Section: Anatomy

Original Research Article

UNVEILING THE UNSEEN: CTS CRUCIAL CONTRIBUTION IN DETECTING ACUTE CHOLICYSTITIS

Received : 02/12/2023
Received in revised form : 09/01/2024
Accepted : 24/01/2024

Keywords:
CT, Cholelithiasis, Cholecystitis.

Corresponding Author:
Dr. Seema Tabassum,
Email: drseemadurrani28@gmail.com.

DOI: 10.47009/jamp.2024.6.1.119

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

Int J Acad Med Pharm
2024; 6 (1); 600-602

Khursheed Durrani[1], Seema Tabassum[2]

[1]Associate Professor, Department of Radiology, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri, Nalanda Bihar, India.
[2]Professor, Department of Anatomy, Darbhanga Medical College Laharia Sarai, Darbhanga Bihar, India.

Abstract

Background: Gallstone disease, specifically cholelithiasis and acute cholecystitis (AC), has increasingly become a significant cause of abdominal pain and discomfort in developing countries. Interestingly, its occurrence is high and is more frequent in North India than in South India. **Material & Methods:** The retrospeectiv study included patient's data diagnosed with acute cholecystitis on Computed Tomography CT. The confirmed diagnosis of cholecystitis was obtained from histopathology, and those without a confirmed diagnosis were excluded from the study. Additional Contrast-enhanced images were obtained during short breath-holds after IV administration of 2 mL/kg of nonionic iodinated contrast material. **Results:** This study included 100 patients between the ages of 20 to 80 years. The most common presenting complaint was 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 gallstones (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 has proven to be an important diagnostic tool in evaluating abdominal pain. Evaluating Computed Tomography CT signs in the diagnosis of acute cholecystitis will help improve diagnostic confidence and aid in the differential diagnosis.

INTRODUCTION

Gallstone disease, specifically cholelithiasis and acute cholecystitis (AC), is increasingly becoming a significant cause of abdominal pain and discomfort in developing countries. Interestingly, the occurrence of this disease is found to be around 7.4% in the adult North Indian population, which is seven times more frequent than in South India. In developed societies, gallstones pose a significant health problem as well, affecting 10-15% of the adult population, which means that approximately 20 to 25 million Americans either have or will develop gallstones. In the United States alone, there are approximately 220,000 cases of cholecystitis requiring surgery each year. Cholelithiasis prevalence varies across Europe, ranging from 5.9% in Italy to 21.9% in Norway, and it is considered to be the primary cause of cholecystitis. Additionally, cholecystitis is a common reason for hospitalization and abdominal surgery. Gallstones are more prevalent in females (61%) compared to males (39%). The age group most affected among females is 45-60 years (38.5%), while in males, it is above 60 years (20.8%). The relatively higher prevalence of 39% among males, compared to previous studies, indicates a significant shift in the pattern of gallstone disease prevalence. CT findings of AC include the presence of gallstones, gallbladder distension with diffuse wall thickening, increased wall enhancement, and pericholecystic fat edema. Among these findings, wall thickening (59%), pericholecystic fat edema (52%), gallbladder distension (41%), and pericholecystic fluid (31%) are the most common. However, CT evaluation of AC has decreased sensitivity compared to ultrasound (US) in detecting cholelithiasis. This is due to the similar attenuation values of mixed gallstones containing cholesterol and gallbladder pigments to the biliary salts present within the gallbladder lumen, which limits CT visualization. The incidence of complications related to

ISSN (O): 2687-5365; ISSN (P): 2753-6556

cholecystitis has significantly reduced as a result of timely diagnosis and treatment. However, it is still crucial to develop the ability to identify the presence of CT in AC, considering the potential for severe morbidity and even mortality resulting from associated complications.[4,5]

MATERIALS AND METHODS

This retrospective study was conducted at department of radio-diagnosis, Bhagwan Mahavir Institute of Medical Sciences, Pawapuri. The study was approved by th institutional research and ethical committee.

The study included data from patients diagnosed with acute cholecystitis on Computed Tomography CT between 2020 and 2022. Only patients with confirmed diagnosis of cholecystitis through histopathology were included, while those without confirmed diagnosis were excluded. MDCT scanners were used to obtain Computed Tomography CT images of the cases. The number of samples included was 100.

Additional Contrast-enhanced images were taken 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. The Computed Tomography CT parameters used were as follows: Slice thickness of 5 mm, tube voltage of 120 kV, and tube current-exposure ranging from 80-700 mAs.

The Computed Tomography CT signs for acute cholecystitis were applied for the study, including gall bladder distention (measuring 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 in a dedicated liver window), positive Tensile fundus sign (absence of flattening of the gall bladder fundus by contact with the anterior abdominal wall), and positive pericholecystic inflammatory changes (stranding of adjacent mesenteric fat or visualization of fluid).

The results were calculated in Microsoft Excel sheet and analyzed using SPSS software.[6-7]

RESULTS

A total of 100 patients were enrolled in this study, ranging in age from 20 to 80 years. The most frequently reported complaint was abdominal pain, with 86% of patients experiencing it. Nausea and vomiting were also common, reported by 30.5% of patients. Leukocytosis was observed in 67.1% of the patients. In terms of CT findings, pericholecystic inflammatory changes were the most prevalent at 85%. This was followed by gall bladder distention (74%), wall thickening (73%), enhancement of gall bladder mucosa (57%), visualization of gall stones (37%), tensile gall bladder fundus (38%), reactive hyperemia (37%), and pericholecystic fluid collections (30%). The most frequent complication observed was perforation and abscess formation.

Table 1: Age Distribution (N=100)

S. No.	Age Group	Number	Percentage
1	31-40	15	15
2	41-50	21	21
3	51-60	22	22
4	61-70	30	30
5	71-80	12	12

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 %

DISCUSSION

Imaging plays a crucial role in the evaluation of acute cholecystitis. While Cholescintigraphy and ultrasound have been well-established in diagnosing acute cholecystitis, with sensitivities reaching up to 94% and 82% respectively, Computed Tomography (CT) scans are still under-evaluated as an imaging modality for suspected cases of acute cholecystitis. This is due to the fact that some patients may not present with classic signs and symptoms, and CT scans are often performed to rule out other intraabdominal conditions such as abscess or inflammation. In our study, we found that the most common finding was pericholecystic inflammation and stranding, which was present in 86.3% of cases. However, this finding has limited importance as a sign of cholecystitis. Nonetheless, the presence of pericholecystic fat stranding can provide a useful clue to the presence of cholecystitis. It is important

ISSN (O): 2687-5365; ISSN (P): 2753-6556

to note that the cause of this stranding could be due to oedema, inflammation, bile, or engorged blood vessels. The second most common finding in our study was gallbladder distension, which was present in 74% of cases. This finding was more common in patients with calculus cholecystitis. However, our findings contradict those of Mirvis et al., who found that gallbladder distension had a poor correlation with calculus cholecystitis. Another common finding in our study was gallbladder wall thickening, which was present in 76.3% of cases. However, it is important to note that gallbladder wall thickening is a nonspecific finding and can occur in various conditions, including hepatitis and hypoproteinemia. Additionally, the normal gallbladder wall may appear thickened if the gallbladder is collapsed. We also observed penicholecystic fluid collections in 31% of cases, which may indicate localized peritonitis or micro-perforation. Lamki et al. found evidence of perforation during surgery in cases of complicated cholecystitis with pericholecystic fluid collections. Overall, our study highlights the various imaging findings associated with acute cholecystitis. While Cholescintigraphy and ultrasound remain the primary imaging modalities for diagnosing this condition, CT scans can provide valuable information in cases where the diagnosis is uncertain or when other intraabdominal conditions need to be ruled out.

A notable finding in this study was the presence of reactive hyperemia in the liver parenchyma. Previous literature has suggested that reactive hepatic hyperemia is not of great importance in diagnosing acute cholecystitis. However, Computed Tomography (CT) scanning is widely accepted as the preferred method for evaluating complications associated with cholecystitis, including gangrenous and emphysematous cholecystitis, gall bladder perforation, abscess formation, and gall stone ileus. While CT has not yet surpassed ultrasound in terms of diagnostic abilities, it is crucial for both radiologists and referring physicians to have a thorough understanding of its signs in order to use this modality with confidence. It is important to note that this study had limitations, as some cases were also diagnosed based on histopathology, which may lead to false positive findings on CT. Further research is needed to enhance our understanding of CT as an imaging modality for acute cholecystitis. In conclusion, CT is the preferred imaging modality for diagnosing acute cholecystitis and its associated complications in the emergency department due to its widespread availability. CT has proven to be an important diagnostic tool for evaluating abdominal pain. Analyzing CT signs in the diagnosis of acute cholecystitis can enhance diagnostic confidence and aid in differential diagnosis. Additionally, CT is valuable for assessing complications such as emphysematous cholecystitis, gangrenous cholecystitis, hemorrhage, and gallstone ileus.

CONCLUSION

Computed Tomography CT has proven to be an important diagnostic tool in evaluating abdominal pain. Evaluating Computed Tomography CT signs in the diagnosis of acute cholecystitis will help improve diagnostic confidence and aid in the differential diagnosis.

REFERENCES

1. Stinton, L. M., and Shaffer, E. A. Epidemiology of gallbladder disease: cholelithiasis and cancer. Gut and liver, 2012;6(2):172.
2. Pinto, A., Reginelli, A., Cagini, L., Coppolino, F., Ianora, A. A.S., Bracale, R., and Romano, L. Accuracy of ultrasonography in the diagnosis.2013:23
3. Chawla, A., Bosco, J. I., Lim, T. C., Srinivasan, S., Teh, H. S., and Shenoy, J.N. Imaging of acute cholecystitis and cholecystitis-associated complications in the emergency setting. Singapore Medical Journal, 2015;56(8):438.
4. Shakespear, J. S., Shaaban, A. M., and Rezvani, M. CT findings of acute cholecystitis and its complications. American Journal of Roentgenology,2010;194(6): 1523-1529.
5. Leschka, S., Alkadhi, H., Wildermuth, S., and Marincek, B. Multi-detector computed tomography of acute abdomen. European radiology, 2005;15(12):2435- 2447.
6. Dai Inoue, Akira Izumozaki. Imaging Features of Gallbladder Lesions Manifesting Wall Thickening 269-278.
7. Murali Belman, Mandapal Toka, Surekha Pandit. 2019. Role of Ct in The Evaluation of Acute Cholecystitis. Journal of Evolution of Medical and Dental Sciences 2019;8(21): 1735- 1740.
8. Piero Portincasa, Emilio Molina-Molina, Gabriella Garruti, David Q.-H. Wang. Critical Care Aspects of Gallstone Disease.The Journal of Critical Care Medicine 2019;5:1, 6-18.

ISSN (O): 2687-5365; ISSN (P): 2753-6556