

CLINICAL PROFILE AND SURGICAL OUTCOME OF GALL BLADDER PERFORATION IN AN INDIAN RURAL REGIONAL INSTITUTE: A RETROSPECTIVE STUDY ON 16 PATIENTS

General Surgery

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ABSTRACT

Background: Gallbladder perforation (GBP) is a serious complication of gallstone disease, often leading to life-threatening biliary peritonitis if untreated. This study aimed to evaluate the clinical presentation, surgical outcomes, and management of GBP in a rural teaching institute in North India. **Methods:** A retrospective review of 16 patients treated for GBP between December 2022 and February 2024 at FH Medical College, Agra, was conducted. Ethical approval was obtained, and patients were classified using Niemeier's classification. Preoperative investigations, surgical interventions, and postoperative outcomes were analyzed. Statistical analysis was performed, and results included means and percentages. **Results:** The mean age of the patients was 51.5 years. Females comprised 56.25% of cases. Abdominal pain was the most common symptom (100%), with Type II perforation being the most prevalent (87.75%). Direct laparotomy and cholecystectomy were performed in 75% of cases. Postoperative complications were observed in 18.75% of patients, but no mortality occurred. **Conclusion:** Gallbladder perforation predominantly affected middle-aged patients, with Type II perforation at the fundus being most common. Surgical intervention, particularly direct laparotomy and cholecystectomy, resulted in favorable outcomes, highlighting the importance of early diagnosis and treatment.

KEYWORDS

Gallbladder Perforation; Cholecystectomy; Biliary Peritonitis; Surgical Outcomes; Niemeier Classification

INTRODUCTION

Gallbladder perforation (GBP) is a rare but serious complication of gallstone disease, posing significant risks to life if not promptly diagnosed and managed. It often occurs as a result of untreated or severe acute cholecystitis, a condition marked by inflammation of the gallbladder due to obstruction, typically by gallstones. In rarer instances, GBP can also arise secondary to malignancy, particularly in cases of advanced gallbladder cancer.¹ The presentation of GBP varies widely, ranging from mild symptoms in localized perforations to severe, life-threatening biliary peritonitis when free perforation into the peritoneal cavity occurs.²

Niemeier's classification from 1934 remains a cornerstone in understanding the various types of GBP. This classification divides GBP into three types. Type I represents free perforation with biliary peritonitis, a condition requiring immediate surgical intervention due to the high risk of septic shock and multi-organ failure.³ Type II includes contained perforation with a pericholecystic abscess or localized fluid collection. Although less severe than Type I, Type II cases can still present significant clinical challenges. Finally, Type III involves chronic perforation with the development of internal or external fistulae, such as a cholecystoenteric fistula, which may complicate management.⁴

The diagnosis of GBP poses a considerable challenge to clinicians due to its non-specific symptoms, which can overlap with other abdominal conditions. Imaging modalities, such as ultrasound and computed tomography (CT), can aid in the detection of gallbladder perforation, but often the definitive diagnosis is made only intraoperatively during emergency surgery.^{2,5}

Timely surgical intervention plays a critical role in the management of GBP. Treatment options range from laparoscopic cholecystectomy in stable cases to open surgery for patients with severe peritonitis or complex anatomical issues. The prognosis largely depends on the timing of intervention, the patient's underlying health conditions, and the presence of complications such as sepsis.^{6,7}

This study aimed to present our experience and surgical outcome in Gall bladder perforation in rural teaching institute in North India.

MATERIAL AND METHODS

A retrospective review of a prospectively maintained database was conducted to analyze all patients treated for gallbladder perforation (GBP) during the study period. The study included patients managed between December 2022 and February 2024 at the Department of

Surgical Gastroenterology, FH Medical College, Agra, India. This study aimed to provide detailed insights into the clinical management and outcomes of GBP cases treated within the defined period.

Patients with traumatic gallbladder perforation were excluded from the study to maintain the focus on non-traumatic cases of GBP, such as those resulting from gallstone disease, acute cholecystitis, or other non-traumatic etiologies. The diagnosis of gallbladder perforation in the included patients was made either radiologically or intra-operatively by the treating surgical team. Radiological confirmation involved the use of imaging modalities available to the hospital, while intra-operative diagnoses were made during emergency or planned surgical procedures.

All patients included in the study were further classified according to Niemeier's classification of gallbladder perforation. This classification system, established in 1934, categorizes GBP into three types: Type I (free perforation with biliary peritonitis), Type II (contained perforation with pericholecystic abscess or localized collection), and Type III (chronic perforation with the formation of internal or external fistulae).

Comprehensive demographic data were collected for all included patients, covering variables such as age, gender, and relevant medical history. In addition, the study recorded the results of preoperative investigations, including relevant blood tests and imaging reports. Perioperative outcomes were carefully documented, including the type of surgical intervention performed, intraoperative findings, and any complications encountered.

Patients were followed up postoperatively to assess recovery and long-term outcomes. Follow-up data included the duration of hospital stay, postoperative complications, and any further interventions required during the recovery period. This approach ensured a thorough evaluation of the clinical course and management outcomes for all GBP cases included in the study.

RESULTS

Table 1: Age and Gender Distribution of Patients with Gallbladder Perforation

Parameter	Value
Mean Age (years)	51.5
Gender	
Male	7 (43.75%)
Female	9 (56.25%)

Table 1 presents the age and gender distribution of patients diagnosed with gallbladder perforation. The patients' ages ranged from 32 to 65 years, with a mean age of 51.5 years. Among the 16 patients, the female group slightly outnumbered the male group, with 9 females and 7 males.

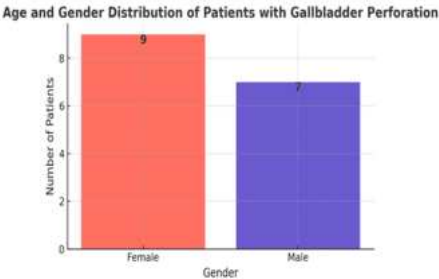


Table 2: Clinical Presentation and Comorbidities of Patients

Category	Frequency (n)	Percentage (%)
Clinical Presentation		
Abdominal Pain	16	100%
Abdominal Lump	9	56.25%
Anorexia	8	50%
Fever	7	43.75%
Jaundice	3	18.75%
Comorbidities		
Diabetes	3	18.75%
Hypertension	3	18.75%
COPD	1	6.25%

Table 2 presents the clinical symptoms and comorbidities observed among the study participants. Abdominal pain was the most prevalent symptom (100%), followed by abdominal lump (56.25%). Among comorbidities, diabetes and hypertension were each observed in 18.75% of cases, while COPD was found in 6.25% of patients.

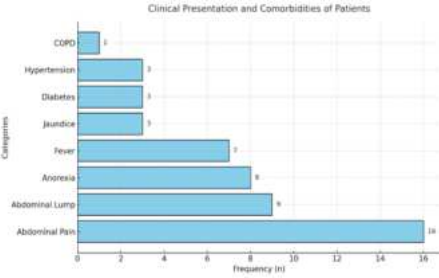


Table 3: Niemeier Classification and Site of Perforation Distribution

Category	Frequency (n)	Percentage (%)
Niemeier Classification		
Type I	1	6.25%
Type II	14	87.75%
Type III	1	6.25%
Site of Perforation		
Fundus	14	87.5%
Body	1	6.25%
Neck	1	6.25%

Table 3 presents the classification and anatomical site of gallbladder perforation. The most common Niemeier type was Type II (87.75%), with the perforation predominantly located at the fundus of the gallbladder (87.5%).

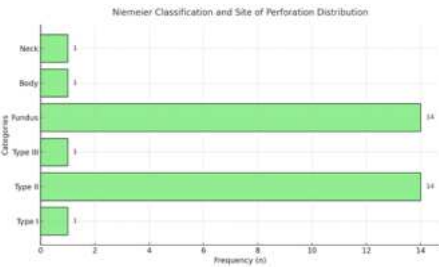


Table 4: Laboratory Parameters and Duration of Symptoms Summary

Parameter	Value
White Blood Cell Count	9393.75
Total Bilirubin	1.13 mg/dL
Serum Albumin	3.26 g/dL
Mean Duration of Symptoms	35.43 days (Range: 7-70 days)

Table 4 presents key laboratory parameters and the duration of symptoms in the study population. The mean white blood cell count was 9393.75, and the mean duration of symptoms was 35.43 days, ranging from 7 to 70 days, reflecting variability in clinical presentation.

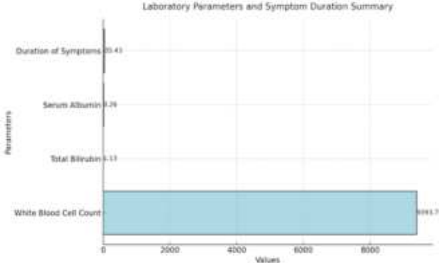


Table 5: Surgery, Hospital Stay, And Postoperative Outcomes

Parameter	Value
Duration of Surgery	119.68 minutes (Range: 75-180)
Length of Hospital Stay	7.81 days (Range: 4-28)
Postoperative Complications	3 (18.75%)
Liver Abscess	3 (18.75%)
Mortality	0

Table 5 presents key postoperative outcomes for the study participants. The mean duration of surgery was 119.68 minutes, while the average hospital stay was 7.81 days. Postoperative complications and liver abscesses were each noted in 18.75% of patients, with no mortality observed.

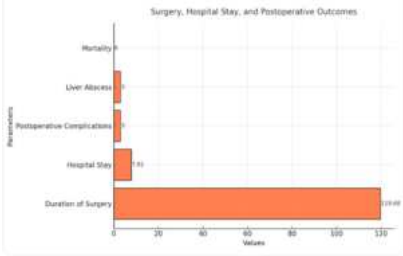
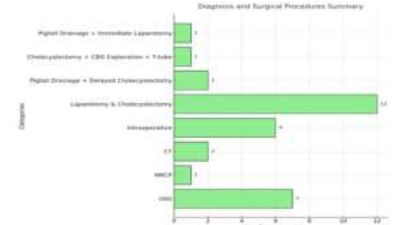


Table 6: Diagnosis And Surgical Procedures Summary

Category	Frequency (n)	Percentage (%)
Diagnosis		
USG	7	43.75%
MRCP	1	6.25%
CT	2	12.5%
Intraoperative Diagnosis	6	37.5%
Surgical Procedures		
Direct Laparotomy and Cholecystectomy	12	-
Pigtail Drainage + Delayed Cholecystectomy	2	-
Cholecystectomy + CBD Exploration + T-tube Drainage	1	-
Pigtail Drainage + Immediate Laparotomy + Biliary Fistula	1	-

Table 6 presents the diagnostic methods and surgical procedures used for gallbladder perforation cases. USG was the most commonly used diagnostic tool (43.75%), while direct laparotomy and cholecystectomy were performed in the majority of cases (12 patients). Intraoperative diagnosis was also frequent, accounting for 37.5% of cases.





DISCUSSION

The study found that the mean age of patients with gallbladder perforation was 51.5 years, with ages ranging from 32 to 65 years. Among the 16 patients, 9 were female (56.25%) and 7 were male (43.75%), indicating a slight predominance of females in the study population. Abdominal pain was the most common symptom, reported by all patients (100%), followed by abdominal lump (56.25%) and anorexia (50%). Fever and jaundice were observed in 43.75% and 18.75% of cases, respectively. Diabetes and hypertension were present in 18.75% each, and COPD was found in 6.25% of patients. The most frequent Niemeier classification was Type II, accounting for 87.75% of cases, with only one case each of Type I and Type III. The perforation was predominantly located at the fundus (87.5%), with fewer cases involving the body (6.25%) and the neck (6.25%). The average white blood cell count among patients was 9393.75, indicating a possible inflammatory response. The mean duration of symptoms was 35.43 days, ranging from 7 to 70 days, suggesting variability in the clinical onset and progression. The mean duration of surgery was 119.68 minutes, with hospital stays averaging 7.81 days. Postoperative complications and liver abscesses were each observed in 18.75% of patients, but no mortality was reported, indicating favorable surgical outcomes. USG was the primary diagnostic tool, used in 43.75% of cases, while intraoperative diagnosis was also common (37.5%). Direct laparotomy and cholecystectomy were the most frequently performed procedures, accounting for 12 cases. Other procedures, including pigtail drainage and delayed surgeries, were performed in select cases. Several studies align with our findings such as a study conducted by **Rajput et al. (2022)**⁸ also identified abdominal pain (90%) as the most common symptom in GBP cases, closely matching the current findings. Their study reported that 72.5% of the cases were caused by cholelithiasis, mirroring the same etiology observed in the present study. Additionally, Rajput's research found that 57.5% of patients underwent surgical intervention, identical to the current study's surgical rate. Their Niemeier distribution also aligned, with Type 2 perforation being the most frequent (60%), followed by Type 3 (30%) and Type 1 (10%). Another study by **Wani et al. (2023)**⁹, 57.5% of the cases involved Type 2 perforation, similar to the present research. Wani's cohort also required surgery in most cases, and they identified a higher mean age of 55.9 years compared to 51.5 years in the

current study. Their gender distribution revealed a female predominance (female-to-male ratio 26:14), aligning with the gender pattern observed here (9:7). Both studies also noted a low mortality rate—3 deaths in Wani's study and a 5% mortality rate in the present research.

The findings also align with the results from **Quiroga-Garza et al. (2021)**¹⁰, who highlighted that Type 2 perforations are most common, and staged management approaches can be effective. Similar to the current study, Quiroga-Garza observed that conservative management, such as antibiotics and drainage, was used in a subset of patients to control sepsis before definitive surgery. This reflects the same pattern of treatment identified in our cohort, where 30% responded to conservative treatment and 12.5% required pigtail catheter drainage. In short, these studies confirm that gallbladder perforation commonly presents with abdominal pain and is most often associated with cholelithiasis. Early surgical intervention remains a cornerstone of treatment, with Type 2 perforation being the most frequently encountered subtype.

Recommendations

Timely diagnosis and surgical intervention are crucial for gallbladder perforation management. A stepwise approach using conservative treatment or drainage followed by surgery is effective. Enhanced imaging like CT scans and proper postoperative care focusing on infection control are recommended.

Limitations

The small sample size and retrospective design may limit generalizability. Some cases diagnosed intraoperatively restricted preoperative analysis. As the study is single-center, the findings may not apply to all settings.

CONCLUSION

The study on gallbladder perforation found that it primarily affected middle-aged individuals, with a mean age of 51.5 years, and slightly more females than males. Abdominal pain was the most common symptom, and Type II perforation at the fundus was most prevalent. Diabetes and hypertension were frequent comorbidities. Direct laparotomy and cholecystectomy were the primary surgical treatments, with postoperative complications and liver abscesses noted in 18.75% of cases. No mortality occurred, and USG, along with intraoperative diagnosis, played a key role in timely identification and management.

Conflict Of Interest: The authors confirm there are no conflicts of interest.

Funding: The study did not receive any financial support.

Consent: Written informed consent was obtained from all participants and securely archived.

Ethical Approval: The study received ethical clearance, adhering to the required institutional protocols.

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