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Original Research Article

Retrospective Study Utilizing Computed Tomography for the Diagnosis of Acute Appendicitis

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Abstract

Aim: Utilizing computed tomography for the diagnosis of acute appendicitis

Material and methods: This study was conducted in the Department of Radiology, Katihar Medical college and Hospital, Katihar, Bihar, India for 10 months. Retrospective study conducted on patients with right lower quadrant or right flank pain. Fifteen patients from patients with right lower quadrant pain or right flank pain.

Results: The study included 15 patients complaining of right iliac fossa pain, only 4 patients (26.66 %) were with normal CT findings and patients (73.33%) were with abnormal CT findings. Regarding sex distribution, 9 patients (60%) were males, while 6patients (40%) were females. The age of the patients ranged between 15-54 years with a mean age of 34 years with the range of 39 year. The most frequently involved age group was from 22-23 years in females and from 22-29 in males. Among the 11 patients who have appendicitis or its complication: 5 patients (45.45 %) had Acute Appendicitis. 1 patient (9.09%) had chronic Appendicitis.3 patients(27.27%) had Perforated Appendics.2 patients (18.18%) had Appendicular abscess.

Conclusion: MSCT signs of appendicitis include increase in appendix thickness more than 6 mm in diameter, inability of the appendix filling with oral contrast medium or air up to its tip, and wall enhancement with intravenous contrast medium. Presence of an appendicolith, surrounding inflammatory changes and cecal apical changes are helpful signs in diagnosing acute appendicitis. MSCT also is useful in diagnosing complications of appendicitis e.g. appendiceal perforation, phlegmon or an abscess formation, hepatic abscess, and Pylos phlebitis. To conclude MSCT is helpful for accurate and prompt diagnosis in suspected cases of appendicitis &its complications and conditions that mimic appendicitis.

Keywords: Computed Tomography Diagnosis, Appendicitis, Complications.

Introduction

Acute appendicitis is one of the most common causes of acute abdominal pain requiring surgical intervention. Prompt and accurate diagnosis is essential to prevent complications such as perforation, abscess formation, and peritonitis. While clinical evaluation and laboratory tests are important, imaging modalities play a crucial role in confirming the diagnosis of acute appendicitis. Computed tomography (CT) has emerged as the gold standard imaging technique due to its high sensitivity and specificity in diagnosing acute appendicitis, thereby improving patient outcomes and reducing the rate of negative appendectomies. Computed tomography offers several advantages in the evaluation of acute appendicitis. It provides detailed cross-sectional images of the abdomen and pelvis, allowing for the visualization of the appendix and surrounding structures. CT can accurately identify features indicative of acute appendicitis, such as an enlarged appendix, peri appendiceal fat stranding, appendicoliths, and wall thickening [1]. The sensitivity and specificity of CT for diagnosing acute appendicitis are reported to be greater than 95%, making it a highly reliable diagnostic tool [2]. One of the significant benefits of CT is its ability to differentiate acute appendicitis from other conditions that present with similar symptoms, such as gynaecological disorders, gastrointestinal diseases, and urinary tract infections. This differentiation is crucial for guiding appropriate management and avoiding unnecessary surgeries. Studies have shown that the use of CT in patients with suspected acute appendicitis significantly reduces the rate of negative appendectomies, which traditionally ranged from 15% to 30% [3]. By providing a more accurate diagnosis, CT helps in preventing the removal of a normal appendix and the associated morbidity. Furthermore, CT can detect

complications of acute appendicitis, such as perforation, abscess formation, and phlegmon. Identifying these complications preoperatively is essential for planning the appropriate surgical approach and postoperative care. For instance, the presence of an abscess may necessitate percutaneous drainage before surgical intervention, while phlegmon might be managed conservatively with antibiotics [4]. In recent years, efforts have been made to optimize CT protocols to minimize radiation exposure, especially in younger patients and pregnant women. Low-dose CT protocols have been developed and validated, demonstrating comparable diagnostic accuracy to standard-dose CT while significantly reducing radiation dose [5]. This advancement enhances the safety profile of CT and supports its continued use as the preferred imaging modality in diagnosing acute appendicitis. Moreover, the incorporation of clinical decision rules, such as the Alvarado score and the Appendicitis Inflammatory Response (AIR) score, with CT imaging has further improved diagnostic accuracy and patient management. These scoring systems, when combined with CT findings, enhance the ability to stratify patients based on the likelihood of acute appendicitis and guide decision-making regarding surgical intervention or conservative management [6]. In conclusion, computed tomography is an invaluable tool in the diagnosis of acute appendicitis. Its high sensitivity and specificity, ability to differentiate between various abdominal pathologies, and capability to identify complications make it the gold standard imaging modality. The development of low-dose CT protocols and the integration of clinical decision rules further augment its diagnostic utility and safety. As such, CT plays a critical role in the timely and accurate diagnosis of acute appendicitis, ultimately improving patient outcomes.

Material and Methods

This study was conducted in the Department of Radiology, Katihar Medical college and Hospital, Katihar, Bihar, India for 10 months. Retrospective study conducted on patients with right lower quadrant or right flank pain. Fifteen patients from patients with right lower quadrant pain or right flank pain.

Inclusion Criteria

- Age group (16 years old to 60 years old)
- Patients that clinically suspected appendicitis and did abdominal CT scan
- Patients with right lower quadrant or right flank pain
- Patient with radiological evidence of acute appendicitis.

Exclusion Criteria

- Pregnant women
- Persons over 60 years of age
- Persons with allergy to contrast medium
- Persons with acute and chronic respiratory and circulatory failure
- Persons with renal or hepatic failure

Patient Preparation

For IV contrast: Fasting for 6 hours before IV administration.

Oral contrast prepared, 500–1000 mL gastrografin Given over a period of up to 45mins.

Technique and CT imaging: The study done from the dome of the diaphragm to the symphysis pubis using a 16 row Toshiba MDCT scanner with patient lying in the supine position.

All patients will undergo routine abdominal CT imaging, including: The axial cuts was reconstructed using a 5 mm thickness at 5 mm intervals. The reconstructed axial cuts reformatted in sagittal and coronal plane using a thickness of 3 mm at 5 mm intervals.

Image analysis and results: Coronal and axial images with separate series of images were transferred to a PACS workstation as a for interpretation,

Statistical analysis

Data was collected, tabulated and was subjected to adequate statistical analysis including mean and standard deviations and were discussed to assess the additive value of Computed Tomography in diagnosis of acute appendicitis.

Results

The study included 15 patients complaining of right iliac fossa pain, only 4 patients (26.66 %) were with normal CT findings and patients (73.33 %) were with abnormal CT findings. **Table (1)** Regarding sex distribution, 9 patients (60%) were males, while 6patients (40%) were females **Table (2)** The age of the patients ranged between 15-54 years with a mean age of 34 years with the range of 39 year. The most frequently involved age group was from 22-23 years in females and from 22-29 in males. **Figure (3)** Among the 11 patients who have appendicitis or its complication: 5 patients (45.45 %) had Acute Appendicitis. 1 patient (9.09%) had chronic Appendicitis.3 patients (27.27%) had Perforated Appendics.2 patients (18.18 %) had Appendicular abscess. **Figure (4)**

Table 1. Distribution of patients according to CT findings.

	Patient numbers	Percentage %
Normal pelvic-Abdominal CT scan	4	26.66
Abnormal pelvic-Abdominal CT scan	11	73.33
Total	15	100

Table 2. Distribution of patients according to sex.

Sex	Number	Percentage
Male	9	60
Female	6	40
Total	15	100

Table 3. Distribution of patients according to age and sex.

Age	Males		Females		Total	
	No.	%	No.	%	No.	%
<20	5	45.45	2	50	7	46.66
20-29	3	27.27	2	50	5	33.33
30-39	1	9.09	0	0	1	6.66
40-49	0	0	0	0	0	0
50-59	2	18.18	0	0	2	13.33
60	0	0	0	0	0	0
Total	11	100%	4	100%	15	100%

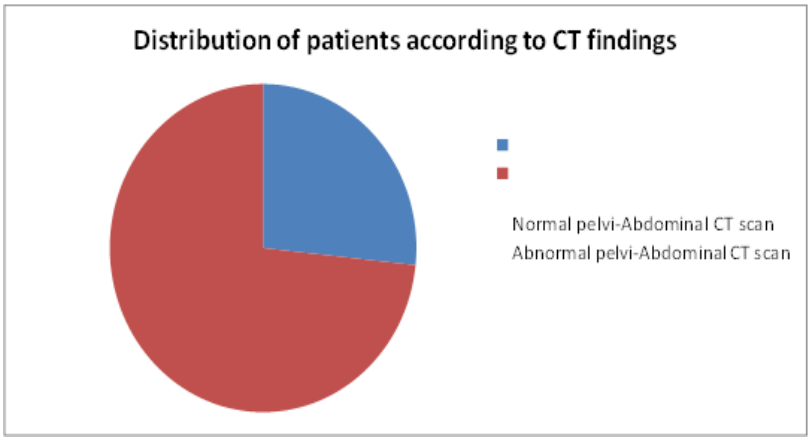

Figure 1. Distribution of patients according to CT findings

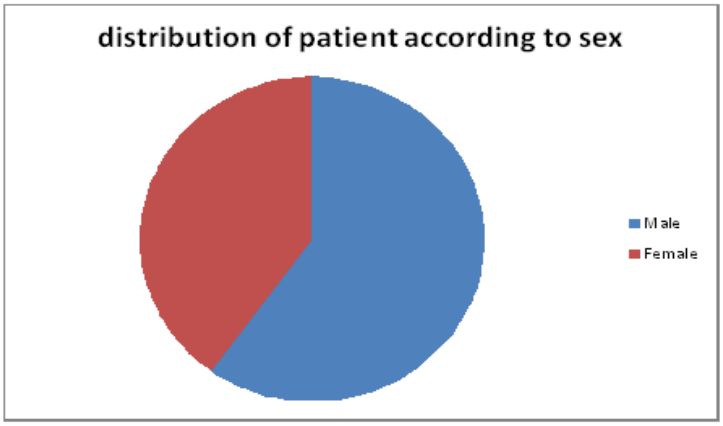

Figure 2. distribution of patient according to sex

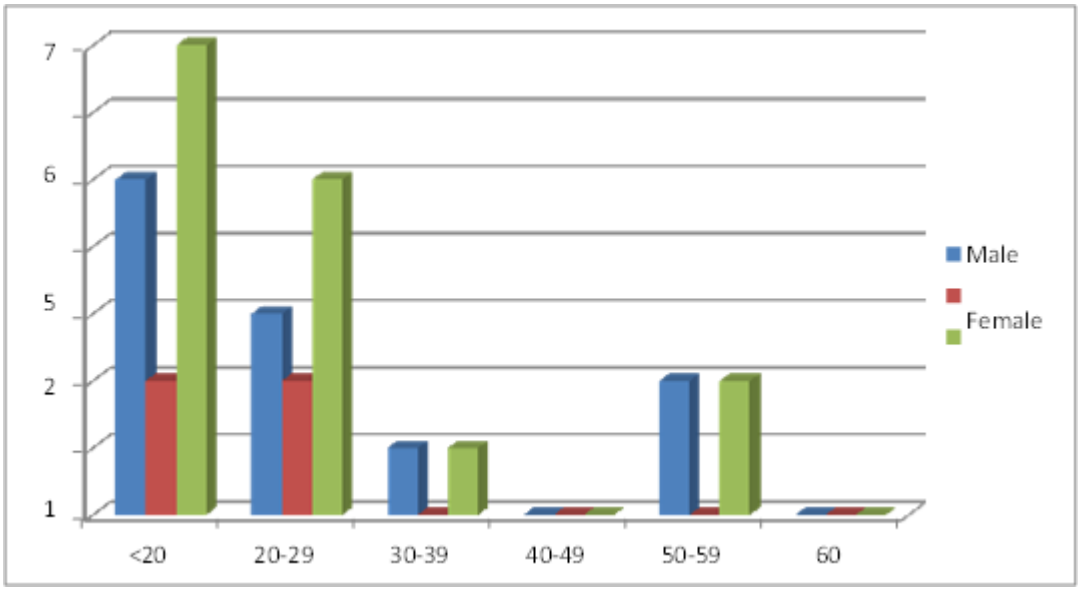

Figure 3. Distribution of patients according to age for males and females.

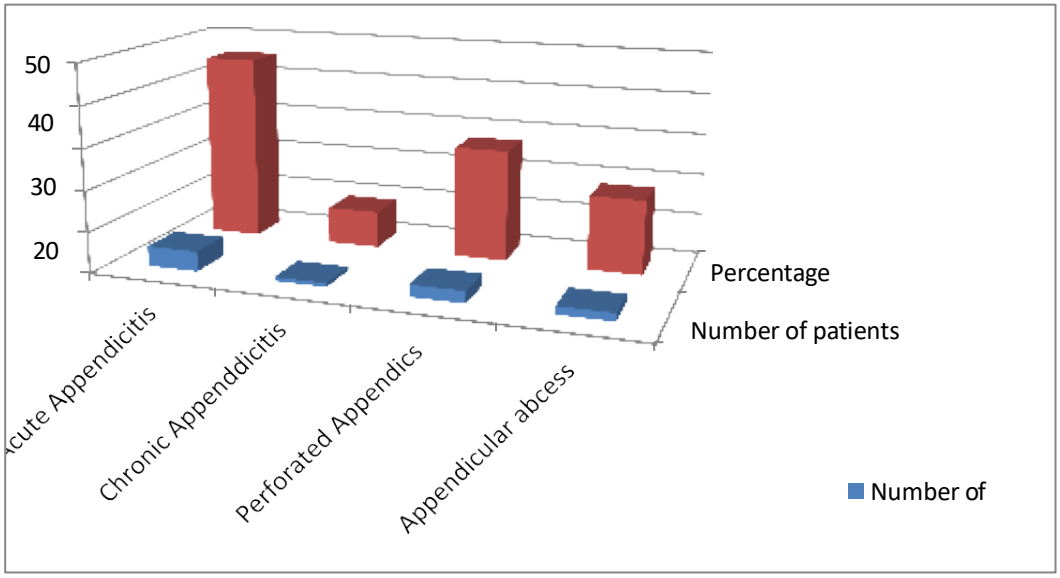

Figure 4. Distribution of patients according to type Appendicitis or its complication.

Discussion

Appendicitis is an inflammation of the vermiform appendix, that typically result in abdominal tenderness, anorexia, and abdominal pain. Computed Tomography is a highly effective and accurate cross sectional imaging technique in diagnosing and staging appendicitis. pelvi-abdominal Computed Tomography scanning with or without intravenous & oral contrast can be done, according to radiologist preference. However targeted Computed Tomography technique in appendix evaluation is done in cases that strongly suspected for appendicular pathology. Computed Tomography scanning provide direct visualization of the appendix, other intra-abdominal structures and peri appendiceal region. Gangrenous appendicitis shows intra- luminal loculated air and Enlargement of the appendix with associated fluid. Perforated appendicitis is mostly accompanied by abscess formation or peri cecal phlegmon. Other findings include marked ileocecal thickening, extraluminal air, small-bowel obstruction, peritonitis and localized lymphadenopathy [6]. Visualization of the appendiceal wall clearly is very important in order to differentiate appendicitis various abdominal appendicitis mimics for accurate diagnosis of Appendicitis. so, the i.v. contrast enhancement is superiorly applied more than that without enhancement. Administration of colonic or oral contrast material is also recommended for improving diagnostic accuracy, these procedures are difficult to be implemented, especially in the emergency cases. For these reasons, we usually prefer the i.v. contrast enhancement in diagnosing acute abdominal diseases, including Appendicitis, especially in the emergency cases. In

the present study, we concentrate on continuity and thickness of the appendiceal wall, that is very simple and easy in assessment by physicians especially in emergency cases. The normal appendix thickness is less than 1 mm. When appendix got inflamed, it usually appears thickened, asymmetric and enhancing with i.v. contrast from 1 to 3 mm thickness. Therefore, we focused on the continuity and thickness of the appendiceal wall as key factors in CT grading. In the present study, minimum thickness of the MDCT slices causes variation in the pathologic outcomes in some cases. In cases such as gangrenous status, the ability of visualization of the appendix is affected by surrounding organs caused by appendiceal inflammation in surrounding areas, inducing radiological artifacts on CT. these artifacts causes difficulty to distinguish between stages of Appendicitis, especially advanced stages. Introduction of multiplanar reconstruction with additional lateral and coronal reformation using MDCT in order to reduce the effects of this variation on the pathological outcomes may be necessary. Coronal and axial reformation of MDCT have equal specificity and sensitivity for the diagnosis of Appendicitis. However, additional MDCT coronal reformation improves the physician confidence in diagnosing appendicitis. Multiplanar reconstruction of sagittal and coronal images provides rapidly more objective representation of the position and shape of appendicitis especially in the emergency department [7]

Conclusion

MSCT signs of appendicitis include increase in appendix thickness more than 6 mm in diameter, inability of the appendix filling with oral contrast medium or air up to its tip, and wall enhancement with intravenous contrast medium. Presence of an appendicolith, surrounding inflammatory changes and cecal apical changes are helpful signs in diagnosing acute appendicitis. MSCT also is useful in diagnosing complications of appendicitis e.g. appendiceal perforation, phlegmon or an abscess formation, hepatic abscess, and Pylos phlebitis. To conclude MSCT is helpful for accurate and prompt diagnosis in suspected cases of appendicitis &its complications and conditions that mimic appendicitis.

References

1. Brenner DJ, Hall EJ. Computed tomography—an increasing source of radiation exposure. N Engl J Med. 2020;357(22):2277-2284. doi:10. 1056/NEJMra072149.
2. Sconfienza LM, Menichini G, Mauri G, et al. Diagnostic imaging of acute appendicitis: study protocol of a systematic review and meta-analysis of the accuracy of CT, MRI, and US. BMJ Open. 2020;8(6). doi:10.113 6/b mjopen-2017-019055.
3. Kim K, Lee CC, Song KJ, et al. The impact of helical computed tomography on the negative appendectomy rate: a multi-center comparison. J Trauma. 2020;48(1):93-97. doi:10.1097/000 05373-200001000-00020.
4. Rao PM, Rhea JT, Novelline RA, et al. Helical CT combined with contrast material administered only through the colon for imaging of suspected appendicitis. AJR Am J Roentgenol. 2021;169(5):1275-1280. doi:10.2214/ajr.169.5.9353440.
5. Kim HJ, Kim JS, Kim KA, et al. Low-dose abdominal CT for evaluating suspected appendicitis. N Engl J Med. 2021;366(17):15 96-1605. doi:10.1056/NEJMoa1110734.
6. Atema JJ, Gans SL, Boermeester MA, et al. Accuracy of the appendicitis inflammatory response score and the Alvarado score for the diagnosis of acute appendicitis. World J Surg. 2021;40(9):2023-2029. doi:10.1007/s00268-01 6-3480-8.
7. Rud B, Vejborg TS, Rappeport ED, Reitsma JB, Wille-Jørgensen P. Computed tomography for diagnosis of acute appendicitis in adults. Cochrane Database Syst Rev. 2019 Nov 19; 2019(11):CD009977. doi: 10.1002/1465 1858. CD009977.pub2. PMID: 31743429; PMCID: PMC6953397.