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Role of Endoscopic Ultrasound (EUS) In Uncertain Diagnosis of Distal Common Bile Duct Lesions: A Case Study.

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Abstract: *Background and study aims:Distal Common Bile Duct(CBD) lesions are sometimes difficult to diagnose due to the atypical nature or very small size of the lesion that is not identified on imaging modalities like Computerized tomography(CT) and Magnetic ResonanceCholangiopancreaticography(MRCP). The aim of this article is to show the pivotal role of Endoscopic Ultrasonography (EUS) in confirming the diagnosis which helps in choosing the best option of treatment. Patients and methods: In this case study 5 patients with distal CBD lesions but unconfirmed diagnosis on CT and MRCP were selected. The patients were made to undergo Endoscopic Ultrasound as an alternative imaging technique to identify the lesion.*
Result's *and MRCP suggested possible space occupying lesions (SOL) in two cases but EUS confirmed the lesions as tumors. In two other cases the presence of calculus in distal CBD was not evident on CT, and MRCP could only suggest a possible calculus but EUS accurately diagnosed the lesion with the location and size of the stone. The other case was shown as a high-density shadow on CT and a possible stone on MRCP but EUS correctly diagnosed the lesion as tumor.*
Conclusion: *EUS plays an important role in identification of distal CBD lesions accurately when CT and MRCP cannot give a definitive diagnosis.*
Keywords: *distal common bile duct lesions; periampullarytumor; CBDimaging; Endoscopic Ultrasound; CBD stone*; *space occupying lesions;*

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I. Introduction

Distal Common Bile Duct (CBD) lesions include choledocholithiasis, bile duct tumors, papillary tumors, etc. Most of these lesions can be diagnosed by imaging modalities like B-ultrasound, CT scan and MRCP (1) but in some situations, it is difficult to reach a conclusive diagnosis. The reason for such difficulties is the small size or atypical nature of the lesion and not so high sensitivity and specificity of the imaging techniques (2). To choose the best option of treatment, the diagnosis should be clear and accurate. Five such cases of unconfirmed diagnosis of the distal CBD lesions by CT and MRCP were selected and EUS was done in every case to identify, confirm the type of lesion and reach a conclusive diagnosis.

II. Patients and Methods

In this case study 5 patients with distal CBD lesions but unconfirmed diagnosis on CT and MRCP were selected. The patients were made to undergo Endoscopic Ultrasound as an alternative imaging technique to identify the lesion.

Case 1

A 62years old female patient came to the hospital with pyrexia of unknown origin and complains of nausea, upper abdominal pain, fatigue, loss of appetite, and jaundice since 15days. Onphysical examination highest temperature recorded was 39.5°C withyellowish discoloration of sclera. Results of liver function tests and tumor markerswere Total bilirubin 45.30µmol/L [Normal value: 2-26µmol/L]. Direct bilirubin 31.80 µmol/L [Normal value: 0-6 µmol/L]. Tumor markers CA 19-9 21.84U/ml [Normal value: 0-37U/ml], CA 50 11.29U/ml [Normal value: 0-23U/ml]. Ultrasound examination indicated fatty liver, enlarged gall bladder, slightly dilated intra and extra hepatic duct and a possible distal CBD lesion. CT abdomen indicated intra and extra hepatic duct dilatation, Pancreatic duct(PD) dilatation and a possible lesion in the distal CBD (Fig. 1a). MRCP revealed a possible papillary SOL (Fig 1b). To overcome this uncertainty in diagnosis, EUS was done which clearly showed a small solid tumor of size 6mmx8mm (Fig.1c) in the distal CBD. Biopsy did not suggest

any malignancy. Based on clinical presentation, biochemistry and combined result of CT, MRCP and EUS, a confirmed diagnosis of distal CBD tumor was made and patient underwent surgery. Intraoperatively a small mass was found in the duodenal papilla (Fig 1d). Intraoperative frozen section indicated papillary adenocarcinoma, hence Whipple procedure was performed.

Case 2

A 42 years old male patient came to the hospital with complains of epigastric pain for 2 weeks. The patient had severe abdominal discomfort and right sided pain radiating to the back while having dinner 2 weeks ago, pain resolved when he stopped eating. He also complains of nausea, vomiting, fever with chills and itching of the skin. Severe yellowish discoloration of sclera and skin was noticed on physical examination, the temperature recorded was 36.8°C. Liver function tests results were Total bilirubin 156.20 µmol/L and Direct bilirubin 112.50 µmol/L. B-ultrasound showed fatty liver, distended gall bladder with extrahepatic duct dilatation. CT scan revealed intra and extra hepatic bile duct dilatation, no evidence of stone in the CBD (Fig. 2a). MRCP could only show a possible lower CBD lesion with intra and extra hepatic duct dilation (Fig 2b). To identify the lesion correctly and confirm the diagnosis EUS was done which showed a clearly visible calculus of 6mmx3mm in the lower part of distal CBD. (Fig. 2c). Laparoscopic exploration of CBD was done and the calculus removed (Fig. 2d).

Case 3

A 50 years old male patient presented with upper abdominal pain, abdominal distension, yellowishdiscoloration of skin and sclera for one month, with no history of fever and chills. The laboratory investigations were Total bilirubin 46.80 µmol/L, Direct bilirubin 39.50 µmol/L. Tumor markers were CEA 2.09ng/ml, [Normal value: 0-3ng/ml], CA 19-9 133.20u/ml, CA50 40.18u/ml. Ultrasound abdomen showed only intra and extra hepatic bile duct dilatation. CT scan revealed high density shadow in the distal CBD with extra hepatic bile duct, CBD and PD dilatation (Fig.3a). MRCP identified a lesion in distal CBD suggesting possible stone (Fig.3b). Furthermore, EUS was done for the patient which clearly showed a duodenal mass in the periampullary region with CBD dilatated to an extent of 12mm and tumor size of 11mmx16mm (Fig.3c). Whipple's procedure was performed and the tumor was found in distal CBD. Pathology reports confirmed the diagnosis as invasive papillary adenocarcinoma.

Case 4

A 56years old male patient presented with intermittent upper abdominal pain for more than one month, an episode of vomiting with fever and chills. He had history of Type-2 Diabetes Mellitus for 8 years. Laboratory investigations were Total bilirubin 18.80 µmol/L, Direct bilirubin 14.50µmol/L. Tumor markers were CEA 1.65ng/ml, CA 19-9 21.08umol/L, CA 50 6.33u/mol. CT was done in a local hospital which suggested only enlarged gall bladder, intra and extra hepatic duct dilatation, no other finding was evident, hence the patient was transferred to our hospital and further investigations were done (Fig.4a).MRCP revealed possible distal CBD calculi, intra and extrahepatic bile duct dilatation with gall bladder wall thickening (Fig 4b). These findings could not identify the lesion correctly and indicate a clear diagnosis, hence EUS was done which showed clearly visible stone of size 10.3mmx12.1mm in the distal CBD (Fig.4c). Laparoscopic exploration of CBD was done and the calculus was removed from distal CBD.

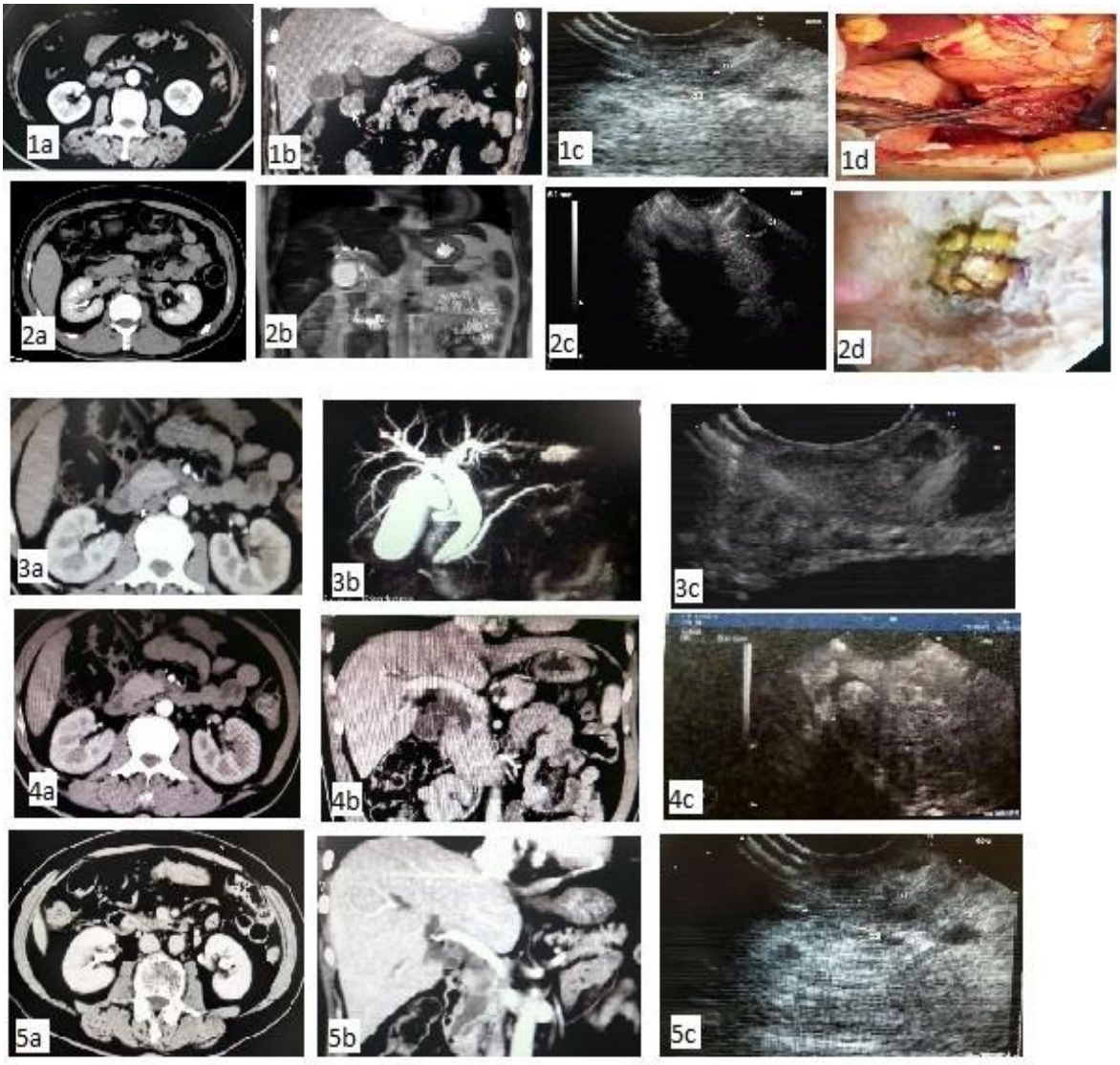
Case 5

A 68years old female patient presented with progressive upper abdominal distention and dull pain for the last 2 years without any known cause. There was no history of weight loss and no signs of jaundice. Laboratory investigations were Total bilirubin 8.30 µmol/L, Direct bilirubin 2.10 µmol/L, Tumor markers were CEA 4.67ng/ml, CA 19-9 11.87u/ml, CA 50 5.39u/ml. Patient underwent abdominal ultrasound at a local hospital which could not identify any abnormality. Gastroscopy was performed which revealed a possible small space occupying lesion in the duodenal papilla. The patient was referred to higher center for further evaluation. CT scan showedmild CBD and PD dilatation, possible papillary SOL (Fig.5a). MRCP also showed a possible duodenal papillary mass with CBD and PD dilatation (Fig.5b). The diagnosis was not yet confirmed, so EUS was done which clearly showed a small distal CBD tumor of size 14mmx8mm (Fig.5c). The patient underwent Whipple's procedure and pathology confirmed the tumor as cholangiocarcinoma.

III. Result and Observation

CT and MRCP suggested possible space occupying lesions (SOL) in two cases but EUS confirmed the lesions as tumors. In two other cases the presence of calculus in distal CBD was not evident on CT, and MRCP could only suggest a possible calculus but EUS accurately diagnosed the lesion with the location and size of the stone. The other case was shown as a high-density shadow on CT and a possible stone on MRCP but EUS

correctly diagnosed the lesion as tumor.This case study explains the importance of Endoscopic Ultrasound in diagnosing the lesions that are small in size and difficult to be identified by other imaging techniques.Endoscopic ultrasound can overcome the limitations of CT and MRCP in difficult cases where the diagnosis is not confirmed. There is less literature that highlights the important aspects of EUS and this case study can be a basis for more extensive research in the future for distal common bile duct lesions.



Case 1: (Figure 1a- 1d); 1a and 1b are CT and MRCP images showing a possible lesion in distal CBD; 1c is EUS image clearly showing a tumor; 1d is intra operative image showing tumor in duodenal papilla.

Case 2: (Figure 2a-2d); 2a is CT image showing only dilation of ducts but no lesion; 2b is MRCP image showing a possible lesion; 2c is EUS image clearly showing a stone with its measurable size; 2d is an intra operative image of case showing the stone.

Case 3: (Figure 3a-3c): 3a is CT image showing a high-density shadow only; 3b is MRCP image showing a stone like lesion; 3c is EUS image showing a clearly identifiable tumor.

Case 4: (Figure 4a-4c); 4a is CT image showing no identifiable lesion; 4b is MRCP image showing a possible stone; 4c shows a clear visible stone on EUS.

Case 5: (Figure 5a-5c); 5a and 5b are CT and MRCP images of case showing a possible SOL; Figure 5c is EUS image showing a clear image of tumor.

IV. Discussion

Distal Common bile duct lesions such as stone, inflammation and tumor are easily diagnosed by Ultrasound, CT and MRCP but some small or atypical lesions are difficult to diagnosecorrectly by these imaging modalities (1). Most common diseases of the biliary tree are calculus formation and neoplasms. Cholesterol dominated calculi have a density that is similar to bile which makes it difficult to differentiate between tumor and stone even if the duct is dilated (2). Sometimes a calculus or tumorous lesion presents with similar contour making it difficult to diagnose accurately (3).

CT scan is commonly used imaging technique as it provides excellent images of all the abdominal viscera. It can bring out details about the structure of the lesion by giving an etiologic diagnosis and being able to establish the benign or malignant nature of the non-calculus lesions (4). For distal CBD lesions it often gives a conclusive diagnosis but some small or atypical lesions are hard to diagnose because of not so high sensitivity and specificity (5). MRCP is a noninvasive imaging technique that accurately depicts the morphological features of biliary and pancreatic ducts (6). It is a useful tool in diagnosis of extrahepatic bile duct and pancreatic duct abnormalities such as cholelithiasis, malignant obstruction of bile and pancreatic ducts, congenital anomalies and chronic pancreatitis. However, in some situations, the relatively low spatial resolution (7) and atypical lesions in the distal CBD limits the visualization of the biliary tree which makes it difficult to give an accurate diagnosis.

If clinical presentation, CT or MRCP suggests a suspicion in the distal common bile duct but cannot confirm the diagnosis, EUS can be useful in identification of the lesions. It combines endoscopy with real-time and high-resolution ultrasound providing excellent sonographic visualization of the extrahepatic biliary tree without interference of bowel gas, due to its ability to place the transducer in close proximity to the extrahepatic bile duct. Additionally, EUS permits the accurate and systematic visualization of the wall of the duodenum, including the papillary region (8). In this case study, the size of the lesion in case 1 was very small which made it difficult to be identified by CT and MRCP but EUS showed the correct size and accurate location of the tumor. The clinical presentation and findings in imaging techniques gave an unclear diagnosis in case 2 and case 4, EUS was useful in identifying the presence of calculus with the precise location and size. In case 3, CT revealed an unclear SOL, MRCP suggested a possible stone which made the diagnosis difficult but EUS clearly showed a small solid tumor in the periampullary region. In case 5, no signs of jaundice were seen, the biochemistry and tumor markers were within normal range, CT and MRCP suggested a possible SOL but EUS confirmed the diagnosis as distal CBD tumor which helped in forming a decision to perform surgery.

V. Conclusion

EUS can play an important role in identification of the distal CBD lesions accurately in patients when CT and MRCP cannot give a definitive diagnosis.

Declaration of Interest:
All the authors declare that they have no conflicts of interests.

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