



TO STUDY THE CLINICAL PROFILE OF THE PATIENTS WITH OBSTRUCTIVE JAUNDICE

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Article Received on 11/12/2018

Article Revised on 31/12/2018

Article Accepted on 21/01/2019

ABSTRACT

Surgical Obstructive jaundice is most commonly encountered by general surgeons. This study focuses on early diagnostic measures for obstructive jaundice. To study the clinical profile of patients with obstructive jaundice. This study was carried out from October 2016 to September 2018 at AVBRH, Sawangi (Meghe), Wardha, Maharashtra, India. 35 patients of obstructive jaundice were included in the study. Ethical Clearance was obtained from the institutional ethics committee. The demographic profile and etiology of all the patients affected with obstructive jaundice were recorded. The comparison and correlation between various diagnostic modalities: USG, CECT, MRCP were done keeping ERCP as a gold standard. The data was entered MS excel Spreadsheet and analysis was done using SPSS version 21.0. Out of 35 patients, the prevalence of SOJ was more common in 7th decade of life with male predominance. The total bilirubin level was more than 10mg% in malignant Obstructive jaundice. Pain in abdomen and jaundice were the most common presenting complaints. The benign cause of obstructive jaundice was present in 65.72% of the patients compared with malignant cause of obstructive jaundice (34.28%). In benign cases, the most common cause were choledocholithiasis and cholangiocarcinoma in malignant obstructive jaundice. The sensitivity of diagnosing benign cause of obstructive jaundice on USG, CECT and MRCP are 100%, 95.65%, 95.65% whereas malignant etiology are 66.67%, 83.33% and 100%. MRCP has got higher sensitivity in diagnosing benign and malignant cause of obstructive jaundice.

KEYWORDS: Choledocholithiasis, ERCP, MRCP.

INTRODUCTION

Jaundice is defined as the yellowish discoloration of the skin, sclera and mucus membrane due to increased bilirubin concentration in the body fluids.^[1] The term 'Jaunisse' which means yellow in French from where the jaundice word originates.^[2]

Jaundice is a generic term for the yellow pigmentation of skin, mucus membranes, or sclera that is caused by heterogeneous group of disorders.^[1,3] Icterus is evident in sclera due to abundance of elastin, which has a high affinity for bilirubin. Jaundice is one of the frequent manifestation of biliary tract disorders and the clinical evaluation and management of obstructive jaundice is one of the commonest problem faced by the general surgeon.^[1]

Obstructive jaundice is defined as a condition that occurs due to the block in the pathway between the site of conjugation of bile in liver cells and the entry of bile into the duodenum through the ampulla.

This block could be:-

- 1) Intrahepatic or

- 2) Extrahepatic^[4]

It is of great importance that a medical cause of jaundice can be differentiated from the obstructive/surgical cause.^[5]

Obstructive jaundice cannot be a definitive diagnosis and early investigation to find out the precise aetiology is of much importance due to pathological changes which take place if obstruction is still present. The common aetiology of obstructive jaundice may vary from one individual to another. The confirmatory diagnosis is usually achieved by standard diagnostic techniques such as taking proper case history, complete physical examination, and laboratory investigations, and when proper cholangiography and tissue biopsy and follow-up of patient.^[6]

The common causes that can lead to obstructive jaundice are described below:-

- 1) Intrahepatic or
- 2) Extrahepatic.^[7]

Hepatitis, cirrhosis and hepato-cellular carcinoma are the most common intrahepatic causes.^[8]

Extrahepatic are classified into:-

- 1) Intraductal and
- 2) Extrahepatic aetiologies.

Carcinoma, CBD calculus, CBD strictures are the most common causes for obstructive jaundice patients. Whereas, biliary tree is compressed from outside by malignancy or stone in cystic duct or due to over distension of Gall bladder results in extraductal obstruction.^[7,9]

Obstructive jaundice that is caused by stones is a common disorder.^[10] The incidence of occurrence of CBD calculus is 10-15percent. In which 80% of the calculus seen in CBD. Due to sphincter oddi dysfunction sludge accumulates in CBD along with calculus from gall bladder result in CBD calculus.^[7]

Total bilirubin is raised and in that more of the conjugated bilirubin is raised in patients with obstructive jaundice. Malignant obstruction presents with more raised bilirubin compared to benign cause.^[13]

Ultrasonography is considered as the 'gold standard' in diagnosing obstructive jaundice.^[8]

It provides clues for further investigations which includes Computed tomography, Magnetic Resonance Cholangiopancreaticography (MRCP), Endoscopic Retrograde Cholangiopancreaticography (ERCP), and Percutaneous Cholangiography (PTC).^[11] A lot of work is going on in managing patients who are coming with obstructive jaundice, despite of doing open approach it has been shifted to ERCP procedure and laproscopic procedures.^[12]

The importance of doing radiological imaging in patients with obstructive jaundice are:

1. To differentiate surgical from medical cause of jaundice.
2. To find the level of obstruction.
3. To find out the most exact cause of obstruction.^[14]

The investigation from radiological point of views which are usually done:-

1. Non-invasive ultrasonography, CT scan & MRCP and
2. Invasive ERCP and PTC.^[14]

Routine abdominal ultrasonography is used to find out the CBD and IHBR dilatation, to see the obstruction level. It is very useful investigation to determine the cause of obstruction but it also depends upon the person who is doing it. It is one of the cheapest and reliable method to differentiate between malignant and benign cause and always used as a first line of investigation.^[14,15]

Computed tomography (CT) of the abdomen is done as it gives a proper imaging of the liver, gallbladder,

pancreas, kidneys, and retroperitoneum. Extra and intrahepatic obstruction can be precisely differentiated by doing this investigation.^[16,17]

MRCP is a non-invasive investigation which gives excellent visualisation of biliary tree compared to ERCP but the only disadvantage is that it is only diagnostic not therapeutic compared to ERCP.^[18]

Endoscopic Retrograde Cholangiopancreatography (ERCP) is considered as the gold standard in evaluation of obstructive jaundice.^[19] ERCP has advantage of therapeutic over diagnostic. It is an excellent investigation for diagnosing Choledocholithiasis, CBD stricture as well as for taking brush cytology.^[20] It has got various complication associated with it like pancreatitis, cholangitis, sepsis.^[14]

Obstructive jaundice is a challenging condition managed by general surgeons and contribute significantly to high morbidity and mortality. Hence this study is undertaken at Acharya Vinoba Bhave Rural Hospital with aim of assessing the clinical profile of the patients with obstructive jaundice and the objectives being to study the clinical profile, demographic profile along with various diagnostic modalities.

MATERIALS AND METHODS

Setting

This is a prospective observational study. All patients diagnosed as obstructive jaundice at Acharya Vinoba Bhave Rural Hospital, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha.

Sample size: - 35.

Duration of study: - October 2016- October 2018

Study design

This was a prospective observational study on 35 patients presenting in OPD/IPD with signs and symptoms suggestive of obstructive jaundice.

The selection of patients was done with the following criteria:-

Inclusion criteria:-

- All patients with signs and symptoms suggestive of obstructive jaundice.

Exclusion criteria

- Patient not giving consent for research study.
- Patients having medical cause of jaundice.

Methodology

All the patients diagnosed with obstructive jaundice have been enrolled in this study. After complete history and thorough clinical examination, haematological investigations with liver function tests including were performed in all cases.

Abdominal USG and CECT was performed as the initial imaging study in all the cases followed by MRCP.

Endoscopic Retrograde Cholangiopancreatography (ERCP) was performed in indicated cases. ERCP is considered as a gold standard investigation in diagnosing obstructive jaundice.

Keeping ERCP as a gold standard, sensitivity and specificity of USG, CECT and MRCP for diagnosing obstructive jaundice was compared.

All the data was fed with the help of electronic spreadsheet (Excel, Microsoft Corp). The data fed included patient's IPD no., age, sex, clinical symptoms (pain in abdomen, yellowish discoloration of sclera, fever, jaundice, pruritis), blood investigations, USG, CECT, MRCP, ERCP findings.

MRCP procedure

MRCP is a non-invasive procedure. It is done by using BRIVO MR355 1.5T Machine in our hospital.

The patient is kept nil by mouth 6 hrs before the procedure.

Patient having metallic implants, cochlear implant and pacemaker are not subjected to MRCP.

The patient is positioned on the moveable examination table. Straps and bolsters may be used to help the patient to stay still and maintain the correct position during imaging.

Devices that contain coils capable of sending and receiving radio waves may be placed around or adjacent to the area of the body being studied.

If a contrast material will be used in the MRI exam, a physician, nurse or technologist will insert an intravenous (IV) catheter, also known as an IV line, into a vein in your hand or arm. A saline solution may be used to inject the contrast material. The solution will drip through the IV to prevent blockage of the IV catheter until the contrast material is injected.

The patient is placed into the magnet of the MRI unit and the radiologist and technologist will perform the examination while working at a computer outside of the room.

If a contrast material is used during the examination, it will be injected into the intravenous line (IV) after an initial series of scans. Additional series of images will be taken during or following the injection.

The actual MRCP exam takes approximately 10-15 minutes, but it is often performed with a standard MRI of the abdomen, which may last approximately 30 minutes and involves the use of contrast material. In this case, the entire examination is usually completed within 45 minutes.

ERCP procedure

The ERCP was performed by Olympus duodenoscope Unit as follows:

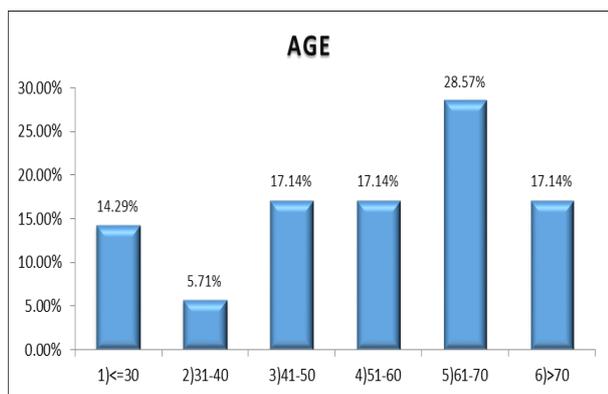
- Patient were asked to be nil by mouth a day prior to the procedure.
- First, the procedure was explained to the patient and the attendant in their own language including possibility of biopsy or other related radiological interventions.
- Patients were asked to sign the consent form agreeing to the procedure and high risk consent was taken in the high risk group.
- They were also asked regarding the medications, any allergies in past.
- Patients were then asked to remove artificial denture, eye wares, if any, prior to the procedure.
- Local anesthesia spray (10% xylocaine) was given on posterior pharyngeal wall to prevent the gag reflex.
- Procedure is done under sedation, IV fluids are connected.
- Patients were asked to lie down in left lateral position and the plastic mouth piece was held between the teeth by the assistant to keep the mouth open and make it easier to pass the duodenoscope.
- After lubricating the front part of the duodenoscope with 2% xylocaine jelly and adjusting the white contrast it was passed through the mouth piece and patient was asked to swallow it.
- Duodenoscope was guided under direct visualization through upper esophageal sphincter to the stomach and first part of the small intestine (duodenum). In the duodenum a small opening is identified (ampulla) and a small plastic tube (cannula) is passed through the duodenoscope and into this opening. Dye (contrast material) is injected and X-rays are taken to study the ducts of the pancreas and liver.
- CBD stenting, papillotomy, stone extraction, biopsies are taken in indicated patient.
- During all this procedure, vitals of the patients were monitored with pulse oximeter.

Patients were advised to take orally after four hour of the procedure when not contraindicated.

OBSERVATIONS AND RESULTS

Table 1: Distribution of cases according to age

AGE (YEARS)	Frequency	Percentage
1) <=30	5	14.29%
2) 31-40	2	5.71%
3) 41-50	6	17.14%
4) 51-60	6	17.14%
5) 61-70	10	28.57%
6) >70	6	17.14%
Total	35	100.00%

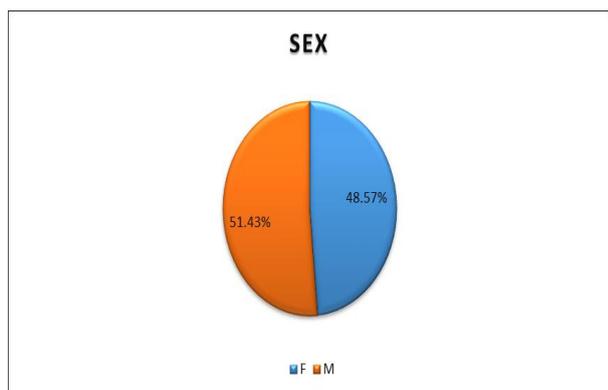


Graph 1: Bar chart showing the distribution of cases as per age.

Out of total 35 patients included in the study, the mean age is found to be 61-70 (28.57%) for patients suffering from obstructive jaundice. The mean age of presentation was 54.77 years with standard deviation of 18.45 years (± 18.45 SD) while median age group was 60. The minimum age was 14 years and maximum age was 85 years.

Table 2: Distribution of cases according to gender.

SEX	Frequency	Percentage
F	17	48.57%
M	18	51.43%
Total	35	100.00%

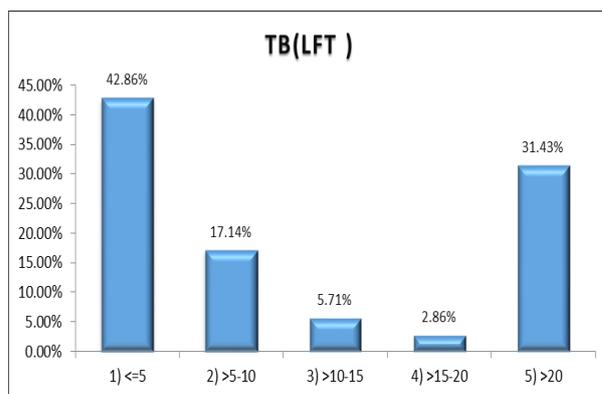


Graph 2: Pie chart showing distribution of cases according to gender.

Male population is outnumbered in this study. Male: Female ratio is 1.1:1

Table 3: Distribution of cases according to Total Bilirubin levels.

(mg%)	Frequency	Percentage
1) <=5	15	42.86%
2) >5-10	6	17.14%
3) >10-15	2	5.71%
4) >15-20	1	2.86%
5) >20	11	31.43%
Total	35	100.00%

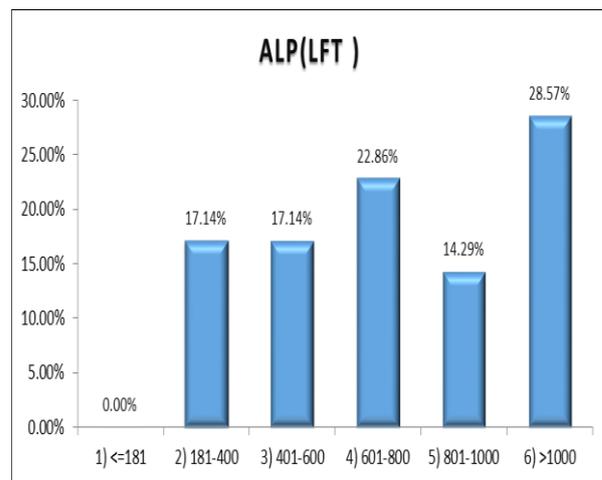


Graph 3: Bar chart showing the distribution of cases as per total bilirubin levels.

The level of bilirubin ranges from 0.86 mg% - 41.81 mg%. Maximum patients (60%) in our study had bilirubin level < 10 mg%. The mean value of total bilirubin was 13.74 mg% with standard deviation of 13.38 (± 13.38 SD) while median value was 6.36. The Bilirubin value ranges from 0.86-41.81mg%.

Table 4: Table showing the distribution of cases as per Alkaline phosphatase levels. Alkaline phosphatase(LFT).

(IU/L)	Frequency	Percentage
1) <=181	0	0.00%
2) 181-400	6	17.14%
3) 401-600	6	17.14%
4) 601-800	8	22.86%
5) 801-1000	5	14.29%
6) >1000	10	28.57%
Total	35	100.00%

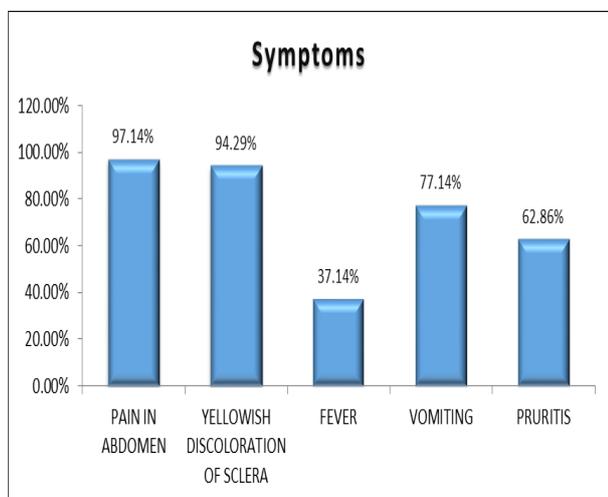


Graph 4: Bar chart showing the distribution of cases as per Alkaline phosphatase levels.

The level of alkaline phosphatase ranges from 229-1918 IU/L. In our study maximum patients (28.57%) fall in range of >1000 IU/L. The mean value of Alkaline phosphatase was 814.66 with standard deviation of 432.6 (± 432.6 SD) while median value was 705. The Alkaline phosphatase value ranges from 229-1918 IU/L.

Table 5: Distribution of cases according to presenting complaints.

Symptoms	Frequency	Percentage
Pain in abdomen	34	97.14%
Yellowish discoloration of sclera	33	94.29%
Fever	13	37.14%
Vomiting	27	77.14%
Pruritis	22	62.86%

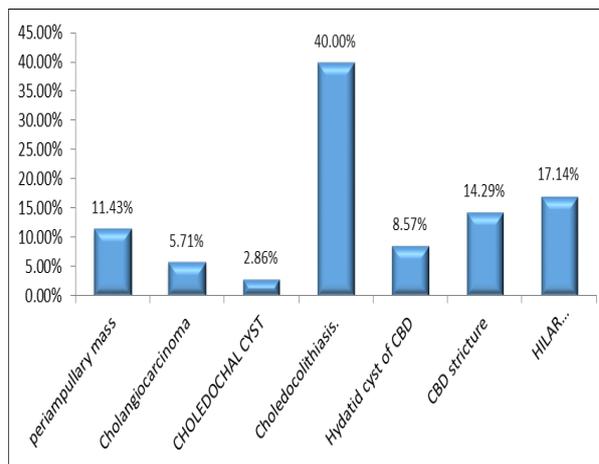


Graph 5: Bar chart showing the distribution of cases according to presenting complaints.

Table 5 shows distribution of cases according to presenting complaints. Out of 35 patients, The most common presenting complaint was pain in abdomen present in 34 patients (97.14%), followed by yellowish discoloration of sclera in 33 patients (94.29%), followed by vomiting present in 27 patients (77.14%), pruritis in 22 patients (62.86%) cases and fever in 13 patients (37.14%).

Table 6: Etiology of obstructive jaundice.

	Frequency	Percentage
Periampullary mass	4	11.43%
Cholangiocarcinoma (distal 1/3 rd)	2	5.71%
Choledochal cyst	1	2.86%
Choledocolithiasis.	14	40.00%
Hydatid cyst in CBD	3	8.57%
CBD stricture	5	14.29%
Hilar cholangiocarcinoma	6	17.14%
Total	35	100.00%

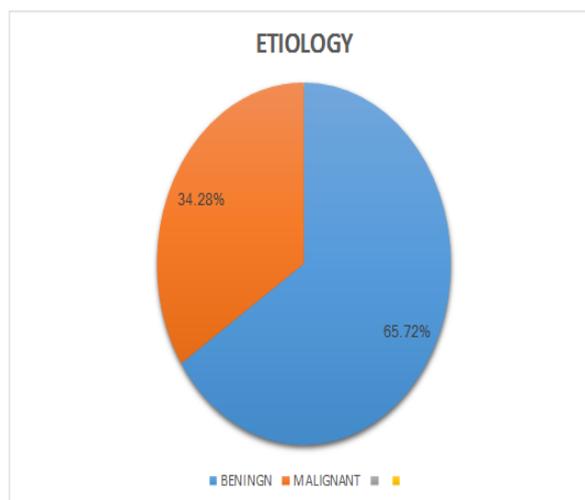


Graph 6: Bar chart showing the etiology of obstructive jaundice.

Out of total 35 patients presented with obstructive jaundice most number of patients 14 (40%) have choledocolithiasis followed by 6 patients (17.14%) with Hilar cholangiocarcinoma followed by 5 patients (14.29%) with CBD stricture followed by 4 patients (11.43%) with periampullary mass followed by 3 patients (8.57%) with Hydatid cyst of CBD followed by 2 patients (5.71%) with cholangiocarcinoma (distal 1/3rd) with only 1 patient (2.86%) with choledochal cyst.

Table 7: Frequency of Malignancy vs. Benign etiology in Obstructive jaundice.

Etiology	NO. OF CASES	Percentage
Benign	23	65.72%
Malignant	12	34.28%



Graph 7: Pie chart showing frequency of malignant and benign obstructive jaundice.

In this study, out of 35 patients of obstructive jaundice, maximum percentage of cases (65.72%) are of benign etiology followed by (34.28%) cases are of malignant etiology.

Table 8: Frequency of benign cases.

Benign diseases	No of cases	Percentage
Choledocholithiasis	14	61%
CBD stricture	5	21.7%
Hydatid cyst in CBD	3	13%
Choledochal cyst	1	4.30%
Total	23	100%

In our study out of 23 patients of benign etiology, maximum number of patients with benign etiology was of Choledocholithiasis 14 patients (61%), followed by CBD stricture (21.7%), followed by Hydatid cyst of CBD in 3 patients (13%) whereas only 1 patient presented with choledochal cyst (4.30%).

Table 9: Frequency of malignant cases.

Malignant diseases	No of cases	Percentage
Hilar cholangiocarcinoma	6	50%
Periampullary mass	4	33.33%
Cholangiocarcinoma (distal 1/3 rd)	2	16.67%
Total	12	100%

In our study out of 12 patients of malignant etiology maximum number of patients with malignant etiology was of Hilar cholangiocarcinoma 6 patients (50%) followed by periampullary mass 4 patients (33.33%) followed by 2 patients (16.67%) of cholangiocarcinoma (distal 1/3rd).

IMAGING STUDIES

Table 10: Comparative table on presence of choledocholithiasis on ERCP and MRCP. CHOLEDOCHOLITHIASIS (MRCP) vs CHOLEDOCHOLITHIASIS. (ERCP)

		Choledocolithiasis.(ERCP)		Total	P value	Kappa
		Present	Absent			
Choledocholithiasis(Mrcp)	Present	13 (44.83%)	1 (3.45%)	14 (48.28%)	<.0001	0.862
	Absent	1 (3.45%)	14 (48.28%)	15 (51.72%)		
Total		14 (48.28%)	15 (51.72%)	29 (100.00%)		

Both ERCP and MRCP had detected presence of Choledocholithiasis in 13 patients (44.83%) out of 29 patients who underwent both the investigations. Whereas on ERCP choledocholithiasis present in 14 patients (48.28%) and MRCP shows presence of choledocholithiasis in 14 patients (48.28%). Both the

investigation shows absence of Choledocholithiasis in 15 patients each (51.72%).Whereas ERCP and MRCP failed to detect Choledocolithiasis in one patient each. The results were statistically significant. Kappa is 0.862 which suggest strength of agreement between both the investigations are very good.

Table 11: Comparative table on presence of dilated CBD on ERCP and MRCP.

Dilated Cbd (Mrcp) Vs Dilated Cbd On Cholangiogram (ErCP)

		DILATED CBD ON CHOLANGIOGRAM(ERCP)		Total	P value	Kappa
		Present	Absent			
Dilated Cbd (Diameter)(Mrcp)	Present	28 (96.55%)	0 (0.00%)	28 (96.55%)	<.0001	1.000
	Absent	0 (0.00%)	1 (3.45%)	1 (3.45%)		
Total		28 (96.55%)	1 (3.45%)	29 (100.00%)		

Out of 29 patients, who underwent both ERCP and MRCP, it is observed that CBD is dilated in 28 patients (96.55%). Both the modalities have shown absence of CBD dilatation for the same patient (1 out of 29 patients) (3.45%). The results were statistically significant. Kappa is 1.000 which suggest strength of agreement between both the investigations are very good.

Table 12b: Specificity of USG v/s ERCP.

	Specificity
CBD stricture	95.83%
Cholangiocarcinoma	92.59%
Choledochal cyst	100%
Choledocolithiasis.	93.33%
Hydatid cyst of CBD	100%
Periampullary Carcinoma	100%

Table 12a: Sensitivity of USG VS ERCP.

USG ABDOMEN v/s ERCP

	Sensitivity
CBD stricture	20.00%
Cholangiocarcinoma	50.00%
Choledochal cyst	0.00%
Choledocolithiasis.	64.29%
Hydatid cyst of CBD	33.33%
Periampullary Carcinoma	75.00%

Keeping ERCP as a gold standard the sensitivity and specificity of USG in diagnosing CBD STICTURE is 20% and 95.83% followed by cholangiocarcinoma is 50% and 92.59% followed by Choledochal cyst is 0% and 100% followed by choledocholithiasis is 64.29% and 93.33% followed by Hydatd cyst of CBD is 33.33% and 100% followed by Periampullary carcinoma is 75% and 100%.

Table 13a: Sensitivity of CECT v/s ERCP.
CECT ABDOMEN v/s ERCP

	Sensitivity
CBD stricture	80.00%
Cholangiocarcinoma	100.00%
Choledochal cyst	0.00%
Choledocolithiasis.	78.57%
Hydatid cyst of CBD.	66.67%
Periampullary Carcinoma	75.00%

Table 13b: Specificity of CECT v/s ERCP.

	Specificity
CBD stricture	100%
Cholangiocarcinoma	96.30%
Choledochal cyst	100%
Choledocolithiasis.	93.33%
Hydatid cyst of CBD.	100%
Periampullary Carcinoma	100%

Keeping ERCP as a gold standard the sensitivity and specificity of CECT in diagnosing CBD STRICTURE is 80% and 100% followed by cholangiocarcinoma is 100% and 96.30% followed by Choledochal cyst is 0% and 100% followed by choledocholithiasis is 78.57% and 93.33% followed by Hydatid cyst of CBD is 66.67% and 100% followed by Periampullary carcinoma is 75% and 100%.

Table 14a: Sensitivity of MRCP VS ERCP
MRCP vs ERCP

	Sensitivity
CBD stricture	80.00%
Cholangiocarcinoma	100.00%
Choledochal cyst	100.00%
Choledocolithiasis.	100.00%
Hydatid cyst of CBD.	100.00%
Periampullary Carcinoma	100.00%

Table 14b: Specificity of MRCP VS ERCP.

	Specificity
CBD stricture	100%
Cholangiocarcinoma	100%
Choledochal cyst	100%
Choledocolithiasis.	100%
Hydatid cyst of CBD.	100%
Periampullary Carcinoma	96%

Keeping ERCP as a gold standard the sensitivity and specificity of MRCP in diagnosing CBD STRICTURE is 80% and 100% followed by cholangiocarcinoma is 100% and 100% followed by Choledochal cyst is 100% and 100% followed by choledocholithiasis is 100% and 100% followed by Hydatid cyst of CBD is 100% and 100% followed by Periampullary carcinoma is 100% and 96%.

Table 15a: Sensitivity of diagnosing malignant etiology of Obstructive Jaundice on USG, CECT and MRCP.

	Sensitivity
USG ABDOMEN	66.67%
CECT ABDOMEN	83.33%
MRCP	100.00%

Table 15b: Specificity of diagnosing malignant etiology of Obstructive Jaundice on USG, CECT and MRCP.

	Specificity
USG ABDOMEN	100.00%
CECT ABDOMEN	95.65%
MRCP	95.65%

In our study sensitivity of diagnosing of malignant obstructive jaundice on USG, CECT AND MRCP are 66.67% followed by 83.33% followed by 100% whereas specificity is 100% followed by 95.65% followed by 95.65%.

Table 16a: Sensitivity of diagnosing benign etiology of Obstructive Jaundice on USG, CECT and MRCP.

	Sensitivity
USG ABDOMEN	100%
CECT ABDOMEN	95.65%
MRCP	95.65%

Table 16b: Specificity of diagnosing benign etiology of Obstructive Jaundice on USG, CECT and MRCP.

	Specificity
USG ABDOMEN	66.67%
CECT ABDOMEN	83.33%
MRCP	100.00%

Sensitivity of diagnosing benign cause of obstructive jaundice on USG, CECT and MRCP are 100% followed by 95.65% followed by 95.65% whereas specificity is 66.67% followed by 83.33% followed by 100%.

DISCUSSION

Age Significance

In this study, maximum number of cases of obstructive jaundice i.e. 10 (28.57%) cases were in 7th decade of life. The mean age was 54.77 with standard deviation of 18.45 years (± 18.45 SD) while median age group was 60.

In study done by Padhy et al,^[21] the mean age was found to be 55.5 years.

The results are in accordance to the study done by Kurian et al.^[22] In this study they have concluded that the maximum number of patients with obstructive jaundice were included in age group of > 60 years.

In the study done by Chalya et al,^[23] the mean age of obstructive jaundice was 56.34 ± 16.42 years.

In study done by Saad N.K. Saadon,^[24] the mean age of obstructive jaundice was 52 years.

These findings are in accordance with the studies mentioned above.

Gender significance

In this study it has been found that males (51.43%) were affected more than females (48.57%). The Male: Female ratio is 1.1:1.

In study done by Padhy et al^[21] shows male predominance.

The results are in accordance with study done by Kurian et al^[22] where male population outnumbered female population.

In study done by Shehu et al^[25] shows male predominance.

In this study the benign cause of obstructive jaundice was more common in younger age group (<40 years) with female preponderance as compared to malignant cause of obstructive jaundice which is more common in older age group (>40 years) and male predilection.

This study was in correlation with study done by Chalya et al in 2011^[23] which concluded that the mean age of patients with benign causes was in range of 12-48 years, while that of malignant causes was 44-78 years.

All above findings are getting correlated with this study.

Total bilirubin and alkaline phosphatase significance

The level of bilirubin ranges from 0.86 mg% - 41.81 mg%. Maximum patients (60%) in our study had bilirubin level < 10 mg%. The mean value of total bilirubin was 13.74 mg% with standard deviation of 13.38 (± 13.38 SD) while median value was 6.36. The Bilirubin value ranges from 0.86-41.81mg%.

In this study the raised bilirubin levels are much higher (>10mg%) in malignant cause of obstruction as compared to benign cause (<10mg%).

In study done by Garcea et al in 2011^[26] concluded that raised bilirubin levels are predictor of malignancy which is correlating with this study.

In study done by Chaudhary et al in 2017^[27] concluded that Serum bilirubin level (100 μ mol/L) was found to be extremely sensitive but less specific marker of malignancy in patients of obstructive jaundice which make it a good screening tool for malignancy among such patients.

Study conducted by Hayat et al^[28] proved that the level of total bilirubin and alkaline phosphatase raised in cases

of obstructive jaundice which is correlating with my study.

Walker H K in 1990 in his book Clinical Methods: The History, Physical, and Laboratory Examinations chapter 87^[29] stated that Alkaline phosphatase is often elevated to at least three times the upper limit of normal in patients with jaundice due to intra- or extrahepatic obstruction but is usually less than this figure in hepatocellular jaundice.

In this study maximum number of patients (28.57%) have alkaline phosphatase level >1000 IU/L followed by (22.86%) in range of 601-800 IU/l followed by (14.29%) patients in a range of 801-1000 IU/L.

Presenting complaints

In this study, out of 35 patients, the most common presenting complaint was pain in abdomen present in 34 patients (97.14%), followed by yellowish discoloration of sclera in 33 patients (94.29%), followed by vomiting present in 27 patients (77.14%), pruritis in 22 patients (62.86%) cases and fever in 13 patients (37.14%).

In study done by Saddique et al^[30] concluded in his study that the pain in abdomen was the most common presenting complaints in the patient of obstructive jaundice.

In a study conducted by Goyani et al^[31] concluded that jaundice was the most common symptom seen in 96% of the patients followed by abdominal pain seen in 86% of the patients.

Study conducted by Prabhakar and syed raj^[32] found out that pain in abdomen was the most common complaints in patient presenting with obstructive jaundice.

Whereas in another study by Gupta et al,^[33] they have found that three most common symptoms of obstructive jaundice were jaundice (91.67%), loss of appetite (77.78%) and pain in abdomen (75%).

Shukla et al^[34] conducted a study on "Clinicopathological study on patients presenting with obstructive jaundice" and found that pain in abdomen and jaundice are too most common presenting complaints in a patient of obstructive jaundice.

In a study by Padhy et al^[21] has found that, the most common symptoms were jaundice (94%) and pain in abdomen (93%).

Comparison of Percentage of Malignant and Benign cause of obstructive jaundice

In the present study, the percentage of benign cause obstructive jaundice is found to be 65.72% whereas malignant cause of obstructive jaundice is found to be 34.28%.

Kurian et al^[22] conducted a study on Assessment of Clinical Profile of Patients with Obstructive Jaundice on 46 patients found out be 78% of the lesions were benign and 22% were malignant lesions.

This result is in correlation to the study done by Huis M et al^[35] in which the percentage of benign cause was found to be 74.17% and malignant cause was 25.83%.

Fish et al^[36] done study on jaundice associated with cholecystitis in 200 patients concluded that the most common cause of obstructive jaundice is common bile duct stone in 57% of the patients.

In contrast to the studies done by Huang et al^[8] and Sharma MP et al^[37] who have concluded that percentage of malignant causes were more than that benign causes.

All above findings are correlated with my study except study done by Huang et al and Sharma MP et al.

Frequency of Benign causes of obstructive jaundice

In our study out of 23 patients of benign etiology maximum number of patients with benign etiology was of Choledocholithiasis 14 patients (61%), followed by CBD stricture (21.7%), followed by Hydatid cyst of CBD in 3 patients (13%) whereas only 1 patient presented with choledochal cyst (4.30%).

In a study conducted by Bjornsson et al,^[38] Seven hundred and forty-nine patients of jaundice were identified, of whom 241 (32%) had Obstructive Jaundice. Of the 87 patients with a benign obstruction, 57 (65%) presented with choledocholithiasis, 7 (8%) had biliary strictures, 6% had PSC, and the obstruction of 16 patients (20.7%) had other causes.

In the study conducted by Garcea et al^[26] who concluded that choledocholithiasis accounted for the majority of patients with obstructive jaundice caused by benign disease (83.8%).

In study conducted by Nayyef Assi et al^[39], Out of 215 patients with obstructive jaundice 163 patients (75.8%) presented with choledocholithiasis were the commonest cause followed by 28 patients (13%) was of Hydatid cyst of CBD 2nd commonest cause.

In study done by Karki s et al^[40] concluded that the the most common benign causes of obstructive jaundice were choledocholithiasis(63%), CBD stricture(12.3%), pancreatitis(6.85%) and cholangitis(8%) and Choledochal cyst (2.74%).

Wang et al^[41] in his study concluded that, the causes of obstructive jaundice are varied, but it is most commonly due to choledocholithiasis; benign strictures of the biliary tract; pancreaticobiliary malignancies; and metastatic disease.

However in a study conducted by Attri et al^[42] concluded that the most common benign cause of obstruction was benign strictures followed by choledocholithiasis.

In a study done by Kuberan et al^[43] conducted a study on “A Prospective study on etiology and management of obstructive jaundice due to extra hepatic biliary obstruction” concluded that the most common cause of benign obstructive jaundice are Choledocholithiasis in 73% cases followed by CBD stricture in 16 % cases followed by Choledochal cyst in 11% cases.

In study done by Anand et al in 2017^[6] on a study on incidence, clinical profile, and management of obstructive jaundice, concluded that 66.23% of patients with benign etiology had choledocholithiasis.

The findings of this study are getting co related with the various studies mentioned above.

Frequency of malignant causes of obstructive jaundice

In this study, out of 12 patients of malignant etiology maximum number of patients with malignant etiology was of Cholangiocarcinoma (66.67%) followed by periampullary mass (33.33%). In cholangiocarcinoma, 6 patients (50%) had hilar cholangiocarcinoma and 2 patients (16.67%) had distal 1/3rd cholangiocarcinoma.

In study done by Ghimire R et al^[44] on study in 45 patients with obstructive jaundice concluded that out of 33 patients with malignant obstructive jaundice 12 patients maximum in number presented with cholangiocarcinoma followed by 11 patients with periampullary carcinoma.

In study done by Suthar et al^[45] conducted a study on 75 patients and found that out of 75 cases, 54 were benign and 21 cases were malignant. The authors have stated the most common cause for malignant obstructive jaundice was cholangiocarcinoma which was found in 13 cases (62%) followed by periampullary carcinoma in 4 cases (19%).

Study conducted by Kurian et al^[22] studied a case of obstructive jaundice in 46 patients out of which most common cause of malignant obstructive jaundice was cholangiocarcinoma in 20% patients followed by periampullary carcinoma in 4% patients.

Study conducted by Padhy et al,^[21] In his study out of 100 patients with obstructive jaundice 67 patient presented with malignant causes (67%), out of which carcinoma head of pancreas was commonest in 40 (59.7%) cases followed by cholangiocarcinoma and periampullary carcinoma in 10 patients (14.9%) each.

Study conducted by Singh et al^[46] had concluded that common cause of malignant etiology in obstructive jaundice are periampullary carcinoma followed by

cholangiocarcinoma.

In this study, the commonest cause of malignant obstructive jaundice is cholangiocarcinoma followed by periampullary carcinoma which is getting co related with the studies done by Ghimire *et al.*, Suthar *et al.* and Kurian *et al.*

Sensitivity and Specificity of benign diseases

The overall sensitivity of diagnosing Benign cause of obstructive jaundice on USG, CECT and MRCP are 100% followed by 95.65% followed by 95.65% whereas specificity is 66.67% followed by 83.33% followed by 100%.

In study done by Verma *et al.*^[47] he concluded that the sensitivities of USG, CT and MRCP in the diagnosis of benign disease were 85.3%, 84.6%, and 92.3% respectively, whereas specificities were 88.4%, 94.2%, and 86% respectively.

In this study sensitivity and specificity for diagnosing choledocholithiasis in USG was 64.29% and 93.33% followed by in CECT was 78.57% and 93.33% followed by in MRCP was 100% and 100%.

In the study done by Connor *et al.*^[48] he found out that the sensitivity and specificity of diagnosing choledocholithiasis on USG is 45% and 97%.

In study done by Demartines *et al.*^[49] sensitivity and specificity of MRCP for diagnosing choledocholithiasis was 100% and 95.6%.

In a study done by Singh *et al.*^[46] sensitivity and specificity for diagnosing choledocholithiasis in USG was 93.3% and 97.14% followed by in CECT was 75% and 96.77% followed by in MRCP was 100% and 97.12%.

In this study sensitivity and specificity for diagnosing CBD stricture in USG was 20% and 95.83% followed by in CECT was 80% and 100% followed by in MRCP was 80% and 100%.

In a study done by Singh *et al.*^[46] sensitivity and specificity for diagnosing CBD stricture in USG was 40% and 100% followed by in CECT was 100% and 100% followed by in MRCP was 100% and 100%.

In study done by Munir *et al.*^[50] on 49 patients with obstructive jaundice concluded that sensitivity and specificity of MRCP on detecting Benign CBD stricture are 83.3% and 97.6%.

In this study the sensitivity of diagnosing choledocholithiasis on USG is less compared with CECT and MRCP.

In study done by Conner *et al.*^[48] concluded that intestinal

gas obscuring the distal common duct was the most important factor limiting the ability of ultrasound to detect duct stones.

Sensitivity and specificity of malignant diseases

In our study sensitivity of diagnosing of malignant obstructive jaundice on USG, CECT and MRCP are 66.67% followed by 83.33% followed by 100% whereas specificity is 100% followed by 95.65% followed by 95.65%.

In study done by Vaishali *et al.*^[52] in study of 30 patients with obstructive jaundice the sensitivity and specificity of detecting malignant cause of obstructive jaundice on MRCP were 94.44% and 81.81% respectively

In study done by Adamek *et al.*^[51] out of 60 patients with obstructive jaundice sensitivity and specificity of MRCP in detection of malignant obstructive jaundice are 81% and 100% respectively.

Out of 35 patients of obstructive jaundice, ERCP was done in 29 patients, out of which one had failed cannulation, hence subjected to percutaneous transhepatic cholangiography (PTC) and remaining 6 patients were also subjected to PTC having hilar cholangiocarcinoma.

In study done by Huang *et al.* in 1993^[8] stated that percutaneous transhepatic cholangiography (PTC) was only used in those patients who had the contraindications to ERCP or the cannulation of ERCP was not successful. The positive rate of PTC was 95.8% in the cases with extrahepatic cholangiocarcinoma. The combination of ERCP and PTC could determine the position and extent of extrahepatic cholangiocarcinoma.

CONCLUSION

- In this study population obstructive jaundice is prevalent more in males than females and more common in 6th and 7th decade.
- The raised bilirubin levels are much higher (>10 mg%) in malignant cause of obstruction as compared to benign and thus much raised bilirubin level can be one of the predictive factors of malignant obstructive jaundice.
- The commonest symptomatology was pain in the abdomen and jaundice.
- In this study the benign cause of obstructive jaundice was more common in younger age group (<40 years) with female preponderance as compared to malignant cause of obstructive jaundice which is more common in older age group (>40 years) and male predilection.
- Choledocholithiasis was the most common cause overall and in benign etiology and cholangiocarcinoma in malignant obstructive jaundice.
- USG abdomen should be the first line imaging modality in detecting the cause of obstructive

jaundice due to its easy availability, non-invasive nature and cost effectiveness.

- MRCP is quick, accurate and non-invasive imaging modality for the assessment of obstructive jaundice with sensitivity and specificity of diagnosing benign cause of obstructive jaundice are 95.65% and 100% whereas for malignant obstructive jaundice sensitivity and specificity are 100% and 95.65%.
- The MRCP has got 100% sensitivity in diagnosing malignant obstructive jaundice and 96% for benign obstructive jaundice compared with ERCP. So before going for invasive procedure like ERCP, MRCP is considered in all patients to avoid unnecessary invasive procedures.
- ERCP has got the advantage of diagnostic as well as therapeutic modality.
- PTC should be done in the patients who had contraindication to ERCP or failed cannulation of ERCP.

ACKNOWLEDGEMENTS

My sincere gratitude and special thanks go to Dr. Meenakshi yeola (Pate), Dr. Pankaj Gharde for their dedicated supervision, constructive criticism, instructions and their encouragement. I would like to thank all the study participants and individuals who were so instrumental in helping me to complete this study.

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