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Unusual Use of Gd-EOB-DTPA in MRCP in Order to Reveal the Source of Bile Leakage in a Patient with Neuroendocrine Tumor – Case Report

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Summary

Background:

MRCP is the method of choice in diagnosing pathologies of the biliary system. One of them is bile fistulae. They are uncommon but tend to cause many diagnostic problems. The possible way to improve MRCP is using it with intravenous injection of hepatobiliary-specific contrast agents. As it is eliminated via the hepatobiliary system, it can be visualized in the bile ducts and may help to reveal disorders undetected by a standard MRCP.

Case Report:

We report a case of a 36-year-old woman with leakage in the biliary system which led to creation of a subcutaneous bile reservoir. By means of a regular MRCP protocol it was impossible to reveal any disorders of the biliary system and thus a decision to inject Gd-EOB-DTPA was taken. As a result, a fistula with its opening in the fundus of the gall bladder was revealed. Patient was qualified for treatment with somatostatin analogues in order to stop bile secretion.

Conclusions:

The Gd-EOB-DTPA in combination with regular T2-weighted MRCP may be helpful in detecting anomalies of the biliary system. Although a high price of the procedure restricts its accessibility, such advantages as lower risk of complications, lower costs of hospitalization, and less traumatic nature make it a technique that may take precedence over ERCP in ambiguous cases.

MeSH Keywords:

Biliary Fistula • Cholangiopancreatography, Magnetic Resonance • Gadolinium DTPA

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<http://www.polradiol.com/abstract/index/idArt/898781>

Background

Biliary fistulae are rare but severe biliary system disorders causing many difficulties in the diagnostic and therapeutic process. Based on their etiology, biliary fistulae can be spontaneous, therapeutic, traumatic and iatrogenic [1]. As a result of the introduction of biliary tract surgery, iatrogenic fistulae replaced spontaneous fistulae as the most common type [2].

Magnetic resonance cholangiopancreatography (MRCP) is a non-invasive method used to visualize the intrahepatic and extrahepatic bile ducts and pancreatic ductal system.

Regular protocols are based on heavy-weighted T2 images with suppression of the surrounding tissue, without using intravenous contrast. The most frequently gained sequences are RARE, FRFSE, and HASTE [3]. Common indications for MRCP are congenital anomalies of the cystic and hepatic ducts, pancreas divisum, post-surgical biliary complications, trauma to the biliary system, Caroli disease or pancreatic diseases. In comparison to endoscopic retrograde cholangiopancreatography (ERCP), which is an invasive diagnostic technique also used to visualize the biliary and pancreatic ductal system, MRCP is a less costly and significantly less risky procedure.



Figure 1. T2-weighted coronal image reveals fluid collection under the right armpit.

Table 1. MRCP sequence parameters.

	Space	Haste
TR (ms)	2000	4500
TE (ms)	705	737
Slice thickness (mm)	1	Slab
Flip angle [°]	160	180
Bandwidth (Hz)	558	150
Voxel size (mm)	0.9×0.9×1.0	Slab

Hepatobiliary-specific contrast agents are commonly administered for magnetic resonance imaging of the liver lesions. However, there are more and more reports of using them in an unusual way. So far, this group contains three contrast agents: gadoxetic acid (Gd-EOB-DTPA), mangafodipir trisodium (Mn-DPDP) and gadobenate dimeglumine (Gd-BOPTA) [4]. Gd-EOB-DTPA and Mn-DPDP are excreted in 50% via the biliary system, while Gd-BOPTA in just 3–5%. Bile excretion of hepatobiliary contrast agents allows to visualize the biliary tree and might be helpful in interpretation of MRCP images [5]. Contrast agent used in this case was Gd-EOB-DTPA.

Case Report

This article reports a case of using Gd-EOB-DTPA in MRCP to find the place of bile leakage in a middle-aged female patient with a huge, reaching the right axilla, subcutaneous bile reservoir (Figure 1).

A 36-year-old woman was admitted to the Endocrinology, Diabetology and Isotopes Treatment Clinic in Wrocław for further treatment of neuroendocrine tumor type G2 (most likely gastrinoma). Patient’s health problems began with

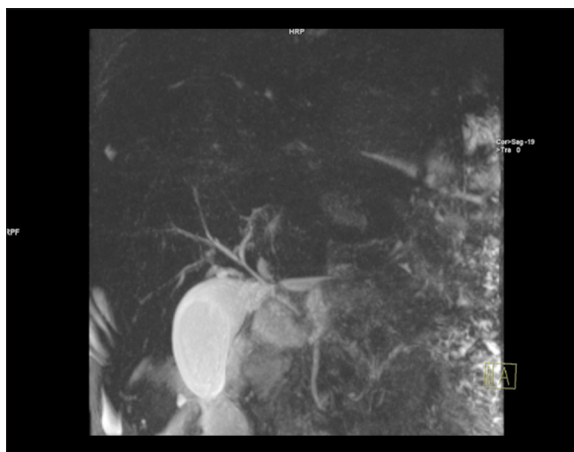


Figure 2. HASTE sequence, T2 image, thick slab. Area of signal loss in the middle part of the common bile duct.

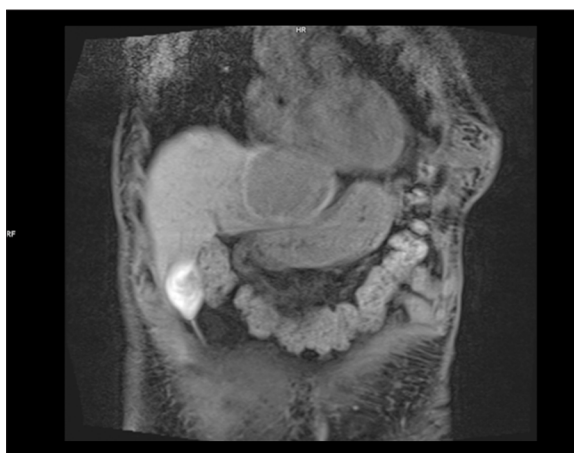


Figure 3. T1-weighted fat-saturated coronal image acquired 40 minutes post intravenous contrast injection, revealing fistula with the internal opening in the fundus of the gall bladder.

duodenal ulcer perforation which proceeds with complications such as peritonitis and abscesses in the peritoneal cavity. The treatment seemed to be successful and it was necessary to find the cause of ulcer perforation. Abdominal CT scan revealed tumor in the tail of the pancreas with metastases to the liver and regional and distant lymph nodes. A few weeks after the drains were removed from the peritoneal cavity, the subcutaneous bile reservoir was formed. It was localized on the right side of the abdomen and reached the right armpit. It turned out to be indispensable to find the bile leakage to determine further actions. It was conjectured that the bile came from the injured intrahepatic bile ducts, and due to patient’s condition the most adequate procedure seemed to be MRCP (Table 1). Analysis of MRCP did not reveal the source of the leakage. The only thing worth mentioning was a signal-loss area in the common bile duct that might have suggested narrowing or occlusion (Figure 2). Due to unsatisfying regular MRCP findings the decision of intravenous injection of the gadoxetic acid was taken. The T1-weighted fat-saturated late-phase images obtained 40 minutes after application of 0.025 mmol/kg of Gd-EOB-DTPA revealed a bile fistula with the internal opening in the fundus of the gall



Figure 4. CT sagittal image (A) – drain in the abdominal cavity. T1-weighted fat saturated sagittal image (B) – bile fistula corresponding with the tract of the drain.

bladder (Figure 3). Those images in correlation with CT scans of the drained peritoneal cavity taken before exposed that the tract of the fistula corresponded with the tract of one of the drains placed in the abdominal cavity after peritonitis (Figure 4). What is more, it revealed no narrowing or occlusion in the common bile duct as the flow of gadoxetic acid through that zone seemed to be undisturbed (Figure 5). Decision of starting treatment with radio-labeled somatostatin analogues was taken in order to stop tumor progression and reduce bile excretion.

Discussion

Since its introduction to the clinical practice at the end of the 20th century, MRCP has significantly been improved and now is a technique comparable with ERCP [6]. There are several reasons why MRCP has become more popular. First of all, it is a non-invasive and well-tolerated technique, therefore the costs of hospitalization and treating complications are lower in comparison to ERCP [7]. Another advantage over ERCP is the possibility of adding 3D imaging and imaging in different additional sequences. Not surprisingly, many studies proved that MRCP is equally or in some cases more effective than ERCP [6].

Every medical diagnostic technique has its disadvantages, MRCP is not an exception. The main drawback in comparison to ERCP is the lack of simultaneous therapeutic possibilities. Second of all, it may give a false-positive image of narrowings, as it occurred in this case.

Gd-EOB-DTPA is commonly used in differential diagnostics of liver lesions. However, it is still not applied in combination with MRCP in imaging of bile duct anatomy and



Figure 5. T1-weighted fat saturated sagittal image excluded narrowing of the common bile duct suspected in a regular MRCP study

abnormalities. The diagnostic effect is the same as in ERCP but it is achieved without exposing patients to serious complications [8]. As the recent analysis shows, addition of Gd-EOB-DTPA to conventional MRCP significantly increases sensitivity, specificity and accuracy in revealing bile leakage. In comparison to regular MRCP, the sensitivity of Gd-EOB-DTPA-enhanced MRCP is over 20% higher (79% vs. 59%) and the specificity rises up to 100% from 59% [9]. The study carried out by Castellanos A. et al. revealed a 100% diagnostic accuracy of Gd-EOB-DTPA-enhanced MRCP in detecting bile leaks [10].

Conclusions

To sum up, the use of Gd-EOB-DTPA does not have to be limited to liver lesion identification but, as it was shown, in combination with regular T2-weighted MRCP it may be helpful in detecting anomalies of the bile duct. Although

the high price of the procedure restricts its accessibility, advantages such as lower risk of complications, lower costs of hospitalization, and less traumatic nature make it a technique that may take precedence over ERCP in ambiguous cases.

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