

论 著

基于DWI定量评估对自身免疫性胰腺炎与胰腺癌的鉴别诊断价值

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【摘要】目的 基于弥散加权成像(DWI)定量评估对胰腺癌(PC)与自身免疫性胰腺炎(AIP)的鉴别诊断价值。方法 回顾性分析中南大学湘雅医学院附属株洲医院确诊的15例 AIP 患者及20例PC患者的临床资料,并随机选取20例胰腺正常者(NP)的临床资料作为对照,研究对象均行上腹部MRI常规序列及动态增强检查,常规序列包括T₁WI、T₂WI、磁共振胰胆管造影(MRCP)、DWI,观察其影像学特征,统计分析表观弥散系数(ADC)值的变化情况,绘制鉴别二者ADC值的受试者工作特征(ROC)曲线。结果 AIP组中多弥漫受累(13/15),T₂WI上病灶区呈等或稍高信号,DWI上多呈高信号,增强扫描多呈均匀明显强化(11/15)。PC组中多局灶受累(19/20),T₂WI多呈稍高信号,DWI呈高或稍高信号为主,增强扫描呈不均匀低强化为主(17/20)。二者均可伴有主胰管或胆管系统的扩张,AIP可有主胰管不规则狭窄,PC可伴有主胰管的截断。PC组ADC值为 $(1.132 \pm 0.097) \times 10^{-3} \text{mm}^2/\text{s}$,AIP组ADC值为 $(0.986 \pm 0.025) \times 10^{-3} \text{mm}^2/\text{s}$,NP组ADC值为 $(1.366 \pm 0.125) \times 10^{-3} \text{mm}^2/\text{s}$;两两比较差异有统计学意义($P < 0.05$)。鉴别AIP与PC的ADC值的最佳界值为 $1.086 \times 10^{-3} \text{mm}^2/\text{s}$,相应的敏感性为75.3%,特异性为89.6%,曲线下面积(AUC)为0.895。结论 基于DWI定量评估可提高AIP与PC的鉴别诊断准确率。

【关键词】磁共振成像;自身免疫性胰腺炎;胰腺癌

【中图分类号】R445.2; R735.9

【文献标识码】A

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The Value of Quantitative Evaluation Based on DWI in the Differential Diagnosis of Autoimmune Pancreatitis and Pancreatic Cancer

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ABSTRACT

Objective To evaluate the differential diagnosis of pancreatic cancer (PC) and autoimmune pancreatitis (AIP) based on diffusion weighted imaging (DWI). **Methods** The clinical data of 15 patients with AIP and 20 patients with PC diagnosed in Zhuzhou Hospital Affiliated to Xiangya Medical College of Central South University were retrospectively analyzed, and the clinical data of 20 patients with normal pancreas (NP) were randomly selected as controls. All the subjects underwent routine sequence and dynamic enhancement of upper abdominal MRI. Conventional sequences included T₁WI, T₂WI, MRCP and DWI. The imaging features were observed, the changes of apparent diffusion coefficient (ADC) values were statistically analyzed, and receiver operating characteristic (ROC) curves were drawn to distinguish ADC values between the two. **Results** In the AIP group, diffuse involvement was more common (13/15), the lesion area showed equal or slightly hyperactive signal on T₂WI, hyperactive signal on DWI, and uniform and obvious enhancement on enhanced scan (11/15). In the PC group, there were multiple focal involvements (19/20), mostly high signal on T₂WI, mostly high or slightly high signal on DWI, and mostly uneven low enhancement on enhancement scan (17/20). Both may be accompanied by dilation of the main pancreatic duct or bile duct system, irregular stenosis of the main pancreatic duct in AIP, and truncation of the main pancreatic duct in PC. The ADC value of PC group was $(1.132 \pm 0.097) \times 10^{-3} \text{mm}^2/\text{s}$, AIP group was $(0.986 \pm 0.025) \times 10^{-3} \text{mm}^2/\text{s}$, and NP group was $(1.366 \pm 0.125) \times 10^{-3} \text{mm}^2/\text{s}$. Pairwise comparison showed statistical significance ($P < 0.05$). The optimal ADC values for distinguishing AIP from PC were $1.086 \times 10^{-3} \text{mm}^2/\text{s}$, with corresponding sensitivity of 75.3%, specificity of 89.6%, and area under curve (AUC) of 0.895. **Conclusion** Quantitative evaluation based on DWI can improve the accuracy of differential diagnosis between AIP and PC.

Keywords: Magnetic Resonance Imaging; Autoimmune Pancreatitis; Pancreatic Cancer

自身免疫性胰腺炎(autoimmune pancreatitis, AIP)的由Yoshida等首次提出,是一种与自身免疫异常相关的慢性胰腺炎^[1-2]。国际共识诊断标准(international consensus diagnostic criteria, ICDC)^[3]将其分为1型AIP和2型AIP,1型AIP在亚洲国家多见,2型AIP则多见于欧美国家。AIP的组织病理学特点主要组织病理学特征是CD4阳性T细胞,IgG4阳性浆细胞大量浸润,并伴有胰腺腺泡细胞萎缩,间质内纤维化以及闭塞性小静脉炎^[4]。AIP与胰腺癌(pancreatic cancer, PC)的临床及影像表现可相近而易混淆,但二者的临床治疗方法及预后差别极大,因此准确诊断至关重要。现已有研究表明,MRI对于鉴别AIP和PC具有一定的价值^[5],但当前关于DWI在鉴别AIP与PC的研究较少,因此本文回顾性分析15例AIP及20例PC患者,旨在提高二者的鉴别诊断准确率。

1 资料与方法

1.1 一般资料 回顾性分析中南大学湘雅医学院附属株洲医院确诊的15例 AIP患者及20例PC患者的临床资料,并随机选取20例同期NP患者作为对照。15例AIP均按照国际共识诊断标准诊断证实;20例PC均经术后病理证实;所有患者均于我院行上腹部MRI检查,包括T₂WI、T₁WI和扩散加权成像(diffusion weighted imaging, DWI)序列,磁共振胰胆管造影(magnetic resonance cholangiography,MRCP)及动态增强扫描。

1.2 方法 MRI检查:采用Siemens3.0T超导型磁共振扫描仪。轴位T₂WI压脂序列:TR/TE=3856ms/80ms,FOV=38cmx38cm;轴位T₁WI压脂序列:TR/TE=180ms/13ms;DWI序列,b值选择0s/mm²和800s/mm²,TR/TE=3000ms/50ms,FOV38cmx38cm;对比剂经肘静脉注射钆喷酸葡胺注射液,剂量0.1mmol/kg,速率为2.5mL/s,分别于注药开始后15、80、300S进行动脉期、门静脉期及延迟期扫描。

1.3 图像分析 分析并记录各患者病灶范围、强化方式以及有无主胰管扩张、中断等情况。数据由1名高年资医师在工作站软件处理包在ADC图像上测量表观弥散系数(apparent diffusion coefficient, ADC)测量得到。感兴趣区(region of interest, ROI)的大小及形态固定为30mm²的类圆形。AIP、PC组ROI置于三个不同的位置,取均值纳入统计;对照组ROI分别置于胰头、胰体和胰尾,取均值。

1.4 统计学处理 采用SPSS 25.0 软件进行数据处理, $P < 0.05$ 为差异有统计学意义。对于ADC值,符合正态分布且方差齐的采用独立样本t检验比较AIP、PC组间差异,方差不齐者采用校正t检验比较AIP、PC组间差异,而不符合正态分布的则采用Mann-Whitney U检验。并绘制ADC值鉴别AIP与PC的受试者工作特征(ROC)曲线。计算曲线下面积(AUC),根据Youden指数确定最佳阈值。

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2 结果

AIP组及PC组ADC值均小于NP组,且PC组ADC值大于AIP组,两两比较差异有统计学意义,见表1。DWI鉴别AIP与PC的

ROC曲线(图3),ADC值的最佳临界值为 $1.086 \times 10^{-3} \text{ mm}^2/\text{s}$, 相应的敏感性为75.3%, 特异性为89.6%, AUC为0.895。

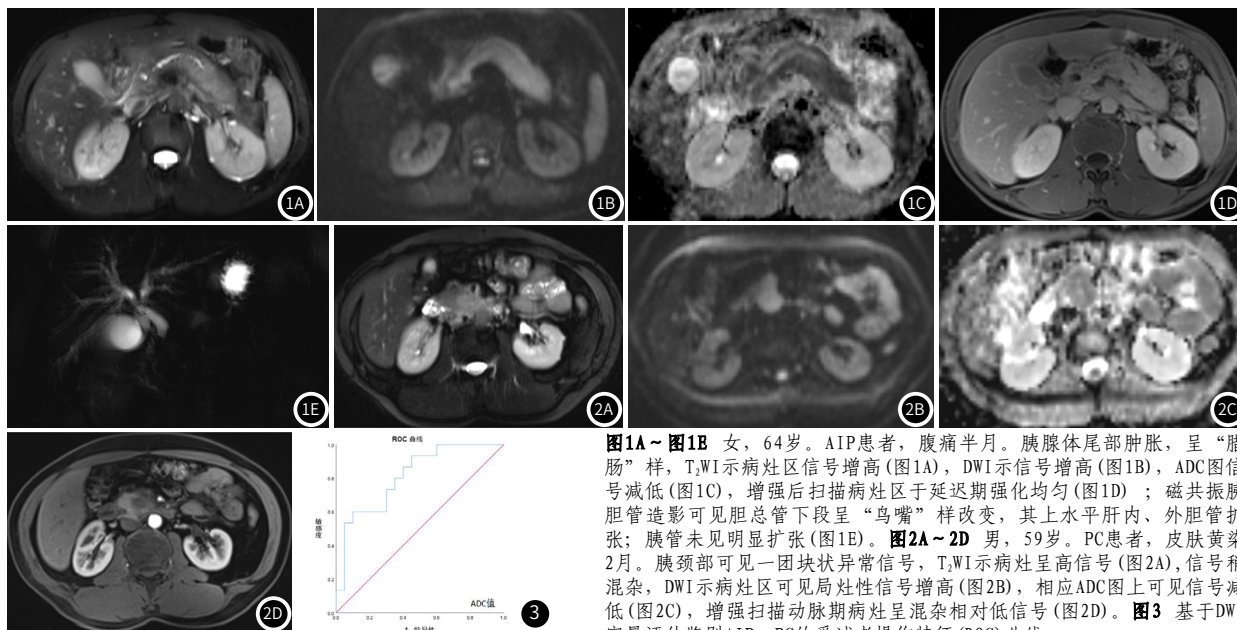


图1A~图1E 女,64岁。AIP患者,腹痛半月。胰腺体尾部肿胀,呈“腊肠”样,T₁WI示病灶区信号增高(图1A),DWI示信号增高(图1B),ADC图信号减低(图1C),增强后扫描病灶区于延迟期强化均匀(图1D);磁共振胰胆管造影可见胆总管下段呈“鸟嘴”样改变,其上水平肝内、外胆管扩张;胰管未见明显扩张(图1E)。图2A~2D 男,59岁。PC患者,皮肤黄染2月。胰颈部可见一肿块状异常信号,T₂WI示病灶呈高信号(图2A),信号稍混杂,DWI示病灶区可见局灶性信号增高(图2B),相应ADC图上可见信号减低(图2C),增强扫描动脉期病灶呈混杂相对低信号(图2D)。图3 基于DWI定量评估鉴别AIP、PC的受试者操作特征(ROC)曲线。

表1 AIP、PC组患者的ADC值(例)

组别	n	年龄	ADC值($\times 10^{-3} \text{ mm}^2/\text{s}$)
PC组	20	62 $\pm$ 12	1.132 $\pm$ 0.097
AIP组	15	57 $\pm$ 14	0.986 $\pm$ 0.025
P值			<0.05
t值			4.135

注:P<0.05 有统计学意义

3 讨论

AIP的主要组织病理学特征是大量浆细胞弥漫分布,并伴有胰腺腺泡细胞萎缩,间质内纤维化以及闭塞性小静脉炎,从而在胰周形成纤维化包壳,类似“腊肠”样改变^[6-7]。AIP组中,12例在T₁WI及T₂WI上胰腺周围可见条带状低信号影包绕,形成“腊肠”样改变,胰腺边缘变平直。AIP组中,13例表现为弥漫性肿大,5例以胰头肿大为主,T₂WI呈等或稍高信号,DWI多呈高信号,增强扫描多呈延迟性均匀明显强化(11/15)。PC组中,T₂WI病灶多呈稍高信号,DWI呈高或稍高信号为主,增强扫描多呈不均匀弱强化(17/20)。MRCP上6例AIP可见胆管或主胰管扩张,PC组中15例可见胆管或主胰管扩张,8例可见主胰管截断或狭窄。AIP可表现为肝内外胆管或胰管狭窄^[8-9],本研究4例AIP患者出现主胰管不同程度狭窄。AIP与PC导致的胆胰管狭窄不同;AIP导致的狭窄一般为炎症引起的节段性不同程度狭窄,截断少见,远端主胰管或胆管可伴有扩张;而PC的主胰管或胆总管大多表现为局部明显狭窄、截断,远端胰管或肝内外胆管明显扩张。有时,AIP与PC可具有类似的影像表现而导致误诊,MRI增强扫描其延迟性均匀明显强化的特点有助于与PC相鉴别,但当二者影像表现不典型时不易鉴别。

DWI成像技术的实现是利用了检测水分子的弥散运动情况,其最常用指标是表现弥散系数,这一指标与水分子的弥散运动情况关系密切。由于多种因素决定了ADC值的大小,检测水分子弥散运动的情况可在一定程度上反映组织结构的变化^[10]。有学者研究显示PC的ADC值大于AIP^[11-12],与本研究相符。AIP组ADC值下降可能是由于胰腺实质内大量淋巴细胞、浆细胞浸润,细胞密度增加,自由水分子的运动空间缩小,从而限制了水分子的自由运动,病变在DWI呈高信号,相应的ADC值下降。PC组织中由于大量癌细胞堆积生长、纤维基质增生,细胞外空间缩小,水分子弥散运动受阻,ADC值下降^[13-14]。AIP组ADC值低于PC组,分析可能是由于AIP细胞密度、间质纤维化程度大于PC,且AIP组织细胞存在炎性水肿,从而导致AIP的ADC值下降更明显。而PC属于乏

血供肿瘤,由于肿瘤血供不足,病灶内常存在坏死、囊变,可导致水分子运动限制减轻,相应ADC值升高。此外,目前国内关于AIP、PC的ADC值的报道存在一定差异,ADC值也不尽相同。Klauß等的研究显示AIP的ADC值大于PC^[15],与本研究结果不符,其原因可能与该研究者磁共振参数的选择不一致有关。

综上所述,基于DWI定量分析及常规MRI序列对于提高AIP和PC的鉴别诊断准确率有一定帮助,但必要时还是需要穿刺活检或术后病理证实。本研究病例数量偏少,有待扩大样本进一步研究。

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