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Clinico-Radiological Profile of Obstructive Jaundice in a Tertiary Care Setting

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Abstract

Background: Obstructive jaundice (OJ) is a common surgical condition caused by bile flow obstruction, leading to conjugated hyperbilirubinemia and clinical features such as jaundice, pruritus, and clay-colored stools. The etiology varies from benign causes like choledocholithiasis to malignant conditions such as pancreatic or biliary tumors. Accurate diagnosis relies on a combination of clinical evaluation, biochemical tests, and imaging modalities, including ultrasound (USG), computed tomography (CT), magnetic resonance cholangiopancreatography (MRCP), and endoscopic retrograde cholangiopancreatography (ERCP). Early intervention is crucial to prevent complications and improve patient outcomes. This study aimed to evaluate the clinicoradiological profile of patients with obstructive jaundice in a tertiary care hospital.

Methods: A prospective observational study was conducted in the Department of General Surgery, GMC, Jammu, over one year. A total of 200 patients with OJ were enrolled after excluding those with medical jaundice or postoperative cases. Detailed clinical history, physical examination, and biochemical tests (bilirubin, liver enzymes, complete blood count, coagulation profile) were recorded. Radiological evaluation included USG, CT, and MRCP. Data were analyzed using SPSS v19.0, with descriptive statistics for quantitative variables and chi-square tests for associations ($p < 0.05$ considered significant).

Results: The mean age of participants was 45.05 ± 10.60 years, with a female predominance (80%) and most residing in urban areas (83.5%). Common comorbidities included diabetes (10%) and obesity (7%). The most frequently presenting symptoms were jaundice (22%),

vomiting (18.5%), and right hypochondrial pain with fever (18%). Laboratory findings revealed elevated total bilirubin (5.02 ± 3.03 mg/dL), direct bilirubin (3.18 ± 1.91 mg/dL), and alkaline phosphatase (227.98 ± 48.39 IU/L). Imaging results showed gallstones and biliary sludge as the leading causes (20% each on USG), while MRCP identified CBD stones in 66.2% of cases. CT scans revealed pancreatic head obstruction in 64.5% of evaluated patients.

Conclusion: Obstructive jaundice mainly affects middle-aged females, with choledocholithiasis as the primary cause. Ultrasound is the initial diagnostic tool, while MRCP and CT offer detailed assessments for complex cases.

Keywords: Biliary Obstruction, Choledocholithiasis, MRCP, Obstructive Jaundice.

Introduction

Obstructive jaundice (OJ) is a common clinical condition resulting from the obstruction of bile flow, leading to the accumulation of conjugated bilirubin in the bloodstream [1]. Jaundice, or hyperbilirubinemia, manifests as yellow discoloration of the sclera (scleral icterus) and skin when serum bilirubin levels exceed 3 mg/dL [2]. The condition arises from impaired bilirubin metabolism, which can be categorized into prehepatic, hepatic, and post-hepatic causes [3].

The prevalence of jaundice varies across age groups, with neonates and the elderly being particularly susceptible [4]. Approximately 20% of term neonates develop jaundice within the first week of life due to immature hepatic conjugation mechanisms [5]. In children, hepatitis A is a leading cause [6,7], whereas adults are more likely to develop OJ from choledocholithiasis, malignancies, or drug-induced liver injury. Gender differences also exist, with men more prone to alcoholic cirrhosis, chronic hepatitis B, and pancreatic malignancies, while women exhibit higher rates of gallstones, primary biliary cirrhosis, and gallbladder cancer [8,9].

The pathophysiology of Jaundice involves disruption in bilirubin metabolism at different levels. Prehepatic causes, such as hemolytic anemia, lead to excessive unconjugated bilirubin production [10]. Hepatic causes include viral hepatitis, drug toxicity, and cirrhosis, impairing bilirubin conjugation and excretion [11]. Post-hepatic obstruction, the hallmark of OJ, occurs due to biliary tract blockage, resulting in conjugated hyperbilirubinemia [12]. Common etiologies include choledocholithiasis, biliary strictures, and malignancies [13]. Intrahepatic cholestasis may arise from infections, drugs, or genetic disorders [14], whereas extrahepatic obstruction is often due to gallstones, tumors, or parasitic infestations [15].

Clinically, OJ presents with jaundice, pruritus, clay-colored stools, and dark urine [16]. Painful jaundice suggests cholangitis or gallstones, while painless progressive jaundice raises suspicion of malignancy [17]. Biochemical findings include elevated conjugated bilirubin, alkaline phosphatase, and γ-glutamyl transferase [18].

Diagnostic imaging plays a crucial role in identifying the level and cause of obstruction. Ultrasound is the first-line investigation, with 80% accuracy in detecting biliary dilation [19]. Computed tomography (CT) and magnetic resonance cholangiopancreatography (MRCP) provide detailed anatomical assessment, particularly in malignant obstructions [20-21]. Endoscopic retrograde cholangiopancreatography (ERCP) is both diagnostic and therapeutic, allowing stone extraction or stent placement [22].

Treatment depends on the underlying cause. Biliary stones are managed endoscopically, while malignancies may require surgical resection, stenting, or palliative drainage [23]. Despite advancements, OJ remains associated with significant morbidity and mortality, emphasizing the need for early diagnosis and intervention [24].

Given the paucity of local epidemiological data on OJ, this study aims to evaluate its clinicoradiological profile in a tertiary care setting, contributing to improved diagnostic and therapeutic strategies.

Material and Methods

The present observational study was conducted at the Post Graduate Department of General Surgery, Govt. Medical College, Jammu, for over one year, from August 2023 to July 2024, following approval from the Institutional Ethics Committee of the hospital. Written informed consent was obtained from all subjects after explaining the nature and purpose of the study to them.

A total of 200 patients suffering from obstructive jaundice meeting the inclusion criteria were included as per the following inclusion and exclusion criteria:

Inclusion Criteria

1. All the patients of obstructive jaundice of all sexes presenting to different units of the surgery department of GMC Jammu.

Exclusion Criteria

1. Patients not willing to participate in the study.
2. Patients presenting with medical jaundice.
3. Patients presenting with jaundice postoperatively or post intervention.

Methodology

Thorough history taking and clinical examination were conducted for each patient included in the study. Patients underwent various laboratory investigations, including liver function tests for total bilirubin, conjugated bilirubin, alkaline phosphatase, hepatic transaminases SGOT and SGPT, total serum proteins, and serum albumin. Other haematological investigations included haemoglobin estimation, total leukocyte count, differential leukocyte count, platelet count, prothrombin time, international normalized ratio (INR), blood urea, serum creatinine, and serum electrolytes. Patients also underwent radiological evaluation, such as abdominal ultrasound, to assess the abnormalities of intra and extra-hepatic biliary channels, the common bile duct, and the presence of causative factors like gallstones, tumours, lymph nodes, worms, or any abdominal mass. The data were recorded in a structured case record form.

Statistical analysis

The statistical analysis was done using the Statistical Package for Social Sciences (SPSS for Windows, Version 19.0). Qualitative variables were summarized using proportions and frequencies. Quantitative variables were summarized using mean and standard deviation. The chi-square test was used to find the association between dependent and independent variables. The level of significance for the present study was fixed at a p-value of less than 0.05.

Results and observations

A total of 200 patients suffering from obstructive jaundice were included in the study with a mean age of 45.05±10.60 years, out of which 160 (80%) were females and 40 (20%) were males. The majority of the participants resided in urban areas (83.5%), whereas 33 (16.5%) were from rural areas.

In our study, the majority of the participants (72.5%) did not have any previous medical history. The most common medical history was of type 2 diabetes mellitus

(10%), followed by obesity (7%), hypertension (4%), hypothyroidism (3.5%), and COPD (3%). (Fig. 1).

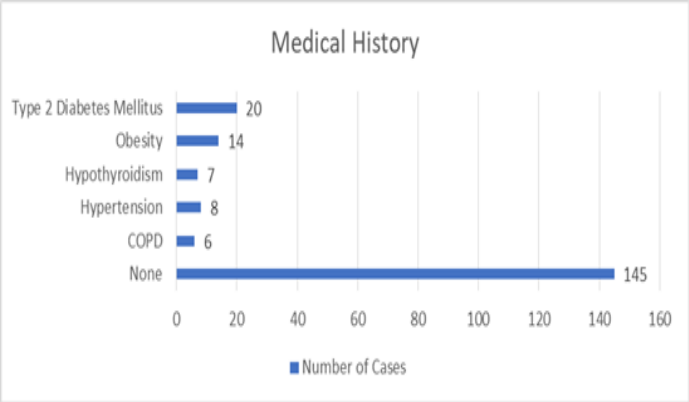

Figure 1: Medical History

Table 1: Distribution as per Clinical Features

Clinical Features	N (%)
Abdominal Mass	3 (1.5%)
Clay colored stool	18 (9%)
Jaundice	44 (22%)
Pain abdomen	21 (10.5%)
Pain right hypochondrium with fever	36 (18%)
Pain right hypochondrium with jaundice	25 (12.5%)
Pruritis	16 (8%)
Vomiting	37 (18.5%)
Total	200

In our study, the most common clinical feature seen was jaundice (22%), followed by vomiting (18.5%), pain right hypochondrium with fever (18%), pain right hypochondrium with jaundice (12.5%), pain abdomen (10.5%), clay coloured stool (9%), pruritis (8%) and the least common clinical feature was abdominal mass (1.5%).(Table 1).

It was observed that the mean total bilirubin concentration was 5.02±3.03 (Range=1.90-20.20), the mean direct bilirubin concentration was 3.18±1.91 (Range=1.10-12.80), and the mean indirect bilirubin concentration was 1.84±1.19 (Range=0.60-7.60). The mean ALP was found to be 227.98±48.39 (Range=164-388). The mean Hb% of the participants was 10.55±1.03 (Range=8.20-13), and the mean HCT was 31.67±3.10 (Range=24.60-39). The platelets count showed a mean of 176775.00±38604.22 (Range=96000-277000). The mean PT was 16.21±3.35 (Range=10.2-23.1), and the mean INR was 1.55±0.47 (Range=0.80-2.51).

Table 2: Usg Findings

USG Findings	N (%)
Abrupt narrowing of the CBD	10 (5%)
Bulky head of pancreas	20 (10%)
GB Sludge+CBD Sludge	40 (20%)
GB Stone+CBD Dilated	39 (19.5%)
GB Stone+CBD Stone	40 (20%)
Large stone at GB Neck	20 (10%)
Mass at pancreatic head	11 (5.5%)
Post-cholecystectomy CBD dilated	10 (5%)
Post-cholecystectomy CBD retained stone	10 (5%)
Total	200

In our study, the USG investigation showed that the most common findings were GB sludge + CBD sludge and GB stone + CBD stone, with 40 (20%) cases each. This was followed by GB stone+CBD dilated (19.5%), bulky head of pancreas and large stone at GB neck with 20 (10%) cases each, mass at pancreatic head (5.5%) and lastly, abrupt narrowing of CBD, post-cholecystectomy CBD dilated, and post-cholecystectomy CBD retained stone with 10 (5%) cases each. (Table No.2)

The CET findings were reported in 31 cases, out of which there were 20 (64.5%) cases of bulky head causing obstruction and 11 (35.5%) cases of pancreatic mass causing obstruction (Fig No 2).

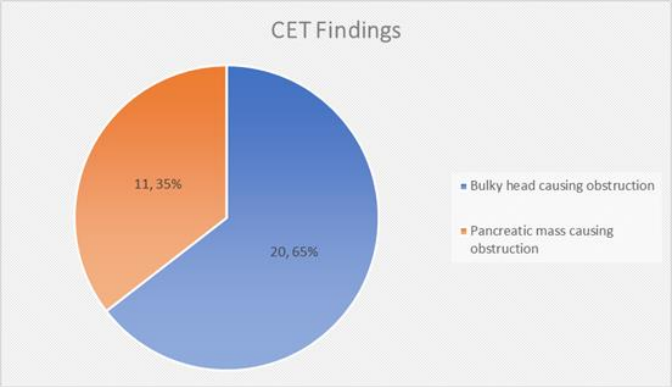

Figure 2: CET findings

Table 3: MRCP Findings

MRCP findings	N (%)
Large stone at GB neck causing CBD compression	15 (20.3%)
Narrowing present in lower CBD with stricture	2 (2.7%)
Narrowing present in middle CBD with stricture	8 (10.8%)
Stone in CBD	49 (66.2%)
Total	74

In our study, MRCP findings were reported in 74 cases, out of which there were 49 (66.2%) cases of stone in CBD, 15 (20.3%) cases of large stone at GB neck causing CBD compression, 8 (10.2%) cases of narrowing present in middle CBD with stricture, and

only 2 (2.7%) cases of narrowing present in lower CBD with stricture (Table no.3, fig. no 3).

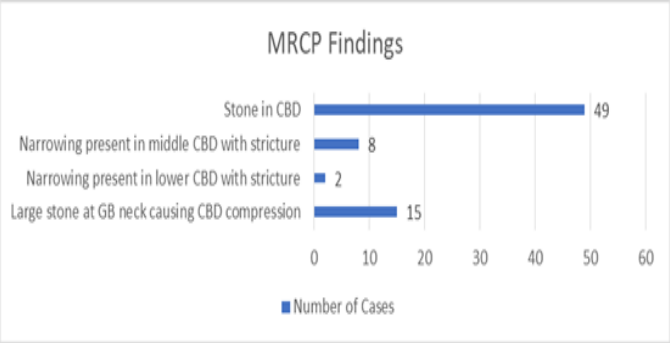

Figure 3: MRCP findings

Discussion

Obstructive jaundice is defined as a blockage in the pathway from bile conjugation in liver cells to the duodenum via the ampulla. Diagnosis typically involves history, physical examination, and biochemical tests, and may also include cholangiography, liver biopsy, and monitoring the patient's progress (Clarke JS et al. 1970) [25]. Obstructive jaundice presents with jaundice, itching, abdominal pain, vomiting, fever, and sometimes weight loss and clay-colored stool. Treatment and prognosis vary based on the etiology and level of biliary obstruction. Cholesterol stones are linked to lifestyle, diet, and sex (Stinton LM 2012) [26]. Benign causes include choledocholithiasis, bile duct strictures, Mirizzi syndrome, impacted parasites, and chronic pancreatitis, while malignant causes encompass gallbladder carcinoma, pancreatic carcinoma, hilar metastasis, periampullary carcinoma, and cholangiocarcinoma (Gracanin AG et al. 2013) [27].

Differentiating medical causes of jaundice from obstructive or surgical ones is crucial for general surgeons. Understanding the etiology, presentation, and management of obstructive jaundice is essential for effective treatment. Therefore, a thorough study of its various causes and management is important (Srinidhi M 2014) [28].

The present prospective observational study was conducted at the Department of General Surgery, GMC Jammu, to study the epidemiology and clinic-radiological profile of obstructive jaundice.

It was observed in our study that there were 200 participants in the study with a mean age of 45.05±10.60 years, out of which 160 (80%) were females and 40 (20%) were males. The majority of the participants resided in urban areas (83.5%), whereas 33 (16.5%) were from rural areas. The findings of our study are in accordance with the previous studies conducted by Bhutia et al. 2021 and Fadahunsi OO et al. 2020 [29].

In our study, the majority of the participants (72.5%) did not have any previous medical history. The most common medical history was of type 2 diabetes mellitus (10%), followed by obesity (7%), hypertension (4%), hypothyroidism (3.5%), and COPD (3%). The findings of previous studies conducted by Odongo CN et al. 2022 and Kaomba L et al. 2024 are similar to our study [30,31].

In our study the most common clinical feature seen was jaundice (22%), followed by vomiting (18.5%), pain right hypochondrium with fever (18%), pain right hypochondrium with jaundice (12.5%), pain abdomen (10.5%), clay-colored stool (9%), pruritis (8%) and the least common clinical feature was abdominal mass (1.5%). This clinical pattern aligns with the findings of other studies conducted by Wagensveld BA et al 1997, Khan et al 2019, and Murshid MY et al. 2024 [32,34].

In our study, the mean total bilirubin concentration was 5.02±3.03 (Range=1.90-20.20), the mean direct bilirubin concentration was 3.18±1.91 (Range=1.10-12.80), and the mean indirect bilirubin concentration was 1.84±1.19 (Range=0.60-7.60). The mean ALP was found to be

227.98±48.39 (Range=164-388). The mean Hb% of the participants was 10.55±1.03 (Range=8.20-13), and the mean HCT was 31.67±3.10 (Range=24.60-39). The platelets count showed a mean of 176775.00±38604.22 (Range=96000-277000). The mean PT was 16.21±3.35 (Range=10.2-23.1), and the mean INR was 1.55±0.47 (Range=0.80-2.51). The findings of our study correlate with the studies conducted by Padhy B et al. 2018, Alatise OI et al. 2020, and Verma S et al. 2010 [35,37].

In our study, USG findings revealed that the most common conditions were GB sludge + CBD sludge and GB stone + CBD stone, each present in 40 (20%) cases. This was followed by GB stone + CBD dilatation (19.5%), bulky head of the pancreas with a stone at the GB neck, and mass at the pancreatic head (10% each), along with abrupt CBD narrowing, post-cholecystectomy CBD dilation, and retained CBD stone (5% each). Gulati P et al. (1994) noted that characteristic sonographic findings of periampullary tumors included intrahepatic ductal dilatation and a hypoechoic mass in the ampullary region, found in over 50% of patients (38). A study by Kaomba L et al. (2024) indicated that Ultrasound was the most used imaging modality (65%), followed by CT (6.5%) and MRI (3.9%). Among the 50 patients evaluated with ultrasound, 38% had CBD dilatation, 32% had intrahepatic duct dilatation, and 28% presented with abdominal masses [38,39].

In our study, CET findings were reported in 31 cases, with 20 (64.5%) due to bulky head obstruction and 11 (35.5%) from pancreatic mass obstruction. MRCP findings were noted in 74 cases, including 49 (66.2%) with CBD stones, 15 (20.3%) with large stones at the GB neck, 8 (10.2%) with narrowing due to stricture in the middle CBD, and 2 (2.7%) with lower CBD stricture. These findings align with Chandra Roy et al. (2015), indicating choledocholithiasis as the primary cause of benign obstructive jaundice at 26%, followed by biliary stricture (8%) and cysts (4%) [40]. However, our study shows a higher prevalence of malignant causes, with pancreatic cancer at 30% and gallbladder cancer at 22%, differing from other studies due to varying demographic characteristics.

Conclusion

Obstructive jaundice is a common surgical issue, primarily caused by choledocholithiasis, affecting mainly productive adults, particularly females and those aged 20-40. Gallstones are the leading cause. Key diagnostic tools include USG, CT scan, MRCP, and ERCP. Early diagnosis and treatment are crucial for improving patient outcomes.

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