Original Research Article

A Prospective Study of Evaluation of Role of CT in The Evaluation of Acute Cholecystitis

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Abstract

Introduction: Now a days, Gallstone disease, particularly cholelithiasis and acute cholecystitis (AC), has increasingly become a significant cause of abdominal pain and discomfort in the developing countries. Its occurrence is high around 7.4% in the adult population in Chandigarh, New Delhi in North India, which is interestingly seven times more frequent than in South India. **Materials and Methods:** Data of patients diagnosed with acute cholecystitis on Computed Tomography CT between the year 2018 to 2019 were included in the study. Confirmed diagnosis of cholecystitis was obtained from histopathology those without confirmed diagnosis was excluded from the study. Computed Tomography CT images of cases were obtained using MDCT scanners (16 Slice Simens Healthcare systems). Additional Contrast-enhanced images were obtained during short breath-holds after 65 seconds of IV administration of 2 mL/kg of nonionic iodinated contrast material injected at a rate of 2.5–2.8 mL/s by power injector. Computed Tomography CT parameters used were. **Results:** 200 patients were included in this study between the age of 20 to 80 years. Most common presenting complains abdominal pain (86.3%) followed by nausea and vomiting (30.5%). Leukocytosis was present in 67.1 % of the patients. Regarding CT signs Pericholecystic inflammatory changes were most commonly present (86.3%). This was followed by gall bladder distention (85.5%), wall thickening (76.3%), enhancement of gall bladder mucosa (75.5 %), and visualization of gall stones (58.8%), tensile gall bladder fundus (38.8%), reactive hyperemia (37.1%) and Penicholecystic fluid collections (31 %). The most common complication was perforation and abscess formation. **Conclusion:** Computed Tomography CT had proved its role as an important diagnostic tool in evaluating abdominal pain. An evaluation of Computed Tomography CT signs in the diagnosis of acute cholecystitis will help improve the diagnostic confidence in acute cholecystitis and will also help in the differential diagnosis.

Key Words: Gallstone disease, CT, Penicholecystic fluid.

Introduction

Gallstone disease, in particular cholelithiasis and acute cholecystitis (AC), has increasingly become a major cause of abdominal pain and discomfort in the developing countries. Its occurrence has been found to be high around 7.4% in the adult population in the cities of Chandigarh and New Delhi in North India, which is interestingly seven times more frequent than in South India.Gallstones constitute a significant health problem in developed societies too, affecting 10–15% of the adult population, meaning 20 to 25 million Americans have or will have gallstones. There are approximately 220,000 cases per year of cholecystitis requiring surgery in the United States. Cholelithiasis has a wide range of prevalence between Europe, fluctuating from 5.9% in Italy to 21.9% in Norway, and is considered to be the primary cause of cholecystitis[1-3]. Furthermore, cholecystitis is also one of the most frequent causes of hospitalization and abdominal surgery. Gallstones are much more common in the female population (61%) compared to males (39%). The age group most affected is 45-60 years (38.5%) among females, and above 60 years in males(20.8%). A relatively higher prevalence of 39% among males when compared to reports from past studies indicates a significant shift in the pattern of prevalence of gallstone disease.CT findings of AC include the presence of gallstones, gallbladder distension with diffuse wall thickening, increase in wall enhancement and oedema of pericholecystic fat. Studies show that among these findings the most common are: wall thickening (59%), pericholecystic fat oedema (52%), gallbladder distension (41%), and pericholecystic fluid (31%). One of the main limitations to the CT evaluation of AC is the decreased sensitivity in comparison to the US for detecting cholelithiasis. Mixed gallstones containing cholesterol and gallbladder pigments have similar attenuation values to the biliary salts present within the gallbladder lumen, therefore, limiting CT visualization.Complications of cholecystitis have generally decreased due to earlier diagnosis and treatment. It remains necessary to learn to recognize the presence of CT in AC given the potential high morbidity, and possible mortality from associated complicat-ions[4,5]

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Materials and Methods

Data of patients who were diagnosed to have acute cholecystitis on Computed Tomography CT between the year 2018 to 2019 were included in the study. Confirmed diagnosis of cholecystitis was obtained from histopathology those without confirmed diagnosis was excluded from the study. Computed Tomography CT images of cases were obtained using MDCT scanners (16 Slice Simens Healthcare systems). Additional Contrast-enhanced images were obtained during short breath-holds after 65 seconds of IV administration of 2 mL/kg of nonionic iodinated contrast material injected at a rate of 2.5–2.8 mL/s by power injector. Computed Tomography CT parameters used were:

1. Slice thickness, 5 mm;
2. Tube voltage, 120 kV;
3. Tube current-exposure 80-700 mAs.

All images were reviewed on "Zillion" Picture Archiving and Communication Systems (PACS) Computed Tomography CT signs for acute cholecystitis applied for study.

A. Gall bladder distention: gall bladder measured more than 8 cm in the long axis.
B. Wall thickening: more than 0.3 cm in the non-collapsed gall bladder.
C. Reactive hyperemia (presence of increased enhancement of the hepatic parenchyma adjacent to gall bladder fossa, visualized in a dedicated liver window).
D. Positive Tensile fundus sign (absence of flattening of the gall bladder fundus by contact with the anterior abdominal wall).
E. Positive pericholecystic inflammatory changes (Stranding of adjacent mesenteric fat or visualization of fluid).

The sample size for this study was taken as 200. Results were calculated in Microsoft Excel sheet and analyzed using SPSS software[6-7]

Results

In total, 200 patients were included in this study between the age of 20 to 80 years. Most common presenting complains abdominal pain (86%) followed by nausea and vomiting (30.5%). Leukocytosis was present in 67.1 % of the patients. Regarding CT signs Pericholecystic inflammatory changes were most commonly present (85%). This was followed by gall bladder distention (74%), wall thickening (73%), enhancement of gall bladder mucosa (57%), and visualization of gall stones (37%), tensile gall bladder fundus (38%), reactive hyperemia (37%) and Penicholecystic fluid collections (30%). The most common complication was perforation and abscess formation.

Table 1: Age Distribution (N=200)

S.No.	Age Group	Number (%)
1	31-40	30(15%)
2	41-50	42 (21%)
3	51-60	44 (22%)
4	61-70	60 (30%)
5	71-80	24 (12%)

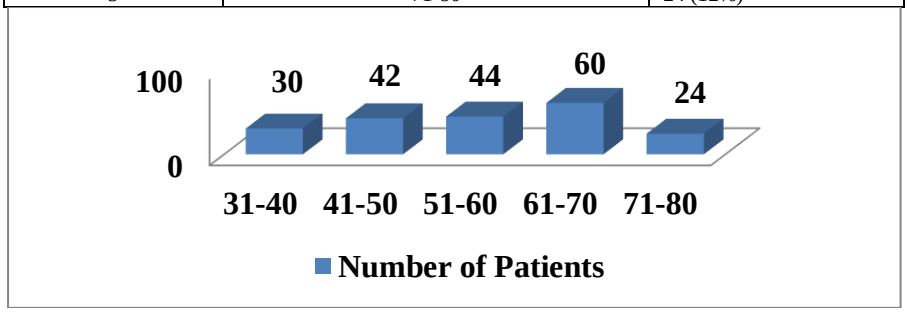

Fig 1: Age Distribution

Table 2: CT Observations

S.No	CT Observations	Percentage
1	Pericholecystic inflammatory changes	85%
2	gall bladder distention	74%
3	wall thickening	73%
4	enhancement of gall bladder mucosa	57%
5	visualization of gall stones	37%
6	Tensile gall bladder fundus	38%
7	reactive hyperemia	37%
8	Penicholecystic fluid collections	30%

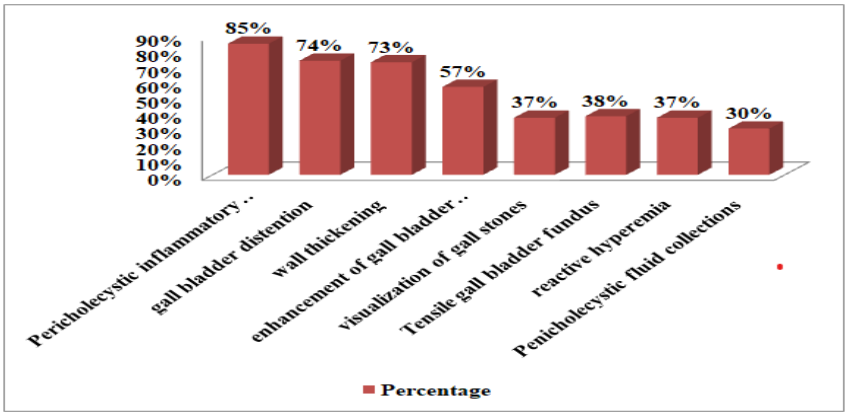

Fig 2: CT Observations

Discussion

Imaging's form an integral part of the evaluation of acute cholecystitis. Though the role of Cholescintigraphy and ultrasound have been quite well established in diagnosing acute cholecystitis with sensitivities reaching up to 94% and 82% respectively, Computed Tomography CT remains to be under-evaluated as an imaging modality in suspected cases of acute cholecystitis. Some patients with acute cholecystitis will not present with classic signs and symptoms. Also, because of the wide differential diagnosis, Computed Tomography CT scans are often performed to look for Intraabdominal abscess or other evidence of intraabdominal inflammation. In our study, pericholecystic inflammation and stranding was the commonest finding (86.3%), but it has a little importance as a sign of cholecystitis. Still stranding of the pericholecystic fat provides a useful clue to the presence of cholecystitis. Although it has presumed to represent oedema, it could be due to inflammation, bile, or engorged blood vessels[8]

The second most common finding was Gallbladder distension (74%), and it was more common in patients with calculus cholecystitis.[8]But this finding is contrary to the findings of Mirvis et al., who found that gallbladder distension had a poor correlation with calculus cholecystitis. The next common finding was gallbladder wall thickening (76.3%). But gallbladder wall thickening is a nonspecific finding and may occur in a variety of conditions including hepatitis, hypoproteinemia. Furthermore, the normal gallbladder wall may appear spuriously thickened if the Gallbladder is collapsed. Penicholecystic fluid collections (31%) may represent either localized peritonitis or micro-perforation. In the study by Lamki et al. of complicated cholecystitis, they found pericholecystic fluid collections with evidence of perforation at the surgery. Gall bladder distention, increased wall thickness and mucosal hyperenhancement followed in order after pericholecystic inflammatory changes, similar to signs previously reported in published literature. A least common finding in this study was reactive hyperemia of liver parenchyma with previous literature suggesting that there is little importance of reactive hepatic hyperemia in the diagnosis of acute cholecystitis. Computed Tomography CT scanning is widely accepted as a modality of choice in evaluating complications of cholecystitis such as gangrenous and emphysematous cholecystitis, gall bladder perforation, abscess formation and gall stone ileus. Although Computed Tomography CT yet has not surpassed the established diagnostic abilities of ultrasound, a detailed understanding of its signs is essential for improving the confidence of both radiologists as well as referring physicians in the use of this modality. Limitations of this study include cases were also diagnosed on histopathology. Hence there may be a chance of false positives findings of Computed Tomography CT. Further work needs to be done in this topic for better understanding of Computed Tomography CT as an imaging modality for acute cholecystitis.

Conclusion

CT is the imaging modality of choice for diagnosis of acute cholecystitis and its associated complications in emergency department setting due to its wide availability. CT (Computed Tomography) had proved its role as an important diagnostic tool in the evaluation of abdominal pain. An evaluation of CT signs in the diagnosis of acute cholecystitis will help to improve the diagnostic confidence in acute cholecystitis and will also help in the differential diagnosis. CT is also useful for evaluating the complications of acute cholecystitis, such as emphysematous cholecystitis, gangrenous cholecystitis, haemorrhage, and gallstone ileus.

Conflict of Interest: Nil
Source of support:Nil

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