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Research Article

SURGICAL MANAGEMENT PATTERNS OF CARCINOMA GALLBLADDER: A RETROSPECTIVE ANALYSIS OF 28 CASES FROM A TERTIARY CARE CENTER IN NORTH-EAST INDIA

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ABSTRACT

Background: Gallbladder carcinoma (GBC) is an aggressive hepatobiliary malignancy with a disproportionately high incidence in northern and north-eastern India. Most patients present at an advanced, often unresectable stage, so surgical resection—when feasible—remains the only potentially curative treatment.

Aim: To describe the surgical management patterns of patients operated for carcinoma gallbladder at a tertiary care centre in North-East India over a three-year period.

Materials and Methods: A retrospective, single-department review of the operation theatre log register was performed for all patients undergoing surgery for histologically or radiologically diagnosed carcinoma gallbladder between January 2023 and December 2025. Demographic details, year of surgery, operating surgeon, and procedure performed were extracted and tabulated. Data were analysed descriptively.

Results: Twenty-eight patients underwent surgery for carcinoma gallbladder (2023: n=4; 2024: n=9; 2025: n=15), showing a rising year-on-year caseload. The cohort was predominantly female (21/28, 75%) with a mean age of 56.1 ± 12.0 years (range 29–76 years); the highest concentration of cases occurred in the sixth decade of life. Curative-intent resection (primary or completion radical cholecystectomy, with or without extended organ resection or bilio-enteric reconstruction) was achieved in 11 of 28 patients (39.3%). The remainder underwent simple/completion cholecystectomy without formal radical clearance (9, 32.1%), exploratory laparotomy with or without palliative bypass (4, 14.3%), diagnostic laparoscopy/ laparotomy (2, 7.1%), isolated palliative bypass (1, 3.6%), or simple open cholecystectomy (1, 3.6%). Two operating Surgeons performed the majority of procedures (82.1% and 17.9% of cases respectively).

Conclusion: Carcinoma gallbladder continues to present predominantly in an advanced or incidentallydetected form in this region, so that curative-intent resection was possible in fewer than two out of every five operated patients. A rising annual caseload, together with the frequency of incidental postcholecystectomy referrals, underscores the need for heightened preoperative suspicion, wider access to cross-sectional imaging, and structured referral pathways to high-volume hepatobiliary units.

KEYWORDS: Carcinoma Gallbladder, Radical Cholecystectomy, Completion Cholecystectomy, Palliative Surgery, Hepatobiliary Malignancy, North-East India, Retrospective Study.

Introduction

Gallbladder carcinoma (GBC) is the most common malignancy of the biliary tract and is notorious for its aggressive biology and poor overall prognosis[1,2]. India contributes disproportionately to the global burden of the disease, and within India the incidence is markedly higher in the northern, north-eastern, central, and eastern regions than in the southern and western parts of the country[13,14]. Age-standardised incidence rates for GBC among women in northern and north-eastern India have been reported to approach or exceed those of other recognised high-incidence areas of the world[13].

Unlike Western populations, where GBC typically presents in the seventh or eighth decade of life, Indian patients tend to present roughly a decade earlier, most often in the fifth and sixth decades[13,14]. Risk factors implicated in the region include chronic gallstone disease, chronic Salmonella typhi, environmental and dietary exposures, and lower socio-economic status[13]. Because the presenting symptoms of GBC are frequently nonspecific—mimicking uncomplicated biliary colic or chronic cholecystitis—a substantial proportion of cases are detected only incidentally, either on routine histopathological examination of a gallbladder removed for presumed benign disease, or at laparotomy for locally advanced, unresectable tumour[11].

Surgical resection remains the only treatment modality capable of offering long-term cure, but the extent of resection required is dictated by tumour stage: mucosal or muscularis-confined disease may be adequately treated by simple cholecystectomy, whereas tumours invading the perimuscular connective tissue or beyond generally require radical (extended) cholecystectomy with hepatic wedge resection and regional lymphadenectomy, occasionally combined with bile duct excision and bilio-enteric reconstruction[10,12,17,18]. When disease is found to be locally advanced or metastatic at exploration, only palliative measures—biliary or gastric bypass, or simple exploration and closure—can be offered[7,9].

Published Indian and North-East Indian series consistently describe a preponderance of advanced-stage disease at presentation, with curative resection feasible in a minority of operated patients [8,13,14]. This retrospective study was undertaken to characterise the surgical management patterns of patients treated for carcinoma gallbladder at a tertiary care surgical department in North-East India over a recent three-year period, with particular attention to the proportion of patients in whom curative-intent resection was achievable, the pattern of incidentally-detected disease, and trends in caseload over time.

Materials and Methods

Study Design and Setting

This was a retrospective, descriptive, single-department study conducted in the Department of General Surgery of a tertiary care hospital in North-East India.

Study Period

January 2023 to December 2025 (36 months).

Data Source

Data were extracted from the departmental operation theatre (OT) log register, in which every case is recorded prospectively at the time of surgery with the date of operation, patient identification (name and unique hospital identification/UHID number, redacted for the purposes of this manuscript and analysis), pre- or intra-operative diagnosis, procedure performed, and name of the operating surgeon. Entries were transcribed and cross-checked against UHID numbers to identify and resolve duplicate or ambiguous entries before analysis (see Limitations).

Sample Size

Twenty-eight consecutive surgical encounters for carcinoma gallbladder recorded in the OT log register during the study period were identified.

Inclusion Criteria

- All patients with a histologically or radiologically confirmed diagnosis of carcinoma gallbladder recorded in the OT log register.
- Patients who underwent a surgical procedure (curative, staging/diagnostic, or palliative) for this diagnosis during the study period.

Exclusion Criteria

- Incomplete or illegible OT log entries in which the diagnosis or procedure could not be reliably ascertained.
- Patients managed entirely non-surgically (e.g., palliative chemotherapy or best supportive care without any operative intervention).

Data Variables Collected

Date of surgery, patient age and sex, year of surgery, diagnosis as recorded (including whether the procedure followed a prior cholecystectomy performed elsewhere, or followed neoadjuvant chemotherapy), the surgical procedure performed, and the identity of the primary operating surgeon (reported here as Surgeon A and Surgeon B to preserve anonymity).

Statistical Analysis

Data were entered into a spreadsheet and analysed using descriptive statistics. Continuous variables (age) are presented as mean ± standard deviation and range; categorical variables (sex, year of surgery, procedure category, operating surgeon) are presented as frequencies and percentages. No formal inferential statistical testing was performed given the small, single-centre, descriptive nature of the dataset.

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Ethical Considerations

Institutional Ethics Committee approval was obtained for this retrospective review. Given the retrospective, de-identified nature of data collection, the requirement for individual patient consent was waived by the committee. All patient names and full identification numbers used during data extraction have been removed from this manuscript and replaced with sequential, non-identifying study numbers, in keeping with ICMJE recommendations on patient confidentiality in published case series.

Results

A total of 28 surgical encounters for carcinoma gallbladder were recorded during the 36-month study period.

Year-wise Distribution of Cases

Table 1: Year-wise distribution of surgically managed carcinoma gallbladder cases (n = 28)

Year	Number of Patients	Percentage
2023	4	14.3%
2024	9	32.1%
2025	15	53.6%
Total	28	100%

The caseload of surgically managed carcinoma gallbladder in this department increased progressively over the study period, more than tripling from 4 cases in 2023 to 15 cases in 2025 (Table 1, Figure 1). This trend may reflect improved case ascertainment, a genuine rise in regional incidence, or increasing referral of GBC cases to this unit, and cannot be distinguished from the available data alone.

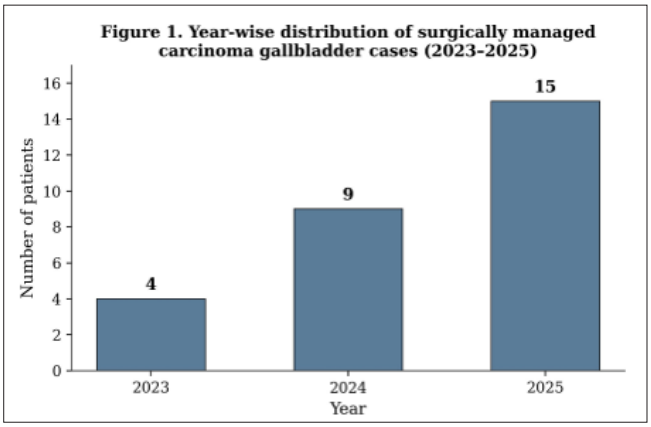

Figure 1.Year-wise distribution of surgically managed carcinoma gallbladder cases (2023–2025)

Demographic Profile

Table 2: Demographic characteristics of the study cohort (n = 28)

Variable	Value
Age range	29–76 years
Mean age ± SD	56.1 ± 12.0 years
Peak age decade	60–69 years (10 patients, 35.7%)
Female	21 (75.0%)
Male	7 (25.0%)
Female : Male ratio	3 : 1

The cohort showed a marked female predominance (75%), consistent with previously reported sex distributions for GBC in Indian populations. The peak decade of presentation was 60–69 years (10/28, 35.7%), with 18 of 28 patients (64.3%) falling within the broader 50–69-year band; the youngest patient was 29 years old and the oldest 76 years old (Table 2, Figure 2).

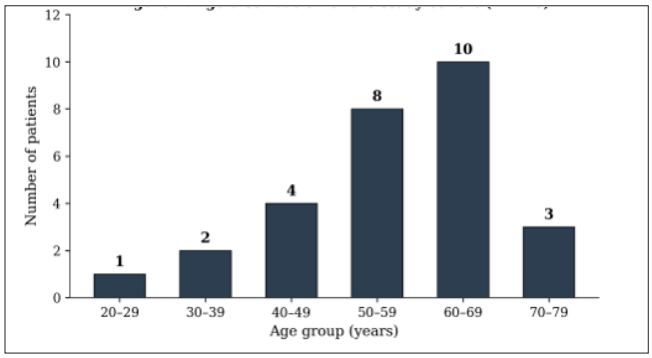

Figure 2. Age distribution of the study cohort by decade (n = 28)

Surgeon-wise Distribution

Table 3: Distribution of cases by operating surgeon

Surgeon	Number of Cases	Percentage
Surgeon A	23	82.1%
Surgeon B	5	17.9%
Total	28	100%

Surgical Procedures Performed

Table 4: Surgical procedures performed, by category (n = 28)

Procedure Category	Number (%)	Notes
Radical cholecystectomy (primary, curative intent)	8 (28.6%)	Includes cases extended with bile duct excision + hepaticojejunostomy, or multivisceral (colonic/ gastric) resection
Completion radical cholecystectomy	3 (10.7%)	Radical re-resection after an initial cholecystectomy performed elsewhere; incidental GBC
Completion cholecystectomy (extent of radicality not specified)	9 (32.1%)	Includes cases combined with portal dissection or gastrojejunostomy
Exploratory laparotomy ± palliative bypass	4 (14.3%)	Found unresectable at exploration; bypass performed where feasible
Diagnostic laparoscopy / laparotomy	2 (7.1%)	One case post neoadjuvant chemotherapy
Isolated palliative bypass (gastrojejunostomy)	1 (3.6%)	Performed for gastric outlet obstruction
Simple (non-radical) open cholecystectomy	1 (3.6%)	
Total	28 (100%)	

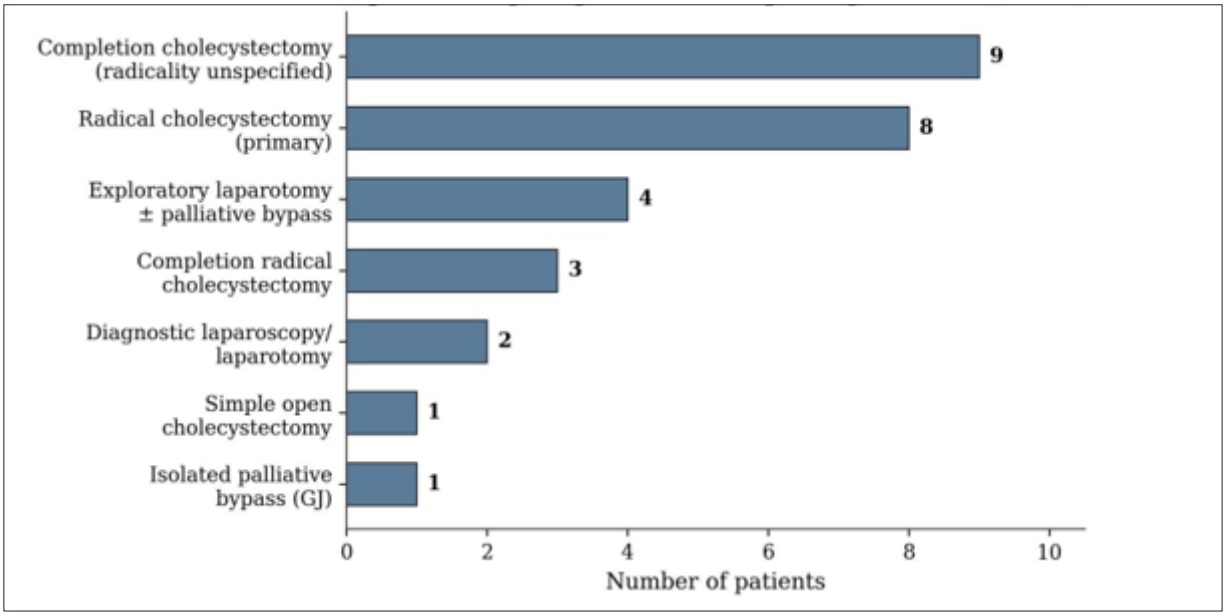

Figure 3.Surgical procedure categories performed (n = 28)

Curative-Intent versus Non-Curative Surgery

Combining the primary radical cholecystectomy and completion radical cholecystectomy groups, curativeintent resection was achieved in 11 of 28 patients (39.3%). The remaining 17 patients (60.7%) underwent surgery that was either explicitly palliative (bypass procedures, 5/28, 17.9% in total across categories), diagnostic/staging in intent (2/28, 7.1%), or a cholecystectomy of unspecified/limited radicality (10/28, 35.7%, combining the simple completion and simple open cholecystectomy groups). This pattern indicates that fewer than two in five surgically managed patients in this cohort were treated with curative intent, broadly in keeping with previously reported Indian series in which advanced-stage presentation limits the scope for curative surgery (Figure 4).

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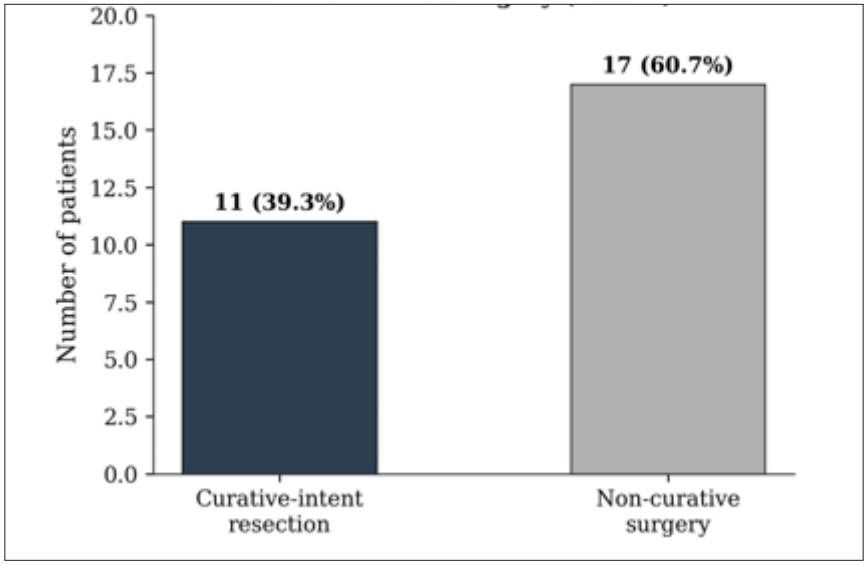

Figure 4.Curative-intent resection versus non-curative surgery (n = 28)

Incidentally Detected Gallbladder Cancer

At least 4 of 28 patients (14.3%) in this series underwent surgery for carcinoma gallbladder discovered incidentally after an initial cholecystectomy performed for presumed benign gallbladder disease, requiring a second, completion procedure (with or without formal radical clearance). One further patient underwent diagnostic laparoscopy after having received neoadjuvant chemotherapy for radiologically suspected, locally advanced disease. These findings highlight the dual pathways by which GBC enters surgical care in this setting: as a preoperatively suspected malignancy planned for primary radical surgery, and as an incidental histopathological finding necessitating a staged completion procedure.

Discussion

This retrospective series of 28 surgically managed carcinoma gallbladder patients from a tertiary care centre in North-East India adds to the growing body of literature describing the surgical burden of this disease in a recognised high-incidence region of the country[13,14,16]. Three features of this cohort merit particular comment: the rising annual caseload, the female-predominant, sixth-decade-peaking demographic profile, and the limited proportion of patients amenable to curative-intent resection.

The near four-fold rise in annual caseload from 2023 (n=4) to 2025 (n=15) mirrors trends reported from other high-incidence pockets of the Indo-Gangetic and north-eastern belt, where both a genuine rise in incidence and improving case ascertainment through wider availability of cross-sectional imaging and histopathological confirmation have been proposed as contributing factors[13,15,16]. Without populationlevel incidence data for the catchment area of this hospital, the relative contribution of a true epidemiological rise versus a referral or ascertainment effect cannot be determined from this series alone.

The demographic profile observed here—marked female predominance and a peak incidence in the sixth decade—closely parallels previously described Indian cohorts, in which GBC characteristically affects patients roughly a decade earlier than in Western populations[13,14]. The youngest patient in this series was only 29 years old, a reminder that GBC, although rare in young adults, cannot be excluded purely on the basis of age when gallbladder pathology is being evaluated.

Curative-intent resection was achieved in only 39.3% of patients in this cohort, a figure that is consistent with, if marginally more favourable than, the proportion typically quoted in Indian surgical series, where advanced stage at presentation is repeatedly identified as the principal barrier to cure[8,13,14]. A substantial minority of patients (14.3%) reached this department only after an initial cholecystectomy performed elsewhere had incidentally revealed malignancy, reflecting a broader, internationally recognised pattern in which routine histopathological examination of cholecystectomy specimens remains an important, if imperfect, safety net for the detection of early GBC[11]. Current expert consensus recommends that all incidentally discovered GBC beyond the mucosal (T1a) stage be referred promptly for completion radical resection, given the demonstrated survival benefit of adequate re-resection with hepatic and nodal clearance[10,11,17].

The proportion of patients who underwent exploratory laparotomy alone or with palliative bypass (14.3%), together with those who received an isolated palliative gastrojejunostomy for gastric outlet obstruction, underscores the continued burden of locally advanced, unresectable disease at first surgical encounter in this population. Improved preoperative staging with contrast-enhanced computed tomography and magnetic resonance cholangiopancreatography has been advocated as a means of better selecting patients for exploration versus upfront

palliation, thereby reducing the morbidity associated with non-therapeutic laparotomy[5,12]. Adoption of the AJCC 8th edition staging system, which refined both the T2 substaging and nodal classification for GBC, may further assist in stratifying operative candidates in future prospective work from this unit[17,18].

Taken together, these findings reinforce the case for heightened clinical suspicion for GBC in patients from this region presenting with gallstone disease, particularly those in the fifth and sixth decades of life, alongside systematic histopathological examination of all cholecystectomy specimens and a low threshold for cross-sectional imaging when intraoperative findings are equivocal.

Limitations

This study has several important limitations that should be considered when interpreting its findings and that the authors should address, where possible, before submission:

1. Source and completeness of data: All data were extracted from a handwritten operation theatre log register rather than structured electronic medical records. Several entries were only partially legible, and diagnostic and procedural terminology was not applied with complete consistency (for example, the distinction between "completion cholecystectomy" performed with versus without formal radical/oncological clearance was not explicitly recorded for every patient and has been inferred here; this categorisation should be verified against operative notes and histopathology reports before submission).
2. Absence of outcome data: The log register captures the procedure performed but not postoperative course, complications, resection margin status, final histopathological stage, adjuvant therapy, recurrence, or survival. Consequently, this study reports surgical management patterns only and cannot comment on oncological outcomes; the authors should not present this as an outcomes study, and follow-up data should be sought from case records, telephonic follow-up, or the hospital cancer registry if a future revision is to include survival analysis.
3. Absence of staging data: Preoperative and pathological TNM stage were not available in the log register and could not be reported. Without staging data, the relationship between procedure performed and disease extent cannot be formally analysed.
4. Single-centre, retrospective, descriptive design: Findings from a single department over a three-year period may not be generalisable to other centres or regions, and the retrospective design is subject to selection and information bias inherent to log-register-based case ascertainment.
5. Small sample size: With only 28 patients, subgroup comparisons (for example, by year, procedure, or surgeon) are descriptive only and are not powered for statistical inference.

Conclusion

In this three-year surgical series from a tertiary care centre in North-East India, carcinoma gallbladder continued to present predominantly in women in their sixth decade of life, with a caseload that rose substantially year on year. Curative-intent resection was achievable in fewer than two out of every five operated patients, and a meaningful proportion of cases were detected only incidentally after cholecystectomy performed for presumed benign disease. These findings support continued efforts toward earlier diagnosis—through heightened clinical suspicion in gallstone disease, routine histopathological examination of cholecystectomy specimens, and timely referral to high-volume hepatobiliary surgical units—as the most realistic route to improving the proportion of patients eligible for curative surgery in this high-incidence region. Prospective data collection incorporating staging, margin status, and follow-up is recommended to allow future analysis of oncological outcomes.

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None.

Conflicts of Interest

None declared.

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