

Endoscopic ultrasonography *versus* magnetic resonance cholangiopancreatography for suspected choledocholithiasis: Comments from the radiologists'

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There is a lack of consensus about the optimal noninvasive strategy for patients with suspected choledocholithiasis. Vinicius Leite de Castro conducted a systematic review in accordance with the preferred reporting items for systematic reviews and meta-analyses recommendations with all published randomized prospective trials.^[1] They come to the conclusion that for the same pretest probability of choledocholithiasis, endoscopic ultrasonography (EUS) has higher posttest probability when the result is positive and a lower posttest probability, when the result is negative, compared with magnetic resonance cholangiopancreatography (MRCP). So, looking from a radiologists' point of view, there are some additional comments.

Choledocholithiasis is a common biliary tract disease in clinical practice and is associated with numerous complications that can seriously impact the patients' daily activities and the quality of life.^[2] The diagnosis of choledocholithiasis is based on clinical signs and symptoms, serum levels of markers for cholestasis, and imaging findings. The current diagnostic imaging methods include transabdominal ultrasonography,

abdominal computed tomography (CT), EUS, MRCP, and endoscopic retrograde cholangiopancreatography (ERCP). Transabdominal ultrasonography is a common diagnostic method for choledocholithiasis, but it can be limited by the interference of bowel gas. CT can reveal details on the structure of the obstacle, whether it is lithiasic or nonlithiasic.^[3] ERCP is the gold standard for diagnosing and treating choledocholithiasis, but the indiscriminate use of ERCP increases the risk of procedure-related complications, including bleeding, acute pancreatitis, and perforation. Performing an accurate diagnosis of choledocholithiasis before surgery or ERCP can prevent unnecessary trauma. This remains a challenge for clinicians and radiologists. MRCP is a technique that has evolved over the past two decades. It is the investigation of choice for the noninvasive diagnosis of many pancreaticobiliary disorders, especially for choledocholithiasis, and serves as an alternative to ERCP. Moreover, EUS is another accurate modality for detecting stones in the common bile duct (CBD). By combining endoscopy with ultrasonography, EUS can minimize interference from fat on the abdominal

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wall and bowel gas, thereby, providing clearer images of the biliary tract. Numerous published studies have shown that EUS and MRCP are both high in diagnostic performance for choledocholithiasis,^[4] and some studies have compared the two methods to determine their appropriate clinical applications.

COMPARING ENDOSCOPIC ULTRASONOGRAPHY AND MAGNETIC RESONANCE CHOLANGIOPANCREATOGRAPHY FOR THE DIAGNOSIS OF CHOLEDOCHOLITHIASIS

Systematic reviews have found that the differences in the diagnostic characteristics of EUS and MRCP were not statistically significant.^[4,5] In our opinion, MRCP should be the first choice for patients without any contraindication to diagnose the calculi in the CBD, and EUS should be performed when MRCP is negative in patients with moderate or high pretest probability.^[6] Because in most studies, EUS has high sensitivity and specificity for identifying stones <3 mm, but it is hard for MRCP.^[7] Moreover, EUS and MRCP should be compared with regard to the different sizes and types of stones.

Because both EUS and MRCP are highly accurate for the patients with choledocholithiasis, their values as diagnostic modalities should be based on the following issues: Cost, the duration of the examination, the degree of invasiveness, and the size of the stone. EUS may not be suitable for people who have undergone gastric bypass procedures, including Roux-en-Y anastomosis for indications such as stomach cancer and obesity. Furthermore, EUS is an invasive, anesthetic examination, and the accuracy of EUS depends on subjective operator factors. However, even although EUS is a more invasive method than MRCP, it can be performed before ERCP during the same endoscopy session, and can reduce both the risk to the patient of a second anesthesia and the amount of labor involved.^[7]

MRCP is an examination without complications and it has high sensitivity, specificity, positive predictive value and negative predictive value in detection of CBD stones. It should be performed in all cases where there is a suspicion of CBD stones, provided facilities and expertise are available.^[8] MRCP with slice thickness >5 mm should not be used for the diagnosis of choledocholithiasis.^[6] MRCP provides multiplanar

capability, technical versatility, and superior resolution of soft tissue. It evaluate choledocholithiasis accurately in the preoperative setting of acute calculous cholecystitis.^[9] It is better than EUS for severely ill patients, but it may not be suitable for patients with claustrophobia, a cardiac pacemaker, metal joint prosthesis, or a metal internal orthopedic fixation device. Moreover, it is a one-step evaluation that enables a comprehensive diagnostic assessment of the hepatobiliary system; therefore, it is more cost-effective than EUS. MRCP did not increase the total inpatient length of stay, even when followed by ERCP.^[10]

FUTURE PERSPECTIVES

Through the use of heavily T2-weighted (T2w) sequences, MRCP has been established as a highly sensitive method for assessing choledocholithiasis, because it reveals the entire hepatobiliary system. The technique of MRCP will continue to evolve in the future, with technological advances in both acquisition and postprocessing.

From our point of view, the role of MRCP will keep expanding, with the availability of faster sequences, specific contrast agents, three-dimensional (3D)-imaging, and the ability to perform functional studies of the biliary system.^[11] The increasingly widespread availability of hepatobiliary-specific gadolinium-based magnetic resonance (MR) contrast agents (Gd-EOB-DTPA, Eovist; Bayer HealthCare Pharmaceuticals Inc., Wayne, NJ; or Primovist; Bayer Schering Pharma, Berlin, Germany), has theoretical potential for combining the functional assessment of the biliary system with anatomical information. Functional MR cholangiography combines the use of hepatobiliary-specific contrast agents in off-label biliary imaging for hepatobiliary MR with traditional MRCP. The higher signal-to-noise ratio of this method provides better delineation of the bile ducts than conventional T2w MRCP.^[12]

To summarize, although ERCP is considered the gold standard for the diagnosis of bile duct stones, a variety of studies have found that ERCP can miss microlithiasis. Some recent studies have shown that performing EUS or MRCP first for patients at low-to-moderate risk of choledocholithiasis can prevent unnecessary ERCP.^[13] Studies performed in the coming years should clarify the differences between EUS and MRCP as applied to the diagnosis of choledocholithiasis. These differences include not only diagnostic accuracy but also the

different sizes and types of stones, economic value, and potential for technical improvements. In addition, investigations to determine which method is better for differentiating choledocholithiasis and myxoma in the CBD are warranted. MRCP can be performed for a relatively low cost and with minimal morbidity; therefore, it is safer and more cost-effective for evaluating choledocholithiasis. The best plan for evaluating suspected choledocholithiasis consists of performing MRCP first for the patients without any contraindication, and if the findings are negative, EUS can be used to provide useful complementary information.

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