Ulusal Cer Derg 2015; 31: 42-3
DOI: 10.5152/UCD.2014.2475

Case Report

Diagnosis of acute pancreatitis by diffusion-weighted magnetic resonance imaging

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ABSTRACT

Diffusion-weighted magnetic resonance imaging has emerged as a successful technique in the early diagnosis of acute pancreatitis. An 82-year-old male patient suspected of acute pancreatitis refused to undergo intravenous contrast-enhanced abdominal computed tomography due to a history of previous allergic reactions to contrast medium. He was imaged with diffusion-weighted magnetic resonance imaging without the use of oral or intravenous contrast material. Diffuse hyperintensity in the pancreas with a relevant apparent diffusion coefficient map showing diffuse hypointensity was demonstrated. The findings were interpreted as restricted diffusion and were diagnostic for acute pancreatitis. Diffusion-weighted magnetic resonance imaging, an imaging modality that does not involve ionizing radiation and does not require the use of contrast material, can successfully demonstrate the manifestations of acute pancreatitis.

Key Words: Acute pancreatitis, magnetic resonance imaging, diffusion-weighted magnetic resonance imaging

INTRODUCTION

Diffusion-weighted magnetic resonance imaging (DWI) has emerged as a promising technique in the early diagnosis of acute pancreatitis (AP) (1). Herein, we present a case of AP successfully demonstrated by DWI and briefly review the literature.

CASE PRESENTATION

An 82-year-old male patient was referred to the emergency service with epigastric pain. He had a history of alcoholism. Laboratory tests showed elevated serum amylase and lipase: 170 U/L and 190 U/L, respectively. With the suspicion of acute pancreatitis and a Ranson score of 4, he underwent an imaging work-up. The pancreas could not be visualized by ultrasonography due to intra-abdominal gas and obesity. There were no detected stones or dilatation in the biliary system. Intravenous contrast-enhanced abdominal computed tomography (CT) was planned to visualize the pancreas but could not be performed due to a history of previous allergic reaction to contrast medium. After obtaining informed consent, the patient underwent DWI without the use of oral or intravenous contrast material using an 8-channel Siemens Symphony Power 1.5 T magnet (Siemens-Erlangen-Germany) and a 4-channel standard pelvic-phased array coil. The b factors used were 10, 600, 800, and 1000. DWI revealed diffuse hyperintensity (bright signals) in the whole pancreas (Figure 1). The relevant apparent diffusion coefficient (ADC) map demonstrated diffuse hypointensity (signal loss) without prominent changes in the peripancreatic fat tissue or pancreatic necrosis (Figure 2). The ADC values of the pancreas were 1.465 x 10^{-3} for the head, 1.279 x 10^{-3} for the body, and 1.228 for the tail. The findings were interpreted as restricted diffusion and were diagnostic for AP.

DISCUSSION

Technically, DWI explores the random motion of water molecules in the body. The degree of restriction to diffusion of water is inversely correlated to the tissue cellularity and the integrity of cell membranes (2). The areas of restricted diffusion will appear to be higher in signal intensity on DWI with low ADC values (3). DWI has been suggested as a powerful tool for evaluating acute pancreatitis, since inflammatory processes correlate with restricted water diffusion (1, 4). The ADC values of normal pancreas have been investigated in several studies. According to the literature, the mean ADC values derived from the head, body, and tail range between 1.02 x 10^{-3} and 1.94 x 10^{-3} mm^2/s. Head and body reveal slightly higher ADC values when compared with the tail (5, 6).

The greatest advantage of DWI in diagnosing AP is the fact that no contrast medium is needed. CT imaging with the administration of intravenous contrast medium is harmful in patients with renal failure in severe AP, since intravenous use of contrast material is reported to aggravate AP (7). Besides, CT is preferably obtained between the fourth and tenth day after the disease onset, since it is classically said that a very early CT is not very helpful (8). In pregnant patients, a diagnostic challenge also occurs, since the

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Received: 12.11.2013
Accepted: 10.04.2014
Available Online Date: 02.09.2014

Available online at www.ulusalcerrahidergisi.org

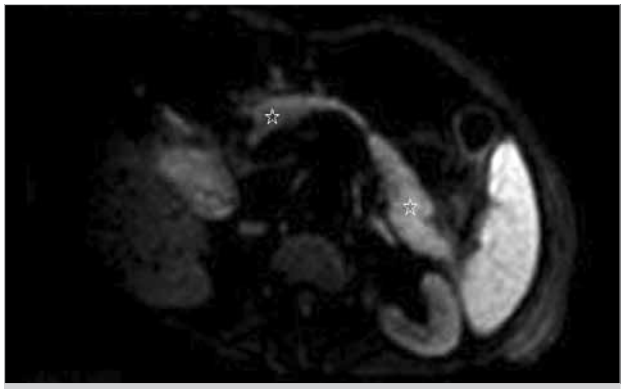

Figure 1. Diffusion-weighted imaging shows diffuse hyperintensity in pancreas (stars) correlated with restricted diffusion

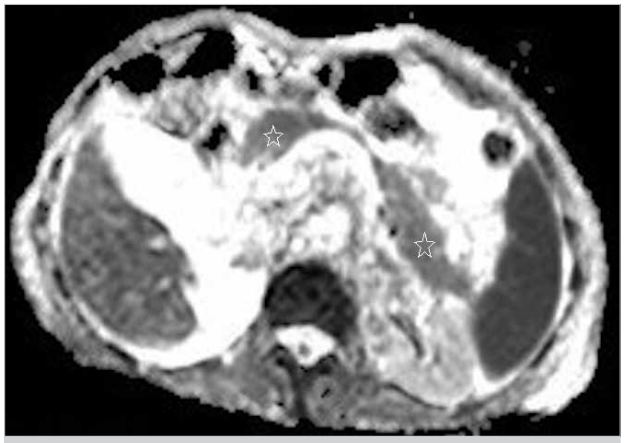

Figure 2. Apparent diffusion coefficient map shows diffuse hypointensity in pancreas (stars) compatible with restricted diffusion

ionizing radiation acquired during the CT examination is potentially harmful for the fetus (9). At this point, magnetic resonance imaging can be an option in the diagnosis of AP, but it still needs to be further investigated, since some concerns have been raised about thermal injury to the fetus in the first trimester (10, 11). DWI is also an excellent imaging alternative for patients with a history of allergy to intravenous contrast medium, such as in our case.

CONCLUSION

It should be kept in mind that DWI, an imaging modality that does not involve ionizing radiation, can successfully display the manifestations of acute pancreatitis in an earlier phase compared to other imaging modalities.

Informed Consent: Written informed consent was obtained from patient who participated in this case.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - İ.G.T.; Design - H.A., İ.G.T.; Supervision - B.H.; Funding - H.A., İ.G.T.; Materials - K.B.Y., B.H.; Data Collection and/or Processing - K.B.Y., H.A.; Analysis and/or Interpretation - İ.G.T., H.A.; Literature Review - B.H., İ.G.T.; Writer - İ.G.T., H.A.; Critical Review - B.H., K.B.Y.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study has received no financial support.

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