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The Role of MRCP on Management of the Acute Biliary Pancreatitis

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Abstract

Acute pancreatitis (AP) an acute inflammation of the pancreas is the most common cause of admission to hospital because of acute gastro-intestinal tract in the USA. In etiology, factors such as cholelithiasis, alcohol, drugs, hypertriglyceridemia, and sphincter of oddi dysfunction play a role. Acute biliary pancreatitis (ABP) constitutes %40 of all pancreatitis cases. The management of patients with ABP are vital for the cases in which choledocholithiazis exists. This review focuses on the management of such patients. The timing of ERCP and the use of MRCP was investigated in this review. For this review, various studies and reviews were critically evaluated

Keywords: Acute Biliary Pancreatitis, Endoscopic Retrograde Cholangiopancreatography, Common bile duct, Magnetic Resonance Cholangiopancreatography

Introduction

Acute pancreatitis (AP), an acute inflammation of the pancreas, is the most common cause of admission to hospital because of acute gastro-intestinal tract pathologies in the USA [1, 2]. According to recent studies, the probability of encountering AP is between 4.9 and 73.4 per one hundred thousand cases [3, 4]. The incidence of AP cases has been increased. Moreover, their potential effects on patients and society are expected to increase too [1]. The mortality rate is approximately % 4-7 for all cases, whereas it is % 20-30 for severe cases [5]. In etiology, factors such as cholelithiasis, alcohol, drugs, hypertriglyceridemia, and sphincter of oddi dysfunction play a role. Additionally, after Endoscopic Retrograde Cholangiopancreatography (ERCP) treatment, AP may develop [6].

Acute biliary pancreatitis (ABP) constitutes %40 of all pancreatitis cases. ABP was first defined in 1901 by Opie [7]. The obstruction in ampulla caused by gallstones passing to duodenum is held responsible for pathogenesis [7, 8], which is temporary in general [9]. However, impacted gallstones in ampulla may cause progression of disease. The disease can be treated within a few days by supportive therapy for the cases in which the biliary obstruction is temporary. On the other hand, the management of the disease is vital for the cases in which choledocholithiazis exists. ERCP is known as golden standard for diagnosis and treatment of common bile duct (CBD) stone [10].

Authors hold a common belief that ERCP must be performed at the soonest time possible, ideally during within the first 24 hours for cholangitis cases. Nonetheless, for the other situations, it is suggested that other imaging methods should be used with the aim of diagnosing, because ERCP is invasive. Today, Endoscopic Ultrasonography (EUS) and Magnetic Resonance Cholangiopancreatography (MRCP) are the most commonly used imaging methods for the diagnosis of CBD stone [11].

MRCP is a non-invasive technique for evaluating the biliary tract and pancreatic canal. It was described by Wallner et al in 1991 using the T2 weighted gradient-echo sequence [12]. Because of the low signal-noise ratio and susceptibility to motion, demonstration of non-dilated bile duct was limited. It is possible to obtain higher quality images with newer techniques including the rapid acquisition with relaxation enhancement (RARE) and half-Fourier acquisition single shot turbo spinecho (HASTE). Also the images can be acquired within a breath-hold period. Additionally, visibility of the bile ducts can be increased with the use of ranitidine and glucagon [13, 14].

MRCP is a highly sensitive and specific noninvasive method for detection of CBD Stones [15]. This non-invasive technique is comparable with ERCP which is standard reference for detecting CBD stone, in acute biliary pancreatitis (Figure 1) [16]. Compared to different modalities, MRCP has a higher sensitivity than transabdominal ultrasonography (US)

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and computed tomography, similar to intraoperative cholangiography and lower than EUS [17].

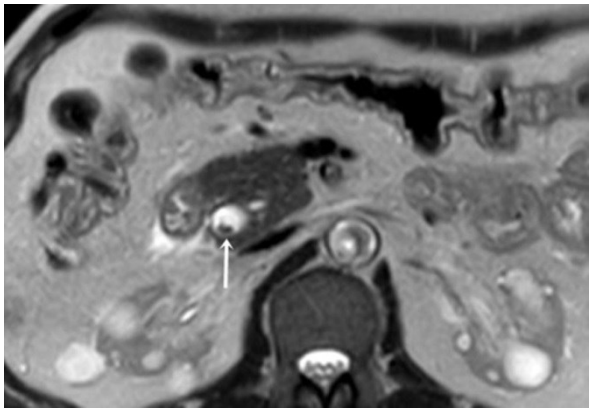

Figure 1A. Axial T2 image shows the hypointense stone (white arrow) in the CBD

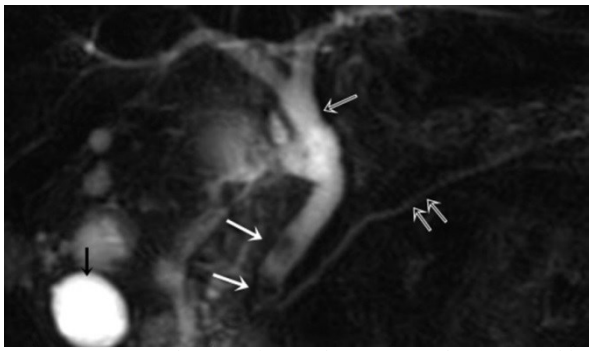

Figure 1B. Coronal MRCP image demonstrates the stones (white arrows) in the distal CBD. Open arrow and double open arrows show the CBD and pancretic duct, respectively. Black arrow demonstrates an incidental renal cyst

MRCP does not need for radiation, intravenous contrast material, anesthesia or sedation and provides the evaluation of surrounding anatomy. ERCP is an invasive procedure and may cause complications but can be used for both diagnostic and therapeutic purposes. Despite EUS is less invasive than ERCP, it is operator dependent and not widely available [6].

There are some limitations of MRCP. Statitionary fluid, metallic clips and fragments within the surrounding area, crossing defect of right hepatic artery or severely narrowed duct can cause image artifacts. MRI, by employing MRCP, has the advantage of detecting CBD stone down to 3 mm diameter and pancreatic duct disruption while providing high-quality imaging for diagnostic and / or severity purposes. In patients with low to moderate risk, MRCP or EUS can be used preoperatively [18]. Sensitivity of detecting CBD stones smaller than 3mm decreases when the bile duct is dilated [6].

The timing of ERCP and the use of MRCP are controversial at the management of patients with ABP [10]. According to studies conducted on patients with ABP, it is stated that biliary duct stones may fall spontaneously into duodenum over time [6]. Because of the reasons mentioned above, a comprehensive review needed to be conducted

Methods

A PubMed search was performed using the terms pancreatitis [MeSH Terms]) AND pancreatitis [Title/Abstract]) AND MRCP [Title/Abstract]) AND Acute [Title/Abstract]. The titles were scanned manually and articles of interest regarding use of MRCP were reviewed.

Discussion

During the assessment of patients with acute pancreatitis, the role of MRCP has been highly debatable. According to some studies, a temporary biliary obstruction may both lead a biliary pancreatitis attack. In addition, post-mortem studies found that patients who died of necrotizing pancreatitis had stones in the CBD [18]. It has been validated by the recent studies that early ERCP within the 24 hours of admission decreases morbidity and mortality in patients with AP complicated by biliary sepsis. However, it is claimed that ERCP is expected to be used for screening CBD stone only if there is considerable evidence and conditional recommendation. In the non-existence of cholangitis and / or jaundice, MRCP or EUS is more feasible approach for diagnosis [19].

CBD stone can be detected by using EUS. EUS is a highly sensitive test and can be another option to MRCP which is not as accurate as EUS while detecting tinier gallstones or sludge [20]. However, MRCP is a beneficial method for detecting retained stones in CBD [11]. The role of MRCP in biliary pancreatitis has been examined by many researches in the past several decades. Some studies have asserted that MRCP images should be taken routinely, whereas it is suggested in some other studies that they should be used selectively. Authors, stating that MRCP images should be used routinely, assert that the sensitivity of transabdominal ultrasonography (USG) and cholestatic enzymes is low.

In a retrospective study carried out by Barlow et al., 256 patients with ABP were examined and the median time to MRCP from admission was found to be 4 days (interquartile range: 2.5–9.5 days). MRCP was applied to 173 of patients and in 30% (52/173) of patients, CBD stone was observed. During the admission, CBD stone was detected in 5 patients who had not a biliary dilatation at USG and had completely normal liver function tests. So, it was suggested that MRCP images should be taken for each patient with the aim of minimizing the risk of CBD stone [21]. Neri et al. used MRCP imaging for all 47 patient having ABP and not having CBD stone at USG and cholestasis. It was discovered that 13 of those patients had CBD stone (13/47) and proposed that routine MRCP images should be taken from the patients with ABP [22].

Telem et al. examine 114 patients with ABP retrospectively. In this study, the correlation between and the existence of CBD stone and variables such as

the diameter of CBD stone measured by USG, Alkaline Phosphatase (ALP), gamma-glutamyl transferase (GGT), total bilirubin(TBIL), direct bilirubin(DBIL) were investigated and 69 patients were assessed with MRCP and ERCP. The optimal laboratory values were found as follows : CBD⩾9 mm; ALP⩾250 U/l; GGT⩾350 U/l; TBIL⩾3 mg/dl; and DBIL⩾2 mg/dl. Moreover, the correlation was observed between five variables and CBD stone (OR:53.1 p< 0.001). In addition, the correlation between four variables and CBD stone was found to be 8.97 (p=0.004). On the other hand, in patients having any combination of one to three variables, there existed no developing correlation with persistent CBD stone. According to findings above and the results of laboratory examinations, it can be said that selective use of MRCP not only reduces the need for ERCP but also helps to prevent unnecessary MRCP imaging [23]. Mofidi et al. investigated 249 patients suspected of having stones in CBD retrospectively. They used ERCP imaging for 57 of patients and MRCP imaging for 46. They stated that the use of MRCP was appropriate for screening biliary tract for the patients with APB and selective use of MRCP might help to diminish the requirement of ERCP and hospital admissions [24].

It is widely accepted that CBD stones may pass spontaneously in many patients when ERCP is used unnecessarily [19). Waele et al. examined 104 patients with ABP in detail. They discovered CBD stone in 21 of 104 (20.2%) patients taken MRCP images [6). Additionally, they used MRCP during the first day of admission and found CBD stones in 2 of 4 patients (50%). After that, they discovered that 6 of 21 patients (28.6%) had CBD stones within 48 hours of admission. In the following days; day 2 + 3, day 4 + 5 and day 6 + 7, the rate of CBD stones was 23.1% (6/26), 25.0% (6/24) and 12.5% (1/8) consecutively. The total incidence of CBD stone was found to be 8.0% (2/25) after 7 days. As a result, they explained that the incidence of CBD stone considerably decreased after acute attack and the reason for this might be explained as spontaneous stone migration.

Çavdar et al. offered a different perspective. They used MRCP screening for 60 patients between 1-4 days after admission and reassessed the patients with CBD stone after 7 days by using MRCP. At the first image, they detected CBD stone in 20 patients. After 7 days, they performed MRCP again and realized that 4 of the patient did not have CBD stone (4/20). The 16 of the patients with CBD stone, detected by MRCP, were applied ERCP. Additionally, they used ERCP imaging because of suspected clinical and laboratory findings for 2 of 4 patients who were not detected CBD stone during MRCP. They declared that controlled MRCP might prevent %10 of ERCP attempt, which could be unnecessary, and suggested that MRCP screening should be performed at the first week of acute attack for patients with ABP [10].

In conclusion, the number of the studies investigating the use of MRCP for diagnosing CBD stone for the patients with ABP is relatively low. In some of these studies, it was suggested that MRCP should be used routinely, however according to others, the use of MRCP should be selective.

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