

Gallbladder Perforation: A Prospective Study of Its Divergent Appearance and Management

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ABSTRACT

Introduction: Gallstone disease is one of the most common surgical diseases. Complications associated with cholelithiasis is not uncommon, but gallbladder perforation is a rare complication of acute cholecystitis with cholelithiasis. This gallbladder perforation may present in different ways like free perforation inside peritoneal cavity causing generalized peritonitis, localized collection around gallbladder fossa after perforation and in chronic cases cholecystoenteric fistula. Here we present our experience of this condition with a review of literature for a different presentation of this condition.

Materials and methods: This study was done for 2 years, and patients who were diagnosed with gallbladder perforation either preoperatively or intraoperatively were included.

Results: There was a total of 16 patient included in the study during this period which were either diagnosed preoperatively or intraoperatively of gallbladder perforation (GBP).

Conclusion: GBP, though a rare complication of cholecystitis with high morbidity and mortality, has no specific pathognomic feature and is often misdiagnosed or late diagnosed. Nowadays most cases can be managed with improved diagnostic means and therapeutic modalities (endoscopic, laparoscopic, endostaplers).

Keywords: Cholecystectomy, Cholecystitis, Fistula, Gallbladder perforation.

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INTRODUCTION

Gallbladder perforation (GBP) is a rare yet potentially fatal condition occurring as a complication of cholecystitis (calculous or acalculous). The clinical presentation of GBP may not be different from uncomplicated acute cholecystitis, or at times its presentation may perplex the clinician. The clinical features of GBP may vary from that of peritonitis to acute cholecystitis. The mortality rate of GBP is reported to be 12–16%.¹ Acute cholecystitis, calculus, or acalculous, can lead to GBP in 6–12% of cases.^{2,3} There are many classifications proposed for GBP, but Niemeier classification is most commonly used. In 1934, he categorized GBP perforation in 3 types, type 1 (acute)—it manifests as generalized peritonitis, type 2 (subacute)—localization of fluid at the site of perforation with pericholecystic abscess and type 3 (chronic)—internal (bilioenteric) or external (cholecysto cutaneous) fistula.⁴

Here we present our experience of this condition with variable presentation and poorly understood etiology, which is often diagnosed late resulting in high morbidity and mortality rate; dealt by us over a period of 2 years in our institute. The different clinical presentations and its management along with a brief review of the literature available are done in this study.

MATERIALS AND METHODS

This study was done over a period of 2 years and patients who were diagnosed with gallbladder perforation either preoperatively or intraoperatively were included. The clinical presentation, demographic profile, investigations, and management done was recorded. The different possible etiological factors associated with GBP are also discussed.

RESULTS

There was a total of 16 patient included in the study during this period which were either diagnosed preoperatively or

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intraoperatively of GBP as per the Neimer classification (Table 1). Total 11 patients were diagnosed with GB perforation on the basis of clinical and radiological evaluation, whereas five patients were diagnosed intraoperatively of the pathology. Seven patients had acute cholecystitis and nine had chronic cholecystitis feature on histopathological examination. Two patients had acute acalculous cholecystitis. There was male predominance over the female (10:6 ratio) and type 2 (7) perforation was seen more as compared to type 1 (5) and type 3 (4) (Table 2). The youngest patient reported in our series was of age 17 years and the oldest was of age 80 years. Mean age of patients was 45.56 years (Table 3). The clinical presentation in our series was with general symptoms like pain abdomen, fever, vomiting. Blood investigations showed leucocytosis and raised ALP. There were some atypical presentations like 2 patients presenting with anterior abdominal wall abscess.

The diagnosis was reached with the help of radiological investigation ultrasound abdomen and CT scan abdomen (Figs 1 and 2). Whenever USG was not conclusive or was partial in favor of GBP; CT abdomen was done. USG was done in all 16 cases, out of which it confirmed perforation only in six cases. CT abdomen was done in eight cases where it confirmed the GBP. The comorbidity

Table 1: Total patients involved in the study with presentation, perforation type and management done

S. No.	Age	Sex	Presentation	Comorbidities	Diagnosis	Perforation type	Treatment
1.	65	M	Abdominal wall abscess	DM	GBP with Ant. abdominal wall abscess	Type 3	Open cholecystectomy
2.	55	M	Abdominal wall abscess	DM, HTN	GBP with Ant. abdominal wall abscess	Type 3	Open cholecystectomy
3.	65	F	Pain abdomen, fever, vomiting	-----	Acalculous cholecystitis with GBP	Type 1	Exploratory laparotomy with cholecystectomy
4.	49	M	Pain abdomen, fever, vomiting	-----	Calculous cholecystitis with sealed GB perforation	Type 2	Elective open cholecystectomy
5.	47	F	Pain abdomen, fever, vomiting	-----	Calculous cholecystitis with sealed GB perforation	Type 2	Pigtail drainage followed by elective open cholecystectomy
6.	37	M	Pain abdomen, fever, vomiting	Typhoid fever in recent past	Calculous cholecystitis with sealed GB perforation	Type 2	Antibiotics followed by elective open cholecystectomy
7.	45	M	H/o pain abdomen and fever subsided on conservative treatment	-----	Calculous cholecystitis with sealed GB perforation	Type 2	Laparoscopic cholecystectomy
8.	25	F	H/o pain abdomen and fever 2 months back subsided on conservative treatment	-----	Calculous cholecystitis with sealed GB perforation	Type 2	Laparoscopic cholecystectomy
9.	80	M	Pain, fever, constipation	-----	Acute acalculous cholecystitis with GB perforation	Type 2	Open cholecystectomy
10.	70	F	Pain abdomen, fever, vomiting	DM	Acute calculus cholecystitis with GB perforation	Type 2	Open cholecystectomy
11.	31	F	Pain abdomen	-----	Chronic calculus cholecystitis with cholecystogastric fistula	Type 3	Laparoscopic cholecystectomy with fistula repair
12.	24	F	Pain abdomen	-----	Chronic calculus cholecystitis with cholecystogastric fistula	Type 3	Laparoscopic cholecystectomy with fistula repair
13.	17	M	Pain abdomen, fever, vomiting	-----	Acute calculus cholecystitis with GB perforation	Type 1	Exploratory laparotomy with cholecystectomy
14.	40	M	Pain abdomen, fever	-----	Acute calculus cholecystitis with GB perforation	Type 1	Exploratory laparotomy with cholecystectomy
15.	56	M	Pain abdomen, fever	DM	Acute calculus cholecystitis with GB perforation	Type 1	Exploratory laparotomy with cholecystectomy
16.	23	M	Pain abdomen, fever	-----	Acute calculus cholecystitis with GB perforation	Type 1	Exploratory laparotomy with cholecystectomy

Table 2: Total number of patients in study with distribution according to gender and type of perforation

Type of perforation	No of patients		Total
	Male	Female	
Type 1	4	1	5 (31.3%)
Type 2	4	3	7 (43.7%)
Type 3	2	2	4 (25%)
Total	10	6	16

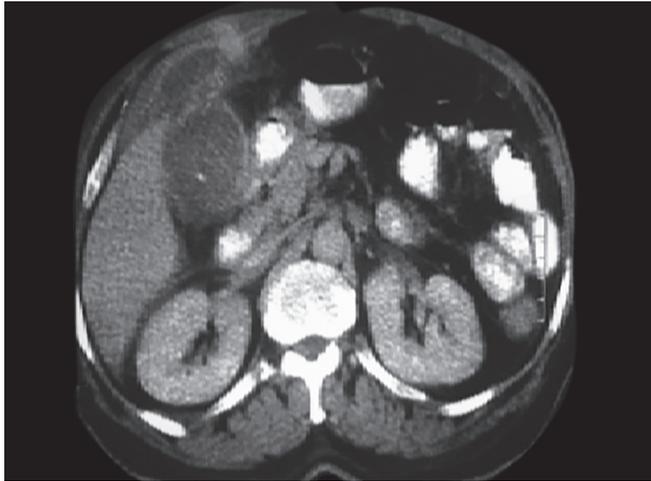


Fig. 1: CT abdomen showing perforation in the gallbladder and cholecystocutaneous fistula

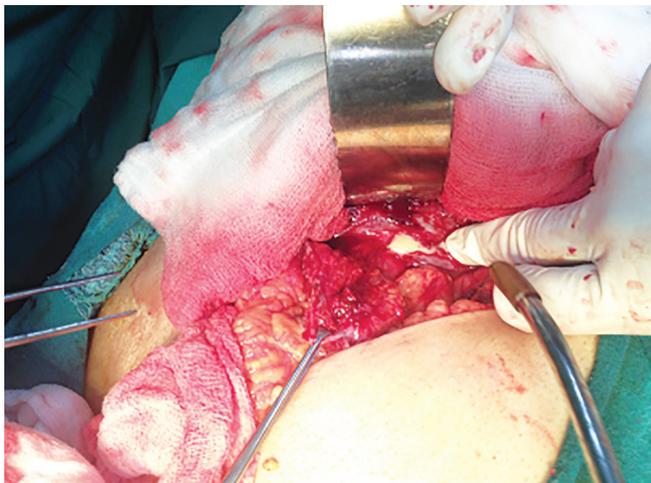


Fig. 3: Intraoperative photo of open cholecystectomy showing pus draining from the gallbladder after draining and opening anterior abdominal wall abscess

in our series was diabetes mellitus (DM) in 4 cases and HTN in two cases. There was a history of typhoid fever in one patient a few days before the presentation with GBP.

The surgery for six diagnosed cases of GB perforation was taken on emergency basis whereas in the rest cases (10) either the diagnosis was intraoperative (5) or the surgery was delayed, and the patient was initially managed by antibiotic and other supportive treatment with or without pigtail drainage of collection. Four patients underwent laparoscopic cholecystectomy and seven patients had open cholecystectomy (Figs 3 and 4). Five patients

Table 3: Age-wise distribution of patients in our study

Age	Male	Female	Total
≤20	1	-	1
21–30	1	2	3
31–40	2	1	3
41–50	2	1	3
51–60	2	-	2
61–70	1	2	3
71–80	1	-	1
Total	10	6	16



Fig. 2: CT showing gallbladder distended with 10 mm size defect posterosuperiorly and pericholecystic collection

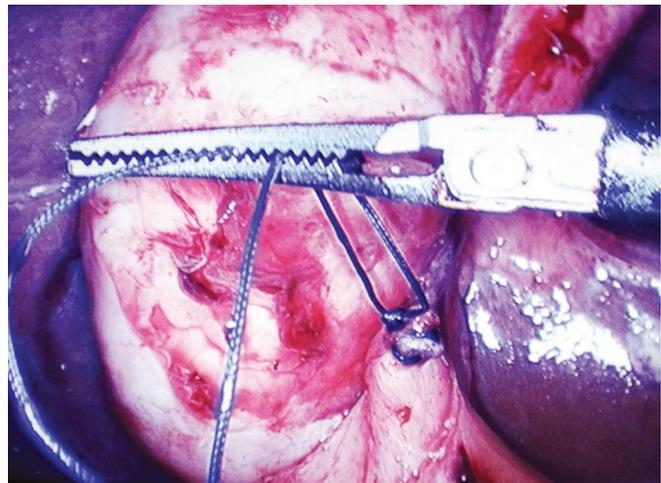


Fig. 4: Laparoscopic repair of cholecystogastric fistula–type 3 perforation

underwent midline laparotomy with peritoneal lavage and drain placement.

The mortality in our series was 6.25% (1 out of 16 patients). The type 1 GBP was associated with the mortality and the patient succumbed to the sepsis. The average length of hospital stay was 15 days ranging from 5–25 days.

Twenty-five studies were reviewed which reported for GBP (Table 4).⁵⁻²⁹ The comparison of these studies with our series is done in the discussion.

Table 4: Summary of various studies reported with their different presentation and type of perforation

S. No	Study	No. of cases	Sex	Age/ mean age	Type of perforation	Comorbidities	Presentation	Treatment
1.	Marwah et al. ⁵	1	F	65 year	Type- 3	---	Pain abdomen and fever Anterior abdominal wall abscess	Laparotomy with cholecystectomy
2.	Misiakos et al. ⁶	1	F	82 year	Type- 3	COPD, HTN	Anterior abd wall abscess/swelling	Transcutaneous paracentesis
3.	Varshney et al. ⁷	1	F	80 year	Type- 3		Pain abdomen Abdominal and chest wall abscess	Cholecystectomy and drainage of abscess
4.	Sayed et al. ⁸	1	F	85 year	Type- 3	DM, HTN	Abdominal swelling Abdominal wall abscess	ERCP, Stone retrieval, sphincterotomy
5.	Illah et al. ⁹	1	F	80 year	Type- 3	HTN	Pain abdomen Abdominal wall abscess	Cholecystectomy
6.	Carragher et al. ¹⁰	1	F	67 year	Type- 3		Abdominal swelling Abdominal wall abscess	ERCP, Stone retrieval, sphincterotomy
7.	Peer et al. ¹¹	2	M- 2		Type 2-2		Pain abdomen, fever Liver abscess	Cholecystectomy
8.	Gobel et al. ¹²	1	F	30 year	Type 2	CKD on dialysis, HTN	Fever, pain abdomen Liver abscess	Laparotomy with cholecystectomy
9.	Yagnik ¹³	1	F	45 year	Type 1		Peritonitis	Laparotomy with cholecystectomy
10.	Goel and Ganguly ¹⁴	1	M	14 year	Type 1		Pain abdomen, fever	Laparotomy with cholecystectomy
11.	Kim et al. ¹⁵	1	F	70 year	Type 1	DM	Pain abdomen, fever	Cholecystectomy
12.	Alvi et al. ¹⁶	1	M	51 year	Type 1		Pain abdomen	Cholecystectomy
13.	Khan et al. ¹⁷	1	F	70 year	Type 2		Pain abdomen, Fever	Cholecystectomy
14.	Chiapponi et al. ¹⁸	1	M	49 year	Type 1	Alcoholic liver cirrhosis	Pain abdomen, fever, vomiting	Laparotomy with cholecystectomy
15.	Jethwani et al. ¹⁹	2	M-2	70 year 58 year	Type 1-2		Pain abdomen, fever	Cholecystectomy Cholecystostomy
16.	Arora et al. ²⁰	2	M F	45 year 45 year	Type 1-2	HTN, DM, HTN, COPD	Diffuse pain abdomen	Laparotomy with cholecystectomy
17.	Karkera et al. ²¹	2	M-2	11 year	Type 1-2		Pain abdomen	Cholecystectomy
18.	Konno et al. ²²	2	M-2	60 year 57 year	Type 2 - 2	DM,HTN	Pain abdomen	Cholecystectomy
19.	Jain et al. ²³	14	M-4 F-10	Mean-65 year	Type 1-6 Type 2-8 Type 3-0	DM, HTN, COPD	Pain abdomen, fever, vomiting	Cholecystectomy- 9 Drainage- 5
20.	Derici et al. ²⁴	16	M-10 F-6	69 year mean	Type 1-7 Type 2-7 Type 3-2	DM, HTN, COPD	Pain abdomen, fever, vomiting	Cholecystectomy
21.	Morris et al. ²⁵	17	M-7 F-10	48 year mean	Type 1-1 Type 2-14 Type 3-2	DM,HTN	Pain abdomen, fever, vomiting	Cholecystectomy
22.	Nandyala et al. ²⁶	18	M-11 F-7	+	Type 1-15 Type 2-3 Type 3-0	DM, HTN	Pain abdomen, fever	3-Cholecystectomy 11-Partial Cholecystectomy 4-Cholecystostomy
23.	Date et al. ²⁷	19	M-10 F-9	71 year mean	Type 1-9 Type 2-9 Type 3-1	DM, HTN, COPD	Pain abdomen, fever, vomiting	Cholecystectomy

(Contd...)

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S. No	Study	No. of cases	Sex	Age/ mean age	Type of perforation	Comorbidities	Presentation	Treatment
24.	Gunasekaran et al. ²⁸	32	M-13 F-19	56 year mean	Type 1-14 Type 2-12 Type 3-6	DM, HTN	Pain abdomen, fever, vomiting	23-Cholecystectomy 5-Drainage followed by delayed cholecystectomy 2-Cholecystostomy
25.	Ergul and Gozetlik ²⁹	37	M-20 F-17	64 year mean	Type 1-12 Type 2-21 Type 3-4	DM, HTN, COPD	Pain abdomen, fever, vomiting	Cholecystectomy
26.	Present study	16	M-10 F-6	45.5 year mean	Type 1-5 Type 2-7 Type 3-4	DM, HTN	Pain abdomen, fever	Cholecystectomy 6-Emergency 10- Elective

DISCUSSION

GBP can be traumatic, iatrogenic, or idiopathic. Infections, malignancy, trauma, drugs (e.g., corticosteroids) and systemic diseases such as diabetes mellitus and atherosclerotic heart disease are common predisposing factors.¹⁷ GBP is well-known, although unusual complication, in enteric fever.³⁰

The review of literature done by our reports of 176 cases of GBP. Out of this type 1 is 75 (42.6%) cases, type 2-80 (45.5%) and type 3-21(11.9%) cases. In our series also most cases were of type 2 GBP followed by type 1 and type 3, respectively. The male to female ratio in these studies is comparable, and there is no explained dominance of one over the other gender. The age group commonly affected is as seen in our review and our series is old age group, i.e., above 45 years age group. But, it has also been seen in young age and pediatric age group.^{10,16}

The mechanism of three types of perforation can be explained by the following mechanisms:

When the gallbladder is perforated at the fundus, it results in generalized peritonitis (type 1). If the perforation site is other than the fundus, it is easily sealed by the omentum or the intestines and the condition remains limited to the right hypochondrium with the formation of a plastrone and pericholecystic fluid or abscess (type 2). The fistulous tract forms from the gradual erosion of the chronically inflamed and densely adherent wall of the gallbladder and stomach. The other etiological factors are peptic ulcer, iatrogenic/trauma, and malignancy.^{31,32}

In atypical presentation like abdominal wall abscess or liver abscess- the process of gallbladder perforation and abscess formation starts with a stone obstructing the cystic duct. It causes a rise in pressure in the gallbladder leading to ischemic necrosis and perforation in the region of the fundus. The inflammation becomes walled off and localized pericholecystic abscess forms. The abscess may resolve, perforate into an adjacent viscus or penetrate the abdominal wall leading to parietal wall swelling. This stage of parietal wall abscess is often missed and patients present with cholecystocutaneous fistula due to external rupture of the abscess.^{9,33}

The patients of GBP present commonly with pain abdomen, fever, and vomiting. These features are commonly shared by different abdominal conditions (cholecystitis, pancreatitis, cholangitis, GBP, etc.); hence, it is difficult to diagnose this condition at once. Radiological confirmation of the diagnosis is required, especially in cases of type II and III perforation. The atypical presentations of GBP like abdominal wall abscess as in our series and liver abscess has been reported in the literature⁵⁻¹² which can perplex the clinician due to its unusual presentation.

In the guidelines published by the Surgical Infection Society of North America (SIS) and Infectious Disease Society of America (IDSA), antimicrobial therapy for secondary peritonitis should include an agent or a combination of agents with activity against both aerobic and anaerobic bacteria.³⁴⁻³⁶ The antimicrobial of choice should be against both gram-negative bacteria (e.g., *E. coli*) and anaerobic bacteria (e.g., *B. fragilis*). Either single-drug therapy with a broad-spectrum cephalosporin, or beta-lactam/ beta-lactamase inhibitor combination, or combination therapy with agents against aerobes and anaerobes, have proven effectiveness in treating community-acquired intra-abdominal infection of mild-to-moderate severity. The Surviving Sepsis Campaign (SSC) recommended that intravenous antibiotics should be started during the first 6 hours from onset of presentation to reduce mortality associated with severe sepsis.

CONCLUSION

GBP though a rare complication of cholecystitis with high morbidity and mortality, has no pathognomic features and is often misdiagnosed or late diagnosed owing to its similarity to other abdominal conditions in early phases. Also, the various modes of its presentation may perplex the clinician. The early assessment of the situation is required which requires experience and expertise of the surgeon. An early administration of antibiotics and surgical treatment may decrease overall morbidity and mortality associated with intraabdominal infection. Nowadays, the majority of cases can be managed with improved diagnostic means and therapeutic modalities (endoscopic, laparoscopic, endostaplers).

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