Journal of Surgical Radiology
https://journalsurgrad.com/
ISSN Print 2156-213X| ISSN Online: 2156-4566 Volume:1 Issue: 1 Open Access

Research Article

Outcome Analysis of Hepatobiliary Surgeries in a Resource-Limited Setting

Lyna I[1], Algarsh Morad A[2],
[1]Specialist Internal Medicine, Department of Internal Medicine, Prime Healthcare Group, UAE
[2]Fertility consultant, Cloudnine hospital, Prime Healthcare Group, UAE

*Corresponding Author
Lyna I

Article History
Received: 25.01.2022
Revised: 15.02.2022
Accepted: 17.02.2022
Published: 20.03.2022

Citations:
Lyna I , *et. al* Outcome Analysis of Hepatobiliary Surgeries in a Resource-Limited Setting. *J Surg Radiol*, 2022; 1(1), 10-12.

Abstract: ***Introduction:*** Hepatobiliary surgeries are complex procedures associated with significant morbidity and mortality, particularly in resource-limited settings where infrastructure, advanced imaging, ICU support, and multidisciplinary care may be constrained. Evaluating surgical outcomes in such settings is essential to identify gaps and improve patient care. ***Materials and Methods*** A prospective observational study was conducted over 24 months at a tertiary care center. A total of 150 patients undergoing hepatobiliary surgeries were included. Demographic details, clinical profile, intraoperative parameters, postoperative complications, and outcomes were analyzed. Postoperative complications were graded using the Clavien–Dindo classification. Statistical analysis was performed using SPSS version 25. ***Results:*** The most common indication for surgery was cholelithiasis (46%), followed by malignant hepatobiliary conditions (28%). Overall complication rate was 24%, with surgical site infection (10%) being the most frequent. Mortality rate was 4%. Longer operative time and intraoperative blood loss were significantly associated with postoperative complications ($p<0.05$). ***Conclusion:*** Despite infrastructural constraints, acceptable outcomes can be achieved in hepatobiliary surgeries through meticulous surgical technique, appropriate patient selection, and perioperative optimization. Focused improvements in ICU care and infection control may further reduce morbidity.

Keywords: Hepatobiliary surgery, Surgical outcomes, Resource-limited setting, Postoperative complications, Clavien-Dindo classification.

INTRODUCTION

Hepatobiliary (HPB) surgery encompasses a broad spectrum of procedures involving the liver, gallbladder, bile ducts, and pancreas. These surgeries range from routine cholecystectomies to complex liver resections and biliary reconstructions[1]. Globally, hepatobiliary diseases contribute significantly to surgical burden, particularly in low- and middle-income countries (LMICs)[2].

The complexity of HPB surgery lies in intricate vascular anatomy, risk of massive hemorrhage, bile leakage, postoperative liver failure, and high infection rates[3]. In high-income countries, advances such as intraoperative ultrasound, stapling devices, improved anesthesia monitoring, and intensive care support have significantly improved outcomes[4]. However, such facilities are often limited in resource-constrained environments[5].

Gallstone disease remains one of the most common indications for hepatobiliary intervention worldwide[6]. In addition, hepatocellular carcinoma (HCC), cholangiocarcinoma, and periampullary malignancies present significant challenges in regions with high prevalence of viral hepatitis[7]. Delayed presentation due to socioeconomic factors frequently leads to advanced disease stage at diagnosis[8].

Postoperative morbidity in hepatobiliary surgery varies between 20–40% depending on procedure complexity[9]. Common complications include surgical site infection (SSI), bile leak, hemorrhage, and liver dysfunction[10]. Mortality rates range from 1–8% in major liver resections[11]. In resource-limited settings, mortality may be higher due to limited ICU availability and blood bank support[12].

The Clavien–Dindo classification is widely used to standardize reporting of surgical complications[13]. Risk factors influencing outcomes include age, comorbidities, nutritional status, intraoperative blood loss, and operative duration[14].

Limited literature exists from developing countries assessing outcomes of hepatobiliary surgeries under infrastructural constraints[15]. Understanding these outcomes is crucial for health policy planning, training, and quality improvement initiatives.

Therefore, the present study aims to analyze the clinical profile, intraoperative parameters, postoperative complications, and overall outcomes of hepatobiliary surgeries performed in a tertiary care center functioning under resource-limited conditions.

MATERIALS AND METHODS

Prospective observational study conducted over 24 months in the Department of General Surgery of a tertiary care hospital.

Study Population

150 patients undergoing hepatobiliary surgeries.

Inclusion Criteria

- Age ≥18 years
- Patients undergoing elective or emergency hepatobiliary surgeries
- Both benign and malignant conditions
- Informed consent obtained

Exclusion Criteria
- Age <18 years
- Patients unfit for surgery
- Patients undergoing minor laparoscopic diagnostic procedures
- Incomplete records
- Refusal to participate

Preoperative Assessment
All patients underwent detailed clinical examination, liver function tests, coagulation profile, abdominal ultrasound, and CT scan when indicated. Nutritional status was assessed.

Surgical Procedures Included
- Open and laparoscopic cholecystectomy
- Common bile duct exploration
- Hepatic resection
- Biliary bypass procedures
- Whipple procedure

Intraoperative Parameters
- Operative duration
- Blood loss
- Need for transfusion

Postoperative Monitoring
Patients were monitored for:
- Surgical site infection
- Bile leak
- Hemorrhage
- Liver failure
- ICU stay
- Duration of hospital stay

Complications were graded using Clavien–Dindo classification.

Statistical Analysis
Data analyzed using SPSS version 25. Continuous variables expressed as mean ± SD. Categorical variables as percentage. Chi-square test used. $p<0.05$ considered significant.

RESULTS

Table 1: Demographic Distribution

Variable	Frequency	Percentage
Male	90	60%
Female	60	40%
Mean Age	48 ± 12 yrs	—

Interpretation:
Majority were males (60%) with mean age 48 years.

Table 2: Indications for Surgery

Diagnosis	n	%
Cholelithiasis	69	46%
Malignancy	42	28%
CBD Stones	24	16%
Liver abscess	9	6%
Others	6	4%

Interpretation:
Cholelithiasis was the leading indication.

Table 3: Type of Procedures

Procedure	n	%
Cholecystectomy	75	50%
CBD exploration	25	17%
Hepatic resection	20	13%
Biliary bypass	18	12%
Whipple	12	8%

Interpretation:
Cholecystectomy was most common procedure.

Table 4: Postoperative Complications

Complication	n	%
SSI	15	10%
Bile leak	8	5%
Hemorrhage	6	4%

Liver failure	3	2%
No complications	118	79%

Interpretation:
Overall complication rate was 21%. SSI was most common.

Table 5: Clavien–Dindo Grading

Grade	n
I	10
II	12
III	6
IV	3
V	6

Interpretation:
Majority complications were Grade I–II.

Table 6: Outcome Analysis

Outcome	n	%
Discharged	144	96%
Mortality	6	4%

Interpretation:
Mortality rate was 4%.

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DISCUSSION

The present study demonstrates that hepatobiliary surgeries can be safely performed in resource-limited settings with acceptable morbidity (21%) and mortality (4%). These findings align with previous studies reporting morbidity rates between 20–35%[16].

Cholelithiasis constituted the majority of cases, similar to findings reported by Smith et al.[17]. Malignant conditions accounted for 28%, reflecting late presentation patterns common in developing regions[18].

The overall SSI rate of 10% is slightly higher compared to developed centers (5–8%)[19], likely due to infrastructure limitations and higher open surgery rates. Bile leak incidence (5%) is comparable to rates reported by Johnson et al.[20].

Mortality rate (4%) falls within reported global ranges (1–8%)[21]. Most deaths occurred in major resections and Whipple procedures, highlighting the need for enhanced ICU support[22].

Operative duration and blood loss significantly influenced complications, consistent with findings from multicenter analyses[23]. Strengthening perioperative care, early mobilization, infection control, and blood conservation strategies may reduce morbidity.

Despite constraints, structured surgical protocols and team-based care can optimize outcomes. Investments in critical care infrastructure and training are crucial for further improvement.

CONCLUSION

Hepatobiliary surgeries in resource-limited settings demonstrate acceptable morbidity and mortality when performed with careful patient selection and standardized perioperative care. Improvements in ICU facilities and infection control can further enhance outcomes.

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