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· 论 著 ·

## 磁共振胰胆管成像结合常规 MRI 成像对胰胆管良恶性病变的诊断价值

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**[摘要]** **目的:** 观察胰胆管病变磁共振胰胆管成像(MR cholangiopancreatography, MRCP)及常规 MRI 影像学表现, 探讨二者可能的诊断价值。 **方法:** 对 58 例经手术病理或综合影像证实的胰胆管病变行 MRCP 三维容积采集薄层重建、MRCP 二维厚层块投射扫描及常规 MRI 扫描, 分析各类病变的 MRCP 及常规 MRI 影像学表现, 探讨诊断价值, 总结诊断经验。 **结果:** 58 例胰胆管病变中胰胆管结石 28 例, 慢性胰腺炎 9 例, 胰腺癌 9 例, 胆管癌 5 例, 肝门区淋巴结转移 2 例, I 型先天性胆总管扩张 1 例, 胆囊切除术后 1 例, 胰腺分裂 1 例, 肝移植术后 1 例, 恶性胰管内乳头状黏液瘤 1 例。胰胆管良恶性病变 MRCP 三维容积采集薄层重建、MRCP 二维厚层块投射扫描及常规 MRI 扫描影像表现各异, 均有各自特征表现。 **结论:** MRCP 三维容积采集薄层重建、二维厚层块扫描结合常规 MRI 有利于胰胆管病变的定位、定性诊断及鉴别诊断, 值得在有条件的医院推广应用。

**[关键词]** 磁共振胰胆管造影术; 胰胆管疾病; 磁共振成像

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### Value of magnetic resonance cholangiopancreatography combined with conventional MRI in diagnosis of pancreaticobiliary duct lesions

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**[ABSTRACT]** **Objective:** To observe the manifestations of magnetic resonance cholangiopancreatography (MRCP) and conventional magnetic resonance imaging (MRI) for pancreaticobiliary duct lesions. **Methods:** Fifty-eight patients with pancreaticobiliary duct lesions, which were confirmed by pathology and comprehensive imaging, were examined by 3D-MRCP volume scanning with thin slice reconstruction, 2D-MRCP projective scanning and conventional MRI. The MRCP and MRI manifestations of different lesions were analyzed and their diagnostic values were discussed. **Results:** Calculus of bile duct and pancreatic duct was found in 28 patients, chronic pancreatitis in 9, pancreatic cancer in 9, carcinomas of bile duct in 5, metastases to lymph nodes of porta hepatic in 2, congenital choledochus dilatation, cholecystectomy, pancreas divisum, post liver transplantation, and malignant intraductal papillary mucinous tumor of pancreatic duct all in 1. The manifestations of 3D-MRCP volume scanning with thin slice reconstruction, 2D-MRCP projective scanning and conventional MRI for pancreaticobiliary duct lesions were different and had their own characteristics. **Conclusion:** The combinations of 3D-MRCP volume scanning with thin slice reconstruction, 2D-MRCP projective scanning and conventional MRI can help to locate and diagnose pancreaticobiliary duct lesions.

**[KEY WORDS]** magnetic resonance cholangiopancreatography; pancreaticobiliary duct diseases; magnetic resonance imaging  
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磁共振胰胆管成像(MR cholangiopancreatography, MRCP)是一种用于观察胰胆管系统解剖及病理形态的新技术, 具有无创、无辐射、无需对比剂、成功率高、图像清晰等诸多优点, 广泛应用于胰胆系疾病的诊断中<sup>[1-2]</sup>。但 MRCP 是计算机重建影像, 由许多

源图像叠加而成, 且 MRCP 中软组织背景呈低信号, 大大限制了其对疾病定性诊断的准确率<sup>[3-4]</sup>。因此, 本研究对 58 例经手术病理或综合影像资料证实的胰胆管病变行 MRCP 三维容积采集薄层重建(薄层法)、MRCP 二维厚层块投射扫描(厚层法)及常规 MRI 检

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查,尝试联合 MRCP 及常规 MRI 技术诊断胰胆系疾病,总结诊断经验,提高相关疾病的诊断率。

## 1 资料和方法

1.1 一般资料 2007年9月至2008年6月我院收治的58例胰胆管病变患者,男36例,女22例,年龄9~85岁,中位年龄59岁。42例经手术病理证实,16例经综合影像资料证实。胰胆管结石28例,慢性胰腺炎9例,胰腺癌9例,胆管癌5例,肝门区淋巴结转移2例,I型先天性胆总管扩张1例,胆囊切除术后1例,胰腺分裂1例,肝移植术后1例,恶性胰管内乳头状黏液瘤1例。

1.2 检查方法 采用 Siemens Avanto 1.5T MRI 扫描仪,相控阵列线圈扫描。患者检查前禁食4~8h,并在检查前训练呼吸。MRCP 采用两种扫描方法:屏气的半傅立叶单次激励快速自旋回波脂肪抑制序列的厚层 MRCP (BH-HASTE-thick),使用参数:TR/TE 4 500 ms/755 ms,翻转角度 180°,视野 350 mm×260 mm,矩阵 384×308,层厚 40~60 mm,单层采集时间约 5 s,一次扫描产生 1 幅厚层投影图像,调整层块角度重复扫描可获得 3~6 幅多角度厚层 MRCP 图像;3D 呼吸触发快速自旋回波序列的连续成像 (3D-RT-TSE),使用参数:TR/TE 18 000 ms/650 ms,翻转角度 170°,视野 350 mm×260 mm,矩阵 241×256,层厚 1 mm,无间隔,频率选择脂肪抑制,采集时间 5~6 min,采集的多层数据在工作站(LEO work-station)经 MIP 后处理得到薄层重建和厚层重建图像。

常规 MRI 扫描:上腹部轴位 T<sub>1</sub>WI 快速小角度激发 (fast low angle shot,FLASH)序列,使用的参数:TR/TE 209 ms/4.8 ms,翻转角度 70°,视野 350 mm×256 mm,矩阵 256×192,层厚 7 mm,层距

1 mm;上腹部轴位 T<sub>2</sub>WI 快速自旋回波 (turbo spin echo,TSE)序列,使用参数:TR/TE 2 000 ms/104 ms,翻转角度 150°,视野 350 mm×260 mm,矩阵 384×207,层厚 7 mm,层距 1 mm,频率选择脂肪抑制。

## 2 结果

2.1 胰胆管结石 胰胆管结石 28 例:肝内胆管结石 5 例;胆总管结石 20 例(图 1A、1B);胆囊管结石 2 例,其中 1 例伴 Mirizzi 综合征,MRCP 表现为胆囊明显增大,胆囊管结石嵌顿,胆囊管与胆总管平行,胆总管扩张伴肝内胆管轻度扩张(图 1C);胰管结石 1 例。28 例中多发结石 17 例,单发结石 11 例,其中 8 例伴胆囊结石。25 例胆管结石的 MRCP 表现为高信号的胆管内类圆形或不规则形低信号充盈缺损,常规 MRI 表现为 T<sub>1</sub>WI 等或略高信号,T<sub>2</sub>WI 为高信号的胆管内低信号充盈缺损,其中 2 例直径约 2 mm 的小结石,仅在薄层源图像上显示;2 例胆管结石伴梗阻性黄疸,MRCP 表现为高信号胆总管内杯口状低信号充盈缺损,肝内胆管扩张呈“枯枝状”,常规 MRI 显示胆管壁无偏心性增厚,管周无软组织肿块;2 例伴急性单纯性胰腺炎,常规 MRI 显示胰腺小片状 T<sub>1</sub>WI 低、T<sub>2</sub>WI 高信号影,胰周见少许渗出液。1 例胰管结石(图 1D),MRCP 表现为胰管高信号内点状低信号充盈缺损。

2.2 慢性胰腺炎 9 例慢性胰腺炎 MRCP 表现为胰管穿透征,即胰管不规则、串珠状扩张,并且贯穿病变区(图 1E)。其中 2 例伴侧支胰管扩张,MRCP 表现为侧支胰管呈“鱼刺样”改变;2 例伴胰腺假性囊肿,常规 MRI 显示胰腺体尾旁边缘光滑清晰的 T<sub>2</sub>WI 高信号影;2 例伴梗阻性黄疸,MRCP 表现为胆总管胰头段受压,上段扩张的胆总管圆而光滑,呈自上而下渐进性缩窄,呈鼠尾状改变。



图 1 胰胆管结石及慢性胰腺炎影像学表现

Fig 1 Manifestations of calculus of bile and pancreatic duct and chronic pancreatitis

A: MRCP shows multiple small calculi with low signal intensity within the distal common bile duct. B: T<sub>2</sub>WI with fat-suppression imaging shows low signal intensity within the common bile duct. C: Mirizzi syndrome. MRCP shows gallbladder enlarged obviously, gallstone is impacted in the cystic duct, cystic duct parallels with common bile duct, and the common bile duct and intrahepatic bile duct are dilated. D: T<sub>2</sub>WI with fat-suppression imaging shows low signal intensity of calculi in main pancreatic duct. E: MRCP shows the ventral and the dorsal pancreatic duct is dilated obviously. The dilatation of the dorsal pancreatic duct is important for diagnosis of chronic pancreatitis

2.3 胰胆管恶性病变 17 例胰胆管恶性病变包括:9 例胰腺癌、5 例胆管癌、2 例肝门区淋巴结转移

和 1 例恶性胰管内乳头状黏液瘤。

2.3.1 胰腺癌 胰腺癌中胰头癌 6 例,MRCP 表现

为主胰管胰头段破坏,出现残留段信号增高且扩张,与扩张的胆总管形成双管征,并且两者形成“不相交征”(图2);胰体癌3例,MRCP表现为肿瘤区胰管中断,肿瘤远端胰管不规则扩张。



图2 胰头癌 MRCP 表现

Fig 2 MRCP manifestation of cancer of pancreatic head

2.3.2 胆管癌 胆管癌 MRCP 表现为病变区胆管呈低信号不规则充盈缺损,并且突然截断,上段胆管明显扩张,发生于下段的胆管癌常合并主胰管扩张(图3A)。常规 MRI 表现为胆管内不规则肿块, T<sub>1</sub>WI 为等信号, T<sub>2</sub>WI 为稍高信号(图3B、3C)。肝门部淋巴结转移 MRCP 表现为梗阻段以上胆管扩张明显,呈“残根状”或“软藤状”改变(图3A、3D); 常规 MRI 表现为胆管外淋巴结压迫、侵犯胆管,致梗阻段胆管突然截断。

2.3.3 恶性胰管内乳头状黏液瘤 MRCP 表现为胰腺体尾部主胰管节段性扩张,且最大径超过 10 mm;常规 MRI 表现为胰管沿胰腺体尾部分布有多发大小不一囊性病灶(图4)。

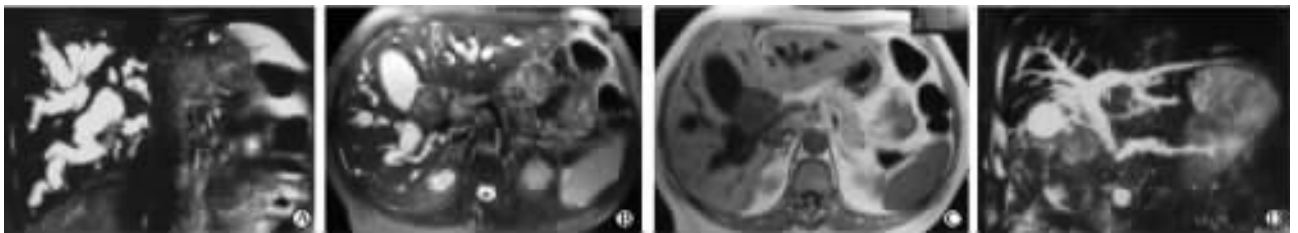


图3 胆管癌影像学表现

Fig 3 Manifestations of cholangiocarcinoma

A; MRCP after MIP of cholangiocarcinoma at the common hepatic duct shows a concentric stricture of the common duct just above the junction of left and right hepatic ducts. Intrahepatic bile ducts show obvious dilatation. B; T<sub>2</sub>WI imaging shows tumor has high signal intensity. C; T<sub>1</sub>WI imaging shows tumor has isointensity. D; Cholangiocarcinoma at the common bile duct, MRCP shows the tumor at distal of common bile duct has low signal intensity, with the common bile duct and main pancreatic duct dilated as double duct sign

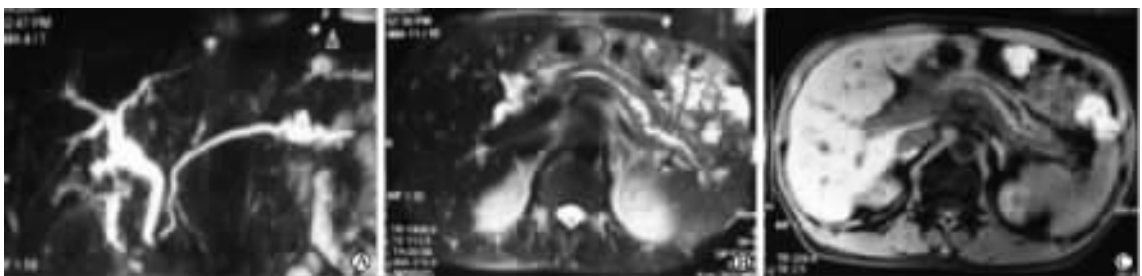


图4 恶性胰管内乳头状黏液瘤影像学表现

Fig 4 Malignant intraductal papillary mucinous tumors of pancreatic duct

A; MRCP shows the pancreatic duct segmental dilatation at the body and tail of the pancreas. The pancreatic duct dilated, with the largest diameter longer than 10 millimeter. The extrahepatic bile duct is dilated. The distal common bile duct shows gradual stricture. B, C; T<sub>2</sub>WI with fat-suppression imaging and T<sub>1</sub>WI imaging show multiple cystic disease around pancreatic duct at the body and tail of the pancreas

2.4 其他病变 I型先天性胆总管扩张1例, MRCP表现为肝外胆管全程囊状扩张,左右肝管及肝内胆管正常,胆囊管汇入扩张的胆总管内(图5)。胰腺分裂1例,MRCP表现为主胰管(腹侧胰管)与胆总管汇合,开口于十二指肠乳头,副胰管(背侧胰管)开口于十二指肠副乳头(图6)。肝移植术后1

例,MRCP显示肝门部胆管缩窄,左右肝管及其分支不同程度扩张。胆囊切除术后1例,MRCP显示胆总管代偿性扩张,扩张的胆总管圆而光滑。

### 3 讨论

MRCP在评价胆总管结石、恶性梗阻、慢性胰腺

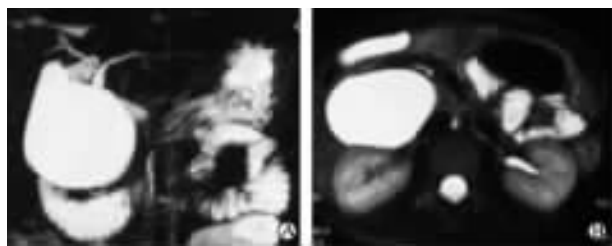


图5 先天性胆总管扩张影像学表现

Fig 5 Congenital choledochus dilatation

A: MRCP shows the common bile duct dilated as cyst; intrahepatic and extrahepatic ducts are normal. B: T<sub>2</sub> WI with fat-suppression imaging shows cystic duct joined into dilated common bile duct

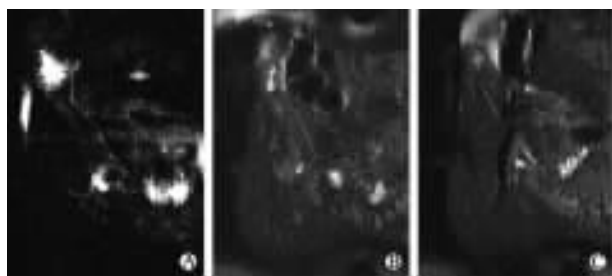


图6 胰腺分裂影像学表现

Fig 6 Pancreas divisum

A: MRCP shows the ventral pancreatic duct and the common bile duct unites into the major duodenal papilla, the dorsal pancreatic duct enters the minor duodenal papilla. B: MIP shows the dorsal pancreatic duct enters the minor duodenal papilla. C: MIP shows the ventral pancreatic duct and the common bile duct unites into the major duodenal papilla

炎和解剖变异的准确率方面可与 ERCP 相媲美<sup>[5-10]</sup>,对于不明原因的腹痛和反复发作的胰腺炎患者,MRCP 可以替代 ERCP 作为排除胰腺分裂的一种方法<sup>[11]</sup>。目前多种 MRCP 新技术的开发和应用,均使图像信噪比明显改善,而且 MRCP 属无创性检查技术,可大大减少 ERCP 检查所带来的并发症。所以快速、准确、无创的 MRCP 技术目前已成为 ERCP 的重要替代检查手段。

本研究使用的两种不同的 MRCP 成像方法各有优缺点<sup>[12]</sup>:三维容积采集薄层重建可获得薄层原始图像,有助于管腔内小病变的显示,图像可以进行各种后处理,且重建图像效果较好,但扫描时间较长,如果患者呼吸运动不均匀,则图像质量很差;二维厚层块投射扫描速度快,一幅图像仅需要数秒钟,管道结构的连续性较好,一般不出现阶梯样伪影,但图像不能进行后处理,不能获得薄层原始图像,容易遗漏小病变。本组 2 例直径约 2 mm 的胆道小结石,仅在薄层源图像上显示。因此,在临床检查中,最好两种以上方法结合应用,注意薄层源图像的观

察并结合常规 MRI 图像。Varghese 等<sup>[13]</sup>认为 MRCP 对胆系结石的检出率优于超声、CT,与 ERCP 相近。

引起恶性梗阻的病因主要有胰头肿瘤、胆管癌、淋巴结转移、壶腹部肿瘤等。本研究 6 例胰头癌及 3 例胰体癌 MRCP 均表现为胰管平滑扩张伴截断,其机制可能为胰腺癌多数来自胰胆管上皮细胞,产生的肿瘤引起胰管阻塞导致远段胰管扩张。席永昌等<sup>[14]</sup>观察发现,胰头癌同时侵犯胆总管和主胰管可形成“双管征”,如使胆总管、胰管汇合部分离则形成“不相交征”。本组 5 例胆管癌胆管梗阻端形态表现多样,包括截断、偏心或鸟嘴样狭窄,MRCP 示胆管壁不规则增厚及腔内不规则充盈缺损,病变上游胆管明显扩张,肝内胆管迂曲扩张,可达肝包膜下,胆管常呈“残根状”或“软藤状”扩张,低位梗阻常出现胆总管和胰管均扩张的“双管征”。2 例肝门部淋巴结转移 MRCP 表现为梗阻端突然截断,病变上段胆管扩张明显,呈“残根状”或“软藤状”扩张,其 MRCP 表现与上中段胆管癌相似,此时需结合常规 MRI 图像鉴别。

引起良性梗阻的病因主要有胆系结石、胆系炎性狭窄、慢性胰腺炎等。本研究 5 例胆管结石伴梗阻性黄疸,MRCP 表现为高信号胆管内低信号充盈缺损,常规 MRI 图像表现为 T<sub>2</sub> WI 低信号, T<sub>1</sub> WI 等、稍高信号,管壁无偏心性增厚,管周无软组织肿块。本研究 2 例慢性胰腺炎伴梗阻性黄疸,MRCP 示胰管沿胰腺长轴呈不规则、串珠状扩张,并且贯穿病变区,此征象是胰腺炎性病变的特异征象<sup>[15]</sup>。

仅仅依靠 MRCP 表现对引起梗阻的良、恶性病变作定性诊断有一定难度,结合常规 MRI 图像可提高梗阻性病变定位、定性的准确率,可清晰显示管腔外的组织结构、淋巴结肿大情况及恶性肿瘤浸润征象,从而进一步提高诊断的准确性<sup>[5]</sup>。本研究中有 2 例肝门部淋巴结转移,MRCP 显示肝内胆管明显扩张,呈“残根状”或“软藤状”,结合常规 MRI 图像发现肝门区肿大淋巴结压迫肝总管,分析 MRCP 漏诊的原因可能是 MRCP 抑制了周围实质性脏器的信号,仅显示胰胆管系统。

综上所述,MRCP 三维容积采集薄层重建(薄层法)、MRCP 二维厚层块投射扫描(厚层法)、常规 MRI 联合检查有利于胰胆管疾病的定性、定位诊断及鉴别诊断,值得在有条件的医院推广应用。

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