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Original Research Article

Evaluation of Ultrasonography and CT scan Findings in Cases of Non-Traumatic Gall Bladder Perforation

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ABSTRACT

Background: Gall bladder perforation (GBP) is a relatively rare complication of acute cholecystitis which results in higher mortality and morbidity. Radiological imaging plays a crucial role in determining the diagnosis and treatment of these group of patients.

Material and methods: Our study is an observational study done over a period of 1 year in Assam Medical College, where radiological modalities of CT and ultrasonography were used to study various types of non-traumatic Gall bladder perforation. Statistical analysis was done using MS excel software (2010).

Results: In our study, males were more common. Type II perforation and size of defect of more than 10 mm were most commonly seen. Imaging with ultrasonography and CT scan help in earlier diagnosis of the acute event and helps in better management of the patient as with their use we can not only determine the location, size of perforation but we can also detect the development of its complications such as abscess or fistula formation.

Conclusion: Site, size of perforation along with development of complications can be detected by using radiological modalities such as ultrasonography and CT.

Keywords: Gall bladder Perforation, Neimer Classification, Fistula, Non-traumatic

INTRODUCTION

Although rare, but a serious complication of acute cholecystitis is Gall bladder perforation (GBP). Delayed diagnosis may result in high morbidity and mortality.[1-3] Neimer proposed a classification system for GBP in 1934 which is used commonly till date.[4]

Neimer classification of GB perforation is as follows.

Type I – Free GB perforation.
Type II – Localised peritonitis and Pericholecystic abscess.
Type II a – Abscess located adjacent to Gall bladder.
Type II b- Abscess located intramurally.
Type II c - Abscess located intraperitoneally.

Type III – Cholecystoenteric fistula
Type III a – Cholecystoduodenal.
Type III b – Cholecystocolic fistula.
Type III c – Cholecystogastric fistula.
Type III d – Choledochoduodenal.

Predisposing conditions for GBP include cholecystitis, cholelithiasis, systemic diseases like diabetes mellitus, atherosclerotic disease, drugs like corticosteroids, traumatic usually penetrating type and iatrogenic injury.[5] As GBP, clinically mimics acute cholecystitis, there is sometime delay in diagnosis and so proper radiological evaluation is necessary.[6] 2- 11 % cases of acute cholecystitis develop GBP.[6-9]

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MATERIAL AND METHODS

Our study is a prospective observational study done from May 2023 to April 2024, where all cases of non-traumatic GBP which came for radiological investigation prior to surgery were evaluated by ultrasonography and CT scan (Contrast enhanced). Informed written consent was taken prior hand from subjects included in the study. Institutional ethical clearance was taken prior to the study from all subjects who were part of the study. In total 11 numbers of patients were studied during the study period.

All patients with GBP who came for radiological investigation were subjected to ultrasonography and to contrast enhanced CT afterwards. During ultrasonography scan, B – mode was used to analyse the Gall bladder along with its walls and to look into the defect. Patients were examined in supine & left lateral position. During CT examination, non-contrast and contrast enhanced CT scan were done with proper technique using helical CT machines. Contrast CT scan was done after administration of ionic iodinated contrast media by using intravenous route. Oral contrast was used in cases who did not have acute abdominal features. Ultrasonography was done using the Samsung RS80 machine while CT was using 256 slice helical Phillips MDCT machine. CT was used as reference modality for classification because of higher sensitivity of CT in detecting GBP as compared to USG.[10]

Inclusion criteria:

a). Patients of all age group who had GBP on ultrasonography or CT scan.

Exclusion criteria:

a) Patients who had abdominal trauma of any sort of within the last 12 months period.

b) Patient who refused to give consent.

RESULTS

Our study is a prospective observational study where 11 numbers of patients were studied during the study period. In our study we found that most of the patients belonged to 50- 60 years of age followed by 40- 50 years of age group. None of the cases belonged to less than 40 years of age. Most of the cases in our study were male (63%). Type II perforation (72.7%) was most commonly seen followed by Type III perforation (27.3%).

In our study, we did not find any case of Type I perforation. A defect size of 10 mm or more was most commonly seen in our study, in 6 out 11 cases (54.6 %). The second group in the category was cases with defect size of less than 5 mm or less, followed by 6 mm to 10 mm size defect size. 7 out of 11 cases (63 %) had perforation in the fundal region of gall bladder, while rest 4 cases (37 %) had perforation in body. 7 out of 11 cases (63 %) had ultrasonographically detectable calculus, while rest 4 cases (37 %) cases did not show calculus on ultrasonography. 1 out 11 cases (9%) had multiple gall bladder wall defect. Rest of the cases had single defect.

DISCUSSION

Most of the cases (7) in our study were males (63%). Derici et al also found 62 % of their cases to be males in their study.[11] Similarly, Chowksey et al found 80 % of cases to be males. However, Boruah et al found higher cases in females.[10] Age range in our study was from 45 years to 82 years. Mean age in our study was

56 years. Derici et al in their study found mean age of 69 years.[11] However, this age and sex distribution pattern can differ due to the presence of geographical and as well as other socioeconomic differences in various areas of the globe.

Type II GBP (8 cases) was most commonly seen in our study (72.7%). Type II perforation was also reported as highest sub type of perforation in studies by Patel et al.[12] Other studies also mention that Type II GBP had highest numbers in their studies.[13,14] No cases (0 cases) of type I perforation were seen in our study. 3 (27.2 %) cases in our study had type III perforation. In cases of type III perforation, fistulous communication to visceral organs such as stomach, duodenum and ascending colon were seen.

Table-1: No of cases as per size of defect

Defect Size	**< 5mm**	**5 -10 mm**	**>10 mm**
No. of cases	3	2	6
Percentage	27.3%	18.1%	54.6%

Table-2: No of cases as per site of perforation

Site of perforation	**Fundus**	**Body**	**Others**
No. of cases	7	4	0
Percentage	63%	37%	0%

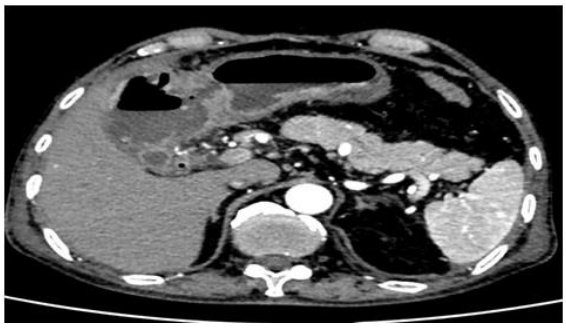

Fig-1: CT abdomen imaging showing fistulous communication with stomach and gall bladder following its perforation.

Fig-2: Reformatted Sagittal CT abdomen imaging showing a collection in sub diaphragmatic location following Gall bladder perforation.

In our study, cases were classified into three groups based on the defect size, namely < 5mm, 5 mm to 10 mm and > 10mm size. Most of the cases in our study had defect size greater than 10 mm. We found more than 10 mm size defect in 6 (54.6 %) cases. Boruah et al also reported highest number of cases (52.9 %) from this category in their study.[10]

Fig-3: Grey Scale Ultrasonography image showing sub-acute Gall bladder perforation.

Fundus was the most commonly observed site of perforation in our study. It was seen in 7 (63 %) of cases. 60 % of perforation was seen in fundus of GB in the study by Derici et al.[11] Fundus of GB is the most distal part of blood supply and hence is commonest site for perforation.[15]

Intraluminal calculus was seen in 7 (63 %) cases in our study. Ultrasonography was taken during our study to detect stones. It is also possible that sometimes stones may be dislodged from the lumen of GB following its perforation.[10] However it is worth mentioning that GBP following acute acalculus cholecystitis will not have intraluminal calculus.

In our study, 10 (90.9 %) cases had single perforation site. Harraz et al also found single perforation in most of the cases (84.4 %).[16] Similar result was also reported by study by Chiapponi et al.[17]

Limitations of study: Intraoperative correlation of the findings wasnot done in this study.

CONCLUSIONS

Radiological imaging is very useful in cases of perforation of GB which may help in proper treatment and reduction of morbidity and mortality from it. It is also helpful in evaluating detecting the size, site of perforation and development of complications. Ultrasonography is more helpful in detecting intraluminal calculus in cases of GBP. Type II perforation is the most common type of GBP while fundus of GB being the most common site.

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