



MULTIDETECTOR COMPUTED TOMOGRAPHY IN EVALUATION OF NON TRAUMATIC ACUTE ABDOMEN

Radio-Diagnosis

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ABSTRACT

Introduction: Acute abdominal pain is one among the common causes of admission in emergency department. In majority of the cases, a definitive diagnosis cannot be made with radiography alone and further imaging is required. USG can often be inconclusive especially in the presence of extensive bowel gas and intra-abdominal fat. CT has emerged as the most appropriate imaging modality in arriving at a specific diagnosis, especially when ultrasonography is inconclusive. **Aims And Objectives:** To evaluate the accuracy of CT in the diagnosis of non-traumatic acute abdomen in cases where USG and X-Ray findings are negative / non-specific or are unable to provide additional information relating to the diagnosis. To enumerate the spectrum of causes of non-traumatic acute abdomen. **Materials And Methods:** It is a hospital based cross sectional study, carried out at Santhiram medical college and general hospital, Nandyal, in between NOVEMBER 2023 to APRIL 2024. A total of 30 cases of acute non-traumatic abdomen diagnosed via CT scan using Siemens soma tom scope 32 slice CT scanner were included in the study. **Results:** Out of 30 patients with acute non-traumatic abdomen most common were males (60%) age group was 30-60 yrs (60%). Most common condition was renal and ureteric calculus (34%) followed by acute pancreatitis (16%). **Conclusion:** Hence CT stays the modality of choice to diagnose the cause of non-traumatic acute abdomen which USG cannot diagnose.

KEYWORDS

INTRODUCTION

Acute pain abdomen accounts 5-10% of patients presenting to emergency room¹. It may be mild condition to a life-threatening condition which may need early diagnosis and treatment. Clinical signs and laboratory investigation may not completely diagnose the condition here comes the role of imaging studies². CT scan has sensitivity and specificity of 90-95% in aiding the diagnosis of acute abdominal pain¹. CT scan helps in visualisation of gut mesentery, omentum, peritoneum, retroperitoneum, vasculature, solid organs, abdominal musculature and bones.

AIMS AND OBJECTIVES

To assess the use of MDCT in evaluation of non-traumatic abdomen in emergency and diagnosis of the non-traumatic abdomen. To enumerate the spectrum of causes of non-traumatic acute abdomen.

MATERIALS AND METHODS

Study is hospital based cross-sectional study in 30 patients presented with acute abdominal pain and referred to CT in department of radiodiagnosis in Santhiram medical college and general hospital, Nandyal. The study period was from NOVEMBER 2023 to APRIL 2024 duration of 6 months. After taking the written informed consent from all the patients history collected and CT findings were noted and analysed.

Inclusion Criteria

1. Patients who all give written and informed consent
2. H/O acute abdominal pain
3. H/O abdominal distension
4. Abdominal guarding and rigidity

Exclusion Criteria

1. Patients who doesn't give informed and written consent
2. Patients who have contraindications for CT scan.
3. Patients who had history of trauma

EQUIPMENT

Patients will undergo CT imaging examination (plain and contrast) under a Siemens soma tom scope 32 slice CT scanner.

Plain CT axial sections were taken first followed by contrast examination. IOHEXOL has been used as the IV Contrast, a concentration of 350 mg iodine/ml at a dose of 1.75 ml/kg (Avg -90 to 100 ml) with the help of a power injector via IV cannula (18 Gauge) at a rate of 2ml/sec.

RESULTS

In our study 30 patients who had non-traumatic acute abdomen were studied and results are as follows

Table 1 - Age Distribution

Age	No of patients	Percentage
1-10	2	6
11-20	4	14
21-30	4	14
31-40	8	26
41-50	6	20
>50	6	20

Maximum number of patients were in age group of 30-60 i.e 60%.

Table 2- Sex Distribution

Sex	No of patients	Percentage
Male	18	60
Female	12	40

Table-3- Cases Diagnosed By CT

Condition	No of patients	Percentage
Hepatic abscess	2	6
Appendicitis	4	14
Small bowel obstruction	4	14
Acute Cholecystitis	4	14
Renal and ureteric calculus	10	34
Acute pancreatitis	5	16
Intussusception	1	3

DISCUSSION

In the total sample of 30 patients who presented with acute non-traumatic abdomen maximum cases were renal and ureteric calculus which were 10 (34%). On CT they appear hyperdense will be >100. MDCT helps in the identification of number, size location of calculi and presence of hydronephrosis³.

Next most seen condition is acute pancreatitis (16%).

It is inflammation of pancreas. There are various causes like alcohol, gall stones, hyperlipidemia, hypercalcemia, ERCP, congenital malformations like pancreatic divisum, choledochocoele etc, corticosteroids, viral infections like measles and mumps. Elevation of serum amylase and lipase occurs, but is not specific to acute pancreatitis. It can also be found in other conditions like cholelithiasis,

bowel obstruction etc. Imaging is necessary to know the cause of pancreatitis, extent and severity of disease. MDCT is the modality of choice for diagnosing acute pancreatitis. On conventional radiography, sentinel loop sign, colon cut off sign, loss of left psoas shadow, pleural effusion can be seen. On USG, difficulty in viewing pancreas because of overlying gas shadows. Increased size and altered echotexture of the gland can be seen on USG in case of acute pancreatitis. Other features include peripancreatic fat stranding and collections.

CECT is the modality of choice. CECT shows enlarged edematous gland with peripancreatic fat stranding and fluid collections. Peripancreatic fluid collection becomes organized with a fibrous wall after 4 weeks, known as pseudocyst.

Non enhancing areas on post contrast studies indicated necrosis of pancreas.

CECT is helpful in diagnosing complications of pancreatitis like vascular thrombosis etc and grading of pancreatitis using CT severity index⁴.

Small bowel obstruction is seen in 14% of the patients who presented with acute nontraumatic abdomen.

Small bowel obstruction shows dilated bowel loops >2.5cms. CT helps in identifying transition point which is seen as a beak (known as beak sign). The bowel loops beyond the transition point are collapsed and the loops proximal to it are dilated. Small bowel feces sign, which is due to stagnant small bowel contents which mixes up. Long term obstruction leads to bowel wall ischemia (seen as non enhancement or minimal enhancement of bowel wall) and perforation⁵.

Acute cholecystitis is seen in 14% of the patients who presented with acute nontraumatic abdomen.

Acute cholecystitis is due to the presence of gall stones in approximately 90-95% individuals and is known as calculus cholecystitis. Gall stones are commonly seen in obese women in their middle age. They appear as hyperdense structures in the lumen of gall bladder. In cholecystitis, there will be increased wall thickness with pericholecystic fat stranding and free fluid, hyperenhancing wall and increased distension of lumen of gall bladder. Acalculous cholecystitis is seen in chronic ill patients who are on parenteral nutrition for many days. It is due to increased viscosity of bile which ultimately results in bile outflow obstruction. The features on CT are same as calculus cholelithiasis except for the presence of gall stones.

Complications like gangrenous cholecystitis (non enhancing gall bladder wall and presence of air foci within the wall), perforation of gall bladder (defect in continuity of gall bladder wall), emphysematous gall bladder (presence of gas in the wall and/or in lumen of gall bladder as a result of infection by gas forming bacteria) can be detected with the help of CT⁶.

Acute appendicitis constitutes about 4 cases i.e., 14%. Increased diameter of appendix, outer wall to outer wall transverse diameter is >6mm. Sometimes, patients will be asymptomatic even though the diameter is increased. Along with increased diameter we should also look for periappendiceal fat stranding, increased appendix wall thickness (>3mm), appendicoliths, mural stratification, intramural gas adjacent bowel wall thickening like apical cecal thickening, ileocecal lymph node enlargement⁷.

Hepatic abscess is seen in 2 patients i.e., 6% of the patients.

There are many causative factors for liver abscess like hematogenous spread from gastrointestinal tract or from ascending cholangitis. *Klebsiella pneumoniae* is the most common causative agent of pyogenic liver abscess. On USG these are seen as hypoechoic areas with internal echoes and debris. On CT, it is seen as low attenuation area which is either single nonloculated fluid collection, single multiloculated fluid collection. On CECT, a double target sign is seen in pyogenic liver abscess which is central area of low attenuation surrounded by a high attenuation inner ring (shows early enhancement and represents pyogenic membrane) and low attenuation outer rim (enhances in delayed phase which represents edema of liver parenchyma). Cluster sign which is multiple small low attenuation

areas coalesce into a single larger abscess cavity⁸.

Intussusception is seen in one patient i.e., 3% of the patients

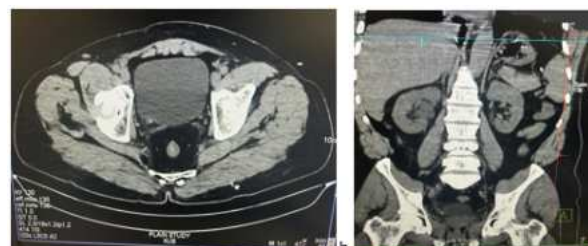
It is invagination of bowel loop with its mesentery into the continuous portion of bowel loop due to peristalsis. 5% cases of total intussusceptions occur in adults. Most commonly occurs in children.

These are mostly caused by lead points like polyps, tumors (lipoma, lymphoma) etc but can also occur without lead points.

Types of intussusception include ileocolic (mc), ileocecal, colocolic⁹. On CT we can see bowel within bowel appearance.

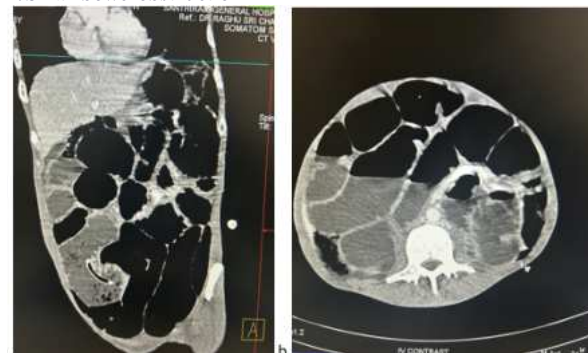
IMAGES OF DIFFERENT CONDITIONS

1. VUJ CALCULUS



a. Axial non contrast CT showing VUJ calculus on right side
b. Coronal sagittal CT image of same patient showing mild dilated calyces on right secondary to VUJ calculus

2. Small bowel obstruction



a. CECT coronal image showing multiple dilated small bowel loops
b. CECT axial image showing multiple dilated small bowel loops with some of loops showing air fluid levels.

3. Acute Cholecystitis



a. CECT axial image showing cholelithiasis with GB wall edema and pericholecystic fat stranding
b. CECT sagittal image showing cholelithiasis with GB wall edema and pericholecystic fat stranding

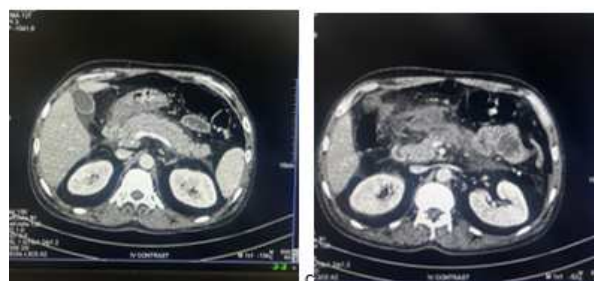
4. Intussusception



CECT axial image showing bowel within bowel appearance on right

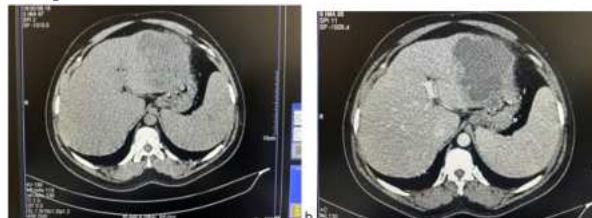
side of abdomen

5. Acute Pancreatitis



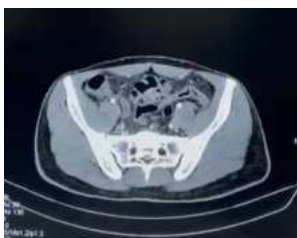
- a. Axial non contrast CT showing bulky pancreas with peripancreatic fat stranding
 b. Axial CECT of abdomen showing uniformly enhancing parenchyma with peripancreatic fluid fat stranding
 c. Axial CECT of abdomen inferior to pancreas showing peripancreatic fluid and fat stranding.

6. Hepatic Abscess



- a. Non contrast CT axial image showing hypodense area in left lobe of liver
 b. CECT axial image showing peripheral rim enhancement
 c. CECT axial image showing cluster sign

7. Appendicitis



- a. CECT axial image showing inflamed appendix with dilatation

REFERENCES

- de Burlet KJ, MacKay M, Larsen P, Dennett ER. Appropriateness of CT scans for patients with non-traumatic acute abdominal pain. *The British Journal of Radiology*. 2018 Aug 1;91(1088):20180158.
- Heiken JP, Katz DS, Menu Y. Emergency radiology of the abdomen and pelvis: imaging of the non-traumatic and traumatic acute abdomen. *Diseases of the Abdomen and Pelvis 2018-2021: Diagnostic Imaging-IDKD Book*. 2018:123-43.
- O'Connor OJ, McWilliams S, Maher MM. Imaging of acute pancreatitis. *American Journal of Roentgenology*. 2011 Aug;197(2):W221-5.
- Nicolaou S, Kai B, Ho S, Su J, Ahamed K. Imaging of acute small-bowel obstruction. *American journal of roentgenology*. 2005 Oct;185(4):1036-44.
- Shakespeare JS, Shaaban AM, Rezvani M. CT findings of acute cholecystitis and its complications. *American Journal of Roentgenology*. 2010 Jun;194(6):1523-9.
- Pinto Leite N, Pereira JM, Cunha R, Pinto P, Sirlin C. CT evaluation of appendicitis and its complications: imaging techniques and key diagnostic findings. *American Journal of Roentgenology*. 2005 Aug;185(2):406-17.
- Bächler P, Baladron MJ, Menias C, Beddings I, Loch R, Zalaquett E, Vargas M, Connolly S, Bhalla S, Huete A. Multimodality imaging of liver infections: differential diagnosis and potential pitfalls. *Radiographics*. 2016 Jul;36(4):1001-23.
- Kim YH, Blake MA, Harisinghani MG, Archer-Arroyo K, Hahn PF, Pitman MB, Mueller PR. Adult intestinal intussusception: CT appearances and identification of a causative lead point. *Radiographics*. 2006 May;26(3):733-44.