Addis Ababa university

COLLEGE OF MEDICINE AND HEALTH SCIENCES
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF RADIOLOGY

IMAGING SPECTRUM,PATTERN AND LEVEL OF OBSTRUCTION OF PATIENTS WITH OBSTRUCTIVE JAUNDICE ON ABDOMINAL CT AND MRCP AT TIKUR ANBESSA SPECIALIZED HOSPITAL, ADDISABEBA, ETHIOPIA FROM Jan 2018 -Aug. 2020E.C

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A RESEARCH THESIS SUBMITTED TO THE DEPARTMENT OF RADIOLOGY, SCHOOL OF MEDCINE GRADUATE STUDIES ADDIS ABEBA UNVISRTY AS PARTIAL FULLFILLMENT FOR REQUIRMENT OF POSTGRADUATE DEGREE IN DIAGNOSTIC RADIOGY

November 2020 E.C

ACRONYMS AND ABBREVIATIONS

AAU …… Addis Ababa university

CT……Computed Tomography

EHBO ……Extra Hepatic Biliary Obstruction

ERCP…… Endoscopic-retrograde-cholangio-pancreatography

MDCT……. Multidetector computed tomography

MIP…….. Maximum intensity projection

MPR……. Multiplanar reformations

MRCP……. Magnetic resonance cholangiopancreatography

PACS …… picture archiving and communication system

TASH…. .Tikur Anbessa hospital

USG …… Ultrasonography

ABSTRACT

Background:obstructive jaundice is a common clinical problem in medical practice.The condition can be caused by theobstruction of the bile duct with choledocholithiasis, strictures and hepato-biliarymalignancy. Objective: To assess imaging spectrum, level and pattern of obstructive jaundice on cross sectional imaging, CT and MRCP

Methods: A retrospective analysis of all patients admitted with a diagnosis of obstructive jaundice atTikur Anbessa hospital fromJan 2010 to Aug. 2012 E.C
The data were collected from patient medical records and PACS using pretested, structured data extraction format was used to collect the data, which were entered onto andanalyzed using SPSSversion 25.

Results: A total of 105 patients, 73 (69.5%) were males. Theirage ranged from 25 to 83 years with a mean age of 53(±SD)13.8years. 79(75.2%) of the cases had malignant causes while the rest 26(24.8%) had benign causes for obstructive jaundice. The most common malignant lesion was cholangiocarcinoma with 33 cases followed by pancreatic cancer which was seen in 28 cases. The most common benign lesion seen was choledocholithiasis which was seen in 9 cases followed by benign Stricture which had 6 cases. The commonest site of obstruction was at the peri- ampullary region in 40(38.1%) of the cases followed by distal common bile duct and the hepatic hilum with 35(33.3%) and 20(19%) respectively. The most common imaging findings was an enhancing intraluminal soft tissue mass which was present in 67(63.8%) which was followed by a focal wall thickening.Abdominal CT and MRCP wasthe main imaging modality used.

Conclusion: The most common imaging spectrumof obstructive jaundice are malignant lesions with cholangiocarcinoma being the commonest and choledocholithiasis is the commonest benign causenoted with periampullary region the commonest level/site of obstructive jaundice and intraluminal enhancing mass the commonest pattern noted both in the cholangiocarcinoma and pancreatic head tumor.

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Introduction

background

obstructive jaundice is an important and common medical entity. It is characterized by yellowish staining of the skin, sclera, and mucousmembranes by bilirubin, a yellow-orange bilepigment. Bilirubin is formed by a breakdown product of hemerings, usually from metabolized red blood cells. It typically noted when the serum bilirubin level reachedabove 3mg per L. Bilirubin metabolism has three phases —prehepatic, intrahepatic, and post hepatic. Dysfunction in any of these phases may lead to jaundice. PREHEPATIC PHASEthe large majority around 80% of the bilirubin comes from heme moiety the rest comes from ineffective RBC synthesis muscle breakdown. Bilirubin is transported from the plasma to the liver for conjugation and excretion[3]. INTRAHEPATICPHASEin this phase there is conjugation of the unconjugated bilirubin which makes it water soluble and facilitate membrane transpiration. POSTHEPATIC PHASEOnce soluble in bile, bilirubin is transported to gallbladder, where it is stored, or it passes to Vater's ampulla to enter the duodenum. Inside theintestines, some bilirubin is excreted in thestool, while the rest is metabolized by the gut flora into urobilinogen and then reabsorbed. Themajority of theurobilinogen are filtered from the blood by the kidney and excreted in theurine. A small percentage of the urobilinogen are reabsorbed in the intestines and reexcreted into the bile. Obstructive Jaundice is a common surgical problem that occurs when there is anobstruction to the passage of conjugatedbilirubin from liver cells to intestine [3]. Extra Hepatic Biliary Obstruction (EHBO) is a condition in which bile exit/flow is obstructed startingfrom hepatic ducts up to thesecond part of the duodenum and it may result in obstructive jaundice.The condition can be caused by either benign or malignant condition. Benign pathologies tend to occur relatively more in younger patients these include biliary stones(choledocholithiasis), benign biliary strictures (iatrogenic or sclerosing), parasite infestations (Ascaris, liver flukes and hydatid cysts), etc benign biliary strictures (iatrogenic or sclerosing), etc. Malignant causes of EHBO include pancreatic head tumors, tumors of the biliary tree, and tumors of the second part of the duodenum, Ampulla of Vater tumorsand others. The clinical presentation of the patients with obstructive jaundice rangefrom abdominalpain, yellowish discoloration of the eye,dark/cola coloredurine, itching, pale colored stools, weight loss andanorexia. In choledocholithiasis jaundice is intermittent, and usually associated with pain. Even though Malignant EHBO commonly presents with short duration of symptom but with persistent and progressive jaundice often accompanied by weight loss and itching.Even though malignantEHBO commonly present with a relatively shortduration yet with persistent and progressive type ofpainless jaundice, often accompanied by significantweight loss and itching. Patients are typically oldmale [2] Obstructive jaundice which is caused by bile duct obstruction can be clinically and biochemically indistinguishable from cholestatic jaundice caused by hepatocellular disease. Since the treatment of both conditions are radically different crucial task of the radiologist is to differentiate the hepatocellular and obstructive jaundice using the available imaging modality and guide further management. Obstructive jaundice is a form of jaundice during which there's blockage of flow of bile from the liver to the intestine leading to redirection of excess bile and its by products like bilirubin into the blood with resultant complications likeascending cholangitis, hepatorenal syndrome, and malabsorption and requires urgent intervention. The role of radiologist therefore is very important in early diagnosis and in

accurately delineating the level and also the reason for obstruction, thus helping in staging similarly as preoperative assessment of tumor resectability. [1]The expanding spectrum of therapeutic options for the jaundiced patient has made it necessary for the radiologist to do over simply discriminating between obstructive and non-obstructive jaundice. Correct choices among therapeutic options usually rest upon aparticular assessment of etiology, location, level and extent of disease.
So, it's mandatory to see pre-operatively the existence, the character and site of obstruction because an ill-chosen therapeutic approach will be dangerous [4]The need for radiological imaging in obstructive jaundice are
(1) to substantiate the presence of biliary system obstruction
(i.e., to discriminate surgical versus medical jaundice)
(2) to figure out the extent of the obstruction
(3) to identify the precise explanation for the obstruction
(4) to produce complementary information referring to the underlying diagnosis (e.g., staging information in cases of malignancy)[6] The radiological investigations available for the diagnosis of obstructive Jaundice are often categorized into noninvasive ultrasonography, CT scan & MRCP and invasive ERCP and PTC[5]Routine abdominal ultrasonography shows the scale of the bile ducts, may define the extent of the obstruction, may identify the cause and offers other information associated with the disease (e.g. Hepatic metastases, gallstones, hepatic parenchymal change).It readily demonstrates both benign and malignant causes of obstruction likewise as any associated conditions or complications [5]Although Ultrasonography (USG) is non-invasive and cheap it has relatively low sensitivity and specificity as compared to other imaging modalities in evaluation of biliary obstruction[6]Computed tomography (CT) of the abdomen can differentiate between intra- and extra-hepatic obstruction with high accuracy. However, CT might not define incomplete obstruction caused by small gallstones, tumors, or strictures. Contrast-enhanced multi-slice CT is extremely useful for assessment of biliary malignancies. For long, Endoscopic Retrograde CholangioPancreatography(ERCP) was the quality established procedure for evaluation of patients with obstructive jaundice. being an invasive procedure, it has an inherent complication rate of 3–9% with mortality rate of 0.2–0.5 %. thanks to significant advances in cross-sectional imaging, specifically the arrival of resonance cholangiopancreatography (MRCP), ERCP currently has an almost exclusively therapeutic role. Abdominal CT can help in a) Differentiating benign from malignant stricture.
b) Staging complex biliary malignancies in terms of involvement of biliary confluence, invasion, and encasement of the adjacent major arterial and venous channel rendering it inoperable, likewise as regional lymphadenopathy and hepatic metastasis. [6]Magnetic resonance cholangiopancreatography (MRCP) could be a relatively newer, noninvasive technique for visualization of the biliary and pancreatic ductal system. it is especially useful in patients who have contraindications for endoscopic retrograde cholangiopancreatography (ERCP). Excellent visualization of biliary anatomy is feasible without the invasiveness of ERCP. But unlike ERCP, it's purely diagnostic with higher cost to patient being its limitations. With relevancy levels the bulk of the cases (70%) had obstruction at the periampullary level [6].In the diagnosis of malignant diseases, MRCP was more sensitive (95.83%) as compared to CT scan (91.67%), which was more sensitive than ultrasonography (79.17%).[4]The diagnostic ability of the MRCP and CT is very high in diagnosing both benign and malignant causes of obstruction as compared to abdominal

ultrasound 98%,98% and 82%,91.43% to 88%[6].
To my knowledge there is paucity of data regarding the imaging pattern and level of obstructive jaundice in our environment as there is no local study which has been done in our setting particularly the study area. This study was undertaken to explain etiology, pattern and level of biliary tract obstruction on cross sectional image, abdominal CT and MRI

STATEMENT OF THE PROBLEM

Obstructive jaundice is an important clinical condition where there is blockage of flow of bile from the liver to the intestine resulting in redirection of excess bile and its by products like bilirubin into the blood. This can lead to grave complications can lead to like ascending cholangitis, hepatorenal syndrome, and malabsorption and hence requires urgent surgical intervention. The radiologist plays paramount role in early diagnosis and in accurately delineating the level and the cause of obstruction, thus helping in staging as well as preoperative assessment of tumor respectability[1]The condition can be caused by either benign or malignant condition. Benign pathologies tend to occur to younger patients these include biliary stones (choledocholithiasis), benign biliary strictures (iatrogenic or sclerosing), parasite infestations (Ascaris, liver flukes and hydatid cysts), etc. Malignant causes include pancreatic head tumors, tumors of the biliary tree, tumors of the second part of the duodenum, Ampulla of Vater tumors and others[2]Despite these huge advantages of imaging in obstructive jaundice there is paucity of information regarding the imaging pattern and level of obstructive jaundice in our environment as there is no current local study which has been done in our setting particularly the study area. This study will try to describe etiology, pattern and level of obstructive jaundice on cross sectional image, abdominal CT and MRCP.

Significance of the study

Since obstructive jaundice is an important and common surgical entity with multiple etiologies range from benign conditions like common bile duct stone to cholangiocarcinoma with the availability of multiple imaging modalities to diagnosis obstructive jaundice these includes the noninvasive one like ultrasound, CT and MRCP. imaging plays an important role in obstructive jaundice with identifying the etiologies, differentiating benign from malignant etiology, delineating level of bile duct obstruction and invasion of adjacent important structures which in turn affect the treatment strategies and patient prognosis. The study aims to assess common imaging spectrum regarding etiology of obstructive jaundice, level of obstruction and imaging pattern as there is no current study in this area and it can be used for further studies in the future

Literature review

obstructive jaundice is an important and common medical entitycharacterized by blockage of the bile from liver to the second part of duodenum. Jaundice is a yellowish staining of the skin, sclera, and mucousmembranes by bilirubin, a yellow-orange bile pigment. Bilirubin is formed by abreakdown product of heme rings, from metabolized red blood cells. Once the serum bilirubin level reach above 3mg per dL the discoloration will be apparent.Jaundice is not a common presentingcomplaint in adults. When present, itmay indicate a serious problem.[3]Obstructive jaundice which is caused by bileduct obstruction can be clinically and biochemicallyindistinguishable from cholestatic jaundice caused byhepatocellular disease. The treatment of both entities quite different the radiologist should be able differentiate obstructive from hepatocellular causes and guide further management. With obstruction of the bile from the liver and subsequent redirection of its by products like bilirubin in the circulation poses various health hazard to the patients these consequencesinclude ascendingcholangitis, hepatorenal syndrome, and malabsorption [1] The radiologist play crucial role in early diagnosis and correctly identifying the level and etiology of obstruction which in turn help in tumor staging and resectability [1]Imaging play crucial role in patients with obstructive jaundice which includes differentiate the obstructive from the nonobstructive causes ,exact level of obstruction, specific etiology of obstruction additionally it can give supplement information which portend the prognosis[5]

The imaging modalities available in obstructive jaundice can be categorized as invasive and noninvasive like ultrasonography, CT and MRCP [5]

Computed tomography (CT) of the abdomen can differentiate betweenintra-andextrahepatic obstruction with high accuracy. However, CT might not be sensitive in identifying small gallstones, tumors, or strictures. For long, Endoscopic Retrograde CholangioPancreatography(ERCP) was the standard established procedure for evaluation of patients with obstructive jaundice. But being an invasive procedure, with higher inherent complication rate of 3-9% and mortality of around 0.2-0.5% ERCP is currently reserved for therapeutic purpose only especially with the advent of MRCP t has an inherent complication rate of 3–9 % and mortality rate of 0.2–0.5 %. MDCT issensitive for determining thepreliminary leveland cause of obstructionwhich isimmensely helpful in

a) Differentiating benign from malignant stricture.

b) Staging biliary malignancies and also assessing the local structure involvement like the veins , arteries and biliary confluence which preclude surgical management as well as regional lymphadenopathy and hepatic metastasis.[6]Regarding the ability of MDCT to differentiate a benign lesion from a malignant one it has a sensitivity of 100%, specificity of 95.65%, and accuracy of 98%. With respect to levels the majority of the cases (70%) had obstruction at the periampullary level[6]even though Magnetic resonance cholangiopancreatography (MRCP) is a relativelynewer technique the fact that it is noninvasive with good visualization of the biliary and pancreatic duct systems make it a preferred modality especially in patient who have contraindications for ERCP.

The diagnostic ability of the MRCP and CT is very high in diagnosing both benign and malignant causes of obstructionas compared to abdominal ultrasound 98%,98% and 82%,91.43% to 88%[6].Symptoms of patient with obstructive jaundice range from abdominal pain, jaundice, fever, pale stool to pruritis. Generally speaking benign etiologies of obstructive jaundice like benign stricture, choledocholithiasis, choledochal cyst tend to occur in younger patients in contrary malignant etiologies like pancreatic head tumor and cholangiocarcinoma tend to occur in older male patients [2] characteristically patient with

choledocholithiasis will have intermittent jaundice this is in contrast to malignant causes of jaundice where there is persistent, progressive and painless type of jaundice is common [2] In one study done in Sweden showed themalignant causes of obstructive jaundice account for the majority of the patients,64% with pancreatic ca being the leading cause (46%) followed by cholangiocarcinoma (29%). choledocholithiasis was the leading benign cause of obstruction (65%) biliary obstruction. Nearly half of the patients had abdominal pain and the other half had painless jaundice.[8]Another study from India showed that Malignant diseases are the common cause of obstructive jaundicewith male preponderance and pancreatic head tumor and common bile duct stones are the most common malignant and benign etiologies identified respectively. Jaundice is the commonest clinical feature in such patients[9] A study done in Karachi, Pakistanshows the same result as previous studies in Indiaand Tanzaniawere 54.17% patients had malignant cause of jaundice followed by choledocholithiasis 37.5% and amoebic liverabscesses[10]yet another Tanzanian studywhich is in contrary to engidaet,al.[2] findings concluded that Femalesslightly outnumbered male . Patients withmalignant obstructive jaundice were older than those of benign type. Pancreatic head ca and common bile duct stones are the commonest malignant and benign etiologies respectively.Both malignant and benign causes of obstructive jaundice are more common in female than males with male to female ratio was1:2.5 and 1:1.4 for benign and malignant causes respectively. choledocholithiasis was the commonest cause of benign etiology identified and pancreatic ca the commonest causes of malignant jaundice. patient with malignant obstructive jaundice tend to be older than the benign group[11]

A study done at St. Paul hospital by engidaet,al.[2]is in contrary to previous European and Asian and as well as other African studies where Benign conditions accounted twice the malignant condition at 68.1% of the underlying etiology, common bile duct stone being the most common, 60.3%. Pancreatic head tumor was the commonest malignant cause, 51.3%, followed by cholangiocarcinoma, 40.5%.In benign EHBO Females were almost two times64.5%more commonly affected than males 35.4% while in malignant conditions males were more commonly affected, 70%, vs 30%.[2].Choledocholithiasis, or stones in the common bile duct, can be classified as primary, forming initiallyin the bile ducts, or secondary, originating in thegallbladder and passing into the bile ducts.[12]. There are a number of risk factors for development of gall bladder stone. Risk factors forgallstones include behavioral factors such as nutrition, obesity, weight loss, and physical activity as well as biologic factors such as increasing age, female sex, race, and serum lipid levels. The risk of gallstones is higher in women than in men at all ages, but the difference in risk is morepronounced at younger ages. Hormonal factors are felt to be largely responsible for this association. Much of the increased risk in young women is probablyrelated to pregnancy and childbearing. Theprevalence of gallstones increases with increasing parity. During pregnancy itself, gallstones form in1% to 3% of women, and biliary sludge, a precursorto gallstones, forms in up to 30%. Increased levels of serum estrogens during pregnancy promote secretionof bile supersaturated in cholesterol, whereas increased serum levels of progesterone may lead togallbladder stasis, an additional risk factor for gall stone formation. Obesity is one of the risk factors for gall bladder stoneformation. There is direct relationship of the body mass index of a patient with gallstone formation about 1/3 patient with BMI over 32 kg/m2 develop gall stone. Rapid weight loss is another risk factor for gall stone formation [15,16] About one fourth of patients with rapid weight loss eventually develop symptomatic gall stone subsequently needcholecystectomy. Risk of gallstone formation is high regardlessof the weight loss method. Weight fluctuationis an additional risk factor for gallstones.[17] Malignant biliary obstruction due to primary biliary tractcancer or metastasis is a common clinical problem[18].contrast-enhanced CT scan helps indeterminingthe morphological type

of cholangiocarcinoma, local spread, vascular involvement and determining stageand resectability of tumor.[1]
Surgical trauma is responsible for the majority of benign cause of biliary stricture. Other cause of benign biliary stricture includes post choledocholithiasis inflammatory stricture, duodenal ulcer and chronic pancreatitis. In cases of benign biliarystricture, it tends to be short in length and focal in nature. With the recent wide availability of laparoscopic procedure, the incidence of the biliary stricture is rising. Patient can present months to years after operation [1]

OBJECTIVES

3.1 GENERAL OBJECTIVES

To assess the imaging spectrum, patternand level extrahepatic biliary obstruction on abdominal CT and MRCP at TikurAnbessa specialized hospital

3.2 SPECIFIC OBJECTIVES

-To assess the imaging spectrum of extrahepatic biliary tract obstruction
-To assess the imaging pattern of extrahepatic biliary obstruction
-To assess the level of obstructive jaundice

METHODOLOGY

STUDY AREA

The study is conducted at TikurAnbessa specialized hospital (TASH), college of health science, Addis Ababa University, Addis Ababa, Ethiopia. TASH is the largest referral hospital in the country with multiple specialties services available among them diagnostic radiology, different surgical subspecialties and oncology.

STUDY DESIGN

This is a retrospective descriptive /qualitative cross sectional institutional based study design

SOURCE POPULATION

Source populations are all patients admitted to surgical department with a diagnosis of obstructive jaundice and patient send to department of radiology for imaging work up of obstructive jaundice

STUDY POPULATION

All patients with imaging reports and complete medical records for demographic and risk factor assessment for obstructive jaundice included as study population

SAMPLE SIZE DETERMINATION

Non-probability convenient method was used for allpatients with imaging feature of obstructive jaundice included during the study period

INCLUSION AND EXCLUSION CRITERIA

Inclusion criteria

All patients diagnosed with obstructive jaundice imaged at radiology department or seen in department of surgery.

EXCLUSION CRITERIA

-All patients age less than 13years(pediatric patients)
-jaundice caused by other than obstructive jaundice (i.e. medical causes of jaundice)
-Incomplete medical record will be excluded from the study

Method of data collection

Medical data of the patients including age, sex, associated risk factor for obstructive jaundice and presenting symptoms were collected from medical chart of the patients and imaging findings were collected from PACS by primary investigator using structured pretest questionaries'

Data analysis and interpretation

The data was checked for clarity and completeness and analyzed using SPSS computer software version 25 then summarization and comparison of data was done and presented in tables, charts and figures

Operational definition

A malignant lesion is a tumor that invades surrounding tissues, is usually capable of producing metastases, may recur after attempted removal, and is likely to cause death unless adequately treated.

Benign lesion is with well-defined solid or cystic lesions without adjacent structure invasion neurovascular or does not have ability to metastasize to other organs

Results

Background information

- There was a total of 105 patients that were included in the study, and 73 (69.5%) of the study participants were males while the rest 32(30.5%) of the participants were Females. The Age of the participants ranged from 25 years- 83 years with a mean age of 53±13.8 years. 63 (60%) of the study participants came from rural regions while the rest 42(40%) of the participants resided in the Urban regions. (Table 1)

Clinical findings

- The most common clinical complaint among the patients was presence of yellowish discoloration of the Eyes which was seen in 97(92.4%) of the cases followed by abdominal pain which was seen in 32(30.4%) and weight loss which was seen in 33(31.4%). (Table 2)
- Risk factors for obstructive jaundice were identified in 16(15.2%) of the cases while the rest of the patients didn't have any identifiable risk factors for obstructive Jaundice. Risk factors for obstructive jaundice were identified in 16(15.2%) of the cases while the rest of the patients didn't have any identifiable risk factors for obstructive Jaundice. (Table 3)

Imaging findings

- All 105 study subjects had undergone a post contrast enhanced Abdominal CT scans to evaluate the cause for the Obstructive jaundice and 3(2.3%) of the patients had additional Imaging with Magnetic resonance pancreatico-cholangiography (MRCP).

- The most common imaging findings that was seen was an enhancingsoft tissue mass which was present in 67(63.8%) which was followed by a focal wall thickening which was seen in 11(10.8%) and stone in the common bile Duct which was seen in 8(7.8%) of the cases. (Table 4)
- The commonest site of obstruction that was noted was at the peri- ampullary region which was seen in 40(38.1%) of the cases followed by distal common bile duct and the hepatic hilum with 35(33.3%) and 20(19%) respectively. (Figure 1) bar graph

- 79(75.2%) of the cases had malignant causes while the rest 26(24.8%) had benign causes for obstructive jaundice. The most common malignant lesion was cholangiocarcinoma with 33 cases followed by pancreatic cancer which was seen in 28 cases. The most common benign lesion seen was choledocholithiasis which was seen in 9 cases followed by benign Stricture which had 6 cases. (Fig6,fig 8)

Table 1 background information of patients who underwent Diagnostic imaging for the Evaluation of Obstructive jaundice at TikurAnbessaHospital from Jan 2010 to Aug. 2012 E.C..

Variables		Number	Percentage
Sex	Male	73	69.5%
	Female	32	30.5%
	Total	105	100%
Residence	Urban	42	40 %
	Rural	63	60 %
	Total	105	100 %
Age- Range	< 20 years	0	0%
	20 -40 years	16	15.2%
	40-60 years	49	46.7%
	>60 years	40	38.1%
	Total	105	100 %

Table 2 Clinical presentation of patients who underwent Diagnostic imaging at Tikur AnbessaHospital for the evaluation of Obstructive Jaundice.

Presenting symptoms	Number	percentage
Jaundice	39	37.1%
Weight loss	2	1.9%
Abdominal pain	5	4.8%

Pruritus	1	1 %
Jaundice and weight loss	31	29.5%
Jaundice and Abdominal pain	27	25.7%

Table 3 Risk factors among patients who underwent Diagnostic imaging at Tikur anbessaHospital for the Evaluation of Obstructive Jaundice

Risk factors	Number	percentage
None identified	89	84.9 %
Prior surgery (hepatobiliary)	7	6.7 %
RVI	3	2.8%
Smoking	3	2.8%
Excessive Alcohol consumption	3	2.8 %
Family History	0	0 %

Table 4: Imaging findings in patients who underwent Diagnostic Evaluation at Tikur AnbessaHospital for the Evaluation of Obstructive Jaundice.

Imaging Findings	Number	Percentage
Enhancing intraluminal soft tissue mass	67	63.8%
Focal wall Thickening	11	10.5%
Malignant stricture	2	1.9%
CBD stone	9	8.6%
Calcified Pancreas	2	1.9%
Cystic lesion	3	2.9%
Benign Stricture	5	4.8%
Multiple Adenopathy	1	1%

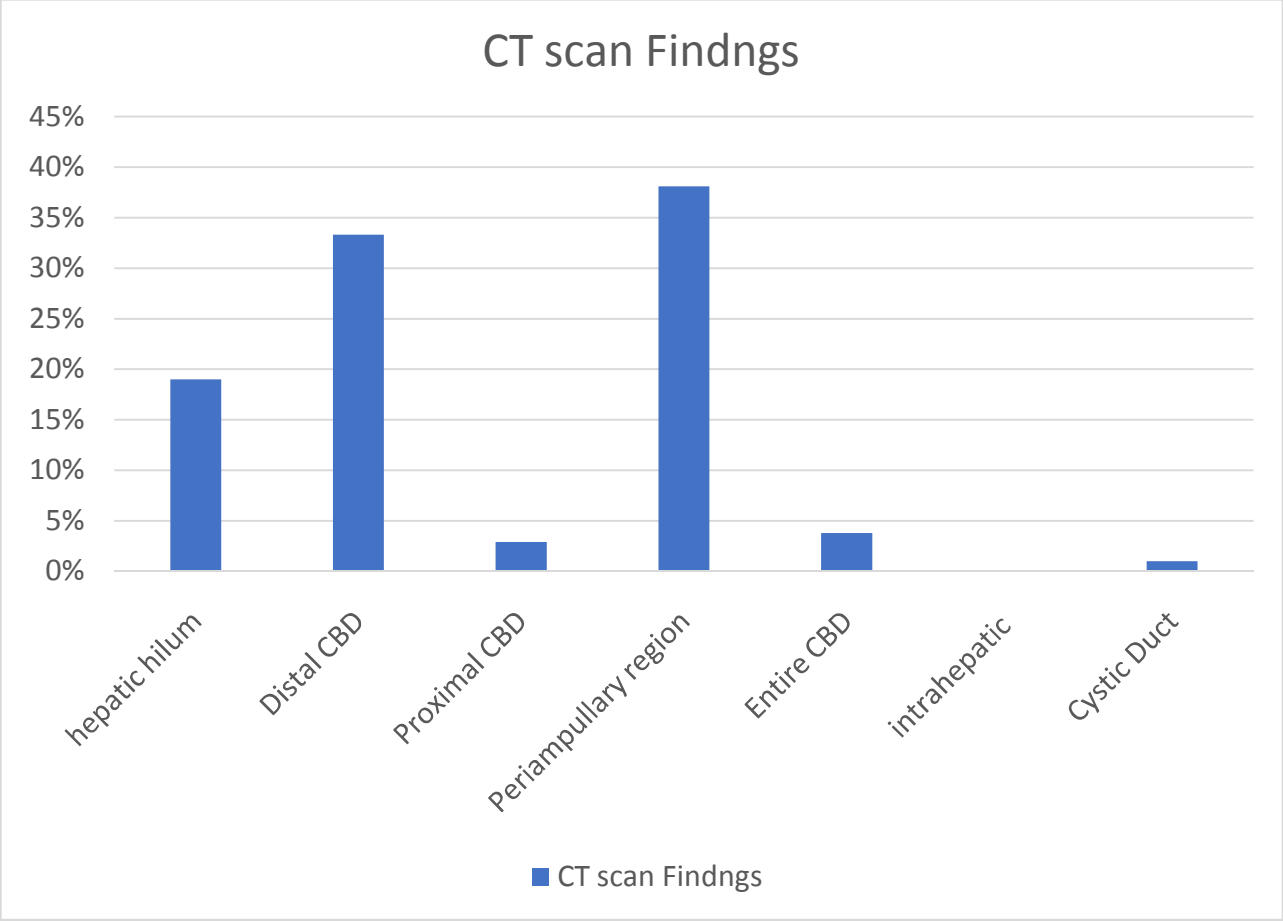

Fig 1 Site of obstruction on CTand MRCP scan Findings among Patient's who underwent Diagnostic Imaging at TikurAnbessaHospital for the Evaluation of Obstructive Jaundice from Jan 2010 to Aug. 2012 E.C

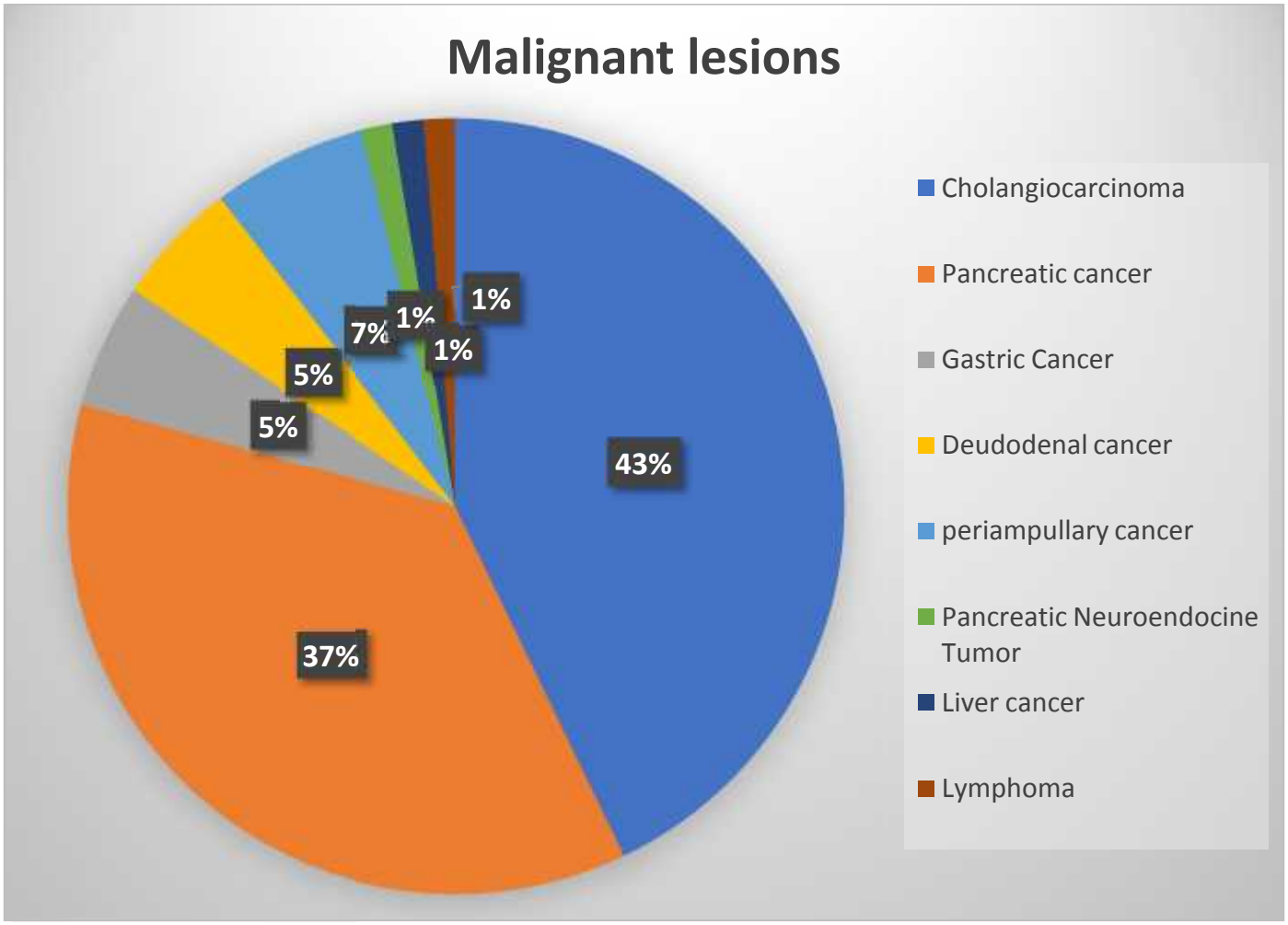

Fig 2 patterns of malignant lesions in patients who Underwent Diagnostic Imaging at Tikur Anbessahospital for the evaluation of Obstructive Jaundice fromJan 2010 to Aug. 2012 E.C

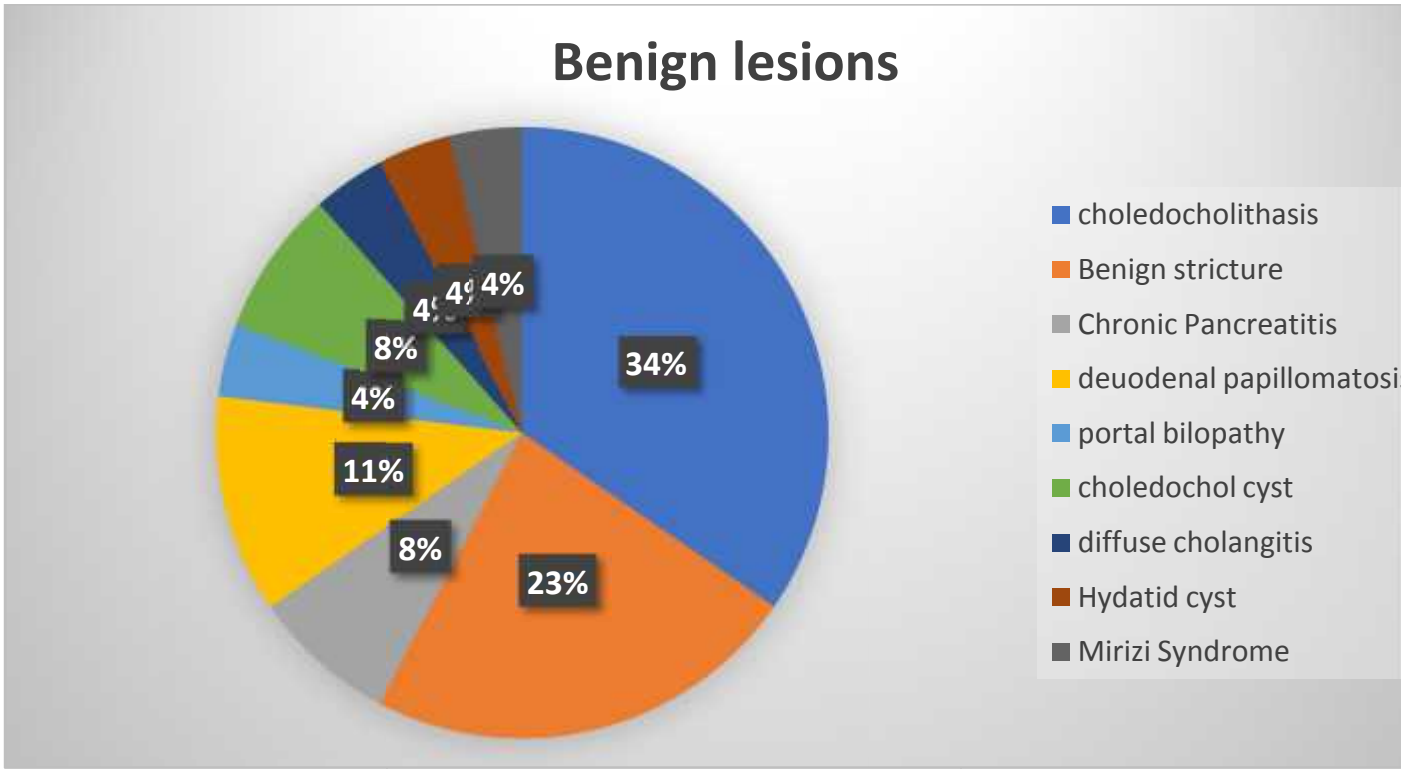

Fig 3 Patterns of Benign Lesions in patients who underwent Diagnostic Imaging at Tikur AnbessaHospital for the evaluations of Obstructive Jaundice from Jan 2010 to Aug. 2012 E.C

Table 6: Association between the socio- demographic characteristic and diagnosis of patients who underwent Diagnostic imaging at Tikur AnbessaHospital for the Evaluation of Obstructive Jaundice

Variables	Categories	Diagnosis		
		Benign	Malignant	
Sex	Male	16	57	$X^2 = 1.04$
	Female	10	22	P = 0.308
Age Range	< 20 years	0	0	
	20 – 40 years	7	9	$X^2 = 8.675$
	40 – 60 years	15	34	P = 0.013
	>60 years	4	36	

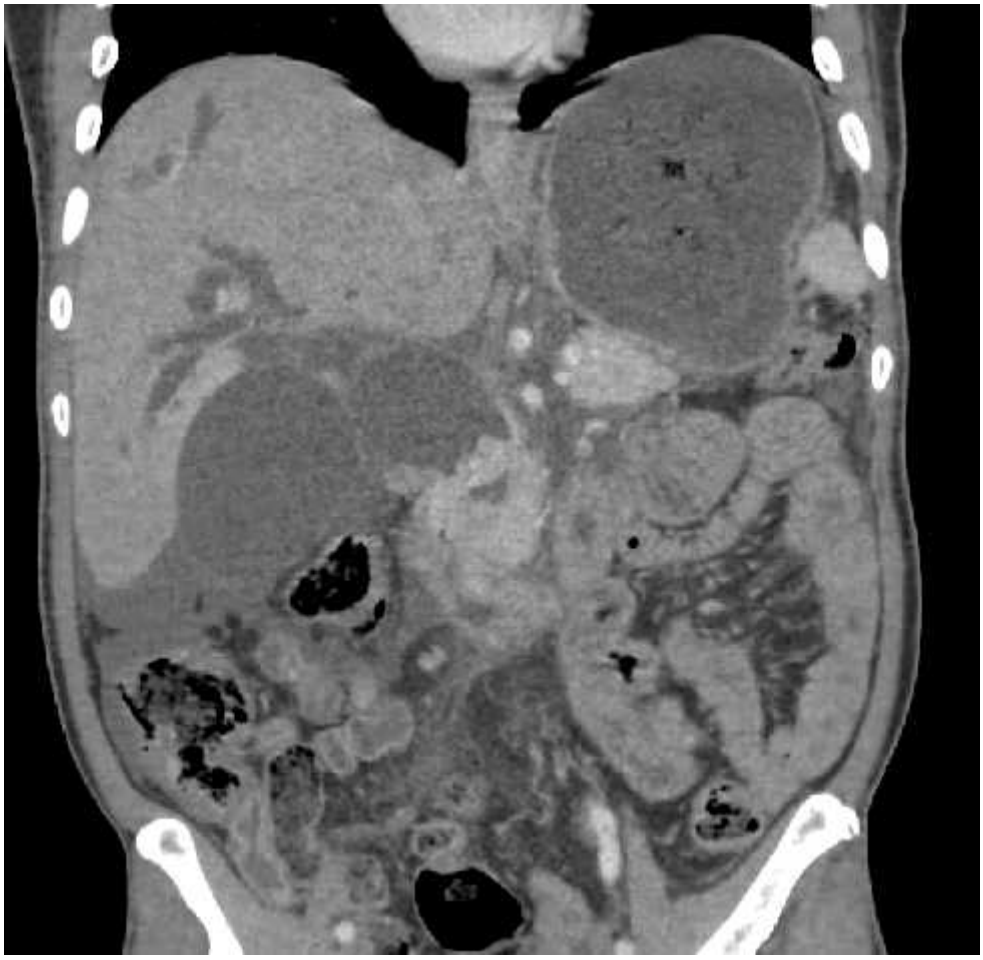

fig 4A 54-year-old male patient with dilated intra and extrahepatic bile duct 2ry to periampullary tumor (duodenal ca)

Fig 5 A 51 year old male patient with hilar cholangiocarcinoma

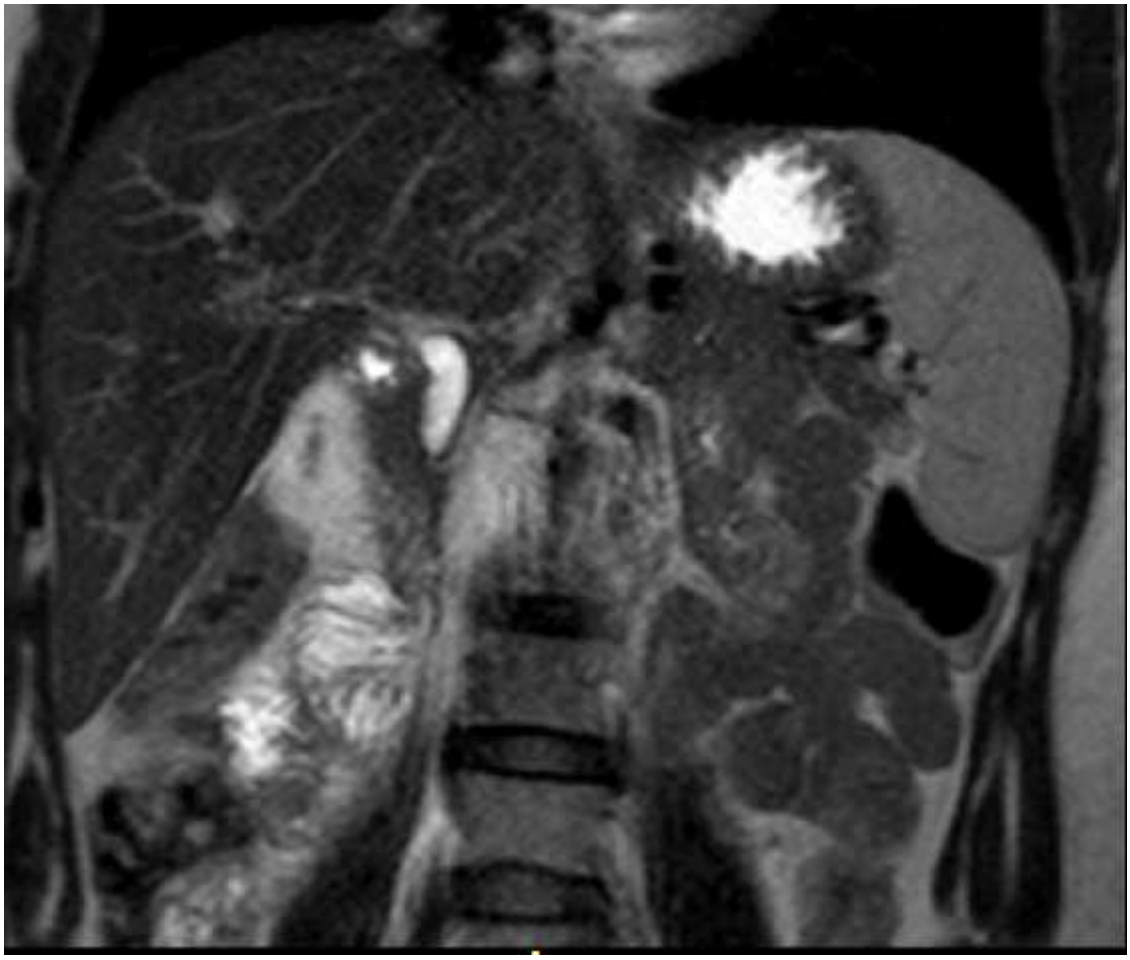

fig 6 MRCP of a 35 year old female patient with distal CBD benign stricture(post cholesctomy)

Fig 7 A 45 years old female patient with pancreatic head ca with dilated intra and extra hepatic bile duct and dilated pancreatic duct

Fig 8 A 30-year-old female patient with distal common bile duct stone

Discussion

Jaundice is a yellowish staining of the skin, sclera, and mucous membranes by bilirubin, a yellow-orange bile pigment. Bilirubin is formed by a breakdown product of heme rings, usually from metabolized red blood cells. It is detected clinically once the serum bilirubin level rises above 3 mg per dL (51.3 µmol per L[3]
Obstructive jaundice is a type of jaundice in which there is blockage of flow of bile from the liver to the intestine resulting in redirection of excess bile and its by products like bilirubin into the blood. It can lead to complications like ascending cholangitis, hepatorenal syndrome, and malabsorption and hence requires urgent surgical intervention. A radiologist therefore play important role in early diagnosis and in accurately delineating the level and the cause of obstruction, thus helping in staging as well as preoperative assessment of tumor respectability[1] Symptoms of obstructive jaundice include yellowish discoloration of the eyes and mucosal surface, pale stools, pain abdomen, fever and pruritus[7]
The causes(etiologies) of obstructive jaundice differ from country to another and can be caused by malignant or benign conditions. There are multiple imaging modalities used for diagnosing obstructive jaundice. abdominal CT and MRCP are among them. Abdominal CT and MRCP have high sensitivity and specificity in diagnosis of obstructive jaundice [6], [23],[25]

In our study most of the cases were malignant causes of biliary obstruction (75.2%) with benign causes forming 24.8%. The most common malignant lesion was cholangiocarcinoma with 33 cases followed by pancreatic cancer which was seen in 28 cases. The most common benign lesion seen was choledocholithiasis which was seen in 9 cases followed by benign Stricture which had 6 cases. (Fig 2,Fig 3)

As far as individual causes were concerned, the major cause for obstructive jaundice was Cholangiocarcinoma 43% followed by pancreatic head adenocarcinoma (37%), choledocholithiasis (34%) and benign biliary stricture (23%)

In Our study malignant etiologies are the commonest causes of biliary obstruction which is in line with other similar studies inAfrican, Indian and international studies [7,8,9,11,18]But our finding is contrary to other Ethiopian hospital-based studies done by engida et, al.[2] and Bekele[23] in their studies benign causes are the most common etiology of obstructive jaundice choledocholithiasis being the commonest etiology. This difference might be attributed to Tikur Anbessa being a tertiary referral center and there is a tendency of send patient with malignancy to the center because of the availability of different specialty service as well as the oncology center

In our study, intraluminal mass was picked up as the most common pattern for biliary obstruction in 68% of the patient followed by periductal mass/focal wall thickening (10.5%) and common bile duct stone (8.6%) which is in line with other studies [6] they found 63% of the patients had intraluminal mass

With regrading to the level of biliary obstruction we found out that the most common site of obstruction was at the level of the periampullary region which was seen in 40(38.1%) of the cases followed by distal common bile duct and the hepatic hilum with 35(33.3%) 20(19%) respectively which coincides with other studies by [6]they found 70% of their cases have obstruction at the level of the periampullary region but other study done by[18]contradict the above findings they concluded that proximal common duct is the commonest site 40% followed by hepatic hilum 36% and distal common bile duct 10%.

In our study, 73 (69.5%) of the study participants were males while the rest 32(30.5%) of the participants were Females. The Age of the participants ranged from 25 - 83 years with a mean age of 53±13.8 with the majority of the patients belonging to the 4th to 6th decade age group

regarding age and sex distribution of the individual etiologies benign causes are common in patients between 40 and 60 years and are females with choledocholithiasis being the commonest etiology making 34% followed by benign stricture 23%. The majority of the patient with malignant etiology are older than 60 years and are males with cholangiocarcinoma being the commonest imaging etiology identified in 43% followed by pancreatic head ca 37%. The age of the patientsis statistically significant for malignant etiologies table. These findings are similar with other hospital based Ethiopian studies Engida et al [2] found benign etiologies are more common in females and patient younger than 49 years choledocholithiasis being the leading cause in 70(60.3%) while in malignant conditions males were more commonly affected, 26 (70%), verses 11(30%). They concluded that the sex difference in the causes of EHBO was statistically significant

A study done in Tanzania [11] found out in both benign and malignant causes of obstructive jaundice are common in females. Benign causes are common under the age of 50 years while malignant causes are common above 50 years. They concluded that the difference in age distribution of the benign and malignant disease was statistically significant

Verma, S., et al[5]. Out of the 110 patient malignant causes of obstructive jaundice were predominated (74.2%), whereas in females benign causes were predominant (52%) they concluded that the difference in age distribution of the benign and malignant disease was statistically significant. Similar finding found in Jain, L. out 50 patient malignant obstructive jaundice was more common as compared to benign obstructive jaundice and malignant

causes are more frequent in males as compared to females where benign causes predominate.
Regarding age distribution among individual etiologies, the majority of patients with choledocholithiasis were in the age range of 20–40 years. Majority of patients with malignant biliary obstruction (pancreatic head ca, periampullary carcinoma, cholangiocarcinoma,) were >40 years. Regarding gender distribution among individual etiologies in our study, there was a predominant distribution of choledocholithiasis in females whereas cholangiocarcinoma and pancreatic head ca were more predominant in males. There was also male preponderance in gender distribution for malignant lesions
Regarding clinical presentation of patients with obstructive jaundice in our study we find the most common clinical complaint among the patients was presence of yellowish discoloration of the Eyes which was seen in 97(92.4%) of the cases followed by abdominal pain which was seen in 32(30.4%) and weight loss which was seen in 33(31.4%)(Table 2) . similar findings found in engidaet,al[2] were Abdominal pain seen in 107 (92.2%) of the patients and jaundice in 98 (84.5%) were the two most common presenting complaints. bekele.et, al. [22] stated that abdominal pain was the main presenting symptom in 94% of their patient with obstructive jaundice

Conclusion

obstructive jaundice is a common and important clinical conditionwith multiple etiologies. cholangiocarcinoma and choledocholithiasis were the most common malignant and benign imaging spectrum respectively whereas periampullary region were the commonest site of bile duct obstruction with intraluminal enhancing mass was picked as the commonest imaging pattern seen.

limitation of this study-small sample size
-single institution study (cluster of malignancy cases since TASH is the only oncologic center in the country)

recommendation
since the study undertaken at the only oncologic center in the country the findings of this research may not truly represent the actually etiology of obstructive jaundice. we recommended future larger sample size and multi institutional study is recommend

References

1. Joshi, A., et al., *Role of CT and MRCP in evaluation of biliary tract obstruction.* Current Radiology Reports, 2014. **2**(11): p. 72.
2. Engida Abebe, M., et al., *ANALYSIS OF THE ETIOLOGICAL SPECTRUM AND CLINICAL PROFILE OF EXTRA-HEPATIC BILIARY TREE OBSTRUCTION AT A TERTIARY HOSPITAL IN ADDIS ABABA.*
3. Roche, S.P. and R. Kobos, *Jaundice in the adult patient.* American family physician, 2004. **69**(2): p. 299-308.
4. Singh, A., et al., *Diagnostic accuracy of MRCP as compared to ultrasound/CT in patients with obstructive jaundice.* Journal of clinical and diagnostic research: JCDR, 2014. **8**(3): p. 103.
5. Verma, S., S. Sahai, and P. Gupta, *Munshi, S Verma, P Goyal.* Obstructive Jaundice-Aetiological Spectrum, Clinical, Biochemical And Radiological Evaluation At A Tertiary Care Teaching Hospital.
6. Rishi, M., M. Abdunnisar, and H. Suresh, *Value and accuracy of multidetector Computed Tomography in obstructive jaundice.* Panacea Journal of Medical Science, 2015. **5**: p. 137-144.
7. Jain, L., *Etiology, epidemiological profile and radiological evaluation of obstructive jaundice at a tertiary care center.* JOURNAL OF EVOLUTION OF MEDICAL AND DENTAL SCIENCES-JEMDS, 2015. **4**(78): p. 13645-13648.
8. Björnsson, E., et al., *Fate of patients with obstructive jaundice.* Journal of Hospital Medicine: An Official Publication of the Society of Hospital Medicine, 2008. **3**(2): p. 117-123.
9. Umeshchandra, D. and J. Maitra, *Clinical Study of Obstructive Jaundice at Basaveshwar Teaching and General Hospital, Gulbarga.* SAS J. Surg, 2015. **1**(3): p. 105-118.
10. Saddique, M. and S.A. Iqbal, *Management of Obstructive Jaundice: Experience in a tertiary care surgical unit.* PJS, 2007. **23**(1): p. 23-25.
11. Chalya, P.L., E.S. Kanumba, and M. Mchembe, *Etiological spectrum and treatment outcome of Obstructive jaundice at a University teaching Hospital in northwestern Tanzania: A diagnostic and therapeutic challenges.* BMC research notes, 2011. **4**(1): p. 147.
12. Ko, C.W. and S.P. Lee, *Epidemiology and natural history of common bile duct stones and prediction of disease.* Gastrointestinal endoscopy, 2002. **56**(6): p. S165-S169.
13. Barbara, L., et al., *A population study on the prevalence of gallstone disease: the Sirmione Study.* Hepatology, 1987. **7**(5): p. 913-917.
14. Maclure, K.M., et al., *Weight, diet, and the risk of symptomatic gallstones in middle-aged women.* New England Journal of Medicine, 1989. **321**(9): p. 563-569.
15. Liddle, R.A., R.B. Goldstein, and J. Saxton, *Gallstone formation during weight-reduction dieting.* Archives of internal medicine, 1989. **149**(8): p. 1750-1753.
16. Shiffman, M.L., et al., *Gallstone formation after rapid weight loss: a prospective study in patients undergoing gastric bypass surgery for treatment of morbid obesity.* American Journal of Gastroenterology, 1991. **86**(8).
17. Syngal, S., et al., *Long-term weight patterns and risk for cholecystectomy in women.* Annals of internal medicine, 1999. **130**(6): p. 471-477.
18. Moon, S., et al., *Biliary obstruction in metastatic disease: thin-section helical CT findings.* Abdominal imaging, 2003. **28**(1): p. 0045-0052.
19. POPP, J.W., R.H. SCHAPIRO, and A.L. WARSHAW, *Extrahepatic biliary obstruction caused by metastatic breast carcinoma.* Annals of internal medicine, 1979. **91**(4): p. 568-571.

20. Wagner, P., et al., *Lymph node counts in the upper abdomen: anatomical basis for lymphadenectomy in gastric cancer.* British journal of surgery, 1991. **78**(7): p. 825-827.
21. Maruyama, K., et al., *Lymph node metastases of gastric cancer. General pattern in 1931 patients.* Annals of surgery, 1989. **210**(5): p. 596.

22 Bekele, Z., & Yifru, A. (2000). Obstructive jaundice in adult Ethiopians in a referral hospital. *Ethiopian Medical Journal*, *38*(4), 267-275.
23 Pedrosa, C. S., Casanova, R., Lezana, A. H., & Fernandez, M. C. (1981). Computed tomography in obstructive jaundice. Part II: The cause of obstruction. *Radiology*, *139*(3), 635-645.
24 Park, M. S., Kim, T. K., Kim, K. W., Park, S. W., Lee, J. K., Kim, J. S., ... & Lee, M. G. (2004). Differentiation of extrahepatic bile duct cholangiocarcinoma from benign stricture: findings at MRCP versus ERCP. *Radiology*, *233*(1), 234-240.

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Questionnaire

NAME		**CT NUMBER:**	
PART ONE: SOCIO DEMOGRAPHIC CHARACTERSTICS			
No	**Questions and filters**	**Coding categories**	
1	Address of the respondent	1.Rural2. Urban	
2	Age	_____ years	
3	Sex	1.male2. female	
Part II risk factor assessments			
2.1	Weight before symptom started	_____kg or not known	
2.**3**	Smoking	Yes. 1 2.NO. if yes packet per day ;____	
2.4	Alcohol consumption	1 Yes 2 No If yes specify it (how many drinks per day, how many days per week)	
2.5	RVI Sero-status	1.positive 2. negative	
2.6	Prior history of abdominal surgery	1 yes 2. NO If yes specify it	
2.7	Family HX of cancer	1- Yes 2.. No If yes specify it _____	
Part III : clinical information			
3	Which of the following health problem or symptoms helps you	1. Yellowish discoloration of the eye	

	to seek health institutions? Duration of Symptom you faced _____months	2. weight loss 3. abdominal pain 4. Clay color stool 5. Itching of the skin 6. cola colored urine 7. others if any specify:	
PART IV: Imaging information			
4.1	Location of the lesion	1. at hepatic hilum 2. distal common bile duct 3. proximal common bile duct 4. periampullary region	
4.2	CT scan imaging features:	1. Enhancing intraluminal soft tissue mass with luminal narrowing 2. focal wall thickening with luminal narrowing 3. asymmetric nodular wall thickening with luminal narrowing / eccentric wall thickening 4. calcified mass 5. others	
4.3	Lymph node involvement	1.hepatic hilar lymph node 2. peripancreatic lymph node 3. abdominal lymph node 4. others specify ----------	
5	MRCP imaging features	1.wall thickening 2.length of involvement 3.luminal irregularity 4.indistinct outer margin 5.hyperenhancement relative to the liver parenchyma during portal phases 6.asymetry	

tables and figures

Table 1 background information of patients who underwent Diagnostic imaging for the Evaluation of Obstructive jaundice at Tikur AnbessaHospital from Jan2010 to Aug.2012 E.C

Variables		Number	Percentage
Sex	Male	73	69.5%
	Female	32	30.5%
	Total	105	100%
Residence	Urban	42	40 %
	Rural	63	60 %
Age- Range	< 20 years	0	0%
	20 -40 years	16	15.2%
	40-60 years	49	46.7%
	>60 years	40	38.1%

Table 2 Clinical presentation of patients who underwent Diagnostic imaging at Tikur AnbessaHospital for the evaluation of Obstructive Jaundice.

Presenting symptoms	Number	percentage
Jaundice	39	37.1%
Weight loss	2	1.9%
Abdominal pain	5	4.8%
Jaundice and weight loss	31	29.5%
Jaundice and Abdominal pain	27	25.7%

Table 3 Risk factors among patients who underwent Diagnostic imaging at Tikur AnbessaHospital for the Evaluation of Obstructive Jaundice

Risk factors	Number	percentage
None identified	89	84.9 %

Prior surgery (hepatobiliary)	7	6.7 %
RVI	3	2.8%
Smoking	3	2.8%
Alcohol consumption	3	2.8 %

Table 4: Imaging findings in patients who underwent Diagnostic Evaluation at Tikur AnbessaHospital for the Evaluation of Obstructive Jaundice.

Imaging Findings	Number	Percentage
Enhancing soft tissue mass	67	63.8%
Focal wall Thickening	11	10.5%
Malignant stricture	2	1.9%
CBD stone	9	8.6%
Calcified Pancreas	2	1.9%
Cystic lesion	3	2.9%
Benign Stricture	5	4.8%
Multiple Adenopathy	1	1%

Table 6: Association between the socio- demographic characteristic and diagnosis of patients who underwent Diagnostic imaging at Black Lion Hospital for the Evaluation of Obstructive Jaundice

Variables	Categories	Diagnosis		
		Benign	Malignant	
Sex	Male	16	57	$X^2 = 1.04$
	Female	10	22	P = 0.308
Address	Urban	13	29	$X^2 = 1.44$
	Rural	13	50	P = 0.230
Age Range	< 20 years	0	0	
	20 – 40 years	7	9	$X^2 = 8.675$
	40 – 60 years	15	34	P = 0.013
	>60 years	4	36	

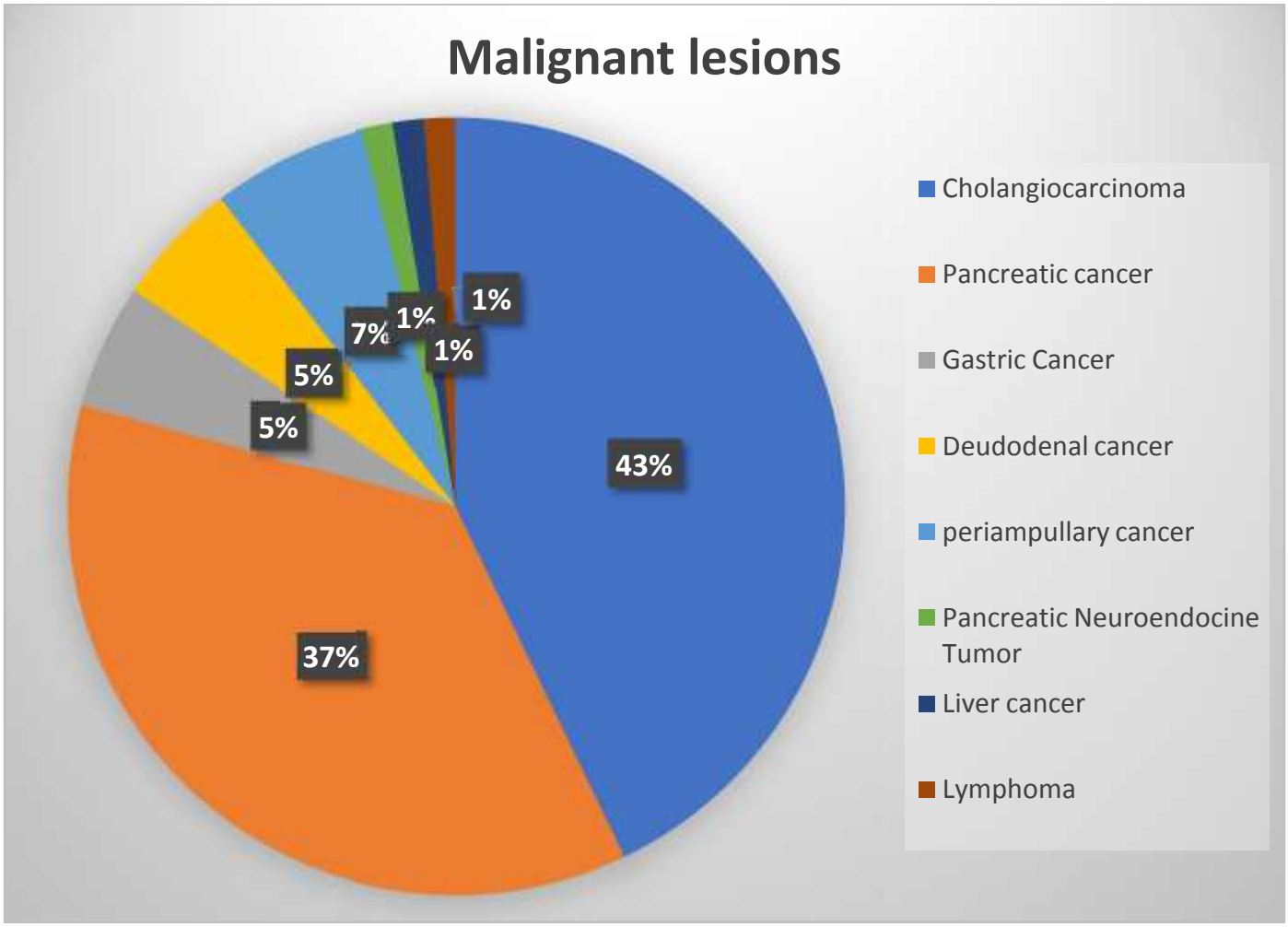

Fig 2 patterns of malignant lesions in patients who Underwent Diagnostic Imaging at TikurAnbessa hospital for the evaluation of Obstructive Jaundice fromJan 2010 to Aug. 2012 E.C

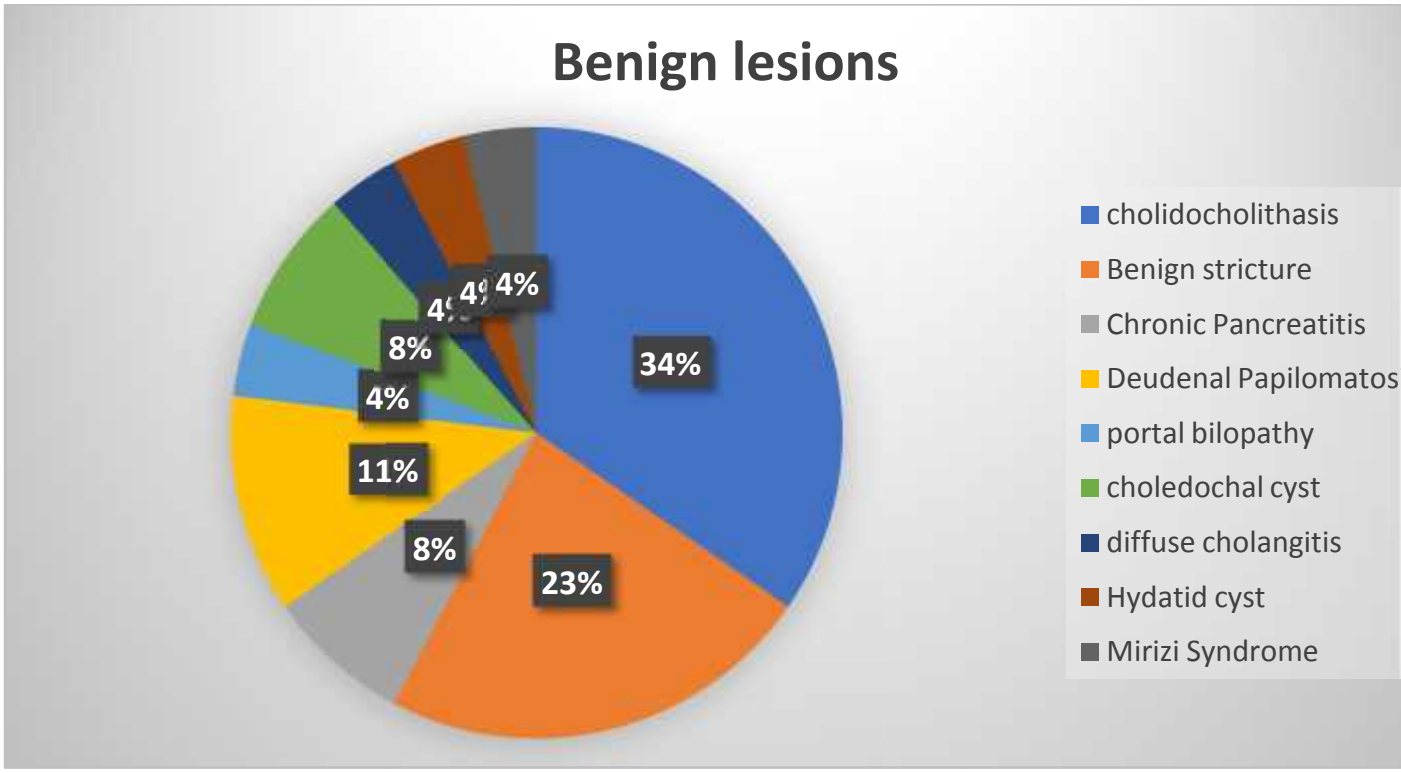

Fig 3 Patterns of Benign Lesions in patients who underwent Diagnostic Imaging at Tikur AnbessaHospital for the evaluations of Obstructive Jaundice Jan 2010 to Aug. 2012 E.C

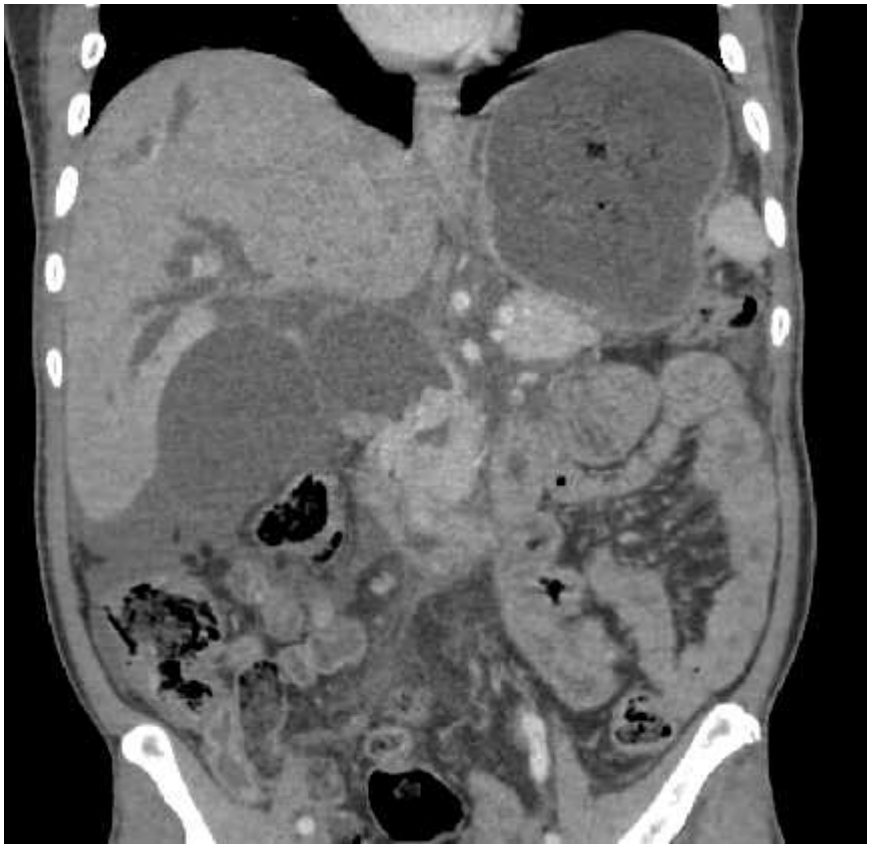

fig 4 A 54-year-old male patient with dilated intra and extrahepatic bile duct 2ry to periampullary tumor (duodenal ca)

fig 5 A 51 year old male patient with hilar cholangiocarcinoma

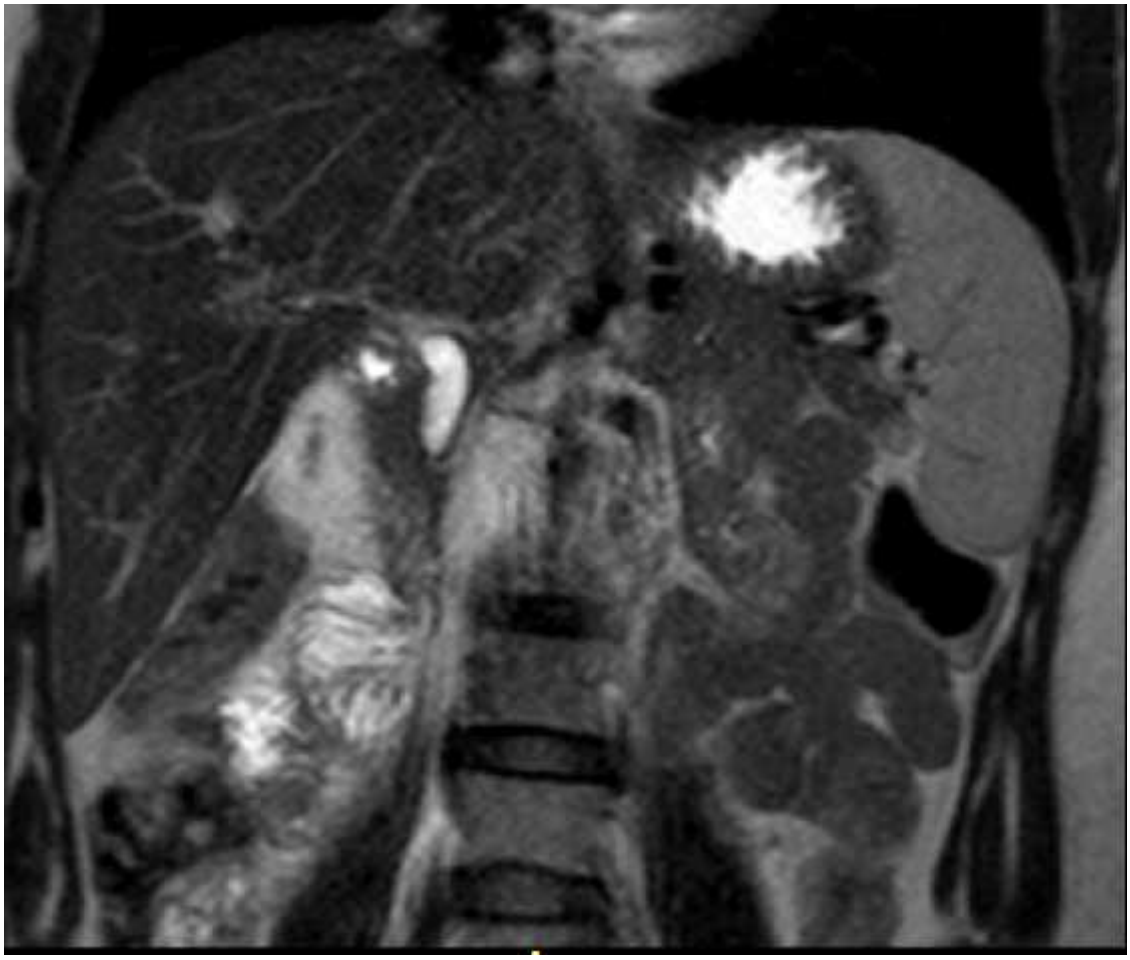

Fig 6 MRCP of a 35 year old female patient with distal CBD benign stricture(post cholesectomy)

Fig 7 A 45 years old female patient with pancreatic head ca with dilated intra and extra hepatic bile duct and dilated pancreatic duct

Fig 8 A 30-year-old female patient with distal common bile duct stone