Role of Radial Endoscopic-ultrasound (EUS) to Establish Diagnosis of Undetermined Causes of Obstructive Jaundice: A Case Series

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ABSTRACT

Identification the causes of obstructive jaundice are challenging. Recent radiologic imaging techniques improve diagnostic yield to determine jaundice causes. However, small lesions particularly in pancreas or periampullary area that lead to jaundice, often unrecognize with conventional radiologic imaging. Radial endoscopic-ultrasound (EUS) is the most sensitive modality to identify the lesions-related obstructive jaundice, remarkably in the lack of high-resolution radiologic facilities. We presented four cases of obstructive jaundice, without obvious obstruction causes from conventional radiologic imaging or abdominal ultrasound. All patients underwent radial EUS, pancreatic head mass revealed in 2 patients, and distal stenosis of the common bile duct without evidence of mass was found in 2 other patients. The masses size were 16 mm and 39 mm in diameter. Due to linear EUS and EUS guided fine needle were unavailable in our center, confirmation biopsy was undone. Three patients were performed endoscopic retrograde cholangiopancreatography (ERCP) for dilatation and inserting stents, and one patient referred to the surgeon. In conclusion, radial EUS aided to diagnose the definite causes of jaundice despite in the less-equipped of high-resolution radiologic imaging.

Keywords: *radial endoscopic ultrasound (EUS), obstructive jaundice*

ABSTRAK

Penegakan diagnosis penyebab ikterus obstruksi masih cukup sulit. Saat ini terdapat banyak kemajuan dalam teknik pencitraan radiologis untuk menentukan penyebab ikterus obstruksi. Namun, lesi kecil penyebab ikterik terutama pada pankreas atau area peri-ampulla seringkali tidak dapat ditegakkan dengan pencitraan radiologis konvensional. Endoskopi ultrasonografi (EUS) radial adalah modalitas paling sensitif untuk mendeteksi lesi yang menyebabkan ikterus obstruktif, terutama di fasilitas tanpa ketersediaan peralatan radiologi resolusi tinggi. Kami memaparkan 4 kasus ikterus obstruksi, tanpa penyebab obstruksi yang jelas dari pemeriksaan radiologis atau ultrasonografi. Semua pasien dilakukan EUS radial, ditemukan massa caput pancreas pada 2 pasien, sedangkan 2 pasien lainnya hanya didapatkan stenosis di duktus biliaris komunis distal tanpa bukti adanya massa. Ukuran massa yang ditemukan adalah 16 mm dan 39 mm. Dikarenakan EUS linier dan aspirasi jarum halus yang dipandu EUS tidak tersedia, penegakan dignosis pasti tidak dapat dilakukan. Tiga pasien menjalani endoskopi retrograde cholangio-pankreatografi (ERCP) untuk dilakukan dilatasi dan insersi silinder bilier, sedangkan satu

pasien lainnya di rujuk ke ahli bedah. Sebagai kesimpulan, EUS radial membantu dalam penegakan diagnosis pasti penyebab ikterik, meskipun tidak tersedia peralatan pencitraan radiologi resolusi tinggi.

Kata kunci: *endoskopi ultrasonografi (EUS) radial, ikterus obstruksi*

INTRODUCTION

Obstructive jaundice is a particular type of jaundice when the essential flow of bile to the intestines was blocked.[1] Cholelithiasis commonly cause obstructive jaundice, other causes are benign stricture of the biliary tract, pancreato-biliary malignancy, and metastatic diseases.[2] Recent computed tomography (CT) technology increased the sensitivity to identify lesions cause obstructive jaundice.[3] However, small lesion such as pancreatic cancer less than 3 cm in size and distal common bile duct (CBD) strictures were frequently missed by CT or abdominal ultrasound.[3,4]

Radial EUS had a role to identify pancreato-biliary lesion more precise and complementary to helical CT to evaluating pancreatic mass in particular.[3,5] Radial and linear endoscopy ultra sonography (EUS) were an accurate modalities for etiologic diagnosis of clinically suspected obstructive jaundice with no definite pathology on abdominal ultrasonography (US), CT scan, and magnetic resonance imaging (MRI).[4,6]

We present four serial cases of undetermined etiology of obstructive jaundice by US and CT scan. Due to linear EUS was unavailable, all cases were assessed by radial EUS.

CASE ILLUSTRATION

Patient 1

A 56 years old female admitted to hospital due to jaundice for 2 weeks. She often feels abdominal pain. She referred from regional hospital with ultrasound revealed enlarged intra and extra hepatic bile ducts, with a lesion suggestive a mass in pancreas but not well described. Laboratory results were significant for total bilirubin level 3.05 mg/dL, direct bilirubin 2.6 mg/dL. Gamma-GT 620 U/L, Alkali phosphatase 445 U/L, HbsAg negative, Anti-HCV negative. Radial EUS was performed, then showed enlargement of gall bladder, common bile duct dilatation (17 mm), and a mass in the head of pancreas with size 40 by 39 mm (Figure 1.) Patient diagnosis was pancreatic head mass. Patient underwent ERCP, location of the major papillae was distorted, dilatation was applied to this patient.

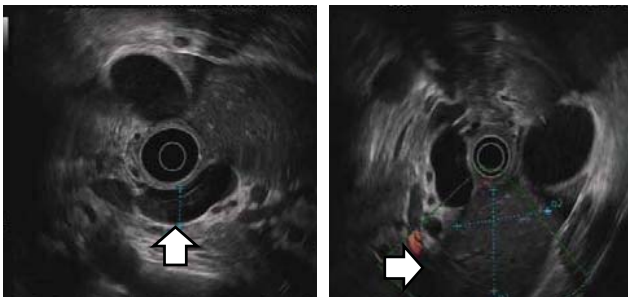

Figure 1. Endoscopy ultra sonography (EUS) showing dilatation common bile duct (CBD) and head pancreas mass

Patient 2

A 68 years old female presented with right upper abdominal pain since 1 month ago. The patient look jaundice, and she experienced weight loss approximately 6 kg in 2 months. She brought ultrasound result showed cholecystitis, sludge gall bladder, and widening of intrahepatic bile duct. magnetic resonance cholangiopancreatography (MRCP) result revealed obstruction intra and extra biliary ducts to distal CBD. She looked anemic and letargic. Laboratory result revealed significantly total bilirubin value (17.9 mg/dL), direct bilirubin 15.3 mg/dL, gamma GT 1451 U/L, Alkali phosphatase 511 U/L, Ca 19-9 < 1.2 U/mL, aspartate aminotransferase (AST) 138 U/L, alanine aminotransferase (ALT) 89 U/L. EUS results showed isoechoic mass in the head of pancreas with size 16 by 16 mm with infiltrating to the duct (Figure 3). CBD was widening (13.6 mm). Patient diagnosis was pancreas head mass. ERCP then

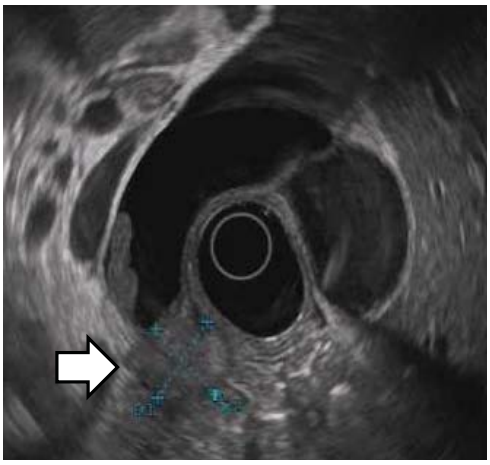

Figure 2. Dilatation of common bile duct (CBD) with pancreatic mass infiltrating to the duct

performed. Cannulation and stent insertion were done for palliative treatment.

Patient 3

A 52 years old female. She had known as myelodysplasia syndrome since 3 years ago. Patient presented with jaundice and gradually increased upper abdominal pain from 1 year ago, sometimes followed by nausea and vomiting. She was performed ultrasound resulted dilatation of intra and extra hepatic bile ducts, multiple cholelithiasis, and cholecystitis. Her laboratory examination showed slight increased value of total bilirubin 4.38 mg/dL, direct bilirubin 3.6 mg/dL, gamma-GT 432 U/L, and alkali phosphatase 278 U/L, AST 27 U/L, ALT 38 U/L. Hepatitis B surface antigen (HBsAg) negative, anti hepatitis c virus (HCV) negative. CT scan showed dilatation on CBD, patient then underwent EUS, revealed slight dilatation on CBD (6.3 mm), and stenotic at distal CBD, thickening wall of gall-bladder (2.6 mm) with multiple cholelithiasis. Patient was diagnosed as stenosis distal CBD, cholecystitis, and cholelithiasis. Patient performed ERCP, dilatation done, but stent cannot be inserted (Figure 2).

Patient 4

A 45 years old female, presented with jaundice since 1 year ago. She looked fatigue, occasionally nausea and vomiting. Patient was performed ultrasound, found an intrahepatic biliary dilatation. Laboratory results showed significant level of total bilirubin 12.6 mg/dL, direct bilirubin 11.3 mg/dL, ALT 148 U/L, AST 100 U/L, Alkali Phosphatase 657 U/L, and Gamma-GT 37 U/L. EUS was conducted, revealed cholecystitis, dilatation of proximal CBD then abruptly stenotic from medial to distal aspect. No evidence of mass or bile stone inside or surrounding stenotic CBD. Patient underwent ERCP, cannulation by dilator was failed. (Figure 4). Patient referred to surgery department for further intervention.

DISCUSSION

Obstructive jaundice is an obstruction in the biliary drainage system causing a rise in the serum bilirubin level.[2,7] In general, causes of obstructive jaundice are usually easy to visualize by ultrasonography (US), CT scan, or MRI. Nevertheless, they have limitations to visualize the distal part of CBD and papillary area because of the interference from bowel gas and abdominal fat tissue.[4,5]

Figure 3. Endoscopy ultra sonography (EUS) showing enlarge and abruptly stenosis of common bile duct/CBD (left) and cannulation of papillae (right).

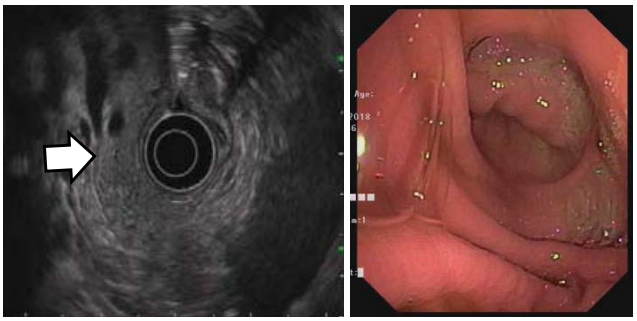

Figure 4. Stenosis of common bile duct (CBD) by endoscopy ultra sonography/EUS (left) and sideview scope visualization (right)

EUS can overcome the limitations of common bile duct (CBD) evaluation by transabdominal ultrasonography (US).[4,8] EUS both radial and linear, aids the physicians to evaluate the causes of obstructive jaundice. Furthermore, the EUS-guided fine needle aspiration (FNA) showed nearly 100% in both sensitivity and specificity for the diagnosing the etiologies of obstructive jaundice.[6,9,10]

Since we only 128 slices CT-scan, and 1.5 Tesla MRI, diagnosing etiologies for obstruction jaundice was difficult, consequently delaying further appropriate treatments. Radial EUS had a role in identifying the etiologies of obstructive jaundice more accurately. The accuracy of EUS was better compare to CT scan or MRI for overall causes of obstruction jaundice (95,9% to 50% and 64,4% respectively).[4,10] Our case series showed the advanced role of EUS to detect pancreato-biliary lesion in the patients with obstructive jaundice, particularly areas with in limited radiological equipment setting.

Case 1 and 2 in our case series showed that the cause of the obstructive jaundice was pancreatic mass. Chen et al observed 123 patients with no definite pathology by US, then pancreas and biliary malignancies were found in 41 of 123 (33,3%) patients.[4] Pancreatic mass with less than 3 cm in size is often difficult to identify by conventional imaging, while EUS is superior in detecting small lesions and able to visualize tumors less than 2 cm in diameter.[5,11] Other obstacles to identify pancreas and biliary malignancies were abdominal fat

tissue, bowel gas, and location of the tumor, despite the size.[4] Tumors near the ampulla are often missed by US or CT-scan. Even, the ampulla of vater itself is a blind spot for MRI examination.[5,11]

Although EUS is very sensitive to identify small pancreas and biliary tumors, multi modalities examinations are mandatory. Single examination by EUS only could result in biases due to dependency on operators' skill and experience. EUS also had low negative predictive value, which potentially limit its clinical utility.[6,9] Other facts, EUS is a relatively expensive equipment, needs trained personnel to operate it, and the procedure is invasive. Nevertheless, EUS is needed to increase yield of diagnostic and staging procedure particularly in pancreas and biliary tumors.[5,9,10] The combination of EUS with CT-scan and MRI, followed by ERCP increased the accuracy of diagnosis and a stepwise fashion for optimal patient managements.[11]

EUS and ERCP were complementary for diagnostic and therapeutic options, particularly in pancreas and biliary disorders.[10,11] Our cases demonstrated the synergism of EUS and ERCP procedures to achieve optimal treatment for our patients.

Case 3 and 4 in our case series revealed biliary stricture or stenosis as the cause of jaundice. Biliary stricture was a challenge to diagnose due to difficult identification by conventional imaging such as US or CT scan. The causes of biliary stricture are mostly due to damage of biliary tract during surgery, abdominal trauma, after recurring pancreatitis, bile duct stone, and primary sclerosing cholangitis.[12,13] Chronic pancreatitis could also lead to biliary strictures, the strictures account for approximately 10-30% in chronic pancreatitis.[13] The list of benign biliary stricture causes are presented in Table 1. Ross et al also described the pancreas or biliary malignancies commonly caused of the biliary strictures in developed countries.[3]

Table 1. Causes of benign biliary strictures[13]

Iatrogenic after cholecystectomy surgery
Chronic pancreatitis
Post sphincterotomy
Radiation therapy
Abdominal trauma
Endoscopic sclerotherapy
Duodenal ulcers bleeding
Post radio frequency ablation
Tuberculosis
Autoimmune diseases

Due to high prevalence of tuberculosis (TB) in Indonesia, tuberculosis as a cause of biliary stricture should be considered. Costamagna et al and Dadhwal et al mentioned TB as a cause of benign CBD stricture, despite its rarity in developed countries.[12,13]

Higa et al described the EUS as a potential modality in diagnosing biliary strictures. EUS had advances in identifying indeterminate biliary strictures that other modalities had failed to find.EUS without FNA had 76% of diagnostic accuracy in identifying causes of strictures. Nevertheless, EUS with FNA improved the diagnostic accuracy, in one study, the sensitivity, specificity, and accuracy raised to 82%, 100%, and 85% respectively.[6,14]

Our case revealed the role of EUS in recognizing the possibility of biliary stricture in jaundice patients, that other modalities failed to find. After possible biliary strictures were found by radial EUS, the ERCP was conducted to confirm these findings. Once more, EUS and ERCP combined procedures had provided optimal approach to the undetermined causes of jaundice patients. Unfortunately, due to unavailability of linear EUS, we could not perform EUS FNA to establish the definite diagnosis.

This case series demonstrated the modality of radial EUS to establish the diagnosis of unknown etiology of obstructive jaundice in a restricted radiologic facility.

REFERENCES

1. Roche SP, Kobos R. Jaundice in the adult patient. Am Fam Physician 2004;69:299–304.
2. Wang L, Yu W-F. Obstructive jaundice and perioperative management. Acta Anaesthesiologica Taiwanica 2014;52:22–9.
3. Ross WA, Wasan SM, Evans DB, Wolff RA, Trapani LV, Staerkel GA, et al. Combined EUS with FNA and ERCP for the evaluation of patients with obstructive jaundice from presumed pancreatic malignancy. Gastrointest Endosc 2008;68:461–6.
4. Chen C-H, Yang C-C, Yeh Y-H, Yang T, Chung T-C. Endosonography for suspected obstructive jaundice with no definite pathology on ultrasonography. J Formosan Med Assoc 2015;114:820-8.
5. Kahl S, Malfertheiner P. Role of endoscopic ultrasound in the diagnosis of patients with solid pancreatic masses. Dig Dis 2004;22:26-31.
6. Tummala P, Munigala S, Eloubeidi MA, Agarwal B. Patients With Obstructive Jaundice and Biliary Stricture±Mass Lesion on Imaging: Prevalence of Malignancy and Potential Role of EUS-FNA. J Clin Gastroenterol 2013;47:532-7.
7. Abbas MW, Shamshad T, Ashraf MA, Javaid R. Jaundice: a basic review. Int J Res Med Sci 2016;4:1313-9.
8. Fekaj E, Jankulovski N, Matveeva N. Obstructive Jaundice. Austin Digestive System 2017;2:1006.
9. Krishna NB, Mehra M, Reddy AV, Agarwal B. EUS/EUS-FNA for suspected pancreatic cancer: influence of chronic pancreatitis and clinical presentation with or without obstructive jaundice on performance characteristics. Gastrointest Endosc 2009;70:70-9.
10. Varadarajulu S, Eloubeidi MA. The role of endoscopic ultrasonography in the evaluation of pancreatico-biliary cancer. Surg Clin North Am 2010;90:251-63.

11. Kahl S, Glasbrenner B, Zimmermann S, Malfertheiner P. Endoscopic Ultrasound in Pancreatic Diseases. DDI 2002;20:120-6.
12. Dadhwal US, Kumar V. Benign bile duct strictures. Med J Armed Forces India. 2012;68:299-303.
13. Costamagna G, Boškoski I. Current treatment of benign biliary strictures. Ann Gastroenterol 2013;26:37-40.
14. Higa JT, Gan SI. Advanced endoscopic imaging for biliary strictures: Review of current technologies. Techniques in Gastrointest Endosc 2016;18:52-61.