh Population In 1st to 5th grade of USG grade, the highest incidence of 5th grade was observed in 11–20 years of age, and the least incidence of USG 5th grade – 6 observed in > 50 years of age (Table 1). In comparison of USG diagnosis with surgical pathological findings, USG findings were 197 positive, 103 negative, but surgically, 88 negative, and 212 positive (Table 2). The results of USG showed that 152 (50.6%) proved histopathologically, 198 (66%) were true positive, 77 (25.6%) were true negative, 20 (6.6%) were false positive, and 2 (0.6%) were false negative (Table 3). These findings are more or less in agreement with previous studies [7,8,9].

Appendix being a lymphoid organ, is prominent in children because other lymphatic organs are not well developed in childhood. The length of the appendix is longer in children than in adults. The appendix is popularly called the soldier of the abdomen because it moves towards the infections by changing its various positions and gets infected and inflamed, probably due to luminal obstruction, which may result from faecolitis, lymphoid hyperplasia, foreign bodies, parasites, and primary neoplasm's or metastasis [10].

AA is commonly observed in children due to the greater length of the appendix and the back of the development of the omentum in young children. It has been suggested that the peak of development of lymphoid tissue, which occurs during adolescence, leads to an increased liability of the appendix to obstruct and so accounts for the high incidence of the disease [11]. A failure to recognize other presentations of AA will lead to delay diagnosis and increase patient morbidity. Patients with retro-ceacal AA or those presenting in the later months of pregnancy may have pain limited to the right flank or costo-vertebral angle. Male patients with a retro-ceacal appendix may complain of a right testicular path. Pelvic or retroileal locations of an inflamed appendix will have been referred to in the pelvis, rectum, adnexia, or rarely in the left lower quadrant; may sub-ceacal and pelvic supra-public pain and urinary frequency predominate [12].

Physical examination reveals a generally soft abdomen with localized tenderness at or about MC Burney's point. Pathological AA is divided into 3 types: (1) catarrhal appendicitis; (2) phiegmnous appendicitis; and (3) gangrenous appendicitis.

The laboratory markers for the diagnosis of AA include elevation of WBC, C-reactive protein, the proportion of polymorpho nuclear cells, and abnormal urine analysis in 19% to 40% of patients with AA. Abnormalities include pyria, bacteriuria, and heamaturia [13].

Summary and Concussion

AA is the most common acute abdominal condition, requiring emergency surgery. As AA is predominantly in children and young adults, USG is quite a safer technique to confirm the diagnosis because imaging radiation from CT or MRI will have an adverse impact on the viscera of growing children. USG and co-morbid clinical symptoms of AA will be an ideal approach to treating AA surgically or conservatively.

Limitation of Study: Owing to tertiary location of the hospital, small number of patients and lack of latest technologies, we have limited findings and results. This research paper was approved by the ethical committee of Nimra institute of medical sciences Nimra Nagar, Ibrahim patnam, Jupudi Vijayawada NTR district, Andhra Pradesh-521456.

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