ISSN- O: 2458 - 868X, ISSN–P: 2458 – 8687
National Library of Medicine - ID: 101731606

International Journal of Medical Science and Innovative Research (IJMSIR)
IJMSIR : A Medical Publication Hub
Available Online at: www.ijmsir.com
Volume – 10, Issue – 2, April – 2025, Page No. : 151 – 156

Evaluation of Acute Abdomen Using Multidetector Computed Tomography (MDCT)

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Citation this Article: Dr. Anu Kushwaha, Dr. Ashutosh Chitnis, Dr. Namrata Jamale, "Evaluation of Acute Abdomen Using Multidetector Computed Tomography (MDCT)", IJMSIR - April – 2025, Vol – 10, Issue - 2, P. No. 151 – 156.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Acute abdomen is a sudden, severe abdominal pain requiring urgent diagnosis and often surgical treatment. Accurate identification is required to reduce complications and mortality. While X-rays and ultrasound aid evaluation, Multidetector CT (MDCT) is usually the modality of choice because of its speed, clarity, and ability to detect a large number of potentially life-threatening conditions efficiently.

Materials & Methods: This prospective observational study was conducted at MGM Medical Hospital, Navi Mumbai, involving 100 patients aged 18–75 years presenting with acute abdomen of gastrointestinal origin. Exclusions included non-GI causes, pregnant women, and those outside the age range. A Toshiba 16-slice MDCT with oral contrast was used; findings were correlated clinically and surgically. Data were analyzed using GraphPad InStat v3.0.

Results & Discussion: Out of 100 cases of acute abdomen, the imaging findings were of acute appendicitis (25%), acute bowel obstruction (20%), acute diverticulitis (13%), mesenteric pathologies (11%), acute appendicitis with rupture / abscess (6%), intraabdominal abscess (4%), small bowel ischemia (4%) acute enterocolitis (3%), intestinal perforation (3%), actively bleeding gastric ulcer (2%), acute infective/ inflammatory enteritis (2%), stump appendicitis (2%), acute bacterial peritonitis (2%), descending colon stricture (1%), perforated duodenal ulcer causing pneumoperitoneum and peritonitis (1%), pseudomembranous colitis (1%).

Conclusions: MDCT effectively detects acute abdomen of GI origin, detecting primary pathologies and complications. Its strong correlation with clinical and surgical findings supports its role as a primary diagnostic tool.

Keywords: Acute Abdomen, Appendicitis, Bowel Obstruction, Perforation, Bowel Ischemia, Pneumoperitoneum, Diverticulitis, Gastric Ulcer.

Introduction

Acute abdomen refers to the sudden onset of severe abdominal pain that typically requires urgent medical or surgical intervention. It encompasses a wide range of conditions, from benign to life-threatening[1]. The precise diagnosis of acute abdomen is essential for optimal treatment outcomes and reducing complications and mortality. While conventional imaging methods like X-rays and ultrasonography play a role, Multidetector Computed Tomography (MDCT) has emerged as a crucial modality due to its high resolution, rapid acquisition, and ability to identify multiple pathologies with clarity. (2)

Aims and Objectives

Aims: To study the role of multidetector computed tomography (MDCT) in evaluation of acute abdomen due to gastrointestinal tract related causes

Objectives

- To study use of MDCT in evaluation of specific changes in cases of acute abdomen due to gastrointestinal Tract related causes.
- To study accurate determination site of cause and aid in surgical intervention in cases of surgical emergencies.
- To study and evaluate complications and associated findings, if any, owing to the acute abdomen due to gastrointestinal tract causes.
- To study and assess the accuracy of computed tomography in affected patients.

Materials & Methods

100 patients who presented with complaints of acute abdomen due to gastrointestinal Tract related causes were prospectively evaluated in study duration after screening for the inclusion and exclusion criteria.

A. Study Type: Prospective observational study

B. Study Period: 1 Year

Sample Size: 100

Study Population: 100 patients aged 18–75 years with acute abdomen due to GI causes

Inclusion Criteria

1. Patients presenting to casualty of MGM Hospital, Kamothe, Navi Mumbai with clinical features of acute abdomen due to gastrointestinal tract related causes.
2. Patients in age group of 18 - 75 years (male/female).
3. Patients willing to give their consent.

Exclusion Criteria

1. Patients with clinical findings indicating any other findings apart from gastrointestinal tract related causes
2. Patients unwilling to give their consent for the above study.
3. Patients less than 18 years and more than 75 years of age.
4. Pregnant females

Materials

Patients were evaluated with CT (Toshiba 16 Slice CT) and findings were correlated with clinical outcome and complications. CT scan of abdomen and pelvis was done with negative oral contrast like water for upper gastrointestinal tract evaluation.

Results and Discussion

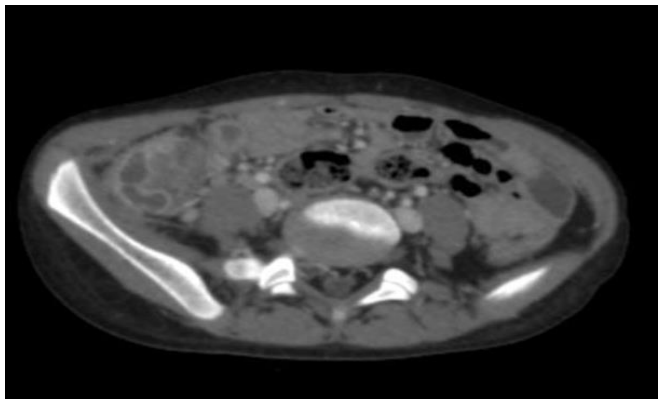


Fig. 1: CECT A+P - Appendicular abscess showing well defined peripherally enhancing collections with irregular

walls seen in right iliac fossa from which appendix is not seen separately.

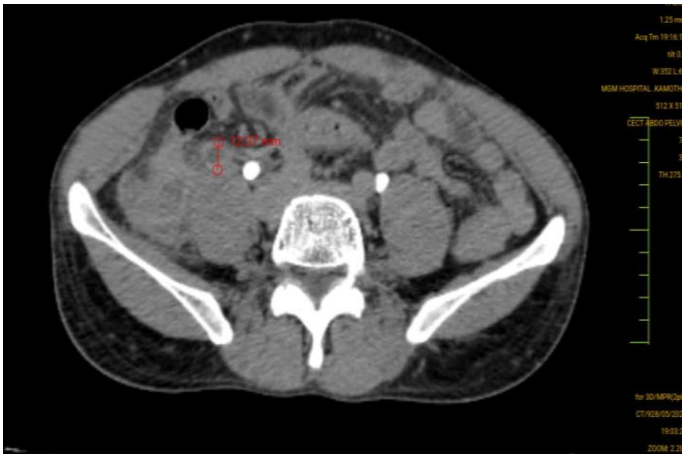


Fig. 2: NCCT abdomen showing inflamed, dilated appendix measuring 12.2mm in diameter with mesenteric fat stranding in right iliac fossa region.

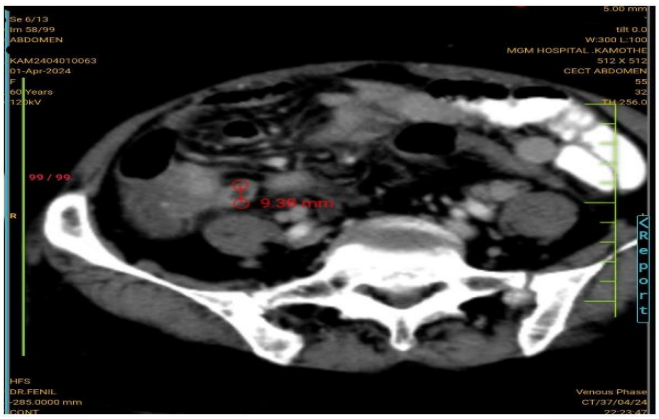


Fig. 3: CECT abdomen showing inflammed, dilated appendix measuring 9.3mm in diameter with moderately enhancing appendiceal wall. Mild mesenteric fat stranding is noted in right iliac fossa region suggestive of acute appendicitis.

Fig. 4: CECT abdomen showing inflammed appendix with enhancing appendiceal wall and surrounding mesenteric fat stranding in right iliac fossa region. Focal breach in appendiceal wall at its tip with foci of free air in periappendiceal region suggesting appendiceal perforation.

Fig. 5: CECT abdomen showing multiple foci of air in mesentery and small bowel wall. Sagittal image shows complete lumen occluding SMA thrombosis at its origin with small bowel and mesenteric ischemia.

Fig. 6: CECT abdomen showing multiple dilated small bowel loops with air fluid levels suggestive of small bowel obstruction.

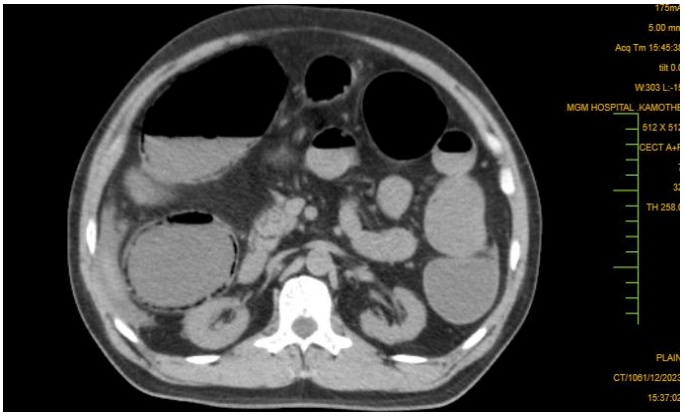
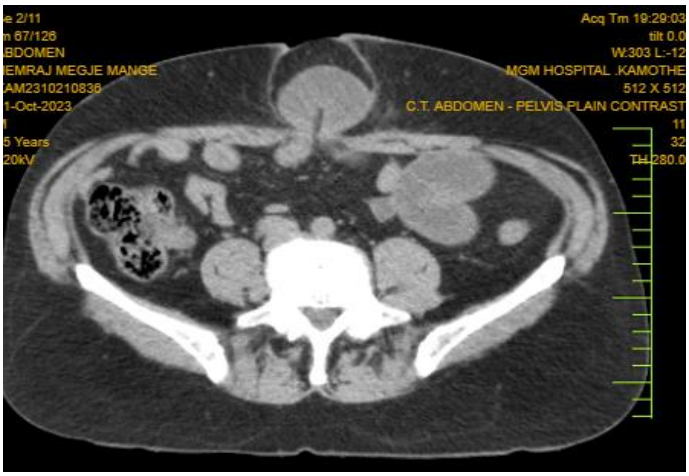


Fig. 7: CT abdomen showing dilated large bowel loops with rim of dependent air foci into the wall of ascending colon suggestive of pneumatosis intestinalis, ischemic changes in ascending colon in case of severe large bowel obstruction.



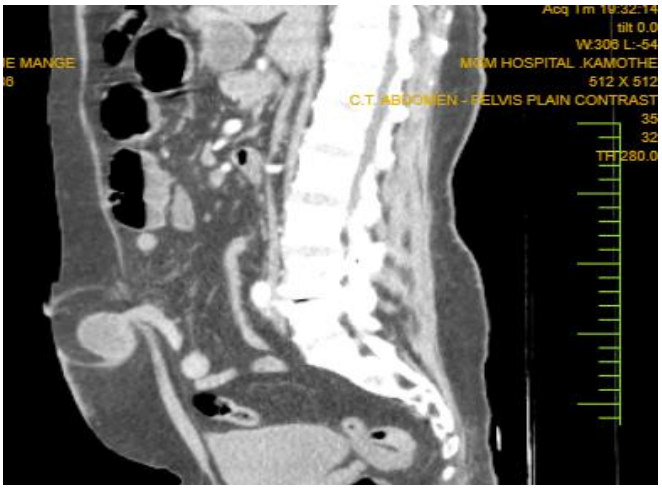
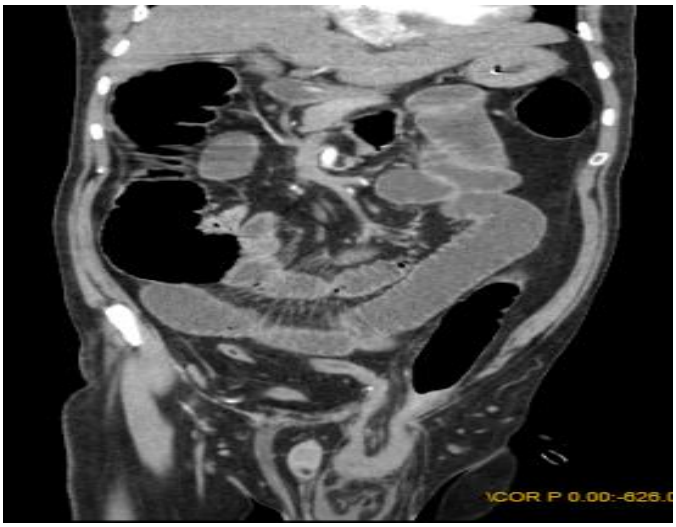


Fig 8: MDCT abdomen showing obstructed umbilical hernia with contents being jejunal loop and mesentery causing small bowel obstruction seen as dilated proximal small bowel loops with air fluid levels and collapsed distal ileal and large bowel loops.



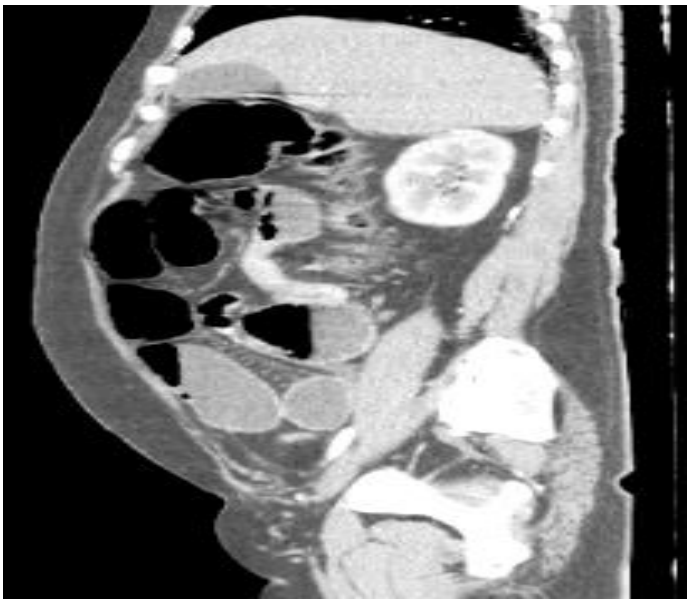


Fig. 9: CECT abdomen showing inguinal hernia with contents being large bowel loop and mesentery, fat stranding in hernial sac, mildly dilated proximal large and small bowel loops with air fluid levels reported as obstructive inguinal hernia. Post laparoscopy cause of obstruction was found to be stricture, final diagnosis bowel obstruction secondary to stricture and nonobstructive inguinal hernia.

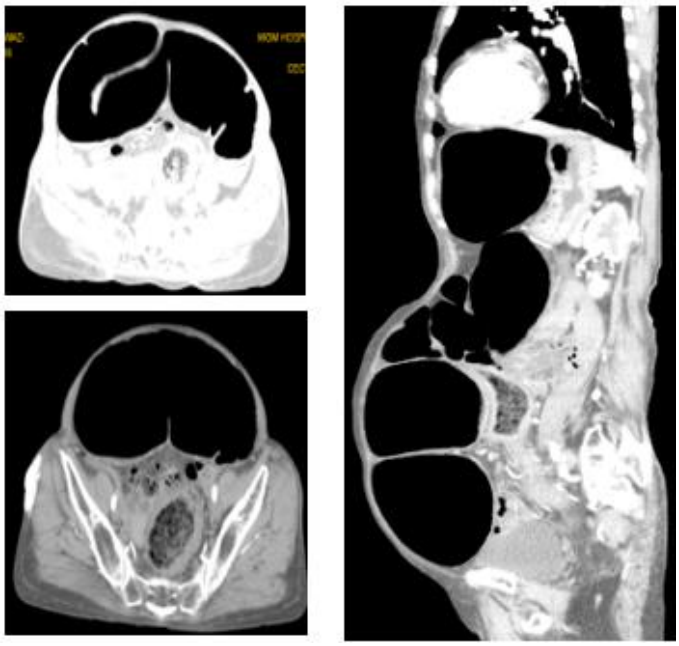


Fig. 10: CT abdomen showing sigmoid volvulus with severely dilated large bowel loops impending rupture and stercoral colitis with fecal impaction of rectum

Discussion

MDCT proved to be an effective tool for evaluating acute abdominal conditions due to its accuracy in detecting causes like appendicitis, bowel obstruction and diverticulitis. Compared to conventional imaging, MDCT offered superior diagnostic confidence and influenced management decisions positively[3]. The study results are consistent with existing global research, emphasizing MDCT's role in improving outcomes in emergency settings[4].

Table 1: MDCT cases of Acute Abdomen

Sn.	Diagnosis	MDCT Diagnosis	Percentage
1.	Acute Appendicitis	25	25
2.	Acute bowel obstruction	20	20
3.	Acute diverticulitis	13	13
4.	Mesenteric pathologies	11	11
5.	Acute appendicitis with rupture or abscess	6	6
6.	Intraabdominal abscess	4	4
7.	Small bowel ischemia	4	4
8.	Acute enterocolitis	3	3
9.	Intestinal perforation	3	3
10.	Actively bleeding gastric ulcer	2	2
11.	Acute infective / inflammatory enteritis	2	2
12.	Stump appendicitis	2	2
13.	Acute bacterial peritonitis	2	2
14.	Descending colon stricture	1	1

15.	Perforated duodenal ulcer causing pneumoperitoneum and peritonitis	1	1
16.	Pseudomembranous colitis	1	1

Conclusion

MDCT is highly effective for evaluating acute abdomen due to GI causes. It not only identifies the primary pathology but also detects associated complications, aiding in timely and appropriate surgical or conservative management. Its diagnostic alignment with surgical and clinical findings supports its use as a primary imaging modality in acute abdominal cases[6].

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