

Original research article

Multidetector Computed Tomography Evaluation of Non-Traumatic Acute Abdomen Patients in Tertiary care Centre

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Abstract

Background: Multidetector Computed Tomography (MDCT) is a that advance technology which provides simultaneous acquisition of multiple images during single rotation of X-Ray tubes. There are number of studies which indicates CT with careful physical examination and evaluation of laboratory reports, gives useful diagnostic information of patients with an acute abdomen.

Aim and Objectives: To evaluate the accuracy and the impact of early CT diagnosis on management of non-traumatic acute abdomen also wanted to enumerate the various causes of non traumatic acute abdomen.

Materials and Methodology: A prospective study was conducted on consecutive patients with acute abdomen in the study for the duration of one year in the department of Radiology. Ultrasonogram was done as the initial modality in these patients and CT was done when USG findings were negative, equivocal or unable to provide additional information. Axial, coronal and sagittal reformatted images were studied. When appropriate, MIP and volume rendering techniques were also analysed. All the patients were followed up before and after CT and also at the time of discharge.

Results: In our study male dominance was observed about 74% of the male had acute abdominal pain and whereas females were 26%. Among all 60% of the patients were in the age group of 25 -50 years of age, followed by < 25 years and > 50 years. maximum patients with bowel and disease related to the bowel showed in above table. 26% of the patients had acute appendicitis and each of 19% of the patients had intestinal obstruction and perforative peritonitis. Compared to USG, CT was better in achieving a specific diagnosis.

Conclusion : Patients presenting with non-traumatic acute abdominal patient and undergone early CT scan diagnosed and treated accurately which reduced hospital stay and morbidity.

Keywords: Multidetector Computed Tomography, Non-Traumatic Acute Abdomen, USG.

Introduction

An acute abdomen is a condition that demands urgent attention and treatment. The acute abdomen may be caused by an infection, inflammation, vascular occlusion, or obstruction. The patient will usually present with sudden onset of abdominal pain with associated nausea or vomiting. This activity reviews the evaluation and treatment of patients presenting with an acute abdomen, and highlights the role of the interprofessional team in caring for these patients.

Abdominal pain has many potential causes. The most common causes such as gas pains, indigestion or a pulled muscle usually aren't serious. Other conditions may require urgent medical attention. While the location and pattern of abdominal pain can provide important clues, its time course is particularly useful when determining its cause. Acute abdominal pain develops and often resolves over a few hours to a few days. Chronic abdominal pain may be intermittent (episodic), meaning it may come and go. This type of pain may be present for weeks to months, or even years. Some chronic conditions cause progressive pain, which steadily gets worse over time.

Hence, imaging plays a vital role in the diagnostic work up and helps to triage these patients. Abdominal radiography is widely available and especially useful in patients with small bowel obstruction and pneumoperitoneum[1]. In majority of the cases, a definitive diagnosis cannot be made with radiography alone and further imaging is required.

Ultrasonogram (USG) is another widely used imaging modality in patients with acute onset of abdominal pain. USG provides additional information, as it helps in real time visualization of the abdominal organs, bowel caliber, bowel wall thickness, peristalsis and the blood flow can also be assessed with the use of Doppler[2]. But, USG can often be inconclusive especially in the presence of extensive bowel gas and intra -abdominal fat.

Computed tomography(CT) is an imaging procedure that uses special X-Ray equipment to create detailed pictures, or scans, of areas inside the body. It is sometimes called computerized tomography or computerized axial tomography. CT findings have been demonstrated to have a marked effect on the management of acute abdominal pain. The cost-effectiveness of CT in the setting of acute appendicitis was studied, and CT proved to be cost-effective. CT can therefore be considered the primary technique for the diagnosis of acute abdominal pain, except in patients clinically suspected of having acute cholecystitis. In these patients, ultrasonography (US) is the primary imaging technique of choice. CT has achieved this vital role as it permits global visualization of the gut, mesentery, omentum, peritoneum, retroperitoneum, vasculature, solid organs, abdominal musculature and bones [3-5]. We have undertaken this study to evaluate the accuracy and the impact of early CT diagnosis on management of non-traumatic acute abdomen also wanted to enumerate the various causes of non traumatic acute abdomen.

Materials and Methodology

A prospective study was conducted on consecutive patients with acute abdomen in the study for the duration of one year in the department of Radiology, Chalmeda Anand Rao Institute of Medical Sciences, Karimnagar. Total 50 patients were included in the study after getting ethical approval and informed consent from the patients and after following inclusion and exclusion criteria given bellow.

Inclusion Criteria:

- H/O acute abdominal pain
- Diagnosis made by ultrasonogram but CT requested by referring clinician for additional information.
- Abdominal guarding and rigidity
- H/O abdominal distension

Exclusion Criteria:

- Patients who has not consented for the study
- Pregnant mothers
- Confirmed diagnosis made by ultrasonogram
- H/O trauma (Blunt injury and penetrating injury)

Methodology

Initially plain CT abdomen and pelvis axial sections were taken, followed by contrast study. Iodinated I V contrast was routinely used except in patients suffering from medical renal disease and known anaphylaxis to medications. E-GFR was calculated and contrast was administrated only when e GFR was normal. Oral and rectal contrast were used wherever necessary. The IV Contrast used was IOHEXOL 350 mg iodine/ml at a dose of 1.75 ml /kg, by using power injector through IV cannula at a rate of 2ml /sec.

Toshiba multi-slice CT (4 Slice) was used for all the patients included in the study. Serial axial section of abdomen and pelvis were taken from diaphragm to inferior border of symphysis pubis with a collimation of 5-7 mm and pitch of 1 to 1.5 depending on the length of coverage.

Collected data were entered in the Microsoft excel 2016 for further analysis. Qualitative data were expressed in the form of frequency and percentage and quantitative data were expressed in the form of mean and standard deviation.

Observation and Results

Our study included 50 patients who presented to the emergency department with acute abdominal pain. CT abdomen and pelvis was done for those patients in whom ultrasound could not yield a definitive diagnosis or when the clinician had referred the patients for CT abdomen and pelvis to obtain further information regarding the diagnosis. Demographic distribution of patients were given as bellow table 1.

Table 1 : Demographic distribution of study population.

Parameter	Frequency	Percentage
Age		
< 25 Years	12	24
25 - 50 Years	30	60
> 50 Years	8	16
Gender		
Male	37	74
Female	13	26

In our study male dominance was observed about 74% of the male had acute abdominal pain and whereas females were 26%. Among all 60% of the patients were in the age group of 25 - 50 years of age, followed by < 25 years and > 50 years shown in table 1.

Table 2 : Distribution of Organ specified Diagnosis.

Organ	Frequency	Percentage
Liver	4	8
Vascular	3	6
Bowel	27	54
Pancreas	4	8
KUB	8	16
Retroperitoneum	1	2
Abdominal Wall	1	2
Others	2	4
Total	50	100

CT abdomen and pelvis was done in 50 patients and the various diagnosis obtained were observed and grouped into organ specific diagnosis.

Table 3 : Distribution of disease related to Bowel

Disease Pertaining to Bowel	Frequency	Percentage
Acute Appendicitis	7	26
Intestinal Obstruction	5	19
Perforative Peritonitis	5	19
Volvulus	3	11
Appendicular Abscess	2	7
Hernia	2	7
other	3	11
Total	27	100

We have observed maximum patients with bowel and disease related to the bowel showed in above table. 26% of the patients had acute appendicitis and each of 19% of the patients had intestinal obstruction and perforative peritonitis.

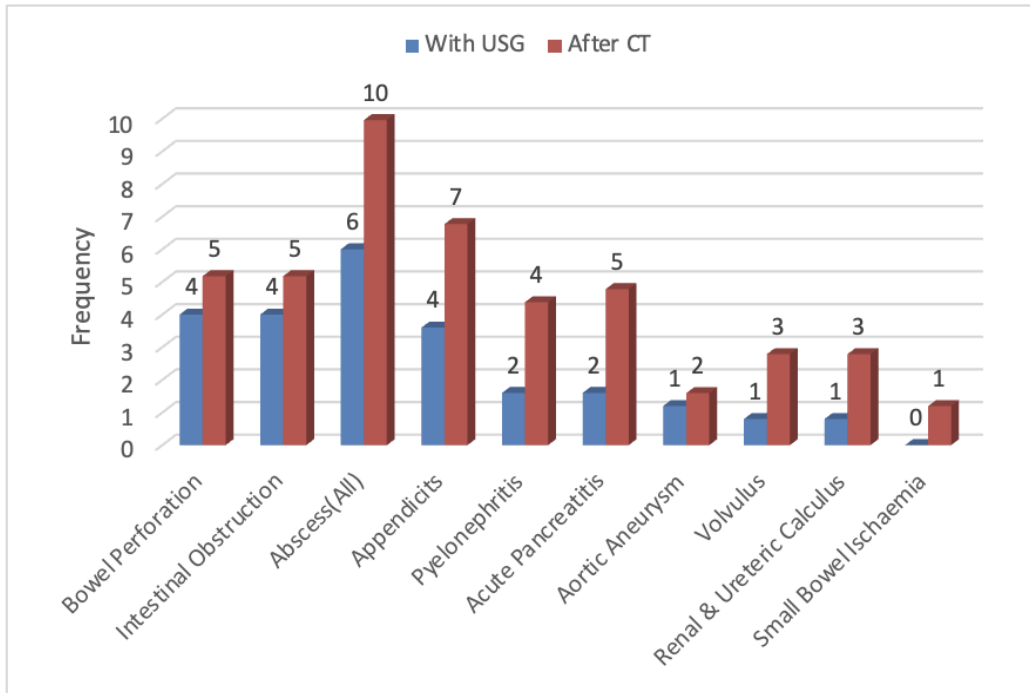


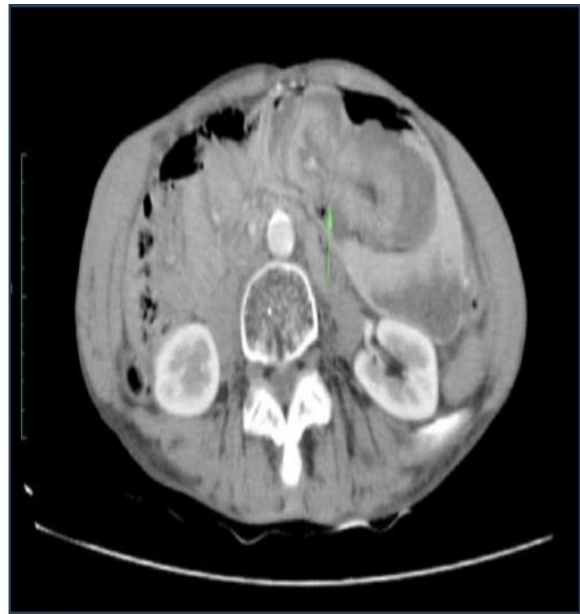
Figure 1 : Distribution of cases with USG and after CT

From the above figure it is showed that , the ultra-sonographic features of the 50 patients were compared with the findings obtained in computed tomography. Compared to USG, CT was better in achieving a specific diagnosis.

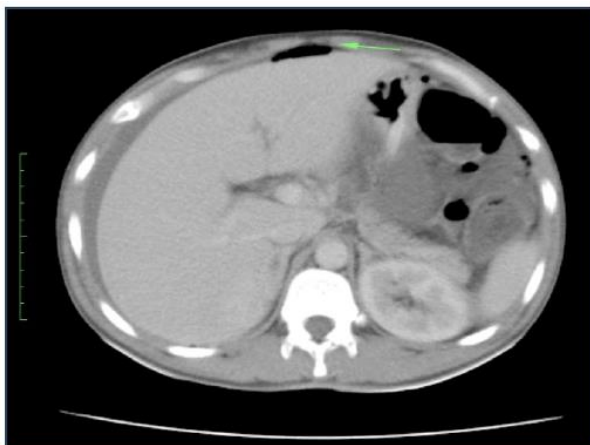
Figure : 2 Different cases among study population



Acute Appendicitis : A 32 year patients with vomiting, fever and lower quadrant pain



Gastro-jejunal Intussusception: A 58 year patients with abdominal distension and Vomitting



Perforative Peritonitis : A 33 year patients
with vomiting, acute abdominal pain



Small Bowel Obstruction: A 17 year
patients with abdominal pain and Vomiting

Discussion:

A prospective study was conducted on consecutive patients with acute abdomen in the study for the duration of one year in the department of Radiology, total 50 patients were included in the study for them, initially ultrasound was performed for these patients and CT was performed when ultrasound was inconclusive or when the clinician wanted additional information. The diagnosis obtained by ultrasonography and that obtained by CT were compared with the per-operative or final diagnosis at discharge. In our study, CT was found to be better than ultrasonography in finalizing the diagnosis. Similarly the impact of CT on the management of these patients was assessed.

In a study conducted by Rosen et al[6] on 57 patients presenting with non traumatic acute abdomen it was stated that abdominal CT could change the planned treatment in 33 patients. The planned treatment based upon the clinical diagnosis was hospital based management in 42 patients. But after performing CT, a total of 32 patients were only admitted, thus CT could avert 10 among these 42 admissions. In this study after performing CT, 2 patients who were initially planned to be sent home were admitted. Additionally 6 patients who were planned on conservative treatment, underwent immediate surgery after performing CT. In our study we have changed 12 patients managements, previously 9 patients were planned for surgery but after CT, it was planned for conservative treatment, and for 3 patients under observation planned for immediate surgery. So thus CT could give the appropriate management of these patients and these results were corelated with studied by Rosen et al.

In our study the diagnosis obtained through ultrasound and CT were compared. CT scored over ultrasound in diagnosing and detecting the complications of several conditions such as acute appendicitis, hollow viscus perforation, volvulus, pancreatitis, pyelonephritis, ureteric stones and abdominal vascular pathology.

Among the total of 7 cases of acute appendicitis, ultrasound could diagnose only 4 cases but CT could diagnose additional 3 cases , which were not suspected in ultrasonography. Appendix when especially retro-caecal in position is difficult to visualize, because of the

caecal gas shadows. These cases could be diagnosed by the help of CT. The complications such as perforated appendix, appendicular abscess, intra peritoneal abscess were better detected through CT.

A total of 5 cases of hollow viscus perforation were diagnosed. 4 cases were diagnosed in ultrasonography. Additional of one case of hollow viscus perforation could be detected by CT.

A total of 5 cases of pancreatitis were included in our study. Ultrasound had missed 3 cases and it could diagnose only 2 cases. CT is superior in diagnosing acute pancreatitis and its complications. In ultrasonography, it is difficult to diagnose pancreatitis because of bowel gas and obesity[7]. But, CT could overcome these limitations of ultrasonography. The complications of pancreatitis could be better detected in CT. The presence of pancreatic and peri- pancreatic fluid collections, pancreatic necrosis, pancreatic abscess, pseudo-cyst and vascular complications could be better appreciated in CT[8]. The CT severity index could be determined which helped in predicting the prognosis. The presence of peri-pancreatic fat stranding, loss of normal lobular contour of the pancreatic borders helped to diagnose early cases of acute interstitial pancreatitis which could not be made out in ultrasound[9]. In our study, there was a case of pseudo-cyst of pancreas with cysto- gastric fistula. Ultrasound showed only the presence of pseudo-cyst in pancreas, but CT performed after administration of oral and IV contrast revealed the presence of fistulous communication between the cyst and stomach, thus proving that CT was superior in diagnosing and detecting the complications of acute pancreatitis.

In the study conducted by Rosen et al , among the 57 patients, complete follow up could be done for 44 patients. CT could yield correct diagnosis in 41 patients. False positive diagnosis was made in 2 patients, in one patient CT showed thickening of transverse and descending colon but colonoscopy showed the presence of only lymphoid aggregates. In another case inflammatory changes were seen around the appendix and the case was diagnosed to as acute appendicitis but per - operative finding revealed normal appendix. One false negative diagnosis was made in a patient with right lower quadrant pain. CT revealed a normally looking appendix but per operatively appendix was inflamed, suggestive of appendicitis.

Similarly, the 50 cases in our study were followed up. The correct diagnosis was obtained for all the cases. We have encounter with some limitation like cost and exposure to radiation. But disease diagnosed in early stages so this limitation can be overcome reduced long hospital stay and morbidity.

Conclusion:

From all observation and results it has been proved that CT helps in arriving at an accurate diagnosis. The associated complications of the underlying disease can also be determined with CT which helps in predicting the prognosis. CT can effectively guide the clinician regarding the management. It helps to determine who need surgery and who do not. Hence CT can be considered as the primary imaging with the exception of acute cholecystitis in which USG proved highly sensitive in the diagnosis.

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