



Original Article

## Clinical Profile, Etiological Spectrum, Imaging Work-up, and Surgical Management of Biliary Obstruction: A Hospital-Based Observational Study

Dr. Mounika Thommandru<sup>1</sup>, Dr. Batthula Ramappa Sandeep<sup>2</sup>, Dr. Ambula Anusha<sup>3</sup>

<sup>1</sup>Assistant Professor, Department of General Surgery, Gandhi Medical College, Secunderabad, Telangana, India

<sup>2</sup>Assistant Professor, Department of General Surgery, Gandhi Medical College, Secunderabad, Telangana, India

<sup>3</sup>Assistant professor, Department of General Surgery, Government Medical College, Sangareddy, Telangana, India

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### Corresponding Author:

**Dr. Mounika Thommandru**

Assistant Professor, Department of General Surgery, Gandhi Medical College, Secunderabad, Telangana, India.

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### ABSTRACT

**Background:** Biliary obstruction is a frequent surgical problem with diverse benign and malignant etiologies. Early recognition of the level and cause of obstruction and timely decompression are central to preventing cholangitis, hepatic dysfunction, and procedure-related morbidity.

**Objectives:** To describe the clinical profile and etiological spectrum of biliary obstruction, assess the imaging work-up used for localization and etiological diagnosis, and summarize operative management in a tertiary care teaching hospital.

**Methods:** A hospital-based clinical study was conducted among adult patients diagnosed with biliary obstruction and managed in the Department of General Surgery of a tertiary care teaching hospital over a 25-month period. Demographic details, presenting symptoms, examination findings, laboratory abnormalities, imaging results (ultrasonography with selective CT, MRCP, and ERCP/upper endoscopy), final diagnosis, and procedures performed were recorded using a structured proforma and summarized descriptively.

**Results:** Forty-five patients were included (23 males, 22 females), with highest frequency in the fifth and sixth decades. Jaundice was the commonest presenting symptom, followed by abdominal pain and pruritus. Malignant obstruction predominated; periampullary carcinoma and carcinoma head of pancreas together constituted more than half of diagnoses. Choledocholithiasis was the major benign cause. Curative resection was performed in selected periampullary tumors, while benign disease and biliary injuries/strictures were managed by duct exploration or biliary-enteric reconstruction. Palliative bypass or endoscopic decompression was used for unresectable malignancy.

**Conclusion:** In this cohort, malignant disease was the leading cause of biliary obstruction, emphasizing the need for systematic imaging-based localization and early stratification for resection versus palliation. Biliary-enteric anastomosis remained the principal reconstructive option for strictures, injuries, and choledochal cysts, while choledocholithiasis required definitive duct clearance.

**Keywords:** Biliary obstruction; Obstructive jaundice; Choledocholithiasis; Periampullary carcinoma; MRCP; Hepaticojejunostomy.

### INTRODUCTION

Biliary obstruction represents impaired passage of bile from the intrahepatic ducts to the duodenum and typically manifests as cholestatic jaundice, pruritus, pale stools, and dark urine. In surgical practice, obstruction is broadly classified as benign or malignant; the distinction is clinically important because malignant obstruction demands rapid staging and decisions about resectability, whereas benign causes require definitive clearance of stones or durable reconstruction of strictures

[1,2]. Persistent cholestasis is not a benign biochemical abnormality: it predisposes to ascending cholangitis, malabsorption of fat-soluble vitamins, coagulopathy, and progressive hepatic dysfunction, all of which increase perioperative risk [3,4]. The etiological spectrum varies by geography, referral patterns, and access to endoscopic services. Choledocholithiasis remains a major benign cause worldwide, frequently occurring in the setting of gallstone disease and complicated by pancreatitis or cholangitis [1,2]. Other benign etiologies include iatrogenic bile duct injury or post-inflammatory strictures, Mirizzi syndrome, and congenital anomalies such as choledochal cysts, which predispose to recurrent cholangitis and long-term biliary complications if untreated. On the malignant side, periampullary carcinoma, carcinoma of the pancreatic head, distal cholangiocarcinoma, and gallbladder carcinoma commonly present with progressive jaundice and weight loss, and they often require multimodality imaging for anatomical definition and staging [8].

Imaging is central to modern evaluation. Abdominal ultrasonography is widely used as the initial test to establish biliary dilatation and suggest the level of obstruction, while MRCP provides noninvasive delineation of the biliary tree with high diagnostic performance for identifying obstruction and mapping ductal anatomy [5,7]. Endoscopic ultrasound and ERCP have complementary roles: EUS improves sensitivity for small ductal stones and periampullary lesions, while ERCP is primarily therapeutic for stone extraction, stenting, and biliary drainage in cholangitis or unresectable malignancy [6,9]. Current pathways therefore integrate these modalities according to clinical probability and severity, including early drainage in acute cholangitis.

Despite advances in imaging and endotherapy, patients in resource-constrained settings often present late and still undergo surgical exploration and biliary-enteric reconstruction for benign strictures, injuries, and selected malignant obstruction. Early stratification to curative resection, definitive stone clearance, or palliation is therefore crucial in day-to-day practice. The present study was undertaken to describe the clinicodemographic profile and etiological pattern of biliary obstruction in our setting, to summarize the imaging approach used for localization and etiological diagnosis, and to document the operative procedures performed, including reconstructive options for benign strictures and biliary injuries.

## **MATERIALS AND METHODS:**

**Study design and setting:** This hospital-based clinical (observational) study was conducted in the Department of General Surgery, Government General Hospital (Rangaraya Medical College), Kakinada, Andhra Pradesh, India, over a 25-month period (July 2013 to August 2015). Consecutive patients evaluated for suspected biliary obstruction and managed by the surgical unit during the study period were assessed for inclusion.

**Participants:** Adult patients with clinical and/or biochemical features suggestive of biliary obstruction and radiological evidence of biliary dilatation or an obstructing lesion were included. Patients with isolated hepatocellular jaundice without evidence of biliary obstruction were excluded. All enrolled patients underwent detailed clinical assessment and were followed through definitive management during the index admission.

**Clinical evaluation and laboratory work-up:** A structured proforma captured demographic variables, symptom profile (jaundice, abdominal pain, pruritus, fever, gastrointestinal symptoms, weight loss), relevant past history (including prior cholangitis) and comorbidities. General and abdominal examinations documented nutritional status, scratch marks, palpable gallbladder, hepatomegaly, and features of sepsis. Baseline investigations included complete blood count, liver function tests (total/direct bilirubin, alkaline phosphatase, transaminases), serum albumin, and coagulation profile. Vitamin K supplementation was administered preoperatively when clinically indicated to optimize coagulation parameters. Patients were optimized for 2–4 weeks before elective procedures when feasible, with intravenous fluids and monitoring during the perioperative period.

**Imaging and endoscopy protocol:** Abdominal ultrasonography was performed as the initial imaging test to confirm biliary dilatation and suggest level of obstruction [5,7]. Depending on clinical suspicion and sonographic findings, further evaluation included contrast-enhanced CT for suspected malignant obstruction and staging, and MRCP to delineate ductal anatomy, define strictures, and evaluate suspected biliary injury or choledochal cysts [5,7]. ERCP was used primarily for therapeutic purposes (e.g., biliary drainage/stenting and decompression in selected malignant cases or cholangitis) in accordance with guideline-based principles. Upper gastrointestinal endoscopy/duodenoscopy was performed in selected cases with suspected periampullary lesions to identify the site and obtain tissue when required.

**Operative management and outcomes:** The choice of procedure was individualized based on final diagnosis, anatomic level of obstruction, and resectability. Curative resection (pancreaticoduodenectomy) was offered for resectable periampullary tumors. Benign stone disease was managed by common bile duct exploration with duct clearance or biliary-enteric drainage when required. Benign strictures, choledochal cysts, and bile duct injuries were managed by biliary-enteric reconstruction (hepaticojejunostomy/segmental hepaticojejunostomy). For unresectable malignancy, palliative bypass (choledochojejunostomy or cholecystojejunostomy with/without gastrojejunostomy) or endoscopic decompression was performed [9]. Postoperative outcomes were assessed clinically, including relief of jaundice/pruritus and in-hospital events.

**Statistical analysis:** Data were summarized using descriptive statistics. Categorical variables were presented as frequencies and percentages, and continuous variables were summarized as ranges where appropriate.

**Ethical Approval:** Ethical approval was obtained from the Institutional Ethics Committee of Rangaraya Medical College, Kakinada, Andhra Pradesh, India, prior to initiation of the study. Written informed consent was taken from all participants before enrolment. Participant confidentiality was maintained by de-identifying study records and restricting access to data to the research team only. The study procedures were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

**RESULT:**

A total of 45 patients with biliary obstruction were evaluated during the study period. There was a near-equal sex distribution (23 males, 22 females). The highest case concentration was observed in the 41–50 and 51–60 year age groups (Table 1).

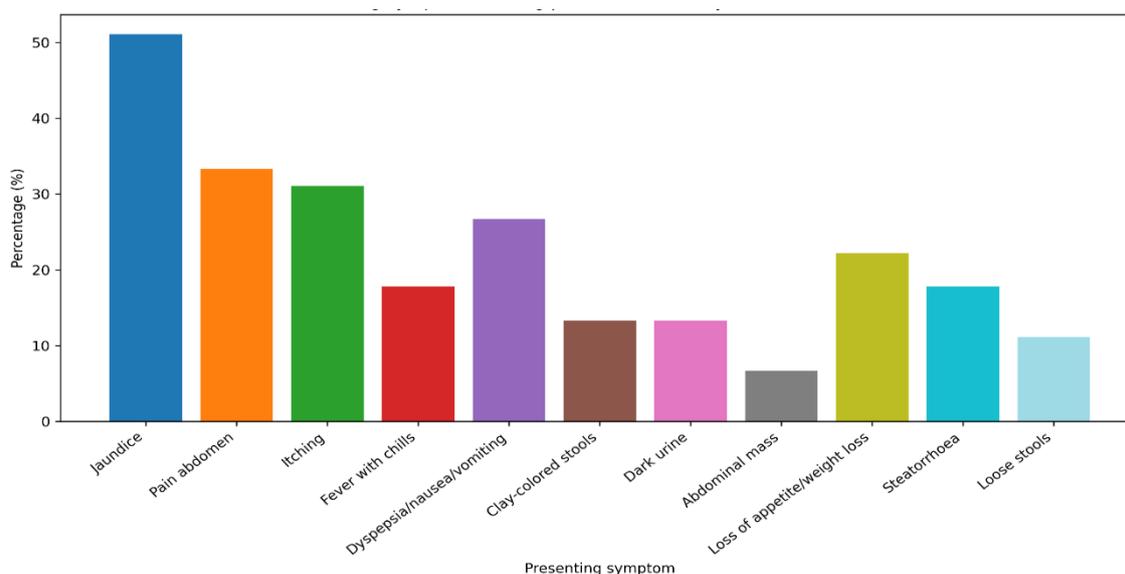
**Table 1. Age- and sex-wise distribution of patients (N = 45).**

Age group (years)	Male, n	Female, n	Total, n
21–30	1	3	4
31–40	4	6	10
41–50	7	7	14
51–60	6	5	11
61–70	4	1	5
71–80	1	0	1
Total	23	22	45

Jaundice was the most frequent presenting complaint (51.1%), followed by abdominal pain (33.3%) and pruritus (31.1%). Dyspepsia/nausea/vomiting (27.5%) and loss of appetite/weight (22.2%) were also common, while fever with chills (17.5%) and steatorrhea (17.5%) were less frequent (Table 2).

**Table 2. Presenting symptoms among patients with biliary obstruction (N = 45).**

Symptom	n	%
Jaundice	23	51.1
Pain abdomen	15	33.3
Itching	14	31.1
Fever with chills	8	17.8
Dyspepsia/nausea/vomiting	12	26.7
Clay-colored stools	6	13.3
Dark urine	6	13.3
Abdominal mass	3	6.7
Loss of appetite/weight loss	10	22.2
Steatorrhea	8	17.8
Loose stools	5	11.1



**Figure 1: Presenting Symptoms among patients with biliary obstruction**

On clinical examination, scratch marks suggestive of cholestatic pruritus were noted in 12 patients (26.7%). A palpable gallbladder was detected in 14 patients (31.1%), and hepatomegaly in 6 patients (13.3%). Previous attacks of cholangitis were documented in 4 patients (8.9%). Comorbid diabetes mellitus and hypertension were present in 8 (17.8%) and 3 (6.7%) patients, respectively; among men, 6 (26.1%) reported chronic alcohol use and 4 (17.4%) reported smoking (Table 3).

**Table 3. Clinical findings and comorbidities (N = 45).**

Finding / comorbidity	n	%
Scratch marks	12	26.7
Palpable gallbladder	14	31.1
Hepatomegaly	6	13.3
Previous attacks of cholangitis	4	8.9
Ill-nourished	5	11.1
Diabetes mellitus	8	17.8
Hypertension	3	6.7
Chronic alcohol use*	6	13.3
Smoking*	4	8.9

\*Alcohol use and smoking were recorded among male patients; percentages are shown using N = 45 for uniformity. Laboratory evaluation showed hemoglobin values ranging from 5–13 g/dL and total leukocyte counts from 5,000–11,000/ $\mu$ L. ESR elevation was documented in 4 patients (8.9%). Serum bilirubin elevation was recorded in 18 patients, with total bilirubin ranging from 4–25 mg/dL and a predominantly direct fraction. Serum albumin ranged from 2–4 g/dL. Alkaline phosphatase elevation was observed in 26 patients (57.8%), reaching up to approximately five times the upper limit of normal; transaminases were moderately elevated in 13 patients (28.9%) (Table 4).

**Table 4. Summary of key laboratory findings (N = 45).**

Parameter	Result
Hemoglobin (g/dL), range	5–13
Total leukocyte count (/ $\mu$ L), range	5,000–11,000
ESR raised, n (%)	4 (8.9)
Total bilirubin elevated, n (%)	18 (40.0)
Total bilirubin (mg/dL), range	4–25
Serum albumin (g/dL), range	2–4
Alkaline phosphatase elevated, n (%)	26 (57.8)
AST/ALT elevated, n (%)	13 (28.9)

Final etiological diagnosis demonstrated a predominance of malignant obstruction (60.0%). Periapillary carcinoma was the single most common diagnosis (35.6%), followed by choledocholithiasis (24.4%) and carcinoma head of pancreas (17.8%). Less frequent causes included choledochal cyst (6.7%), cholangiocarcinoma (4.4%), benign CBD stricture (4.4%), bile duct injury (4.4%), and gallbladder growth (2.2%) (Table 5).

**Table 5. Final etiological diagnosis (N = 45).**

Diagnosis	n	%
Periapillary carcinoma	16	35.6
Carcinoma head of pancreas	8	17.8
Cholangiocarcinoma	2	4.4
Choledocholithiasis	11	24.4
Choledochal cyst	3	6.7
CBD stricture	2	4.4
Bile duct injury	2	4.4
Gallbladder growth	1	2.2
Total	45	100.0

Thirty-eight patients underwent definitive operative procedures as summarized in Table 6. Pancreaticoduodenectomy (Whipple's procedure) was performed in 11 patients, primarily for resectable periapillary malignancy. Benign stone disease was managed by common bile duct exploration in 6 patients. Biliary-enteric bypass/reconstruction constituted a major operative workload, including hepaticojejunostomy (n=9), choledochojejunostomy (n=6), excision of choledochal cyst with hepaticojejunostomy (n=3), and cholecystojejunostomy (n=3). Patients with unresectable malignancy received palliative decompression and supportive/oncologic care as appropriate.

**Table 6. Operative procedures performed (N = 38).**

Procedure (N=38)	n	%
Whipple's procedure (pancreaticoduodenectomy)	11	28.9
Cholecystectomy with CBD exploration and T-tube drainage	6	15.8
Choledochojejunostomy	6	15.8
Hepaticojejunostomy	9	23.7
Choledochal cyst excision with hepaticojejunostomy	3	7.9
Cholecystojejunostomy (± gastrojejunostomy)	3	7.9
Total	38	100.0

Note: The remaining patients were managed non-operatively due to unresectable disease or received palliative decompression/supportive care.

## DISCUSSION

This hospital-based series highlights the heterogeneous etiological profile of biliary obstruction encountered in general surgical practice. Patients clustered predominantly in the fifth and sixth decades, consistent with the age distribution expected for both gallstone-related obstruction and periampullary–pancreatic malignancies. Nearly equal sex distribution in the overall cohort likely reflects the mixture of stone disease (often more frequent among women) and malignant obstruction (often more frequent among men in many populations), although local referral patterns and comorbidity profiles can modify these trends.

Clinically, jaundice and pruritus were frequent, and a subset had fever with chills, indicating biliary infection and the need for prompt decompression when cholangitis is suspected [3,4]. The proportion of patients with palpable gallbladder supports the classic observation that painless progressive jaundice with a distended gallbladder often points toward distal malignant obstruction rather than choledocholithiasis, while scratch marks reflect the burden of cholestatic pruritus. Weight loss and anorexia were also notable, aligning with the symptom constellation described for periampullary and pancreatic head tumors [14].

The imaging pathway in this study mirrors contemporary recommendations. Ultrasonography remains a practical first-line test to confirm biliary dilatation and guide subsequent evaluation [2]. When sonographic findings are nondiagnostic or malignancy is suspected, cross-sectional imaging provides additional anatomical detail and enables staging. MRCP offers an excellent noninvasive overview of the biliary tree and performs well for demonstrating obstruction, although sensitivity can decline for small stones and for distinguishing benign from malignant obstruction in some contexts [5,7]. Head-to-head evidence indicates that EUS can provide higher sensitivity than MRCP for choledocholithiasis, while maintaining comparable specificity, supporting its role where expertise and access exist [6]. ERCP is best reserved for therapeutic interventions, including stone extraction and stenting, given procedure-related adverse events and guideline emphasis on selective use.

Management in this cohort was diagnosis-driven. For choledocholithiasis, definitive duct clearance remains standard, using endoscopic or surgical approaches according to stone burden, anatomy, and resource availability [1,2]. Biliary-enteric reconstruction, particularly hepaticojejunostomy, formed the cornerstone for benign strictures, bile duct injuries, and choledochal cysts, consistent with guideline-endorsed principles favoring tension-free, well-vascularized anastomosis to the proximal bile duct [11,12]. Choledochal cyst excision with reconstruction is recommended to reduce recurrent cholangitis and long-term malignant risk [12,13]. For malignant obstruction, curative resection was feasible in selected periampullary tumors, while carcinoma head of pancreas was frequently unresectable at presentation—an issue well recognized globally due to late clinical presentation and early vascular involvement. In unresectable disease, endoscopic stenting and surgical bypass are both established palliative options; randomized and pooled evidence suggests similar initial success, with lower recurrent obstruction after surgical bypass at the cost of an operative intervention, supporting individualized decision-making based on performance status and expected survival [14]. Routine preoperative biliary drainage for resectable pancreatic head cancer increases complications and therefore should be selective rather than routine.

## LIMITATIONS

This single-center study included a modest sample and combined diverse benign and malignant etiologies, limiting disease-specific subgroup analyses. Follow-up beyond discharge was inconsistently documented, restricting assessment of long-term patency and survival after biliary-enteric reconstruction or palliation. Imaging and endoscopic pathways depended on

availability, so modality use was not uniform. Severity grading for cholangitis and formal nutritional assessment were not applied in all cases.

## CONCLUSION:

In this surgical cohort, malignant disease constituted the majority of biliary obstruction, with periampullary carcinoma as the leading diagnosis, followed by choledocholithiasis and carcinoma head of pancreas. Jaundice, abdominal pain, and pruritus were common presentations, while a palpable gallbladder and weight loss supported suspicion of distal malignant obstruction. An imaging pathway beginning with ultrasonography and supplemented by CT/MRCP enabled localization and etiological diagnosis, and ERCP served mainly as a therapeutic modality. Operative management was diagnosis-specific: pancreaticoduodenectomy for selected resectable periampullary tumors, duct exploration for stone disease, and biliary-enteric reconstruction for strictures, bile duct injury, and choledochal cysts, with bypass or endoscopic decompression for unresectable malignancy at presentation.

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