

CASE REPORT

Acute pancreatitis successfully diagnosed by diffusion-weighted imaging: A case report

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has the potential to replace CT as a primary diagnostic strategy for acute pancreatitis.

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Abstract

Diffusion-weighted imaging (DWI) is an established diagnostic method of acute stroke. The latest advances in magnetic resonance imaging (MRI) technology have greatly expanded the utility of DWI in the examination of various organs. Recent studies have revealed the usefulness of DWI for imaging of the liver, kidney, ovary, and breast. We report a patient with acute pancreatitis detected by DWI and discussed the efficacy of DWI in diagnosing acute pancreatitis. A 50-year old man presented with a primary complaint of abdominal pain. We performed both DWI and computed tomography (CT) for this patient. The signal intensity in a series of DWI was measured and the apparent diffusion coefficient (ADC) values were calculated to differentiate inflammation from normal tissue. Two experienced radiologists evaluated the grade of acute pancreatitis by comparing the CT findings. Initially, the pancreas and multiple ascites around the pancreas produced a bright signal and ADC values were reduced on DWI. As the inflammation decreased, the bright signal faded to an iso-signal and the ADC values returned to their normal level. There was no difference in the abilities of DWI and CT images to detect acute pancreatitis. However, our case indicates that DWI can evaluate the manifestations of acute pancreatitis using no enhancement material and

INTRODUCTION

Acute pancreatitis is a potentially fatal disease with an overall mortality rate of 7%-11%^[1-3]. Patients suffering from acute pancreatitis (AP) often have additional complications such as sepsis, systemic inflammatory syndrome (SIRS) and multiple organ failure (MOF), resulting in a life-threatening condition^[4-6]. Therefore, it is important to accurately evaluate the grade of inflammation and absence of necrotizing pancreatitis to improve its prognosis. Diffusion-weighted imaging (DWI) is an established diagnostic tool of acute stroke and brain tumors^[7-11]. Due to the latest technical advances in magnetic resonance imaging (MRI), DWI has also been applied in detecting various disorders of abdominal organs^[12-16]. This report describes the efficacy of DWI in evaluation of acute pancreatitis.

CASE REPORT

A 50-year-old man presented with a primary complaint of epigastric pain after drinking alcohol. Laboratory tests upon admission revealed slightly higher levels of white blood cells ($108 \times 10^2/\text{mL}$), C-reactive protein (53.3 mg/L),

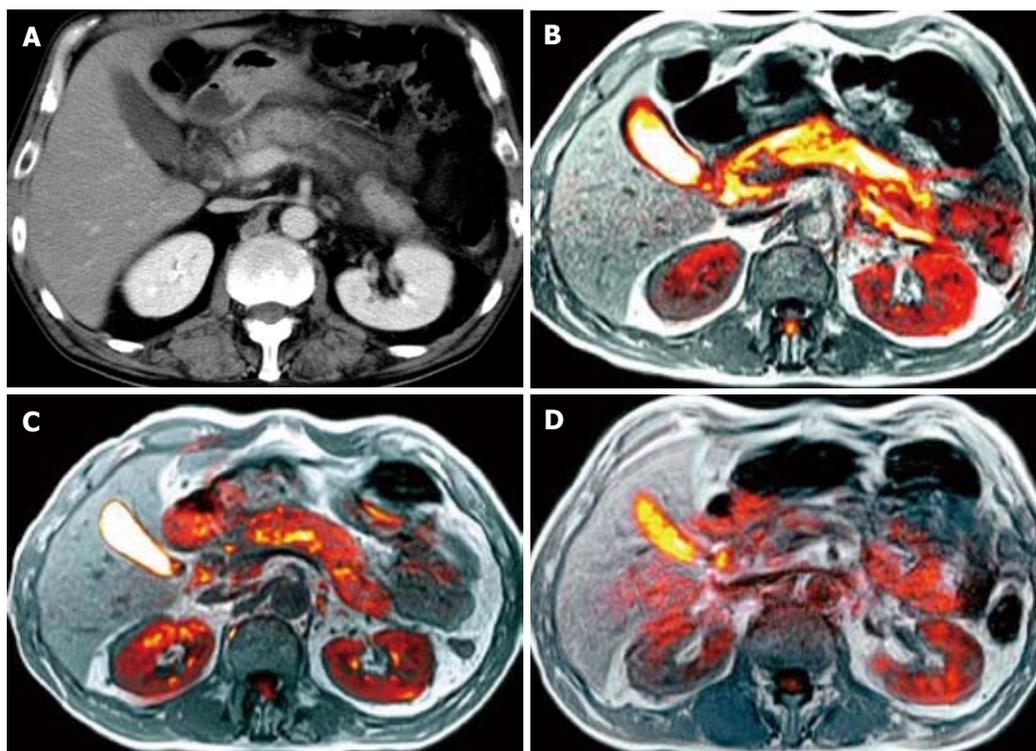


Figure 1 A CT scan at admission revealing enlarged pancreas complicated by acute multiple ascites (A), a fusion image at admission (B), on days 10 (C) and 50 (D) showing bright signals in the whole pancreas and ascites around it, diminished pancreatic enlargement and slightly decreased signal-intensity, as well as disappearance of all signs of acute pancreatitis, respectively.

serum amylase (276 IU/L). His APACHI II score and Ranson score were 2 and 0, respectively. An enhanced abdominal computed tomography (CT) scan revealed an enlarged pancreas complicated by multiple acute ascites (Figure 1A). An abdominal DWI at 1.5 T (Toshiba; Excelart vantage AGV, screw ratio 130 mT/m per ms) showed bright signals in the whole pancreas and multiple ascites around it (Figure 1B). Furthermore, the apparent diffusion coefficient (ADC) map in that area revealed a reduced ADC value. Following admission, the patient received drip infusion of 300 mg gabexate per day. Seven days after admission, laboratory tests revealed almost normal levels of WBC ($54 \times 10^2/\text{mL}$), CRP (4.1 mg/L) and serum amylase (93 IU/L). Ten days after admission, DWI revealed diminished pancreatic enlargement, slightly decreased signal-intensity (Figure 1C), slightly increased ADC values and disappearance of ascites. His symptoms improved significantly at that time. After 50 d, DWI showed complete disappearance of the manifestations of acute pancreatitis (Figure 1D).

DISCUSSION

Severe acute pancreatitis is often associated with pancreatic necrosis and has a rather high mortality rate. It was reported that necrotizing pancreatitis and inflammatory changes are related to its various complications and prognosis^[4-6]. To improve its mortality, it is essential to accurately evaluate the grade of inflammation and the absence of necrotizing pancreatitis. Plane CT can show the changes in inflammation around the pancreas, but

cannot detect necrotizing pancreatitis without the use of enhancement material^[17]. However, enhancement material has been reported to aggravate acute pancreatitis^[18] and it is hard to employ enhanced CT in patients with renal failure due to severe acute pancreatitis. At present, CT is the only available diagnostic imaging method of acute pancreatitis. Clearly, it is urgent to develop new diagnostic strategies for this condition. DWI is a MR imaging technique that provides information about the diffusion of water protons, such as brownian motion in living tissues. DWI has been applied in the diagnosis of brain ischemia and brain tumors^[7-11]. Recent technical development in MRI has expanded the utility of DWI in examinations of the liver, kidney, breast, *etc*^[12-16]. The apparent diffusion coefficient (ADC) is a quantitative parameter, which reflects the microenvironment of diffusing water molecules. It was reported that reduced ADC is observed in most malignant tumors^[8,12,13,15,16]. This present study demonstrated that DWI could detect acute pancreatitis with reduced ADC values at the time of diagnosis. As serum WBC, CRP, and amylase became normal, the signal-intensity and ADC values returned to their normal levels. The decreased ADC value is thought to result from the increased number and size of cells. Therefore, intercellular spaces become smaller, restricting the movement of water molecules^[15,16]. If a malignancy is found in abnorm, the ADC value would remain low. These results suggest that inflammation may be closely related to the bright signal. In addition, changed ADC values are useful in differentiating malignant from benign tumors. DWI has a potential to evaluate the manifestations

of acute pancreatitis. Furthermore, the greatest advantage of DWI in diagnosing this condition is that no enhancing material is needed.

In conclusion, DWI is a powerful tool for evaluating acute pancreatitis and has a potential to replace CT as a primary diagnostic strategy for acute pancreatitis.

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