IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 12 Ser.9 (December. 2020), PP 41-44
www.iosrjournals.org

A Prospective Study of Evaluation of Role of Ct in the Evaluation of Acute Cholecystitis

Dr. Vettri Vignesh[1*], Dr. Jugal James[2], Dr.Sujeet Patil[3]
[1*]*Junior Resident, Department of Radiology, A.J Institute Medical Sciences, Mangalore.*
[2]*Junior Resident, Department of Radiology, A.J Institute Medical Sciences, Mangalore.*
[3]*Junior Resident, Department of Radiology, A.J Institute Medical Sciences, Mangalore.*
Corresponding author: Dr. Vettri Vignesh

Abstract
Introduction: *Acute cholecystitis is an acute inflammatory condition of the gall bladder; 95% of cases of acute cholecystitis are due to an obstructing calculus in the gall bladder neck or cystic duct.1The pathophysiology of acute cholecystitis is complex and not completely understood. In 96% of cases there are gallstones, and typically, a calculus causes cystic duct obstruction.*
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 study. Computed Tomography CT images of cases were obtained using MDCT scanners (Aquilon One and Aquilon 64 from Toshiba 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.*
Results: *In total 100 patients were included in this study between the age of 20 to 80 years. Most common presenting complains were 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 %), visualization of gall stones (58.8%), tensile gall bladder fundus (38.8%), reactive hyperemia (37.1%) and Penicholecystic fluid collections (31 %). Most common complication was perforation and abscess formation.*
Conclusion: *Computed Tomography CT had proved its role as an important diagnostic tool in evaluation of abdominal pain. An evaluation of Computed Tomography CT signs in diagnosis of acute cholecystitis will help improve the diagnostic confidence in acute cholecystitis and will also help in differential diagnosis.*
Key Words: *Acute cholecystitis, CT, Leukocytosis, MDCT.*

Date of Submission: 06-15-2020 Date of Acceptance: 21-12-2020

I. Introduction

Acute cholecystitis is an acute inflammatory condition of the gall bladder; 95% of cases of acute cholecystitis are due to an obstructing calculus in the gall bladder neck or cystic duct.1The pathophysiology of acute cholecystitis is complex and not completely understood. In 96% of cases there are gallstones, and typically, a calculus causes cystic duct obstruction.1The trapped concentrated bile has an irritative effect on the gallbladder wall, causing increased secretions leading to distention, wall edema, and hypervascularity of the wall. As intraluminal pressure rises, vessels become compressed that may result in thrombosis, ischemia, and subsequent necrosis of the gallbladder wall.2Bacterial colonization, perforation, or abscess formation may also follow. Most (95%) patients with acute cholecystitis have gallstones. As opposed to ultrasound, which is very sensitive and specific for the detection of gallstones, CT detects only approximately 75% of patients with gallstones. With CT, gallstones have a varied appearance based on their composition and pattern of calcification. Stones with calcifications tend to be well seen with CT.3However, stones with high cholesterol content may be difficult to detect because they may be hypo attenuating or isoattenuating compared with bile.

II. 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 study. Computed Tomography CT images of cases were obtained using MDCT scanners (Aquilon One and Aquilon 64 from Toshiba 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 kVp;
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 long axis.
B. Wall thickening: more than 0.3 cm in non-collapsed gall bladder.
C. Reactive hyperemia (presence of increased enhancement of the hepatic parenchyma adjacent to gall bladder fossa, visualized in dedicated liver window).
D. Positive Tensile fundus sign (absence of flattening of the gall bladder fundus by contact with 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 100. Results were calculated in Microsoft Excel sheet and analyzed using SPSS software

III. Results

In total 100 patients were included in this study between the age of 20 to 80 years. Most common presenting complains were 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 %), visualization of gall stones (58.8%), tensile gall bladder fundus (38.8%), reactive hyperemia (37.1%) and Penicholecystic fluid collections (31 %). Most common complication was perforation and abscess formation.

S.No	Age Group	Number (%)
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 1: Age Distribution (N=100)

S.No	CT Observations	Percentage
1	Pericholecystic inflammatory changes	86.3%
2	gall bladder distention	76.3%
3	wall thickening	75.5%
4	enhancement of gall bladder mucosa	58.8%
5	visualization of gall stones	38.8%
6	Tensile gall bladder fundus	38.8%
7	reactive hyperemia	37.1%
8	Penicholecystic fluid collections	31%

Table 2: CT Observations

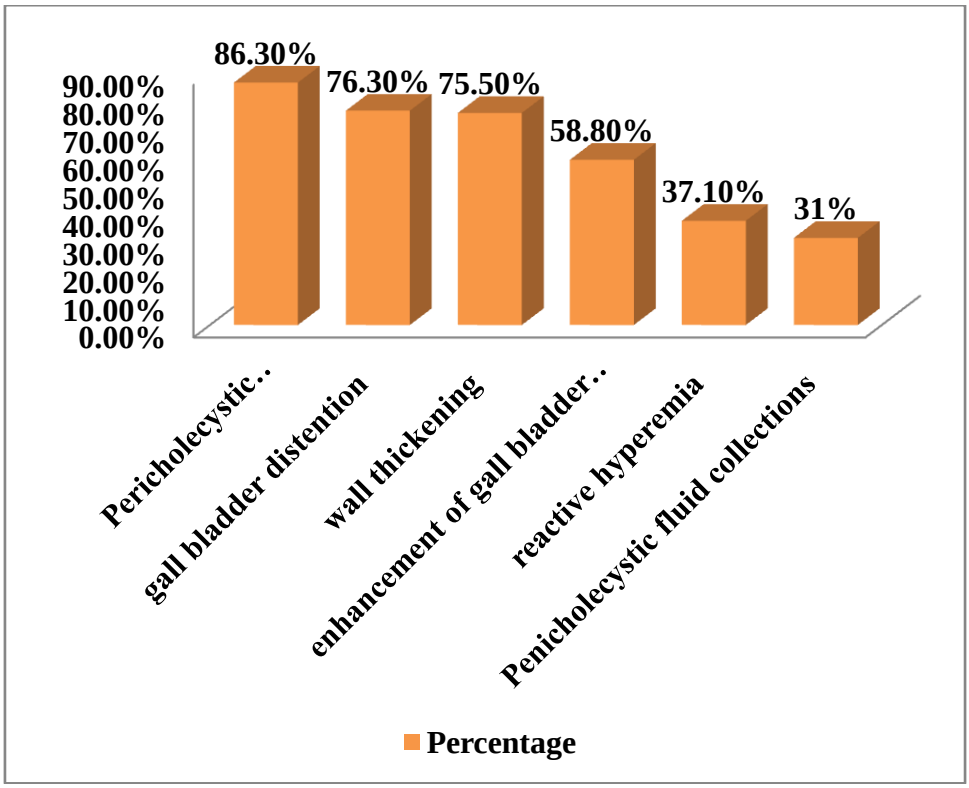

Figure 1: CT Observations

IV. Discussion

Imagings form an integral part of 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 imaging modality in suspected cases of acute cholecystitis. Some patients with acute cholecystitis will not present with the classic signs and symptoms and 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 edema, it could be due to inflammation, bile, or engorged blood vessels.

The second most common finding was Gallbladder distension (85.5%) and it was more common in the patients with a calculus cholecystitis. 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 a localized penitonitis or microperforation. In the study by Lamki et al. of complicated cholecystitis they found penicholecystic fluid collections with evidence of perforation at surgery. Gall bladder distention, increased wall thickness and mucosal hyper enhancement followed in order after pericholecystic inflammatory changes, similar to signs previously reported in published literature. 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 diagnosis of acute cholecystitis. Computed Tomography CT scanning is widely accepted as 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 surpass the established diagnostic abilities of ultrasound but a detailed understanding of its signs is essential for improving confidence of both radiologists as well as referring physicians in use of this modality. Limitations of this study include cases were also diagnosed on histopathology, hence there may be chance of false positives findings of Computed Tomography CT. Further work needs to be done in these topic for better understanding of Computed Tomography CT as imaging modality for acute cholecystitis.

V. Conclusion

Computed Tomography CT had proved its role as an important diagnostic tool in evaluation of abdominal pain. An evaluation of Computed Tomography CT signs in diagnosis of acute cholecystitis will help improve the diagnostic confidence in acute cholecystitis and will also help in differential diagnosis.

References

[1]. Stinton, L. M., and Shaffer, E. A. (2012). Epidemiology of gallbladder disease: cholelithiasis and cancer. Gut and liver, 6(2), 172.
[2]. Pinto, A., Reginelli, A., Cagini, L., Coppolino, F., Ianora, A. A. S., Bracale, R., ... and Romano, L. (2013). Accuracy of ultrasonography in the diagnosis.
[3]. Chawla, A., Bosco, J. I., Lim, T. C., Srinivasan, S., Teh, H. S., and Shenoy, J. N. (2015). Imaging of acute cholecystitis and cholecystitis-associated complications in the emergency setting. Singapore medical journal, 56(8), 438.
[4]. Shakespear, J. S., Shaaban, A. M., and Rezvani, M. (2010). CT findings of acute cholecystitis and its complications. American Journal of Roentgenology, 194(6), 1523-1529.
[5]. Leschka, S., Alkadhi, H., Wildermuth, S., and Marincek, B. (2005). Multi-detector computed tomography of acute abdomen. European radiology, 15(12), 2435- 2447.
[6]. Yamashita, K., Jin, M. J., Hirose, Y., Morikawa, M., Sumioka, H., Itoh, K., and Konish, J. (1995). CT finding of transient focal increased attenuation of the liver adjacent to the gallbladder in acute cholecystitis. AJR. American journal of roentgenology, 164(2), 343-346.
[7]. Kane, R. A., Costello, P., and Duszlak, E. (1983). Computed tomography in acute cholecystitis: new observations. American journal of roentgenology, 141(4), 697-701.
[8]. Kiewiet, J. J., Leeuwenburgh, M. M., Bipat, S., Bossuyt, P. M., Stoker, J., and Boermeester, M. A. (2012). A systematic review and meta-analysis of diagnostic performance of imaging in acute cholecystitis. Radiology, 264(3), 708-720.
[9]. McDonnell CH Ill, Jeffrey RB Jr, Vierra MA. Inflamed pericholecystic fat: color Doppler flow imaging and clinical features. Radiology 1994; 193:547- 550.
[10]. Mirvis SE, Whitley NO, Miller JW. CT diagnosis of acalculous cholecystitis. J ComputAssist Tomogr 1987:11:83-87.
[11]. Kane RA, Costello P, Duszlak E. Computed tomography in acute cholecystitis: new observations. AJR 1983:141:697-701 8.
[12]. Lamki N, Reval B, St. vile E. Computed tomography of complicated cholecystitis. J ComputAssist Tomogr i986;319-324.

Dr. Vettri Vignesh, et. al. "A Prospective Study of Evaluation of Role of Ct in the Evaluation of Acute Cholecystitis." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(12), 2020, pp. 41-44.