Original Article

Comparative Study of CT and Direct Cholangiogram for Evaluation of Obstructive Jaundice

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Abstract:

Introduction: The main aim of the study was to compare the findings of CT (computed tomography) and direct cholangiogram for the evaluation of obstructive jaundice.

Methods: A retrospective hospital based study was done among 62 patients with suspected biliary obstruction at Annapurna Neuro Hospital and TUTH from 2013 to 2015. CT scan of the abdomen and DC (PTC) were done in each patient. The level and cause of obstruction were evaluated by these modalities.

Results: In this study, male to female ratio was 1:1.5 showing female predominance. The mean (±SD) age of the patients was 65.5 ±15.6 years and range of from 28-94 years. CT and DC (PTC) identified hilum as the most common level of obstruction in71% and 69.4% of the patients. The most common malignancies were cholangiocarcinoma and gall bladder carcinoma, identified by CT and DC (PTC) respectively, which were present in over one third (35.5%) of the patients. Further, CT and DC (PTC) identify edpostoperative stricture as the most common benign aetiology in 6.4% and 4.8% of the patients respectively. Moreover, sensitivity of CT and DC (PTC) for malignant lesion 75% and 98% while specificity was 96.2% and 54.5% respectively (P value 0.000).

Conclusion: CT and DC (PTC) showed the almost similar accuracy in evaluating the level of obstruction at hilar region. Carcinoma of gall bladder and cholangiocarcinoma are the commonest malignancies whereas postoperative stricture was the commonest benign aetiology. Early diagnosis and proper treatment will significantly reduce complication, morbidity and mortality rates.

Key words: Computed Tomography, Direct cholangiogram, Obstructive jaundice

Introduction

Jaundice is the yellowish pigmentation of skin, sclera and mucosa by abnormally high blood levels of plasma bilirubin. Jaundice may be non-obstructive and obstructive types. Obstructive jaundice will produce due to blockage of essential flow of conjugated bile from liver to the intestine by various causes .[1] Incidence ofobstructive jaundice is increasing which is approximately 5 cases per 1000 people in United States.[2] The common causes of jaundice due to biliary obstruction are both malignant and benign conditions.[3] Among the most common causes, malignant examples are carcinoma gall bladder, periampullarycarcinoma, cholangiocarcinoma and carcinoma head of pancreas and benign causes are common bile duct stone and strictures.[4]Jaundice with or without pain, anorexia, weight loss, dark color urine and steatorrhea are the major symptoms of obstructive jaundice.[5]There are various noninvasive and invasive imaging modalities available diagnosis of obstructive jaundice. The non invasive investigations are USG,CT, MRCP, and invasive are ERCP, endoscopic USG and PTC which can pick up calculus, dilated intra and extra hepatic ducts, mass and strictures. Apart from this USG, CT and MRCP can detect mass, fluid and metastasis in the peritoneal cavity and liver. ERCP helps in taking the brush cytology and biopsy.[6,7,8]

Postsurgery complications in jaundiced patients are also higher than non-jaundiced patients.[9] Major complications include cholangitis and septic shock, hemorrhage, abscess, leakage, impaired wound healing and renal impairment,[10] which lead to increased morbidity and mortality.[11]Early diagnosis and management are the appropriate solutions to reduce complications as well as morbidity and mortality.[12]The main aim of this study was to compare CT and direct cholangiogram (DC) findings for the evaluation of obstructive jaundice.

Methods

A retrospective hospital based study was done among 62 patients where the mean age was 65.5 (28-94 years SD±15.6).Verbal consent was taken from each patient and none of them were forced to participate. The informations of the patients were kept confidential. CT scan of the abdomen and direct cholangiogram (DC) {Percutaneous Transhepatic Cholangiography (PTC)} were done in each patient. These were done at Annapurna Neuro Hospital (Siemens C arm Artis U) and radiology department of Tribhuvan University Teaching Hospital(Siemens Fluoroscopy machine -Axiom Luminous DRF) between 2013 to 2015. The masses were evaluated for level and cause of obstruction.

All patient'scoagulation profile was evaluated for cholangiogram. Patients were kept in supine position with a aseptic precaution an 18 G chiba needle was introduced into the dilated bile duct under USG guidance from right or left sided approach. 0.037" guide wire was introduced and serial dilatation of tract done with 7 or 8 F dilator. The drainage tube was kept in position inside the duct and 60% urograffin was used for opacification of biliary tree.Level of obstruction was defined anatomically as described by NICHOLS. Level I is at or above the porta hepatis, level II is upper border of pancreatic head and lower limit of hilum and level III is pancreatic and ampullary regions. Minimally dilatedcentral IHBDs defined as grade I dilatation, dilatation up to mid hepatic level defined as grade II and dilatation up to periphery as grade III.

All cases were divided into benign and malignant group. An imaging presence of irregular outline mass with significant enhancement, vascular encasement and nodal involvement, abrupt termination of bile duct and irregular stricture and irregular meniscus sign were interpreted as probable malignant causes. Smooth outlinedmass with minimal/absent enhancement, calculus in CBD with smooth meniscus sign, smooth stricture or choledochal cyst were considered benign. All images were evaluated for probable cause, level of obstruction and the presence of biliary dilatation. Positive and negative imaging findings in CT/MRI and direct cholangiography were tabulated and comparison was done. The cause of obstruction was confirmed by histopathology. The cause was labeled as indeterminate in difficult cause.

Data was entered in a predesigned performa and was analyzed using IBM SPSS V21. Numeric variables were presented as mean and standard deviation and categorical variables were presented as number and percentage. P values were calculated using chi-square probability test. Test level of significance was considered as when p value was ≤0.05.

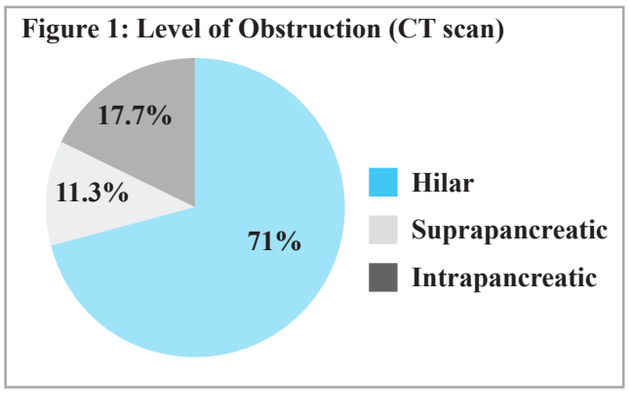
Results

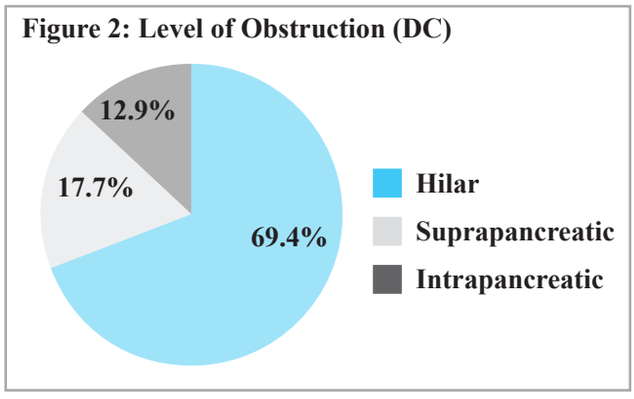
A total of 62 patients were evaluated with the mean (±SD) age of 65.5 (±15.6) years and range from 28-94 years. Majority 38(61.3%) of the patients were females while nearly two fifth of the patients 24(38.7%) were males. The male female ratio was 1:1.5 showing female predominance. Further, the male female ratio for malignancy was 1:1.8 while for benign it was 1.6:1. Most common age for malignancies was above 61 to 70 years old and common malignant lesion was carcinoma of gallbladder 35.5%.

Nearly one third 20 (32.2%) of the patients were diagnosed with jaundice and pain in abdomen while a quarter 16 (25.8%) of the patients present of jaundice, nausea and vomiting. Similarly, the patient presented with jaundice, pain in abdomen and fever were 15.6 (24.2%). Jaundice and itching were presented in 11 (17.8%) of the patients.

(1) CT: contrastenhanced CT of abdomen was performed in all 62 patients with biliary obstruction for the evaluation of level of obstruction and cause of biliary obstruction.

Evaluation of level of obstruction: Hilar level for obstruction was identified in nearly three quarters of the patients 44(71%) followed by suprapancreatic level in 7(11.3%) and intrapancreatic level in 11(17.7%) of the patients (Figure 1).





Evaluation of cause of biliary obstruction: Histopathological final diagnosis was obtained in all patients from FNAC/Biopsy. Among malignant lesion in CT cholangiocarcinoma was seen in over one third 22(35.5%) of the patients followed by gall bladder carcinoma in 16(25.8%), carcinoma head of pancreas in 8(12.9%), ampullary carcinoma in 4(6.5%). The benign lesions were choledocholithiasis in 3(4.8%) and post operative stricture in 4(6.5%) patients (Table 1).

Table 1: Diagnosis of CT scan

Malignant lesion	Frequency	Percent
Cholangiocarcinoma	22	35.5
Gall bladder carcinoma	16	25.8
Carcinoma head of pancreas	8	12.9
Ampullary carcinoma	4	6.5
Benign lesion	**Frequency**	**Percent**
Choledocholithiasis	3	4.8
Post operative stricture	4	6.5

For malignant lesion, the sensitivity of CTwas 75% at 95% CI and specificity was 96.2%. The overall accuracy of CT abdomen for identification of malignancy was 93.5% (P valve 0.000). Similarly, for benign lesion, the sensitivity and specificity were 94.7% and 80% respectively with overall accuracy of 93.5% at 95% CI.

(2) Direct Cholangiogram (PTC): All 62 patients also assessed by direct cholangiogram (PTC) for evaluation of level and cause of obstruction.

Evaluation of level of obstruction: Hilum as the obstruction was identified in over two third of the patients 43(69.4%) followed by suprapancreatic level in 11(17.7%)and intrapancreatic levelin 8(12.9%) of the patients (Figure 2).

Evaluation of cause of obstruction: From DC (PTC), malignant lesion was identified in majority of the patients 54(82.8%) while only 8(12.9%) of the patients were presented with benign lesion. The most common malignant causes diagnosed on DC (PTC) was gall bladder carcinoma in 22(35.5%) of the patients followed by cholangiocarcinoma in patients 17(27.4%), carcinoma head of pancreas in 6(9.7%), ampullary carcinoma in 4 (6.5%), Benign cases were choledocholithiasis in 2 (3.2%) and postoperative stricture in 3 (4.8%) of the patients (Table 2) respectively.

Table 2: DC (PTC) diagnosis of obstructive jaundice

Malignant lesion	Frequency	Percent
Cholangiocarcinoma	17	27.4
Gall bladder carcinoma	22	35.5
Carcinoma head of pancreas	6	9.7
Ampullary carcinoma	4	6.5
Benign lesion	**Frequency**	**Percent**
Choledocholithiasis	2	3.2
Post operative stricture	3	4.8

Sensitivity of DC (PTC) for malignant lesion was 98% and specificity was 54.5%(P value 0.000). Accuracy was 90.3%.

Discussion

Evaluation of biliary obstruction frequently requires several imaging techniques in stepwise manner. Purpose of these investigations are to provide the adequate anatomic and diagnostic information for appropriate therapy to reduce morbidity and mortality in the patients.

The mean age of the patients in the present study of obstructive jaundice was 65.5 (28-94 years), SD±15.6. Malignancy was most commonly seen above 61 to 70 years and most common malignant cause was carcinoma of gallbladder (35.5%). The increased incidence of malignant obstructive jaundice with the increasing age has also been reported by various studies. [5, 13]

Siddiqueet al.[14] and;Chalya et al.[13]found abdominal pain in 27 (54%) of the patients while anorexia was in29(58%). Further, among malignant jaundice, they found fever in 27 (54%) of the patients.

In present study, nearly one third 20 (32.2%) of the patients were presented with jaundice and pain in abdomen while a quarter 16 (25.8%) of the patients had with jaundice, nausea and vomiting. Similarly, 15.6 (24.2%) patients were present with jaundice, pain in abdomen and fever. Jaundice and itching were present in 11(17.8%) patients.

This study found malignant obstructive jaundice more commonly in females while benign jaundice was common in male. The male to female ratio for malignant jaundice was 1:1.8 while it was 1.6:1 for the benign.

Gallstone may be the cause for increase in the incidence of malignant obstructive jaundice among females, as cholelithiasis is frequently found in them. These findings have been supported by some studies.[14, 15] As per nature, malignant obstruction was more common than benign, 58% vs. 42%, which is in agreement with other studies reported elsewhere.[1, 14-16] Bekele et al.[4] reported benign obstruction as the most common cause of obstructive jaundice.

In this study, DC (PTC) identified postoperative stricture as the most common benign cause in 4.8% of the patients followed by choledocholithiasis(3.2%). Choledocholithiasis was found to be the commonest benign cause in other studies.[4, 13-16]

Similarly, DC (PTC) identified gall bladder carcinoma as the commonest malignancy in over one third 22(35.5%) of the patients followed by cholangiocarcinoma in 17(27.4%),carcinoma head of pancreas in 6(9.7%) and ampullary carcinoma in 4(6.5%) of the patients.Similar incidence of various malignancies in patientswith obstructive jaundice has been seen in various studies. [13, 14, 16]

Further, hilar region was identified as the most common level of obstruction by DC (PTC) and was seen in 43(69.4%) patients followed by suprapancreatic in 11(17.7%) patients and intrapancreatic level in 8(12.9%) patients. The accuracy of CT scan and direct cholangiograms in identification of malignant biliary obstruction were 93.5% and 90.3% respectively. However the sensitivity of DC(98%) was higher than CT(75%).These findings are similar with the study of Gibson et al.[10]In their study of 65 patients had USG examination , 51 had CT scan of abdomen and 57 patients had direct cholangiography. They found the exact level of obstruction from USG and CTin 95% and 90% respectively. The cause was correctly identified by USG in 80%, CT in 63% and by DC in 89%.Of patients.

Pedrosa et al.[17,18]had conducted a study in 67 patients of obstructive jaundice , who underwent CT examination. The accuracies in determining the exact level and cause of obstruction were 97% and 94% respectively.

The study of Pradhanet al.[19]had found the most common cause of biliary obstruction as common bile duct calculus (54.5%) followed by cholangiocarcinoma (26.6%) and carcinoma of pancreas (7%).

The present study showed the most common cause of biliary obstruction as neoplastic, namely carcinoma of gall bladder followed by cholangiocarcinoma and postoperative stricture followed by choledocholithiais were most common benign causes of biliary obstruction.

There was similar accuracy of CT and DC for evaluation of hilar region and also for cause of biliary obstruction in this study. For suprapancreatic and infrapancreatic region, DC had higher accuracy identifying for level and CT had higher accuracy for identifying the cause of obstruction.

Conclusion

In conclusion,CT and DC (PTC) showed the almost similar accuracy in evaluating the level of obstruction at hilar region. Carcinoma of gall bladder and cholangiocarcinoma were the commonest malignancies whereas postoperative stricture was the commonest benign etiology. Postoperative stricture in CT should be carefully evaluated because it is often mistaken for malignant lesion. Most of the patients with malignant obstructive jaundice present late with advanced disease

and the only treatment modality for these patients is palliative surgery. Early diagnosis and proper treatment will significantly reduce complication, morbidity and mortality rates.

Acknowledgement

I would like to extend my sincere appreciation to Dr. Dan Bahadur Karki for the valuable suggestion and support during the study. Further, I would like to convey my heartfelt gratitude to Dr. Anup Pradhan and Ms. Amrita Chaulagain for their help in preparing the manuscript.

Conflict of interest: None declared

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