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ORIGINAL ARTICLE

ANALYSIS OF THE ETIOLOGICAL SPECTRUM AND CLINICAL PROFILE OF EXTRA- HEPATIC BILIARY TREE OBSTRUCTION AT A TERTIARY HOSPITAL IN ADDIS ABABA

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ABSTRACT

Background: *Extra-hepatic biliary tree obstruction is a common problem in surgical gastroenterological practice. The condition can be caused by the obstruction of the bile duct with gallstones, strictures and hepato-biliary malignancy.*

Objective: *To assess and report the etiological spectrum, clinical presentation, treatment and outcome of patients with extra-hepatic biliary tree obstruction.*

Methods: *A retrospectives analysis of all patients admitted with a diagnosis of extra-hepatic biliary tree obstruction and operated at St. Paul Hospital Millennium Medical College from January 1, 2012 to December 30, 2015 was performed. The data were collected from patient medical records identified using the operation theater log-book. A pretested, structured data extraction format was used to collect the data, which were entered onto and analyzed using SPSS version 20.*

Results: *A total of 116 patients, 62 (53.4%) females, were operated for extra-hepatic biliary tree obstruction. Their age ranged from 21 to 80 years with a mean (±SD) of 40.3(11.2) years. Abdominal pain seen in 107 (92.2%) of the patients and jaundice in 98 (84.5%) were the two most common presenting complaints. Abdominal ultrasound was the main imaging modality used to identify the etiology in 88.8% of the patients. Benign conditions accounted for 79 (68.1% of the underlying etiology, common bile duct stone being the most common, 70 (60.3%). Pancreatic head tumor was the commonest malignant cause, 19 (51.3%), followed by cholangiocarcinoma, 15 (40.5%). Cholidochoduodenostomy was performed for 50 (43.1%) of the patients and cholecystojejunostomy with Braun's anastomosis for 22 (19%).*

Conclusion: *Abdominal pain and jaundice were the main presenting symptoms of extra-hepatic biliary tree obstruction, which was mainly caused by common bile duct stone obstruction and pancreatic head tumor. Ultrasound was the main modality for diagnosing the underlying causes and bypass operation was commonly done*

Key word: *Common bile duct, Stone, Extra-hepatic biliary tree obstruction, Jaundice*

INTRODUCTION

Extra Hepatic Biliary Obstruction (EHBO) is a condition in which bile exit/flow is obstructed starting from hepatic ducts up to the second part of the duodenum and it may result in obstructive jaundice (OJ) (1). Jaundice refers to yellowish discoloration of the skin, sclera and mucous membrane due to an increased level of bilirubin concentration in body fluid. It is detectable when plasma bilirubin exceeds 50 mmol/L or 2-2.5 mg/dl. Jaundice is called obstructive when the cause is blockage of bile flow from the liver to the intestine (1).

EHBO is one of the most common hepatobiliary surgical conditions managed by general surgeons and hepatobiliary surgeons (2-4). The condition can be caused by either benign or malignant conditions.

Benign pathologies which occur relatively more in younger patients includes biliary stones (choledocolithiasis), benign biliary strictures (iatrogenic or sclerosing), parasite infestations (ascaris, liver flukes and hydatid cysts), etc. Malignant causes of EHBO includes pancreatic head tumors, tumors of the biliary tree, tumors of the second part of the duodenum, Ampula of Vater tumors and others (2,5). Pancreatic head tumor is the most common cause of malignant EHBO (1,3,4).

The symptoms of EHBO include abdominal pain, yellowish discoloration of the eye, dark/cola colored urine, itiching, pale colored stools, weight loss and anorexia. In choledocholithiasis jaundice is intermittent, and usually associated with pain. Malignant EHBO commonly present with a relatively short duration but persistent and progressive type of painless jaundice, accompanied by significant weight loss and itching. Patients are typically old male (4,6).

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Differentiating causes of EHBO/OJ needs laboratory and imaging studies. Laboratory investigations such as liver enzyme, serum bilirubin level and uribilinogen level help in defining the type of jaundice. A significant rise in Alkaline phosphatase (ALP) compared to a rise in Alanine Aminotransferase (ALT) or Aspartate Aminotransferase (AST) is common characteristics of OJ due to EHBO (4). Definitive diagnosis is usually reached by imaging studies like abdominal ultrasound (AUS), Endoscopic Ultrasound (EUS), abdominal computed tomography (CT), Magentic Resonant Cholangiopancreatoprahpy (MRCP), Endoscopic Retergrade Cholangiopancreatography (ERCP) and Percuatneos Cholangiography (PTC) (7,8). AUS is considered as the first line investigation while MRCP the gold standard (9). CT is an important evaluation and staging study in patients with malignant obstruction (1).

The type of treatment for EHBO can be minimally invasive procedures or open surgery depending on the diagnosis and the hospital setting (10). In areas where the technology and the skill is available stones in the Hepatic Duct (HD) or Common Bile Duct (CBD) are treated by ERCP (8). In resource limited countries like Ethiopia open surgery is still the preferred option of treatment for both benign and malignant conditions. Because most patients with malignant EHBO present late, resection surgery is done only for few percent of the patients. The objective of this study was to determine the etiologic spectrum, clinical presentation, treatment and outcome of patients with extra hepatic biliary tree obstruction who were admitted to St. Paul Hospital Millennium Medical College (SPHMMC), surgical wards from January 1, 2012 - December 30, 2015.

PATIENTS AND METHODS

A cross-sectional descriptive study was conducted at SPHMMC department of surgery, Addis Ababa, Ethiopia. SPHMMC is a tertiary level teaching hospital engaged in both undergraduate and postgraduate programs. During the study period department had 10 general surgeons, 04 operation theaters and 110 surgical beds. The study included all patients admitted and operated from January 1, 2012 to December 31, 2015 at the department of surgery with a diagnosis of EHBO. EHBO was defined as obstruction to the bile exit/flow starting from hepatic ducts up to the second part of duodenum. The hospital had no ERCP or PTC service during the study period. Patients were identified from operation theater log books and ward admission and discharge book. Patients admitted but not operated and those with incomplete medical records were excluded from the study.

Data was collected from individual patient's medical records by trained second year surgical residents using a pretested structured data collection format. Data collection was supervised by the investigators. Collected data was checked for completeness, cleaned, coded, entered and analyzed with SPSS version 20. Patient socio-demographic characteristics, presenting complaint, laboratory and imaging finding, intra-operative findings, type of surgery done and post operative complications were collected. A rise in ALT, AST or ALP 2-3 times above the normal values was considered significant. Chi square test was used to test the presence of association and P value <0.05 was considered as a statistically significant. Ethical clearance was obtained from SPHMMC Institution Review Board (IRB).

RESULTS

Totally 120 patients were operated for EHBO in the study period and charts of 116 (96.7%) patients with complete medical records used for this study. There was a slight female preponderance, (53.3%) with male to female ration of 1:1.14. Age of patients ranged from 21 to 80 years with a mean (±SD) of 40. 3 years(11.2). The majority of patients, 90 (77.6%), were above 40 years of age. Among patients under 49 years of age females (35) out number males (14) while in those above 50 years, male (40) were more commonly affected than females (27) (**Figure 1**). The difference in age and sex distribution of EHBO was found to be statistically significant (p=0.013, p=0.000, respectively).

Abdominal pain was the most common symptom, 107 (92.2%), followed by history of yellowish discoloration of the eye, 98 (84.5%), and both abdominal pain and yellowish discoloration of the eye, 89 (76.7%). Abdominal pain associated with jaundice (painful jaundice) was less prevalent presentation in patients with malignant EHBO, 27 (72.9%), compared to benign EHBO, 62 (78.4%). On physical examination 95 (81.9%), 27 (23.3%) and 25 (21.6%) patients found to have icteric sclera, right upper quadrant abdominal tenderness and hepatomegaly/palpable gall bladder respectively. Table 1 Sixteen (13.8%) patients had co-morbid illness: hypertension, DM or both.

Significant rise in ALT& AST level was seen in 61 (52.6 %) and 63 (54.3%) patients respectively. Significant ALP rise was seen in 72(62.7%) of the patients. Serum bilirubin was determined in 94 (81%) patients, total bilirubin raised above normal in 75 (79.8%) patients while direct bilirubin was raised in 80 (85.1%). The rise in both total and direct bilirubin level was significantly higher in malignant EHBO compared to benign causes (P=0.000) (**Table 2).**

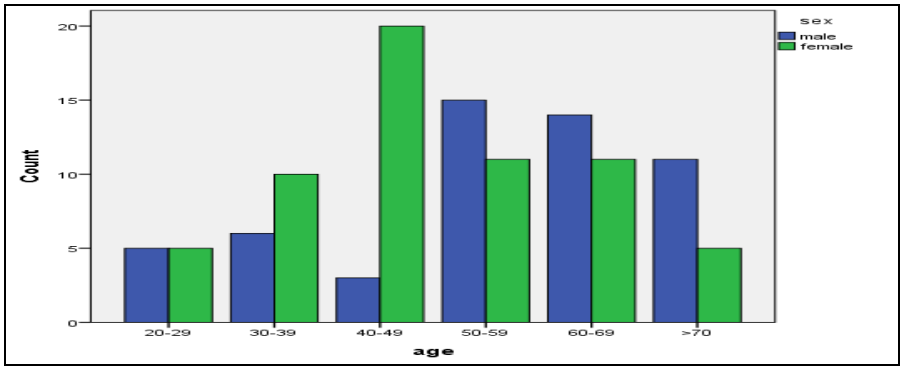

Figure 1: Age and sex distribution patients with extra hepatic biliary tree Obstruction at SPHMMC, Addis Ababa, Ethiopia, 2015.

Table 1: Clinical finding of patients with extra hepatic biliary obstruction at SPHMMC, Addis Ababa, Ethiopia 2015.

Clinical manifestation	Number of patients	Frequency (%)
Abdominal pain	107	92.2
Yellowish discoloration of the eye	98	84.8
Icteric sclera (on P/E)	95	81.9
Abdominal pain and yellowish discol-oration of the eye	89	76.7
Dark color urine /pale color stool	59	50.9
Abdominal Tenderness	27	23.3
Hepatomegaly/palpable GB	25	21.6
Pruritis	23	19.8
Weight loss	17	14.7

Abdominal ultrasound was the main radiologic/ imaging study, which was done for all patients. US missed diagnosis in 10 (8.6%) patients. Computerized tomography was done in 33(89.2%) of the patients with malignant EHBO but missed diagnosis of 7 (21.2%) patients.

CBD stone was the most commonly miss labeled pathology 7(6.1%). Distal cholangiocarcinoma found to be more prone for under diagnosis than any other cause of EHBO .

Table 2: The degree of serum bilirubin increment among benign and malignant Causes of EHBO at SPHMMC, Addis Ababa, Ethiopia, 2015.

Serum bilirubin		Pathology		Total	P-value
		benign	malignant		
Total serum bilirubin	<1mg/dl	19	0	19	
	1-5	20	5	25	
	5-10	14	10	24	
	10-15	6	8	14	
	>15	2	10	12	
Total		61	33	94	0.000
Direct bilirubin	<0.3mg/dl	14	0	14	
	0.3-1.8	12	1	13	
	1.8-3.3	14	1	15	
	3.3-4.8	9	10	19	
	>4.8	12	21	33	
Total		61	33	94	0.000

The etiology of EHBO was benign in 79 (68.1%) cases. Stone diseases of the biliary tree (choledocholithiasis) were the leading cause, 70 (60.3%), followed by pancreatic head tumor 19 (16.4%). Pancreatic head tumor made 51.4% of all causes of malignant EHBO and 62.3 % of peri-ampularry tumors **Table 3**.

In benign EHBO Females were almost two times, 51 (64.5%), more commonly affected than males (28 (35.4%)) while in malignant conditions males were more commonly affected, 26 (70%), verses 11(30%).

The sex difference in the causes of EHBO was statistically significant (P =0.000) Table 4. Among patients with malignant EHBO, 81% of them were older than 50 years of age. The difference in occurrence of malignant EHBO in different age group was statistically significant (P < 0.013) (**Table 4**).

Table 3. Frequency of Benign and malignant causes of EHBO at St. Paul hospital, Addis Ababa, Ethiopia, 2015.

Pathologic entity	**Diagnosis**	**Number**	**% (of total)**
Benign	CBD/CHD stone	70	60.3
	Stricture	3	2.6
	Choledochal cyst	1	1.4
	Hydatid cyst ruptured into the biliary tree	1	1.4
	External compression by Hydatid cyst	1	1.4
	Other	3	2.6
	Total	**79**	**68.1**
Malignant	Pancreatic head tumor (PHT)	19	16.4
	Distal cholangiocarcinoma	9	7.75
	Proximal cholangiocarcinoma	3	2.58
	Gall bladder Ca	3	2.58
	Ampula of vater tumor	2	1.7
	Duodenal cancer	1	0.8
	Total	**37**	**31.9**

Table 4: Age and sex distribution of benign Vs malignant causes of extra-heaptic biliary obstruction at St. Paul's hospital, Addis Ababa, Ethiopia, 2015.

		Benign		Malignant		Total		P value
		No.	%	No.	%	No.	%	
Age group	20-29	8	10.1	2	5.4	10	8.6	0.013
	30-39	16	20.3	-	-	16	13.8	
	40-49	18	22.8	5	13.5	23	19.8	
	50-59	14	17.7	12	32.4	26	22.4	
	60-69	14	17.7	11	29.7	25	21.6	
	>70	9	11.4	7	18.9	16	13.8	
	Total	79	100	37	100	116	100	
Sex	Male	28	35.4	26	70.3	54	46.6	0.000
	Female	51	64.6	11	29.7	62	53.4	
	Total	79	100	37	100	116	100	

The types of surgery performed according to the cause of EHBO are shown in Table 5. For benign conditions the most common intervention was Cholidochodoudenostomy, 45 (64.3%), followed by Cholidochotomy with T-tube insertion, 13(18.6%). Patients with stricture were managed with Hepaticojejunostomy. In Malignant EHBO, the most common surgery was Cholecystojujunostomy with Braun's anastomosis. Pyelorus preserving pancreaticodouden -ectomy was done only for 4 (12.9 %) of the patients who can be managed by that surgery. A good number of patients had only exploration **Table 5**.

There were 32 complications on 18 (15.5%) patients. Surgical site infection was the most common complication, 16 (13.4%), followed by pulmonary infections 5(4.3%). Ascitis leak (2.6%) and wound dehiscence (2.6%) were seen in malignant conditions only. None of the patients developed anastomotic leak. Overall complication rate was higher in patients with malignancy than benign conditions (21.6% Vs 12.6%). There was no death among patients with benign causes but three (8.1%) patients with malignant EHBO died.

Table 5: The type operation done for patients with extra-hepatic biliary obstruction at St. Paul Hospital, Addis Ababa, Ethiopia, 2015.

Cause of EHBO	Type of surgery	No.	%
Stone	Choledochodoudenostomy	45	64.3
	Cholidochotomy with T-tube	13	18.6
	CBD exploration and primary repair	6	8.6
	Choledochojejunostomy	3	4,3
	CBD exploration through cystic duct	2	2.8
	Hepaticojejunostomy with braun's anastomosis	1	1.4
	Total	70	100
Malignant conditions	Cholecystojenuostomy with braun's anastomosis	22	59.5
	Exploratory laparatomy	6	16.2
	Pyelorus Preserving pancreaticodoudenectomy	4	10.8
	Hepaticojejunostomy with Braun's anastomosis	3	8.1
	Triple by pass	2	5.4
	Total	37	100
Strictures	Hepaticojejunostomy with braun's anastomosis	2	66.7
	Roux en-Y Hepaticojejunostomy	1	33.3
	Total	3	100
Cholidochal cyst	Roux en-Y Hepaticojejunostomy	1	-
Others	Miscellaneous operations	5	-

DISCUSSION

The finding of this study showed females and males to be affected almost equally except when age category is considered where relatively young females are more commonly affected by benign causes. Khurram and etals also showed benign conditions to occur at younger age, mean age of 42 years (12). Older age groups are affected more by malignant causes of EHBO and are mostly males. The occurrence of malignancy at older age is a well established fact (1).

Regarding clinical presentation most of the findings of our study are consistent with the literatures report where abdominal pain and yellowish discoloration of the eye top the list in the table (2-5).

This may be due to the fact that most of the patients had stone disease as the underlying cause of EHBO. These patients can have pain without jaundice as biliary obstruction may not necessarily be complete. Additionally most patients with malignant conditions presented at advanced stage where pain is common due to reteroperitoneal spread of the tumor. Abdominal pain as most common presenting complaint was also shown by Bekele Z, et al. where 89% of their patients presented with abdominal pain (13,14). Abdominal pain associated with jaundice was less prevalent among patients with malignant EHBO. This finding is similar to what Talib and et als from Iraq found (11). In malignant EHBO jaundice was the main presenting complaint because jaundice can present without pain due to progressive and complete obstruction (2-5).

Regarding live enzymes the finding in our study, lower rate of significant rise in liver enzyme and bilirubin levels, was due to a higher rate of choledocholithiasis, where obstruction is not always complete and persistent. Though the rise in liver enzyme level is lower, the rate of ALP is higher than that of ALT/AST which is in line with what the literature reported (4,11). Another important finding of this study was the degree of elevation of serum bilirubin (both total and direct), which was significantly different between benign and malignant pathologies. Malignant causes of EHBO had higher values of serum bilirubin because they cause persistent and progressive jaundice due to complete obstruction (2-5).

Though MRCP is the gold standard imaging study in biliary obstruction, due to unavailability of the technology in the hospital and cost at private settings it is done only in less than 7% of the patients (19). AUS was not only the first line but also the only imaging modality done especially when malignancy was not suspected. The result of AUS was reasonably good as seen in the fact that it missed diagnosed only in 12% of our patients. In developing nations like Ethiopia, given the limited resource, late presentation of patients which make clinical evaluation and judgment less difficult and cancer is a less likely diagnosis, AUS alone can be used to decided diagnosis and management. Mahteme, et al. showed AUS to be diagnostic in 97% of their patients (16). Admassie D, et al. showed AUS to have reasonably good sensitivity and specificity in diagnosing choledochocholelithiasis (sensitivity of 90% and specificity of 79%) and pancreatic head tumor(sensitivity of 50% and specificity of (90%) (19,20). A study done in Tanzania showed abdominal ultrasound was the only diagnostic imaging which revealed CBD stones and abdominal masses in 58.1% and 72.4% of the cases, respectively (5). A relatively better result was seen in Akhtar et al study where abdominal ultrasound was diagnostic in 85% of the cases (18,19).

Abdominal CT was requested only in patients where cancer was suspected based on clinical and AUS findings. The overall CT request rate is comparable to study in Nigeria where CT scan was requested in 27.5% of the cases (20) probably due to the machine capacity and inexperience of the reporting radiologists the diagnostic accuracy of CT in our patients was significantly lower than reports from the developed world (19).

Biliary stones and pancreatic head tumors as most common cause of EHBO were shown in our study and other literatures from Ethiopia and elsewhere (13,16,17). Abutalib found an almost similar finding, CBD stones accounting for 57% while PHT 25% of their cases.

The result of Talib from Bagdad was also similar, stones and pancreatic head tumors accounting for 48% and 16% of causes of EHBO respectively (11). Textbook findings are also similar though pancreatic head tumor account for 80% of malignant EHBO (1, 16). Malignant obstruction occurring in older male Ethiopians was also shown by Mahteme, et al (16). Most cases of choledocholithiasis are secondary to the passage of gallstones from the gallbladder into the CBD (16). Stones as a cause of EHBO were seen more often in females and younger patients probably due to the fact that females are affected more commonly by biliary stones and a relatively younger population with life expectancy less than 60 years (21,22).

Though ERCP is the standard of care for patients for CH or CBD stones, the service was not available in the hospital. All the patients had open surgery. Cholidochotomy followed by biliary-enteric by pass - mostly choledochodoudenostomy (CDS) - the main form of surgery. CDS is a preferred surgical option in patients whose CBD is dilated to at least 1.2cm (23, 24). Anastomotic leak is a potentially serious complication of CDS, but none of the patients developed that. In setting where T-tubes are scarce, CBD is reasonably dilated and the surgeon is trained, CDS should be the preferred surgical treatment for CBD stones.

Like in the literatures, in our patients malignant conditions which caused EHBO were advanced at presentation as revealed by less than 15% PPPD rate (1-5,16). Because we didn't have minimally invasive means to relive EHBO all patients ended up in open surgery. Though hepaticojejunostomy is the one (probably better) option of palliation of obstruction, cholecystojejunostomy with Braun's anastomosis was the preferred surgery may be it is technically easier (11) . The rate of post-op complications was higher in malignant conditions most likely related to the age of the patients, the nature and stage of the disease at presentation.

Conclusion

Abdominal pain and jaundice were the main presenting symptoms of EHBO which was mainly caused by CBD stone and PHT. Benign conditions cause EHBO in relatively young female patient while malignant conditions in older male patients. AUS can be used as the only imaging study when malignancy is not suspected. Choledochodoudenostomy is a good option of treatment for patients with CBD stones in area where ERCP is not available.

Limitation of the study

Since the study was done on review of documented case cards and records, the usual problems of record review may not be abolished.

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