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Original Research

A prospective study to assess the use of CT scans in the evaluation of acute cholecystitis

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ABSTRACT:

Aim: A prospective study to assess the use of CT scans in the evaluation of acute cholecystitis. **Materials and Methods:** Data of patients who were diagnosed to have acute cholecystitis on Computed Tomography CT 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). **Results:** In total, 100 patients were included in this study between the age of 18 to 75 years. Most common presenting complains abdominal pain (85%) followed by nausea and vomiting (31%). Leukocytosis was present in 68% of the patients. Regarding CT signs Pericholecystic inflammatory changes were most commonly present (86%). This was followed by gall bladder distention (75%), wall thickening (74%), enhancement of gall bladder mucosa (58%), and visualization of gall stones (38%), tensile gall bladder fundus (39%), reactive hyperemia (38%) and Penicholecystic fluid collections (31%). The most common complication was perforation and abscess formation. **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 differentialdiagnosis. **Keywords:** Gallstone disease, CT, Penicholecystic fluid

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INTRODUCTION

Gallstone disease, namely cholelithiasis and acute cholecystitis (AC), is becoming a significant source of stomach pain and discomfort in emerging nations. The prevalence of this condition has been seen to be much higher, at around 7.4%, among the adult population residing in the cities of Chandigarh and New Delhi in North India. Interestingly, this incidence is seven times more common in comparison to the adult population in South India. Gallstones are a prevalent health issue in modern cultures, impacting around 10-15% of adults. This equates to around 20to 25 million Americans who now have or will acquire 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 therefore. lumen, 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 complications[4,5]

MATERIALS AND METHODS

Data of patients who were diagnosed to have acute cholecystitis on Computed Tomography CT 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 Contrastenhanced images were obtained duringshort breathholds 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: Slice thickness, 5 mm; Tube voltage, 120 kV; and 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.

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

The sample size for this study was taken as 100. Results were calculated in Microsoft Excelsheet and analyzed using SPSS software 21.0 version.[6-7]

RESULTS

In total, 100 patients were included in this study between the age of 18 to 75 years. Most common presenting complains abdominal pain (85%) followed by nausea and vomiting (31%). Leukocytosis was present in 68% of the patients. Regarding CT signs Pericholecystic inflammatory changes were most commonly present (86%). This was followed by gall bladder distention (75%), wall thickening (74%), enhancement of gall bladder mucosa (58%), and visualization of gall stones (38%), tensile gall bladder fundus (39%), reactive hyperemia (38%) and Penicholecystic fluid collections (31%). The most common complication was perforation and abscess formation.

Table	1۰	Δσe	Distribution
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Age Group	Number	Percentage
Below 40	16	16
40-50	22	22
50-60	24	24
60-70	31	31
Above 70	7	7

Table 2:	CT Observations
	CT Observations

CT Observations	Percentage
Pericholecystic inflammatory changes	86%
gall bladder distention	75%
wall thickening	74%
enhancement of gall bladder mucosa	58%
visualization of gall stones	38%
Tensile gall bladder fundus	39%
reactive hyperemia	38%
Penicholecystic fluid collections	31%

DISCUSSION

Imaging's form an integral part of the evaluation of cholecystitis. Though the role acute 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 In study, inflammation. our pericholecystic inflammation and stranding was the commonest finding (86%), 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[6-8]

The second most common finding was Gallbladder distension (75%), and it was more commonin patients with calculus cholecystitis.[8]But this finding is contrary to the findings of Hwang H et al., who found that gallbladder distension had a poor correlation with calculus cholecystitis. The next common finding was gallbladder wall thickening (74%). 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 Shakespear JS, et al. of complicated cholecystitis, they found pericholecystic fluid collections with evidence of perforation at the surgery[9]. Gall bladder distention, increased wall thickness and mucosal hyperenhancement followed order after in 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 cholecystitis, emphysematous 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 wellas 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.

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