

*Research Article***Effectiveness of Endoscopic Ultra Sonography in Evaluation of Dilated Common Bile Duct of Undetermined Etiology****Hosam Bayoumi\***, **Hala Elfeky\***, **Amr Abou El-magd\*\*** and **Moataz Abd Elgayed\*\*\***

\* Department of Hepatology, Gastroenterology and Infectious Diseases, banha Faculty of Medicine

\*\* Department of Internal medicine, Armed Forces – college of Medicine.

\*\*\* Department of Gastroenterology and Hepatology, Kobry el kobba Military Hospital.

**Abstract**

The aim of the present study was to assess the value of EUS in identifying the cause of CBD dilatation which its nature could not be diagnosed by transabdominal ultrasonography and other modalities as computed tomography (CT). This prospective longitudinal study was conducted on 50 adult patients between March 2018 and March 2019 because of dilated CBD of undetermined etiology on TUS and CT. Thirty-eight patients (76%) were males and twelve patients (24%) were females. Patients were selected according to the following criteria: Patient with dilated CBD > 7 mm, with no definite cause of biliary obstruction on abdominal sonography and CT and patients with dilated biliary system and suspected periampullary lesions or enlarged pancreatic head with no definite focal masses which sent for more clarification by EUS. The diagnostic performance of: US, CT, and EUS in prediction of malignancy showed that abdominal US had sensitivity of (57.1%) and specificity (100%) while, CT had sensitivity of (68.6%) and specificity of (100%) while EUS had sensitivity of (85.7%) and specificity of (100%).

**Keywords:** Diagnosis, Endosonography, common bile duct**Introduction**

The biliary system plays a central role in digestive pathophysiology, since it allows bile sterile flow from hepatocytes, through intra- and extra-hepatic ducts, Oddi's sphincter and Vater's ampulla, to the duodenum determining lipids absorption and excretion of metabolites and toxins in the small bowel<sup>[1]</sup>.

Variety of factors can influence bile duct size, prominently imaging modality, age and prior cholecystectomy. In trans-abdominal ultrasound (TUS), distal CBD may be difficult to visualize because of bowel gas, thus resulting in underestimation of duct size compared to other imaging techniques as computed tomography (CT), magnetic resonance cholangiopancreatography (MRCP), endoscopic retrograde cholangio pancreatography (ERCP) or percutaneous transhepatic cholangiography (PTC)<sup>[2]</sup>.

EUS is considered more accurate in detecting CBD stones, especially if smaller than 5mm in diameter, which are sometimes not identified by MRCP and HCT-C. When choledocholithiasis is suspected, sensitivity of EUS reaches 90% for the detection of CBD stones<sup>[3]</sup>.

**Patients and methods**

This prospective cross sectional study was conducted on 50 adult patients who referred to Kobri Elqoba Armed Forces Hospital between August 2016 and March 2018 because of dilated CBD of undetermined etiology on TUS and CT. Thirty-eight patients (76%) were males and twelve patients (24%) were females.

**Statistical analysis**

The collected data was revised, coded, tabulated and introduced to a PC using Statistical package for Social Science.

Statistical analysis was done to determine the accuracy of EUS in evaluating the etiology of dilated Common Bile Duct of undetermined etiology.

**Descriptive statistics:**

1- Mean, Standard deviation ( $\pm$  SD) and range for parametric numerical data, while Median and Interquartile range (IQR) for non parametric numerical data.

2- Frequency and percentage of non-numerical data.

**Analytical statistics:**

1- The sensitivity of Diagnostic measures was calculated as: True positive by the test / (True positive by the test + False Negative by the test) and for Specificity the equation was True Negative by the test / (True Negative by the test + false positive by the test).

PPV= true positive by test / all positive by the test (True positive by the test + False Positive by the test).

NPV=true negative by test / all negative by the test (True negative by the test + False negative by the test).

2- Kappa statistics to compute the measure of agreement between two investigational methods. Kappa's < 0.20 was defined as poor agreement; 0.21 to 0.40, fair; 0.41 to 0.60, moderate; 0.61 to 0.80, good; and 0.81 to 1.00, very good or almost perfect.

3- Correlation analysis (using Pearson's method): To assess the strength of association between two quantitative variables. The correlation coefficient denoted symbolically "r" defines the strength and direction of the linear relationship between two variables.

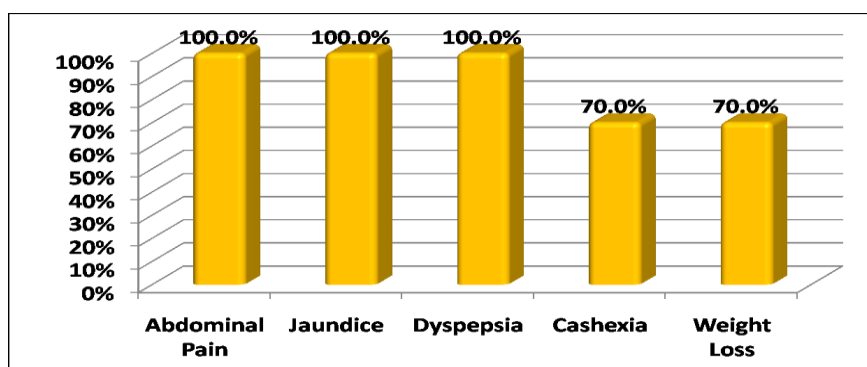
**P- value:** level of significance  $p > 0.05$ : Non significant. (NS)  $p < 0.05$ : significant (S)  $P < 0.01$ : Highly significant. (HS)

**Results**

**Table (1): Demographic characteristics of the studied cases**

Variables		Mean $\pm$ SD	Range
Age (years)		54.0 $\pm$ 7.1	39.0–66.0
		N	%
Sex	Male	38	76.0
	Female	12	24.0

**Fig. (1): Clinical picture of the studied cases:**



**Table (2): Laboratory data of the study group.**

Laboratory data	Range	Mean±SD
HB% (g/dl)	9-14	11.77±1.22
WBC (c/mm <sup>3</sup> )	5500-10500	6854.11±2286.38
Platlet (c/mm <sup>3</sup> )	150000-450000	289200±90053
T.bilirubin (g/dl)	2.3-8.5	4.54±1.61
D.bilirubin (g/dl)	2-7.9	3.80±1.59
S. Creatinine(mg/dl)	0-1.2	1.00±0.17
ALP (U/L)	177-550	331.48±64.04
AST (U/L)	18-150	57.80±37.89
ALT (U/L)	12-130	47.36±30.69
INR	0.9-1.3	1.03±0.07

**Table (3): Abdominal ultra sound examination of the studied cases**

Findings		Mean±SD	Range
		N	%
CBD stone		0	0.0
LN enlargement		20	40.0
Suspected mass		20	40.0
	Pancreatic Head	13	26.0
Suspected mass site	CBD	3	6.0
	CHD	2	4.0
	Multiple HFL	2	4.0
Suspected Benign Lesion		30	60.0
Diagnosis	Suspected Malignant Lesion	20	40.0

Total=50, HFL: Hepatic focal lesion

**Table (4): CT findings among the studied cases**

Findings		Mean±SD	Range
		N	%
CBD Size (mm)		8.8±1.0	8.0–12.0
Stone		0	0.0
LN enlargement		24	48.0
Mass		24	48.0
Mass site	Pancreatic Head	14	28.0
	CBD	5	10.0
	CHD	3	6.0
	Multiple HFL	2	4.0
Diagnosis	Suspected Benign Lesion	26	52.0
	Suspected Malignant Lesion	24	48.0

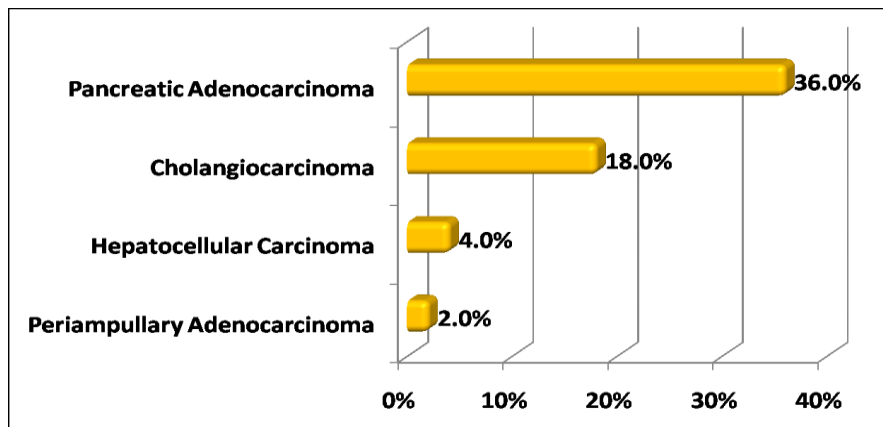
Total=50

HFL: Hepatic focal lesion.

**Table (5): EUS findings among the studied cases**

Findings		Mean±SD	Range
		N	%
CBD stone		12	24.0
CBD stricture		6	12.0
Enlarged papillae		2	4.0
LN enlargement		24	48.0
Mass		30	60.0
Diagnosis	Benign Lesion	20	40.0
	Malignant Lesion	30	60.0

Total=50



**Fig. (2): FNA diagnosis among the studied cases**

**Table (6): Characters of masses detected by EUS examination of the studied cases**

Mass			
		Mean±SD	Range
Size (mm)		17.1±10.0	4.0–35.0
		N	%
Site	Pancreatic head	18	36.0
	CBD	6	12.0
	CHD	3	6.0
	Periampullary	1	2.0
	Multiple HFL	2	4.0
FNA Pathology	Pancreatic Adenocarcinoma	18	36.0
	Cholangiocarcinoma	9	18.0
	Hepatocellular Carcinoma	2	4.0
	Periampullary Adenocarcinoma	1	2.0
Enlarged lymph node			
		Mean±SD	Range
Size (mm)		13.0±5.3	5.0–22.0
Site	Peripancreatic	15	30.0
	Porta hepatis	9	18.0
Enlarged Papillae			
		Mean±SD	Range
Size (mm)		14.3±3.2	12.0–18.0

Total=50

HFL: Hepatic focal lesion

Table (7): Diagnostic performance of TUS for detection of malignancy

Characters	Value	95% Conf. Interval
Sensitivity	57.1%	39.4%–73.7%
Specificity	100.0%	78.2%–100.0%
Positive Predictive value (PPV)	100.0%	83.2%–100.0%
Negative Predictive value (NPV)	50.0%	31.3%–68.7%
Diagnostic accuracy (DA)	70.0%	55.4%–82.1%
Youden's index	57.1%	40.7%–73.5%
Kappa	0.44	0.25–0.64

Table (8): Diagnostic performance of EUS for detection of malignancy

Characters	Value	95% CI
Sensitivity	85.7%	69.7%–95.2%
Specificity	100.0%	78.2%–100.0%
Positive Predictive value (PPV)	100.0%	88.4%–100.0%
Negative Predictive value (NPV)	75.0%	50.9%–91.3%
Diagnostic accuracy (DA)	90.0%	78.2%–96.7%
Youden's index	85.7%	74.1%–97.3%
Kappa	0.78	0.61–0.96

CI: Confidence interval

## Discussion

In this study, (76%) of the studied cases were males (table 1). All the studied cases had abdominal pain, jaundice and dyspepsia while (70%) of them had cachexia and weight loss (table 2).

<sup>[4]</sup> showed that (53.9%) of the studied cases were females, (77.6%) of the studied cases had abdominal pain, (27%) had weight loss and (40%) had jaundice.

In the current study by TUS, 60% of the studied cases were suspected to have benign lesions and 40% of the cases were suspected to have malignant lesions.

Twenty six percent of the studied cases were suspected to have pancreatic head mass. Six percent of the studied cases were suspected to have CBD mass and 4% have

CHD mass. Four percent of the studied cases were found to have multiple hepatic focal lesions by TUS (table 3).

On the same hand,<sup>[5]</sup> studied 50 patients with clinical features of biliary obstructive disease and reported that by TUS, 60% of the studied cases were suspected to have benign lesions and 40% were suspected to have malignant lesions. Twenty-five percent of the last cases were suspected to have pancreatic head mass, 7% were suspected to have peri-ampullary cancer and 6% have cholangiocarcinoma, and lastly 2% of them were found to have gall bladder cancer by TUS, results that were close to that of the current work.

In the current study by abdominal CT examination, 26 cases (52%) had undetectable etiology and 24 cases (48%) were

suspected to have malignant lesions. Fourteen cases of the malignant cases were diagnosed to have pancreatic head mass by CT. Five cases of the malignant cases were diagnosed to have CBD mass and 3 cases have CHD mass by CT. Two cases had multiple hepatic focal lesions by CT (table 4).

<sup>16]</sup>reported that 52% of the studied cases were found to have benign lesions and 48% of the cases had malignant lesions; 28% of them were diagnosed to have pancreatic head mass by CT, 10% were diagnosed to have CBD mass and 6% had CHD mass by CT, and lastly 4% were found to have multiple hepatic focal lesions by CT, the result that were close to that of the present work .

In this study, EUS showed that: 40% of the studied cases were found to have a benign etiology and 60% of the cases had a malignant etiology. Thirty-six percent of those with malignant etiology were found to have pancreatic head mass by EUS, 12% were diagnosed to have CBD mass, 6% had CHD mass by EUS, 4% were found to have hepatic focal lesions and lastly 2% were found to have periampullary mass (table 5).

The present study showed that EUS-FNA was done for all the cases that were found to have a mass by EUS for histopathology to reach the diagnosis. Histopathology confirmed that 36% of cases had pancreatic adenocarcinoma, 18% of cases had cholangiocarcinoma, 4% had hepatocellular carcinoma with portahepatis lymphadenopathy and 2% had periampullary adenocarcinoma. (Fig 2)

On agreement with the result of the current study,<sup>[4]</sup> who conducted a study on one hundred and fifty two patients with dilated CBD and reported that the final diagnoses by EUS was as the following:

choledocholithiasis in 32 cases (21.1%), passed CBD stone in 35 cases (23%), opium-induced CBD dilation in 14 cases (9.2%), postcholecystectomy states in 20 cases (13.1%), ampullary neoplasia in 15 cases (15.8%), cholangiocarcinoma in 14 cases (9.2%) and pancreatic head cancer in

9 cases (5.9%).

This study showed that the final diagnosis of all the studied cases (after 6 months follow up) is 35 cases (70%) were found to have malignant lesions, 18 cases (36%) were pancreatic head adenocarcinoma, 14 cases (28%) had cholangiocarcinoma, two cases (4%) had hepatocellular carcinoma with portahepatis lymphadenopathy and one case (2%) had periampullary adenocarcinoma.

According to the result of the present study, TUS and CT were not enough to confirm diagnosis in cases with benign obstruction.

In the present work, TUS had sensitivity of (57.1%) and specificity of (100%) in prediction of malignancy (table 7). This low sensitivity of TUS may be primarily contributed to some factors like obese patients who were poor ultrasound candidates, bowel gases, as well as, smaller lesions beyond the resolving power of ultrasound.

Also EUS showed sensitivity of (85.7%) and specificity of (100%) in prediction of malignancy (table 8).

**In conclusion,** In this study comparison between diagnostic characteristics of US, CT, and EUS in prediction of malignancy showed that:

- 1- US had low sensitivity (57.1%) and high specificity (100%).
- 2- CT had low sensitivity (68.6%) and high specificity (100%).
- 3- EUS had moderate sensitivity (85.7%) and high specificity (100%).

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