

## Role of CT in Evaluation of Nontraumatic Acute Abdomen

Sunil Kumar Agrawal<sup>1</sup>, Amit Kumar Singh<sup>2</sup>, Akhil Kumar Gupta<sup>3</sup>, Bindu Agrawal<sup>4</sup>

<sup>1</sup>Professor & Head, Department of Radiodiagnosis & Imaging, Muzaffarnagar Medical College, Muzaffarnagar, <sup>2</sup>3rd year resident, Department of Radiodiagnosis & Imaging, Muzaffarnagar Medical College, Muzaffarnagar, <sup>3</sup>Professor & Head, Department of Surgery, Muzaffarnagar Medical College, Muzaffarnagar, <sup>4</sup>Associate Professor, Department of Radiodiagnosis & Imaging, Muzaffarnagar Medical College, Muzaffarnagar.

### Abstract

**Background:** The term 'Acute Abdomen' refers to any clinical condition characterised by severe abdominal pain that develops over a period of hours. For diagnosing the cause of 'acute abdomen', CT is superior to clinical evaluation, basic laboratory investigations and inconclusive imaging examination regardless of duration of signs and symptoms. Aim and Objectives:-To establish the role of CT in diagnosis of aetiology of acute abdominal pain & to quantify the degree to which CT and clinical findings correlate. **Subjects and Methods:** 50 patients of suspected acute abdomen; established by clinical findings and subsequent course referred to department of Radiodiagnosis and Imaging, Muzaffarnagar Medical College and Hospital, Muzaffarnagar, for CT scan during the period of 14th NOV 2017 to 31st march 2019, comprised the material for the present study which fulfilled the inclusion criteria and do not come under the ambit of exclusion criteria. The usual CT scan protocol comprised of contiguous 5mm transaxial sections from dome of diaphragm to pubic symphysis after administration of oral and intravenous contrast media. Serial CT sections of abdomen was obtained in each case using spiral CT scanner Siemens Somatom Emotions 16 slice. **Results:** The collective data was analysed for CT findings of non-traumatic group which presented clinically as acute abdomen. The total number of cases analysed was 50. **Conclusion:** Computed tomography is an important modality in the evaluation of acute abdomen for grading the severity of disease.

**Keywords:** Acute Abdomen, CT.

**Corresponding Author:** Dr. Amit Kumar Singh, 3rd year PG resident, Room No. 414, P.G. Hostel, Muzaffarnagar Medical College, Muzaffarnagar-251003.

**Received:** December 2019

**Accepted:** December 2019

### Introduction

The term "acute abdomen" defines a clinical syndrome characterized by the sudden onset of severe abdominal pain requiring emergency medical or surgical treatment. A prompt and accurate diagnosis is essential to minimize morbidity and mortality.

Cross-sectional imaging is helpful in the diagnosis and treatment of acute abdomen as it is reliable, rapid, cost effective, highly accurate modality and also helps in the evaluation of the causes of acute abdomen with confusing signs and symptoms.<sup>[1,2]</sup>

Imaging also plays an important role in diagnosis and in some cases the management of gastrointestinal disease in pediatric population but radiation burden is important and all possible measures should be taken to ensure to decrease its burden during examinations of diagnostic quality.<sup>[3,4]</sup>

When costs and ionizing radiation exposure are primary concerns, a possible strategy is to perform USG as the initial technique in all patients with acute abdominal pain; CT can be performed in cases when not diagnosed on USG.<sup>[5]</sup>

CT appears to be the best modality due to its recent advances in contrast dynamics and high resolution

reformations and volumetric data acquisition as it narrow down the differentials in acute abdominal pain.

### Aim and objectives

- To establish the role of CT in diagnosis of aetiology of acute abdominal pain.
- To quantify the degree to which CT and clinical findings correlate.

### Subjects and Methods

CECT abdomen using Siemens Somatom Emotions 16 slice MDCT scanner were performed in 50 cases in a hospital based observational study referred from department of Surgery with complaint of acute abdominal pain in department of Radiodiagnosis and Imaging, Muzaffarnagar Medical College and Hospital, Muzaffarnagar, Uttar Pradesh from 1st NOV 2017 to 31st march 2019. Before evaluating a patient by CT informed consent, detailed clinical history and investigations were taken.

All CT scans were obtained with helical CT scanner using a collimation of 5-7 mm and a pitch of 1.0 -1.5. Clinical findings or investigations and imaging findings were co-related. Distribution of cases according to post CT diagnosis was done.

**Inclusion criteria**

- Patients of any age group referred to the department of Radiodiagnosis from Dept of Surgery for NCCT/CECT scan of Abdomen suspected of having non-traumatic cause of acute abdomen were included in this study.
- Only those patients who are willing to participate in study were included.
- Patients coming for evaluation for other diseases, and are accidentally found to have any pathology causing acute abdomen, were included in this study.

**Exclusion criteria**

- Patients not willing to participate in the study.
- Patients with Traumatic acute abdomen conditions and pregnant women.

**Results**

**Table 1: Age Distribution of Patients In Acute Abdomen**

Age Group (Years)	Number Of Patients	Percentage (%)
0-10	1	2%
11-20	5	10%
21-30	11	22%
31-40	3	6%
41-50	8	16%
51-60	9	18%
>60	13	26%
Total Number Of Patients	50	100%

Approximately 62% of patients were 20 to 60 years of age which is due to high prevalence of urolithiasis in young to middle aged adults and pancreatitis in middle aged adults.

**Table 2: Sex Distribution**

Gender Of The Patient	Number Of Patients	Percentage
Male	29	58%
Female	21	42%
Total Number	50	100%

Out of 50 patients of non-traumatic acute abdomen 29 cases (58%) were males whereas, 21 cases (42%) were females.

**Table 3: Presenting Complaints in Patients of Acute Abdomen**

Complaints	Number of Patients	Percentage (%)
Abdominal Pain	50	100%
Nausea/Vomiting	29	58%
Fever	26	52%
Dysuria/Hematuria	17	34%
Constipation Or Obstipation	12	24%
Abdominal Distention	7	14%

**Table 8: MDCT Findings In Patient With Pancreatitis**

Age Distribution (Yrs)	Bulky Panc.	Alt. Enh.	Ipf/ Epf	Necrosis		Pcyst	Dmpd	Plef/ Asc.
				<30%	>30%			
41-50	1	2	2	1	1	1	-	1
51-60	3	3	2	2	1	-	2	2
>60	3	1	3	3	-	-	-	2
Total No. Of Patients	7	6	7	6	2	1	2	5
Percentage	87.5%	75%	87.5%	75%	25%	12.5%	25%	62.5%

Panc.-Pancreas, Alt.-Altered, Enh.-Enhancement, Ipf-Intrapancreatic Collection, Epf-Extrapancreatic Collection, Pcyst-Pseudocyst, Dmpd-Dilated Main Pancreatic Duct, Plef- Pleural Effusion, Asc.- Ascitis.

In our study most common findings for diagnosing pancreatitis on CECT were increased pancreatic size (87.5%) & intra/extrapancreatic collection (87.5%) followed by altered enhancement (75%) and < 30% necrosis

All 50 patients came with acute abdominal pain. Nausea/vomiting were the second commonest complaint with 29 (58%) patients presenting with it.

**Table 4: Causes of Non Traumatic Acute Abdomen**

Causes	No. Of Patients	Percentage
Urinary Tract Pathology	16	32%
Hepatobiliary Pathology	13	26%
G.I. Pathology	13	26%
Pancreatic Pathology	8	16%
Total	50	100%

Maximum number of patients had urinary tract pathology 16 cases (32%), followed by hepatobiliary and gastrointestinal pathology with 13 cases each (26%) & pancreatic causes 8 cases (16%).

**Urinary Tract Pathologies**

**Table 5: Urinary Tract Causes Of Non Traumatic Acute Abdomen**

Pathology	No. Of patients	Percentage
Urolithiasis	16	100%
a. Uretric calculus	7	43.7%
b. Renal calculus	6	37.5%
c. Vesical calculus	3	18.7%

**Hepatobiliary Pathologies**

**Table 6: Hepatobiliary Causes Of Non Traumatic Acute Abdomen**

Pathology	No. Of Patients	Percentage
Hepatic Causes	13	100%
a. Cholelithiasis/ Cholecystitis	7	53.8%
b. Liver Abscess	6	46.2%

In our study among the hepatobiliary causes of non traumatic acute abdomen cholelithiasis/ cholecystitis (53.8%) was the most common cause diagnosed on MDCT.

**Table 7: Gastrointestinal Causes Of Non Traumatic Acute Abdomen**

Pathology	No. Of Patients	Percentage
Gastrointestinal Causes	13	100%
a. Acute Appendicitis	4	30.8%
b. Intestinal Obstruction	6	46.2%
c. Intestinal Perforation	3	23.1%

(75%). Nearly more than half of the cases (62.5%) had extrapancreatic complications as pleural effusion and ascitis owing to the severity of disease.



**Figure 1: Urolithiasis**

Coronal NCCT shows right side Mid Ureteric calculus causing Hydronephrosis



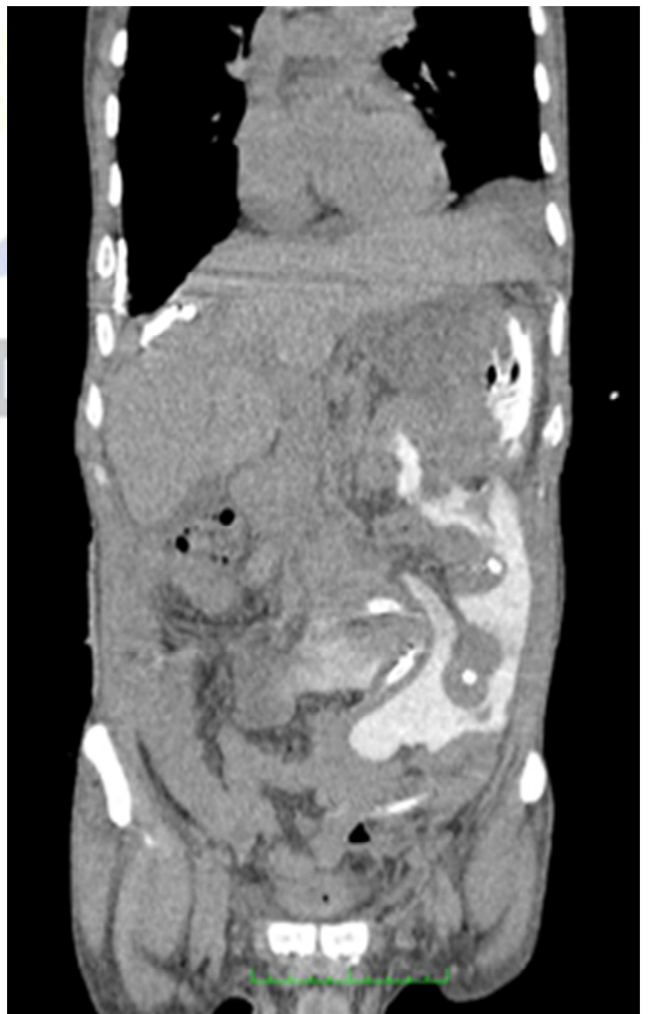
**Figure 2: Cholelithiasis**

CECT abdomen a small Calculus seen in gall bladder.



**Figure 5: Intestinal Obstruction**

CECT abdomen axial section shows dilated bowel loops



**Figure 6: Intestinal Perforation**

CECT abdomen duodenal perforation with intraperitoneal leak of contrast



Figure 7: Pancreatitis

Pancreatic necrosis with peri-pancreatic fluid collection with ascites

## Discussion

In our study there high prevalence of acute abdomen in young to middle aged patient with male predominance with most common site of pain being right hypochondrium [Table 1 & 2]. Similar prevalence in age, sex and site of pain was observed in a study done by Lakshay Chanana & Moses A.K. Jegraj in 2015.<sup>[6]</sup> Maximum number of patients had urinary tract pathology 16 cases (32%), followed by hepatobiliary and gastrointestinal pathology with 13 cases each (26%) & pancreatic causes 8 cases (16%)(Table 4). Commonest causes of acute abdomen includes urolithiasis, cholecystitis, pancreatitis, intestinal obstruction & liver abscess in our study. Similar results were shown by Hani H. Abujudeh & Rathachai Kaewlai study in 2011.<sup>[7]</sup>

In our study the commonest cause of acute abdomen came out to be as urolithiasis which could be attributed to topography and warm climate of Muzaffarnagar where the study took place. Urolithiasis proved to be a most common cause of acute abdomen in the study done by Hani H. Abujudeh & Rathachai Kaewlai in 2011.<sup>[7]</sup>

In Hani H. Abujudeh & Rathachai Kaewlai study, intestinal obstruction was the second commonest cause of acute abdomen while in our study it held 4th place, which depicts the higher prevalence of the disease in western world as compared to the Asian region. This has been attributed to high consumption of low

cellulose and high animal fat diet in western world. The findings corresponds to the previous studies of Addis in 1990(8), Al-Omran in 2003 & Sulu in 2010.<sup>[9,10]</sup>

In our study, CECT abdomen was more accurate in diagnosing the cases with acute calculus cholecystitis as compared to clinical provisional diagnosis. Jaap stroker and randen in 2009 evaluated the CECT findings in acute cholecystitis and found that CT is a better modality than the clinical and lab based diagnosis of cholecystitis.<sup>[11]</sup>

In our study, all cases of acute appendicitis with clinical provisional diagnosis of acute appendicitis were diagnosed on CECT abdomen proving its efficacy (100%). Similar to our study various studies have shown a very high sensitivity of MDCT for acute appendicitis. Funaki in 1998,<sup>[12]</sup> reported 97% sensitivity of CT for acute appendicitis. Gore in 2000,<sup>[13]</sup> reported sensitivity of 90-100% while Van Randen found 94% sensitivity for acute appendicitis.

In our study, out of 3 diagnosed cases of intestinal perforation only 2 cases (66.7%) cases had provisional diagnosis of perforation. Gore in 2000(13) found CT 100% sensitive for diagnosis & location of site perforation.

In our study, CECT findings of all cases(100%) of pancreatitis were diagnosed with provisional clinical diagnosis of pancreatitis. Julia Meyerle in 2005 found sensitivity of CT to be 78% for pancreatitis detection. According to Balthazar, CT early overall detection rate of 90% with close to 100% sensitivity after 4days for pancreatic gland necrosis.<sup>[14]</sup>

## Conclusion

Our study concluded that MDCT plays a important role in diagnosis of etiology of acute abdominal pain. It proved to be a better modality for diagnosing all causes of acute abdomen. Moreover, its inherent advantages to quantify the CT findings seen in different diseases causing acute abdominal pain further strengthen its importance in imaging of acute abdomen.

MDCT is also superior in terms of lack of operator dependency, ability to diagnose broad spectrum of diseases & helping the physician and surgeon by assessing the severity and grading of the disease, and giving exquisite and comprehensive anatomical details.

1. Thus, MDCT can be recommend as the modality of choice for patient presenting with acute abdominal pain with positive clinical and lab investigations causes of acute abdomen.
2. Also, MDCT preferably be used for grading the severity of disease.
3. Lastly, we acknowledge the overall superiority of MDCT over clinical and lab parameters in diagnosing acute abdomen and thus recommend its use whenever clinical and lab findings are equivocal or gives limited details to the physician or operating surgeon.

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**How to cite this article:** Agrawal SK, Singh AK, Gupta AK, Agrawal B. Role of CT in Evaluation of Nontraumatic Acute Abdomen. *Asian J. Med. Radiol. Res.* 2019;7(2):142-46.

DOI: [dx.doi.org/10.21276/ajmrr.2019.7.2.30](https://doi.org/10.21276/ajmrr.2019.7.2.30)

**Source of Support:** Nil, **Conflict of Interest:** None declared.

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