

Radiologic Findings of Mirizzi Syndrome with Emphasis on MRI

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Abstract

We have reported a case of Mirizzi syndrome preoperatively diagnosed using MR cholangiopancreatography. MRCP and T2-weighted image using a single-shot fast spin-echo sequence accurately depicted all components of Mirizzi syndrome, including impacted stone in the neck of the gallbladder compressing the common hepatic duct and wall-thickening of the gallbladder without any evidence of malignancy. The combination of MRCP and T2-weighted image can be counted on to replace conventional modalities of diagnosing Mirizzi syndrome without any loss of diagnostic accuracy.

Key Words: Bile ducts, calculi bile ducts, MR Bile ducts, stenosis or obstruction

INTRODUCTION

Compression of the common hepatic duct can be caused mechanically by an impacted stone, either in the cystic duct or in the neck of the gallbladder, as well as by the surrounding inflammatory mass effect. Mirizzi¹ reported this pathogenesis as a rare cause of obstructive jaundice in 1948. After that, anatomical variants, including low or medial insertion of the cystic duct with a parallel or spiral course within a common sheath of the common hepatic duct, have been reported as predisposing factors.² Ultrasonography and computed tomography have been widely accepted screening methods for Mirizzi syndrome.³⁻⁵ However, direct cholangiography has usually been necessary for definite diagnosis and evaluation of ductal anatomy because an accurate preoperative diagnosis is critical in this disease entity.³⁻⁶ Magnetic resonance cholangiopancreatography (MRCP) and T2-weighted imaging have the combined advantage of a conventional cross-sectional scan and direct cholangiography, and demonstrated excellent accuracy in di-

agnosing Mirizzi syndrome in the following case report.

CASE REPORT

A 46-year-old male presented at our institution with a 2-week history of jaundice and dark urine. At the time of admission, laboratory data showed total bilirubin of 3.2 mg/dl, alkaline phosphatase of 294 IU/L, SGOT of 164 IU/L, and SGPT of 394 IU/L. The patient underwent an ultrasonography of his right upper quadrant. The ultrasonogram revealed a finding of a probable stone in the common bile duct (CBD) with dilatation of the proximal common duct and intrahepatic duct. Endoscopic retrograde cholangiopancreatography (ERCP) demonstrated a floating stone in the distal CBD, which was successfully extracted. However, a near-complete obstruction was noted at the level of the common hepatic duct, and the proximal common duct and intrahepatic duct were not filled with contrast material. An endoscopic nasal biliary drainage (ENBD) catheter, the tip of which was located in a proximal portion beyond the obstructed level, was inserted for the drainage of bile. The total bilirubin dropped to 1.4 mg/dl after 2 days, and an ENBD cholangiogram was obtained. The cholangiogram revealed a fixed mass-like lesion with a slightly irregular margin at the lateral aspect of the common hepatic duct. The endoscopist performed a biopsy with concerns about malignancy. The path-

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Fig. 1. (A) T2-weighted coronal MR image. A coronal image using T2-weighted multi-slice technique without fat suppression clearly demonstrates the relationship between the calculus (black arrow) and common hepatic duct (white arrow) and excludes any other possible etiology of obstruction-like soft tissue mass. Diffuse wall thickening of the gall bladder is seen. (B) MR cholangiopancreatography: maximal intensity projection (MIP). A MIP image shows a round dark signal of a large calculus (arrow) in the neck of the gallbladder, compressing the common hepatic duct. MIP images can be rotated to any direction for accurate evaluation of the relation between the gallbladder and common hepatic duct. (C) MR cholangiopancreatography: single-projection. A single-projection image shows the same image as a MR cholangiopancreatogram by MIP reconstruction. The arrow indicates a calculus in the gallbladder.

ologic report was ulceration and chronic inflammation with subepithelial fibrosis, but without malignancy. MRCP was carried out with a 1.5 T scanner (Horizon; GE Medical Systems, Milwaukee, WI, U.S.A.) using a phased-array torso coil. CT images, which the patient had previously undergone at another institution, were available at the time of MRI review. A 2-cm round stone was impacted in the neck of the gall bladder as the cause of obstruction in the common hepatic duct without any abnormal mass lesion, suggesting malignancy (Fig. 1). Diffuse wall thickening of the gall bladder was clearly demonstrated in multi-slice source images without fat suppression (Fig. 1, A-C). At this point, Mirizzi syndrome was strongly suspected and the patient was referred for laparotomy. At laparotomy, a 2.5 cm-pigmented stone was found to be impacted in the neck of the gall bladder. There was evidence of severe cholecystitis with adhesion to the common hepatic duct. Segmental resection of the common duct was inevitable. Cholecystobiliary fistula was not found.

DISCUSSION

Recently, magnetic resonance imaging (MRI) has been successfully applied for diagnosing Mirizzi syndrome.⁷ With technical advances of MRI, MRCP has been performed complementary to ERCP, or even routinely for the evaluation of pancreaticobiliary diseases. MRCP is recommended instead of ERCP because it has the advantages of noninvasiveness, virtually no procedure-related mortality or morbidity,

and visualization of the proximal duct in case of complete obstruction, particularly when therapeutic procedure is not anticipated.⁸ The recently introduced single-shot fast spin-echo (SSFSE) or half-Fourier single-shot turbo spin-echo (HASTE) technique have enabled the depiction of normal structures and the presence and level of biliary obstruction accurately without motion artifact.⁹ However, in diagnosing Mirizzi syndrome, a cholangiographic image like ERCP or MRCP is not sufficient to exclude malignancy.

Choi et al. noticed that T2-weighted images with relatively short TE without fat suppression were more informative than source images for maximal intensity projection (MIP) in tissue characterization.¹⁰ They reported 93% and 96% sensitivity in diagnosing malignancy and calculous disease of the pancreaticobiliary system, respectively, with a combination of MRCP and T2-weighted image. In considering the limitations of MRCP, short-T2 material in the lumen of bile ducts is not easily differentiated from a true stone or other obstructive lesion. This is a consequence of water imaging with only bright or dark signals permitted, which only resembles direct cholangiography from the aspect of just showing a lesion as a filling defect regardless of its nature. In our patient, Mirizzi syndrome was dramatically depicted in T2-weighted image without fat suppression, showing irregular GB wall thickening with a dark calcified stone impacted in the neck of the gall bladder and compressed common hepatic duct without evidence of malignancy in surrounding tissue. MIP images and multi-slice source images showed only bright lumen

of CBD and GB with focal narrowing and round filling defect, respectively.

In conclusion, one-stop MR imaging is a possible substitute for a combination of cross-sectional imaging including ultrasonography or CT and cholangiographic imaging including ERC or PTC. A T2-weighted MR image can detect all the diagnostic components of Mirizzi syndrome and exclude malignancy as a cross-sectional imaging, while MRCP can delineate the shape and extent of bile duct stenosis and detect fistula as a ductal image. Furthermore, T2-weighted image without fat suppression can be obtained in a relatively short period of time (about 20 seconds) using SSFSE sequence. Therefore, MRI can be used as a primary diagnostic tool for suspected Mirizzi syndrome in order to reduce the diagnostic delay for ultrasonography or CT and direct cholangiography before surgery. The accuracy in detecting cholecystobiliary fistula should be determined with MRCP and T2-weighted image in appropriate cases.

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