

OBSTRUCTIVE JAUNDICE: A CLINICAL STUDY

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ABSTRACT

BACKGROUND

Jaundice is a frequent manifestation of biliary tract disorders and evaluation of obstructive jaundice is a common problem faced by general surgeons. Obstructive jaundice of varied aetiology is one of the main cause of hospital admissions. Hence, comprehensive study of aetiology, clinical presentation, management of obstructive jaundice is important in management of these patients.

AIMS AND OBJECTIVES

- Study the clinical history and presentation of obstructive jaundice.
- Study the various causes and sites of obstruction of the biliary tree.
- Study the different modalities of treatment of obstructive jaundice.

METHODS

Source of Data

Patients admitted to the Department of General Surgery at Thanjavur Medical College were taken up for the study. Number of cases studied were 30 from September 2014 to December 2015.

CONCLUSION

Pain abdomen was present in 73.33% patients, dyspepsia in 60%. Itching and clay coloured in 53% of patients. Melena in 10% patients with 36 times increased risk for malignancy. Palpable gallbladder was also statistically significant for malignant aetiology.

KEYWORDS

Obstructive Jaundice, Fever, Gallbladder.

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INTRODUCTION

Jaundice is a frequent manifestation of biliary tract disorders and the evaluation and management of obstructive jaundice is a common problem faced by the general surgeon. Obstructive jaundice is strictly defined as a condition occurring due to a 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. The block may be intrahepatic or extrahepatic in the bile duct.¹

Despite the technical advances, the operative modes of management of obstructive jaundice were associated with very high morbidity and mortality. Yet, during the last decade significant advances have been made in our understanding with regard to the pathogenesis, diagnosis, staging and the efficacy of management of obstructive jaundice.²

Obstructive jaundice of varied aetiology is one of the causes of admission to hospitals across Tamil Nadu. To diagnose the cause, site of obstruction and management of a clinical presentation and management of obstructive jaundice

case of surgical jaundice is indeed a challenging task for the surgeon. Hence, a comprehensive study of the aetiology is of paramount importance in the appropriate management of these patients.

OBJECTIVES OF THE STUDY

- To study the clinical history and presentation of obstructive jaundice.
- To study the various causes and sites of obstruction of the biliary tree.
- To study the different modalities of treatment of obstructive jaundice.

REVIEW OF LITERATURE

Jaundice is a generic term, which describes yellow pigmentation of the skin, mucous membrane or sclera. Mention of jaundice is made in the works of Hippocrates (400 BC) who pointed out that persistent jaundice may be due to cancer or cirrhosis of liver.³ Gallstones have been described in Chilean mummies since the second and third centuries AD. Galen in second century AD in his humoral concept of disease attributed abnormalities of yellow bile, black bile, blood and phlegma within the body to cause disease.

Surgical Jaundice

A complete or partial obstruction of biliary flow can cause jaundice and this may be intra- or extra-hepatic.

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Causes of Surgical Jaundice Classified into.⁴

- A. In the lumen of duct
 - Choledocholithiasis
 - Parasitic infestation due to Hydatid disease, Ascariasis
 - Haemobilia
- B. In the wall of duct
 1. Congenital
 - Biliary atresia
 - Choledochal cyst
 2. Acquired
 - Papillary stenosis
 - Strictures
 - a. Post-traumatic
 - b. Post-surgical
 - Injuries during cholecystectomy
 - Exploration of CBD
 - Pancreatic operation
 - Gastrectomy
 - Biliary enteric anastomosis
 - Operation on liver and portal vein
 - c. Post-inflammatory strictures Gallstones
 - Chronic pancreatitis
 - Chronic duodenal ulcer
 - Parasitic inflammation
 - Recurrent pyogenic cholangitis
 - d. Primary sclerosing cholangitis
 - e. Following radiotherapy
 - f. Mirizzi's syndrome
 - g. Malignant causes
 - Ca Gall bladder
 - Cholangiocarcinoma
 - Ca of ampulla of vater
- C. Outside the wall
 1. Benign: Pseudocyst of pancreas
 2. Malignant:
 - Ca head of pancreas
 - Enlarged lymph nodes at portahepatitis
 - Periampullary Ca

Pathophysiology of Biliary Obstruction

Cholestasis is defined as the failure of normal bile to reach the duodenum. It is classified as:

1. Extrahepatic cholestasis.
2. Intrahepatic cholestasis.

MALIGNANT CAUSES**Ca Gallbladder**

This tumour represents only 2% of all cancers, but it is commonest site of cancer in biliary tract.

Cholangiocarcinoma.^{5,6}

The incidence of bile duct tumours increases with age; has even distribution between men and women. The most common is adenocarcinoma (95%).

Periampullary Carcinoma.⁷

Periampullary cancers include a group of malignant neoplasms arising at or near the ampulla of vater within 2 cms of radius from ampulla. Most of them are

adenocarcinoma arising from the head of pancreas (60%), ampulla of vater (20%), distal common bile duct (10%) or second part of duodenum (10%).

Ca Head of Pancreas.⁸

Accounts for 60% of periampullary carcinomas. At least 2/3rd of cases of pancreatic cancer arise in the head of the gland. Ductal carcinoma of the pancreas accounts for more than 90% of all malignant pancreatic exocrine tumours.

Carcinoma of Ampulla of Vater.⁹

Accounts for 20% of periampullary carcinomas.

Clinical Features.¹⁰

Abdominal pain

Jaundice

Pruritus

Anorexia

Nausea, vomiting

Bowel functions—steatorrhoea occurs with biliary obstruction, but much higher level of faecal fat results when pancreatic duct is blocked.

Bleeding

Fever

Radiological Studies.¹¹⁻¹⁵**Ultrasound**

Ultrasound examination of the hepatobiliary system is an important first line, non-invasive investigation. Patient preparation for ultrasound should include fasting for 12 hours.^{12,13}

Computed Tomography (CT)

CT also shows dilated biliary ducts, thus helps to distinguish obstructive from non-obstructive jaundice in 90% of cases. Still as a screening procedure, it does not have an advantage over ultrasound scan. It is however more likely than ultrasound to show the level and cause of obstruction.

Endoscopic Retrograde Cholangiopancreatography (ERCP)

With the help of ERCP, diseases which involve the oesophagus, stomach, duodenum, pancreas and the biliary system including duodenal diverticula and fistulae can be easily diagnosed.¹⁶

Percutaneous Transhepatic Cholangiography

Magnetic Resonance Cholangiopancreatography (MRCP).^{17,18} It has an overall accuracy of greater than 90% in showing CBD duct stones.

Endoscopic Ultrasound (EU).¹⁹

Main role is in the detection of pancreatic tumours. It also detects CBD stones and can be used for image-directed biopsy. Accuracy of endoscopic ultrasound for choledocholithiasis is more than 90.

Biliary Scintigraphy.²⁰

Abdominal Radiography Barium contrast upper gastrointestinal X-ray, X-rays can distinguish between a neoplastic and calculus obstruction. Early changes in malignancy include short thick mucosal folds in duodenum

with relative stasis. The circumscribed filling defect in the gastric silhouette described as PAD SIGN, the post-bulbar impression of duodenum due to a dilated common duct in Ca pancreas. The reversed "3 sign" of Frostburg in periampullary carcinoma are all important radiological signs of malignancy.

Method of Collection of Data

After admission to TMCH Hospital, a detailed clinical history and examination of the patient was done. Relevant investigations were undertaken to make a diagnosis. Patients were assessed preoperatively for the fitness for surgery and later subjected to curative or palliative surgery depending on the stage of the disease and general condition of the patient. The resected tissue was subjected to histopathological examination. Postoperatively, patient's condition was assessed and complications were documented. Photographic documentation has been done wherever possible.

Inclusion Criteria

- Age – More than 12 years.
- Patients proved to have obstructive jaundice by any investigative modality during the period from September 2013 to September 2014.

Exclusion Criteria

- Age less than 12 years.
- Medical jaundice.
- Cases of obstructive jaundice who are unfit for interventional treatment.

Statistical Methods

Chi-square and Fisher Exact test have been used to find the significance of proportion of symptoms and signs between benign and malignant cases. Student 't' test has been used to find the significance of mean difference of lab parameters between benign and malignant cases. The Odds ratio has been used to find the strength of relationship between symptoms and signs of benign and malignant cases. If p value was <0.05, the probability was considered to be statistically significant.

RESULTS AND OBSERVATIONS

Study Design

A prospective clinical study consisting of 30 cases of obstructive jaundice was undertaken to investigate the pattern of clinical presentation and lab parameters to study the cause of obstructive jaundice and the different modes of

treatment adopted.

Age in Years	Male (n=20)		Female (n=10)		Total (n=30)	
	No.	%	No.	%	No.	%
≤40	2	10.00	4	40.00	6	20.00
41-50	10	40.00	0	0	8	26.67
51-70	6	30.00	6	60.00	12	40.00
>70	2	10.00	2	20.00	4	13.33

Table 1: Age & Sex Distribution

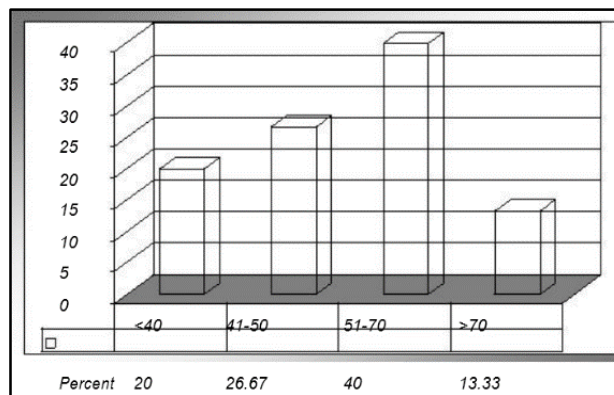


Fig. 1: Age Distribution of Study Population

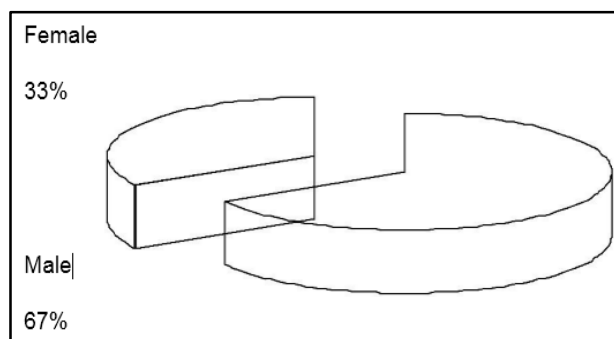


Fig. 2: Sex Distribution of Study Population

The above table shows analysis of age and sex distribution. The age varied from 34 years to 75 years. Number of male patients was 20 (66.7%) and number of female patients was 10 (33.3%).

Symptoms	Benign	Malignant	Total	Significance	Odds Ratio
	(n=20)	(n=10)	(n=30)	(p value)	(Malignant)
Pain abdomen	20	2	22	< 0.001	0.016
	(100.00)	(20.00)	(73.33)	Sig.	NR
Flatulent dyspepsia	14	4	18	> 0.05	0.286
	(70.00)	(40.00)	(60.00)	NS	NR
Jaundice	12	8	20	> 0.05	2.667
	(60.00)	(80.00)	(66.67)	NS	R+
Itching	10	6	16	> 0.05	1.5
	(50.00)	(60.00)	(53.33)	NS	R+
High coloured urine	12	8	20	> 0.05	2.667
	(60.00)	(80.00)	(66.67)	NS	R+
Clay coloured stools	8	8	16	> 0.05	6
	(40.00)	(80.00)	(53.33)	NS	R+

Nausea/Vomiting	12	4	16	> 0.05	0.44
	(60.00)	(40.00)	(53.33)	NS	NR
Fever	14	2	16	> 0.05	0.107
	(70.00)	(20.00)	(53.33)	NS	NR
Loss of appetite	10	8	18	> 0.05	4
	(50.00)	(80.00)	(60.00)	NS	R+
Melena	2	8	10	> 0.001	36
	(10.00)	(80.00)	(33.33)	Sig	R+
Pallor	8	8	16	> 0.05	6
	(40.00)	(80.00)	(53.33)	NS	R+
Palpable GB	2	8	10	< 0.001	36
	(10.00)	(80.00)	(33.33)	Sig.	R+

Table 2: Association of Symptoms & Signs with Diagnosis

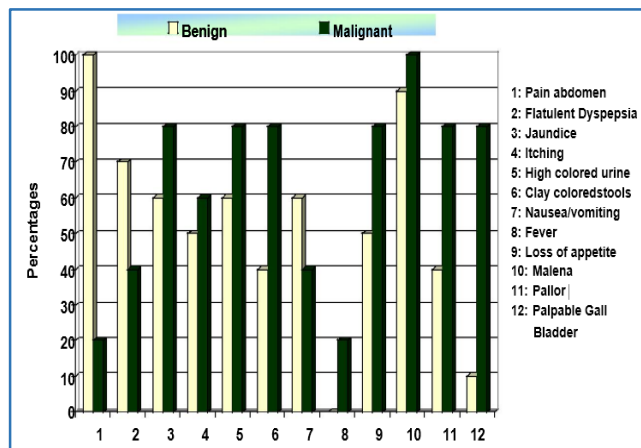


Fig. 3: Bar Chart showing Percentage Distribution of Presenting Symptoms and Signs of Benign and Malignant Cause of Obstructive Jaundice

The above analysis shows the incidence of presenting symptoms and signs.

- Pain abdomen was present in 22 patients (73.33%) with 100% of patients with benign and 20% of patients with malignant aetiology presenting with this symptom. This was found to be statistically significant without any increase in risk for a malignant aetiology.
- Flatulent dyspepsia which includes bloating, belching or heart burn was present in 18 patients (60%) with 70% of patients of benign and 70% of patients with malignant aetiology presenting with this symptom, but was not statistically significant without an increase in risk.
- Jaundice was present in 20 patients (67%). Jaundice in benign condition 12 patients (60%) and in malignant condition 8 patients (40%). Jaundice had 3 times the risk for a malignant cause, however, not statistically significant.

- Itching was present in 16 patients (53%). In benign condition-50% and malignant condition-60% with a 2 times increased risk for malignancy which was not statistically significant.
- High coloured urine was present in 20 patients (67%). In benign condition - 60% and malignant condition, it was 80% prevalent with 3 times increased risk for the cause to be malignant, but not statistically significant.
- Clay coloured stools was present in 16 patients (53%). In benign condition, it was 40% prevalent and in malignant condition 80% with 6 times increased risk which was statistically significant.
- Nausea and vomiting was present in 16 patients (53%). In benign condition, the prevalence was 60% and in malignant condition 40% prevalent with no increased risk or statistical significance.
- Fever was present in a total of 16 patients (53%) with benign condition- 70% and malignant condition 20% prevalence with no increased risk or statistical significance.
- Loss of appetite was present in 18 patients. In benign condition, it was 50% and in malignant condition it was 80% with 4 times increased risk of being malignant with no significant difference among the 2 groups.
- Melena was present in 10 patients who were diagnosed as obstructive jaundice with 36 times increased risk for malignancy with statistical p value <0.05.
- Pallor was present in a total of 16 (53%) patients with benign condition (40%) and in malignant condition it was 80% with an increased risk for malignancy, but no significant difference was noticed between the 2 groups.
- Gallbladder was palpable in 10 patients (33%). In patients with benign condition 10% and malignant condition 80% prevalence with 36 times increased risk for malignancy was noted with a p value <0.05, which was statistically significant for a malignant aetiology.

Lab Parameters	Benign (n=20)	Malignant (n=10)	Student t Test Value	p value
	Mean ±SD	Mean ±SD		
Haemoglobin (gm%)	10.54±1.86	9.84±0.38	0.818	> 0.05 NS
Total Bilirubin (mg/dL)	7.12±7.06	15.26±5.786	2.219	< 0.05 Sig.
Direct Bilirubin (mg/dL)	4.65±4.55	12.72±5.81	2.96	< 0.05 Sig.
Alkaline Phosphatase IU	243±212.75	470.8±150.77	2.12	< 0.05 Sig.

Table 3: Laboratory Investigations in Comparison of Benign with Malignant

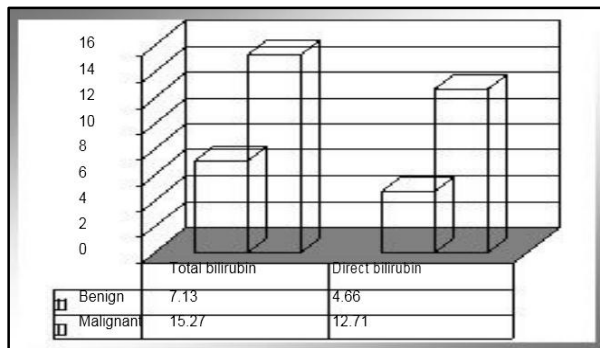


Fig. 4: Bar Diagram showing Comparison of Total and Direct Bilirubin Levels in Benign and Malignant Conditions

Mean haemoglobin in benign was 10.54 g/dL with SD 1.86 and 9.84 g/dL with 0.38 in malignant with no significant difference.

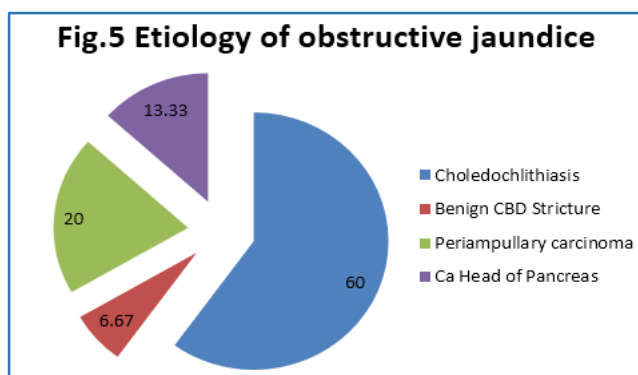
Mean total bilirubin in benign is 7.12 mg/dL with SD 7.06 and is 15.26 mg/dL with SD 5.786 in malignancy and the similar values of direct were 4.65 mg/dL with SD 4.55 and 12.72 mg/dL with SD 5.81 respectively. Both these tests had a statistically significant difference between benign and malignant conditions.

Mean alkaline phosphatase in benign condition is 243 IU/L with SD 212.75 and mean alkaline phosphatase in malignant condition is 470.8 IU/L with SD 150.77, which was significantly raised in malignancy (p<0.05).

In the radiological studies, ultrasound was used as the main diagnostic procedure in this study; 60% of patients had common bile duct calculi and 33.33% of patients were diagnosed to have a malignant lesion; 6.67% of patients the diagnosis could not be ascertained by ultrasound. This was diagnosed as common bile duct benign stricture by an MRCP examination.

The other investigations done were CT scan, which was done in most patients to confirm diagnosis of USG and to know any metastasis in case of malignancy.

MRCP was also done in 25 patients to confirm the diagnosis.

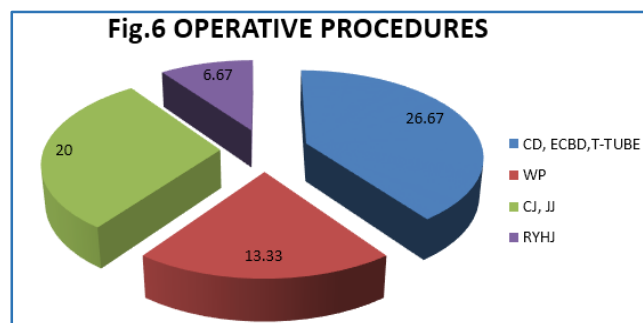


Diagnosis	No. of Cases	Percentage of Total
Cholelithiasis	18	60%
Benign CBD stricture	2	6.67%
Periampullary carcinoma	6	20%
Ca head of pancreas	4	13.33%

Table 4: Aetiology of Obstructive Jaundice

Procedure	No. of Cases	Percentage of Total
Cholecystectomy with ECBD & choledochoduodenostomy	10	33.33%
Cholecystectomy with ECBD & T tube drainage	8	26.67%
Whipple's Procedure	4	13.33%
Palliative Cholecystojejunostomy with jejunostomy	6	20%
Roux en Y Hepatico-Jejunostomy	2	6.67%

Table 5: Operative Procedures

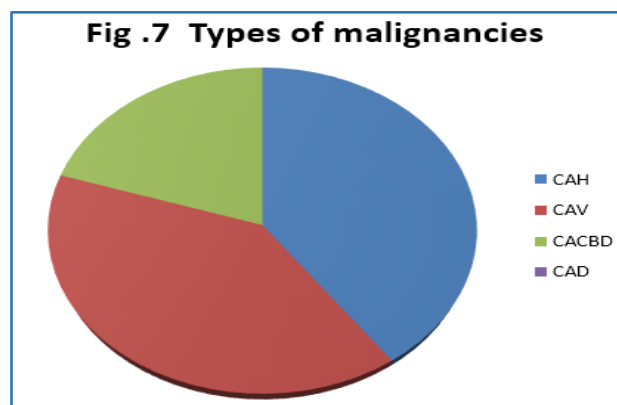


Cholecystectomy and CBD exploration with T-tube drainage for CBD calculi in 8 patients and choledochoduodenostomy in 10 patients. Of these 9 patients, only 2 patients (22.22%) developed peritubal leak which subsided spontaneously.

Two patients diagnosed to have benign CBD stricture with history of previous Cholecystectomy, underwent Roux en Y Hepatico-Jejunostomy and enteroenterostomy. One patient developed bile leak with cholangitis, which was treated with antibiotics and right pleural effusion, which was treated with intercostal drainage.

Types of Malignancy	No. of Cases	Percent of Malignant Cases
Ca Head of Pancreas	4	40%
Ca Ampulla of Vater	4	40%
Ca Lower CBD	2	20%
Ca Duodenum 2 nd part	-	-

Table 6: Types of Malignancies causing Obstructive Jaundice (n=10)



Malignant cause for obstruction was seen in 10 patients (33.33%). Ca head of pancreas was seen in 4 patients, distal

Cholangiocarcinoma in 2 patients and Carcinoma of Ampulla of Vater in 4 patients on histopathological examination of the resected specimen.

Complications	No. of Cases	Percentage of Total
Peritubal leak with cholangitis	3	20%
Rt. pleural effusion	1	6.67%
Death	1	6.67%

Table 7: Postoperative Complications

Patients were followed up during the postoperative period for 6 months. One patient with palliative cholecystojejunostomy with jejunojejunostomy again for Ca Head of Pancreas died on the 15th postoperative day due to sepsis; 3 cases that underwent Whipple’s procedure for Carcinoma Ampulla of Vater during his followup was asymptomatic except for delayed gastric emptying which was treated with prokinetic drugs.

	Mean Pre-op D.	PO Day 7 Mean	Rate of fall of D.
Procedure	Bilirubin (mg/dL)	D. Bilirubin (mg/dL)	Bilirubin (mg/dL/day)
Cholecystectomy + ECBD + Choledochoduodenostomy	4.26	1.15	0.50
Cholecystectomy+ECBD +T tube drainage	6.05	2.72	0.475
Palliative	12.6	3.6	1.28
Cholecystojejunostomy			

Table 8: Outcome of Operative Procedures

Cholecystectomy with exploration of the CBD and drainage was associated with a significant fall in direct bilirubin values, which occurred approximately at the rate of 0.5 mg/dL/day. Palliative cholecystojejunostomy for obstructive jaundice in patients who have tumours, which are not resectable have also shown to decrease the direct bilirubin sizably at the rate of approximately 1.2 mg/dL/day.

DISCUSSION

Obstructive jaundice is a frequent condition of biliary tract disorders and the evaluation and management of the jaundice patient is a common problem facing the General Surgeon. While diagnosing a case of surgical jaundice, a thorough history, a complete physical examination and biochemical tests are necessary. Once diagnosed, the surgeon should have good knowledge about the anatomy of the biliary tree, physiology of bile metabolism and pathophysiological changes occurring in the liver secondary to obstruction, various causes of obstruction, different imaging facilities and different modalities of treatment.

In this study, analysis of the various causes of surgical jaundice and its presentation were done. Investigations were carried out and different types of operative procedures were conducted. Total number of cases were 30. The results were compared with other similar studies done by various authors.

In this study, the peak incidence of surgical jaundice was

seen in age group of 51 to 70 years with M:F :: 66.67 : 33.33%.

The common presentation in a benign condition was pain abdomen and flatulent dyspepsia, whereas in malignant condition it was jaundice, high coloured urine, pale stool and loss of appetite. Most malignant cases had icterus and a palpable gallbladder when compared to benign condition. These conditions also carried an increased risk for malignancy as calculated by the odds ratio.

There were significantly higher values of total bilirubin, direct bilirubin and alkaline phosphatase in malignant conditions.

It was found that obstructive jaundice secondary to common bile duct stones remains the commonest cause, obstructive jaundice secondary to malignancy was the second most common cause followed by benign stricture.

USG abdomen was carried out on all patients as a standard imaging technique for investigation on a patient presenting with jaundice. USG was successfully used as a cheapest non-invasive tool to know the cause and level of obstruction in nearly 93% of the patients (USG was unable to diagnose one benign CBD stricture, which was diagnosed by ERCP). The limitation of this diagnostic test was its high operator dependence.

ERCP: Its value is its ability to remove stones, stenting and also taking tissue for HPE. ERCP is also one of the diagnostic tools used for surgical jaundice.

MRCP: It is a diagnostic test for imaging of biliary tree. Drawback of this imaging technique is its inability to remove calculi, stenting or biopsy tissue for HPE. CT scan was also used in selected cases to confirm the diagnosis made on USG.

Patient with obstructive jaundice due to CBD calculi underwent Cholecystectomy with CBD exploration with either T-tube drainage after intraoperative cholangiogram showed normal flow of dye into duodenum with no residual calculi or choledochoduodenostomy. Definitive procedure done for benign CBD stricture following Cholecystectomy was Hepatico-Jejunostomy with enteroenterostomy.

Obstructive jaundice due to malignancy, 6 underwent palliative procedure and four patients underwent definitive procedure (Whipple’s procedure). The outcome of palliative procedures was good. Patients were free from jaundice.

Present study was compared with those of other authors. It has been summarized below.

	Agarwal et al.	Nadkarni et al	Present Study
Icterus	100	100	100
Pain abdomen	79.1	53.8	73
Itching	50	73.1	53
Fever	12.5	53.8	53
Nausea/Vomiting	70.9	88.5	53
Clay-coloured stools	41.7	92.3	53

Table 9: Comparison of Presenting Symptoms and Signs

As can be seen, jaundice was the main presenting symptom/sign in the study of Agarwal and Nadkarni et al. Nausea/Vomiting and Pain abdomen was the other major presenting symptoms.

In the present study, it is pain abdomen followed itching, fever, nausea/vomiting and clay-coloured stools.

	Nadkarni et al. (24)	Kar et al. (129)	Present Study (30)
CBD stones	9	32	9
CBD benign stricture	1	4	1
Malignancy of pancreas/CBD	14	93	5

Table 10: Comparison of etiological distribution.^{21,22}

In our study, common bile duct stone were the main aetiology for jaundice when compared to Nadkarni et al., Kar et al. It was malignancies, which were common.

CONCLUSION

- Common presentation of surgical jaundice is jaundice.
- Palpable GB indicates the aetiology to be malignant.
- Common cause for surgical jaundice is CBD calculi.
- USG remains the cheapest, safest and most reliable diagnostic tool in the management of surgical jaundice.
- Open exploration of CBD under experienced hands is a good treatment modality in the management of obstructive jaundice.
- In malignancies, early detection and staging and proper selection of the patient are more important to gain benefit from resection of tumour, whereas late presentation and those patients not suitable for resection had good improvement in quality of survival with palliative surgery.
- Improving deranged LFT, correction of anaemia and hepatorenal problem improves the surgical results (Morbidity and mortality).

SUMMARY

30 patients were diagnosed to have surgical jaundice in the study period from September 2014 to December 2015. The study was conducted at the Department of Surgery, Thanjavur Medical College, Tamil Nadu.

A brief introduction and a historical review of biliary tract has been presented with a detailed discussion on the surgical anatomy, physiology, aetiopathogenesis, clinical features, investigations and management of surgical jaundice.

The findings of this study were compared with those available in literature. The results have been represented with tables and graphs for better understanding.

The Findings of the Study are as Follows

1. The occurrence of surgical jaundice was maximum in the 51-70 years' age group.
2. Icterus was present in all 30 patients. Pain abdomen and flatulent dyspepsia were more in benign condition whereas jaundice, clay-coloured stools, high coloured urine with itching was more common in malignancy.
3. High values of serum bilirubin and alkaline phosphatase are noted in malignancy.
4. USG was the cheapest non-invasive investigation used for diagnosis of surgical jaundice.
5. Most common cause of obstruction was CBD calculi followed by malignancy, then by benign CBD stricture.
6. For CBD calculi, CBD exploration with cholecystectomy and drainage procedure was done by T tube or choledochoduodenostomy.
7. For benign CBD stricture, the patient underwent hepatico-jejunostomy with enteroenterostomy.
8. For malignancy operative curative procedure was Whipple's surgery and palliative procedure was cholecystojejunostomy.
9. Recently increasing reliance of ERCP and MRCP to image biliary tract has helped to diagnose the pathology earlier and hence early intervention can be initiated.

REFERENCES

1. Scharsschmidt GF, Goldberg HI, Schmid R. Approach to the patient with cholestatic jaundice. *N Engl J Med* 1983;308:1515-1519.
2. Kim U Kahnag, Joel J Roslyn. Jaundice: maingot's abdominal operations. Singapore: Mc Graw Hill, 10th edn. 2001;Vol I & II:p 315-36, 1701-2031.
3. Morgenstern L. A history of choledochotomy. in: Berci G, Cushieri A. Bile ducts and Bile duct stones, WB Saunders 1997;2:3-8.
4. Osler W. Principles and practice of Medicine. New York: Appleton and Co. 1992;5th ed:p 569.
5. Musser JH. Primary cancer of the gallbladder and bile ducts. *Boston Med Surg J* 1989;121:581-588.
6. Burke EC, William R Jamagin, Steven N Hochwald, et al. Hilar cholangiocarcinoma. *Ann Surg* 1998;228(3):385-394.
7. Gold EB. Epidemiology of and risk factors for pancreatic cancer. *Surg Clin North Am* 1995;75(5):819-843.
8. Jagannath P, Shrikhande S. Current options in the diagnosis & management of periampullary carcinoma. *Indian J Surg* 2003;65(5):347-353.
9. Lillemoie KD. Current management of pancreatic carcinoma. *Ann Surg* 1995;2219(2):133-148.
10. Sherlock S, Dooley J. Diseases of the liver and biliary system. Oxford: Blackwell Science, 2002;11th edn.
11. Thomas MJ, Pellegrini CA, Way LW. Usefulness of diagnostic tests for biliary obstruction. *Am J Surg* 1982;144(1):102-108.
12. Laing FC, Jeffrey RB, Wing VW, et al. Biliary dilatation: defining the level and cause by real time. *Radiology* 1986;160(1):39-42.
13. Scheske GA, Cooperberg PL, Cohen MM, et al. Dynamic changes in the caliber of the major bile ducts, related to the obstruction. *Radiology* 1980;135(1):215-216.
14. Maglinte DDT, Torres WF, Laufer I. Oral cholecystography in contemporary gallstone imaging: a review. *Radiology* 1991;178(1):49-58.
15. Dooley JS, Dick R, George P, et al. Imaging in hepatobiliary disease. Oxford: Blackwell Scientific Publications, 1988;8(6):1720-1721.
16. McCune WS, Shorb PE, Moscovitz H. Endoscopic cannulation of ampulla of vater: a preliminary report. *Ann Surg* 1968;167(5):752-756.
17. Semelka RC, Shoenuit JP, Kroeker MA, et al. Bile duct disease: prospective comparison of ERCP, CT, and fat suppression MRI. *Gastrointest Radiology* 1992;17(4):347-352.
18. DiMagno EP, Buxton JL, Regan PT, et al. Ultrasonic endoscope. *Lancet* 1980;1(8169):629-631.
19. Lieberman DA, Krishnamurthy GT. Intrahepatic versus extrahepatic cholestasis. Discrimination with biliary scintigraphy combined with ultrasound. *Gastroenterology* 1986;90(3):734-743.
20. Dooley JS, Dick R, Olney J, et al. Non-surgical treatment of biliary obstruction. *Lancet* 1979;2(8151):1040-1044.
21. Nadkarni KM, Jahgirdar RR, Kagzi RS, et al. Surgical obstructive jaundice—a study of 26 cases. *J Postgraduate Med* 1981;27(1):33-39.
22. Agarwal JB, Patel RA. Surgical management of obstructive jaundice. *J Ind Med Ass* 1974;62(12):414-416.