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The Usefulness of Magnetic Resonance Cholangiopancreatography in the Diagnosis of Infantile Congenital Choledochal Cyst : Report of a Case

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Abstract We report herein the case of a 5-year-old girl found to have a congenital choledochal cyst. The patient was admitted to our hospital for investigation of epigastralgia and vomiting and a choledochal cyst was subsequently diagnosed by ultrasonography (US) and abdominal computed tomography (CT). A magnetic resonance cholangiopancreatography (MRCP) revealed a congenital choledochal cyst with anomalous pancreatico-biliary ductal union. Thus, resection of the dilated bile duct with a cholecystectomy and hepaticoduodenostomy were performed. Her postoperative course was unremarkable and she was discharged on postoperative day 40. MRCP is a new noninvasive imaging technique used for visualizing the biliary ducts, the advantages of which include its safety, high sensitivity, specificity, and accuracy. It is also more cost-effective than most other examinations, with the exception of ultrasonography and CT without use of contrast material.

Key Words: congenital choledochal cyst, magnetic resonance (MR) imaging, magnetic resonance cholangiopancreatography (MRCP)

Introduction

Congenital choledochal cyst is a congenital dilated biliary disease caused by an anomalous pancreatico-biliary ductal union[1,2)]. The only effective method of treatment for this disease is surgical[1,3)]; however it is important to detect the morphology of the panceatico-biliary duct system preoperatively[1,4)]. As ultrasonography (US) and computed tomography (CT) are not able to demonstrate the pancreatico-biliary ductal union in detail, it has been necessary to perform percutaneous transluminal cholangiography (PTC) or endoscopic retrograde cholangiopancreatography (ERCP) to establish an exact morphological diagnosis of diseases of the pancreas and bile duct[5)].

Recently, considerable progress has been made in clinical imaging techniques, especially magnetic resonance (MR) imaging. Magnetic resonance cholangio-pancreatography (MRCP) is a new noninvasive imaging technique used for visualizing the biliary ducts[6,7,8)]. We report herein the case of a child in whom a congenital choledochal cyst was diagnosed by MRCP.

Case Report

A 5-year-old girl was admitted to our hospital following the development of acute abdominal pain and vomiting after breakfast one day. US and CT revealed a congenital

choledochal cyst (Fig. 1, 2). Therefore, MRCP was carried out under venous anesthesia using thiopental sodium, with imaging performed employing a 1.5-tesla superconducting MRI unit (Magnetom Vision, Siemens Medical Systems, Erlangen, Germany). A half-Fourier acquisition single-shot turbo spin-echo (HASTE) pulse sequence was used in this patient. The effective echo time (TE) was 87 msec with a inter-echo spacing of 10.9 msec, a section thickness of 3mm, a field of view of 23cm ×23cm, and a matrix size of 240cm×256cm. Data were acquired during quiet breathing with a coronal or oblique view (RAO). The MRCP revealed dilatation of the common bile duct and intrahepatic bile duct with a defect in the lower common bile duct and evidence of debris. A main pancreatic duct was demonstrated, indicating an anomalous union with the pancreatico-biliary duct system (Fig. 3 a). After the MRCP, resection of the dilated common bile duct, cholecystectomy, and hepaticoduodenostomy were performed. The findings of an operative cholangiography were the same as those of the preoperative

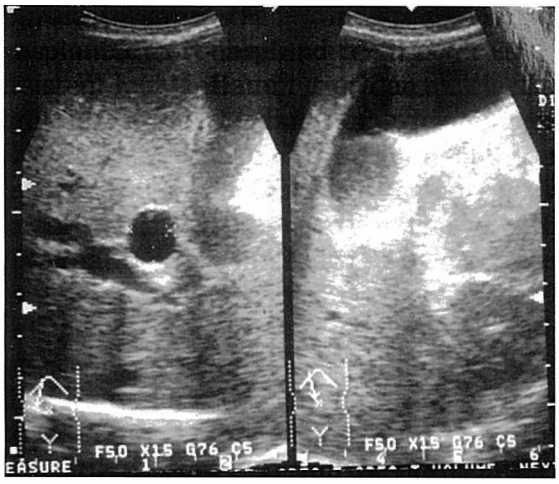

Fig. 1 US showing a dilating common bile duct with sludge, and the gallbladder with sludge.

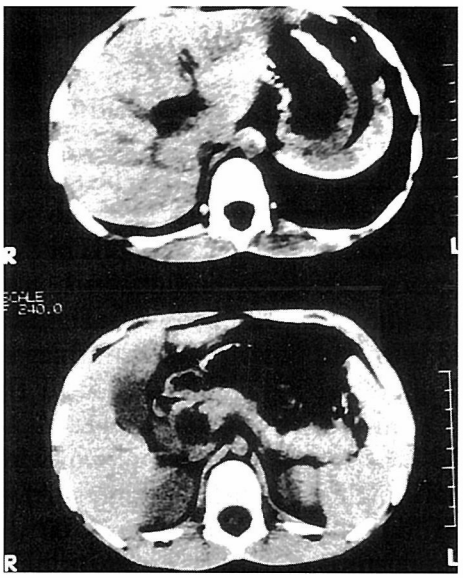

Fig. 2 Abdominal CT scan showing dilatation of the intra- and extra-hepatic bile ducts

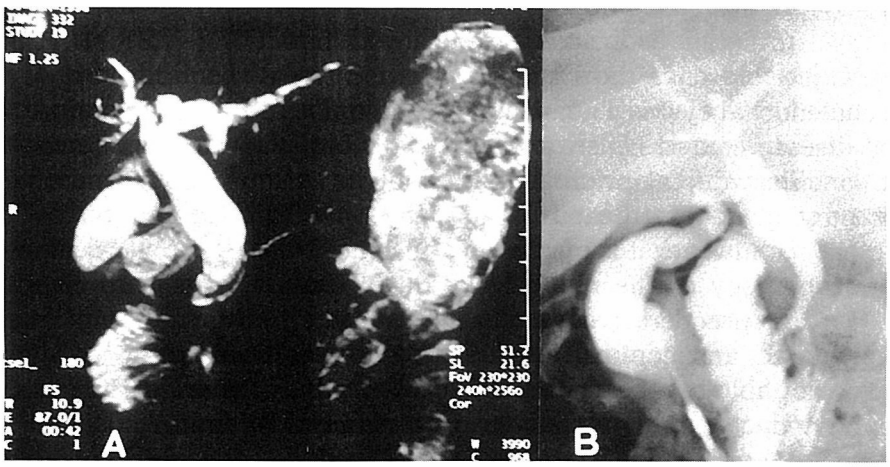

Fig. 3 A. MRCP demonstrated dilatation of the intra- and extra- hepatic bile ducts with an anomalous pancreatico-biliary ductal union. B. Operative cholangiography shows dilatation of the intra- and extra- hepatic bile ducts with an anomalous pancreaticobiliary junction.

MRCP (Fig. 3B). Her postoperative course was unremarkable and she was discharged on postoperative day 40.

Discussion

The principle aim of treatment for a choledochal cyst is resection of the dilated bile duct and biliary reconstruction[1-3]; however, it is necessary to establish the dilatation form of the biliary duct[1, 4]. Most patients with this disease have an anomalous pancreatico-biliary ductal union[9, 10, 11]. Although the standard noninvasive methods for evaluating the biliary tree are US and CT, it is difficult to detect the exact diagnosis of diseases of the pancreatobiliary system by these examinations. The role of ERCP in diagnosing biliopancreatic diseases has expanded to become a routine examination[12]; however, this procedure is time-consuming, invasive, and associated with complications including pancreatitis, hemorrhage, and duodenal perforation[13].

Moreover, it is often impossible to perform without general anesthesia in children. While some authors are of the opinion that it is not necessary to establish a morphologic diagnosis of the biliary system preoperatively as operative cholangiography is sufficient[1], Tsardakas and Robnett[4] stated that the importance of a correct preoperative diagnosis in influencing the prognosis of a condition is well illustrated by the mortality statistics. We believe that it is worthwhile to establish an accurate diagnosis of the pancreatico-biliary duct system in patients with a choledochal cyst in consideration of the need for complete informed consent and safe surgery.

MRCP is a new, noninvasive imaging technique used for visualizing the biliary ducts with cholangiographic images[6, 7]. MRCP uses stationary water in the biliary and pancreatic secretions as an intrinsic contrast media, thus imaging all fluid-filled structures in the upper abdomen[14]. According to Takehara[14], there are no contraindications for MRCP. Nevertheless, Mehta et al[6] reported that the absolute contraindications to MR imaging are the presence of a cardiac pacemaker, a cerebral aneurysm clip, ocular or cochlear implants, or an ocular foreign body, while the relative contraindications include a cardiac prosthetic valve, a neurostimulator, a metal prosthesis, or a penile implant. Hintze et al[15] reported that the overall sensitivities of magnetic resonance cholangiography (MRC) and magnetic resonance pancreatography (MRP) were 89% and 77%, respectively, the overall specificities being 78% and 67%, and the overall accuracy being 87% and 75%, respectively. Lomanto et al[12] stated that the sensitivity of MRCP was 91.6%, the specificity, 100%, and the diagnostic accuracy, 96.8% in choledocholithiasis and recommended that the clinical indication for MRCP is to evaluate patients with cholestatic syndrome and

Table 1. Characteristics of examinations used for investigating anomalies of the pancreatico-biliary ductal system

	Invasive	Radiography	Anesthesia	Contrast agent	Operator	Cost
US	N	N	N	N	dependent	¥ 1500
CT	N	Y	Y	Y	independent	¥ 12585
CT	N	Y	Y	N	independent	¥ 4274
ERCP	Y	Y	Y	Y	dependent	¥ 11841
MRCP	N	N	Y	N	independent	¥ 6858

US, ultrasonography ;
CT, computed tomography ;
ERCP, endoscopic retrograde cholangiopancreatography ;
MRCP, magnetic resonance cholangiopancreatography ;
Y, yes ; N, no

dilatation of the biliary system demonstrated by US. Ng et al[16] reported that congenital and acquired biliary abnormalities, such as choledochal cyst, are well depicted by MRCP. Lee et al[13] recommended that the sensitivity, specificity, and accuracy of MRCP compared with ERCP in distinguishing benign from malignant lesions was not statistically significant.

Finally, the calculated costs of materials for US, plain CT, contrast CT with venous anesthesia using thiopental sodium, MRCP with venous anesthesia using thiopental sodium, and ERCP with general anesthesia using ketamine were ¥1,500 ($11.50), ¥4,274 ($32.90), ¥12,585 ($96.80), ¥6,858 ($52.80), and ¥11,841 ($91.10), respectively (Table 1). Thus, the cost of MRCP is lower than those of contrast CT or ERCP and higher than those of US or plain CT.

In conclusion, we reported a case of infantile congenital choledochal cyst with anomalous pancreatico-biliary ductal union diagnosed by MRCP. Establishing a correct preoperative diagnosis of the pancreatico-biliary union in patients with an infantile congenital choledochal cyst is important. MRCP is safe, having high sensitivity, specificity, and accuracy, and a relatively lower cost performance for pediatric patients in Japan.

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