

Role of MR Imaging in the Diagnostic Work-up of Acute Pancreatitis

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Acute pancreatitis is usually evaluated with contrast-enhanced computed tomography in order to judge the severity of the inflammatory process and in order to precociously detect complications.

MR imaging is known for its ability to detect subtle variations in the fluid content of tissues and to detect blood degradation products in fluids. Most of the pathologic effects of the pancreatic process on the pancreatic gland are due to an increase in the fluid content and to the appearance of hemorrhagic necrosis [1, 2].

Therefore, the MR imaging of acute pancreatitis depends on the severity of the inflammation itself.

Edematous pancreatitis is detected due to an increase in the thickness of the gland with a loss of its normal lobulations. Signal intensity

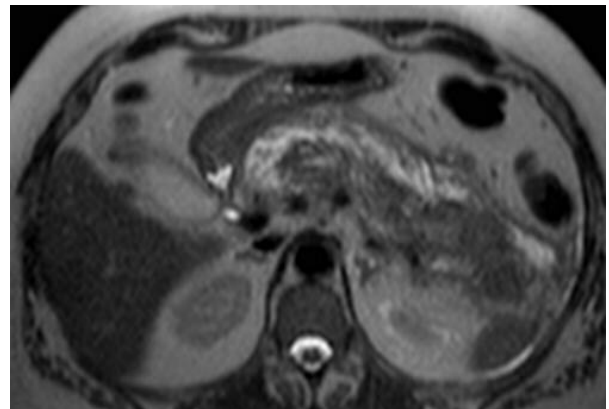


Figure 2. Axial T2w acquisition showing peripancreatic fluid.

can be decreased in T1w acquisitions especially when obtained with fat suppression (Figure 1) and increased in T2w sequences [3, 4].

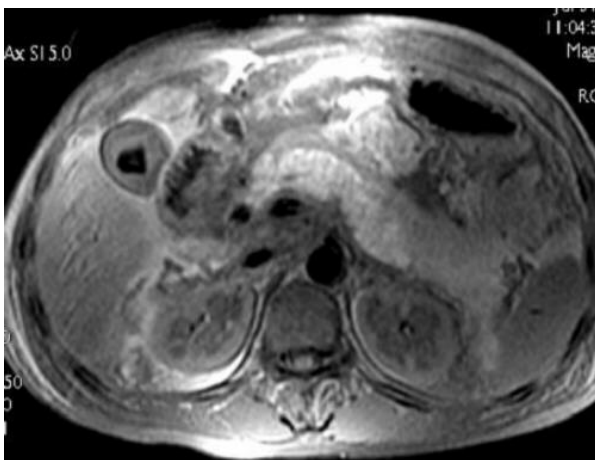


Figure 1. Axial T1w fat-suppressed image showing focal pancreatitis at the tail of the gland as a hypointense area.



Figure 3. Axial T2w acquisition in a patient with multiple and multiloculated fluid collections around the pancreas with necrotic debris inside.

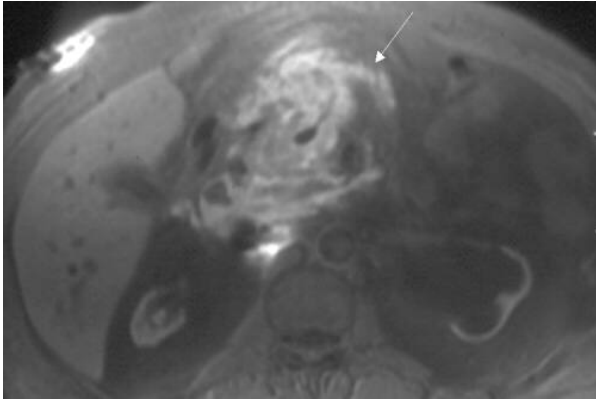


Figure 4. Axial T1w fat suppressed acquisition showing diffuse hyperintensity of peripancreatic fluid due to the presence of blood degradation products in a patient with hemorrhagic pancreatitis.

The presence of peripancreatic edema or fluid collections is easily demonstrated with T2w sequences (Figure 2).

Multiple loculations or the presence of necrotic debris are seen with T2w acquisition (Figure 3).

When hemorrhagic necrosis is present, the fluid and the gland become hyperintense on T1 weighted sequences due to the paramagnetic effect of methemoglobin. Again, this signal hyperintensity is more easily differentiated from the hyperintensity of retroperitoneal fat if fat-suppression is applied [5] (Figure 4).

The use of intravenous injection of paramagnetic contrast medium (gadolinium chelates) allows the detection of hypovascular necrotic portions of the pancreatic parenchyma with the same accuracy as CT. In fact, necrotic parts of the gland show signal

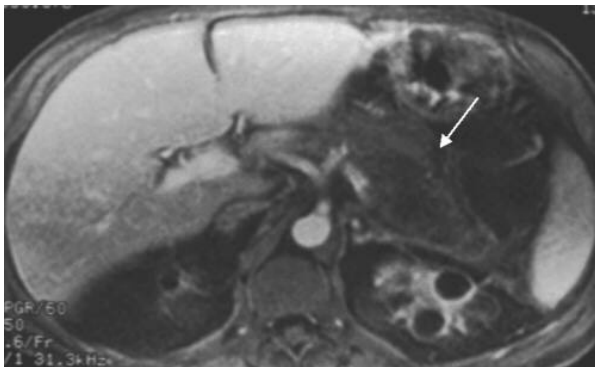


Figure 5. Axial T1w fat-sat acquisition obtained post-gadolinium intravenous infusion. The entire pancreatic tail shows absent enhancement due to gland necrosis.

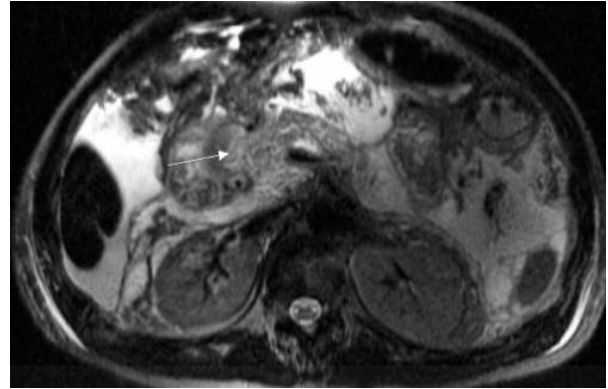


Figure 6. Axial T2w acquisition in a patient with acute pancreatitis. In the distal part of the main pancreatic duct, a hypointense small stone is evident.

hypointensity in the precocious phases of a dynamic acquisition during intravenous bolus of gadolinium [3, 4] (Figure 5).

Other advantages of MR imaging are related to the use of hydrographic acquisition (MR cholangiopancreatography: MRCP) [6]. These sequences permit the visualization of the pancreatic and bile ducts. The identification of a stone in the distal part of the main pancreatic duct is essential in the therapeutic work-up of the acute patient (Figure 6).

Anatomic variants such as pancreas divisum can also be identified with MRCP [7] (Figure 7).

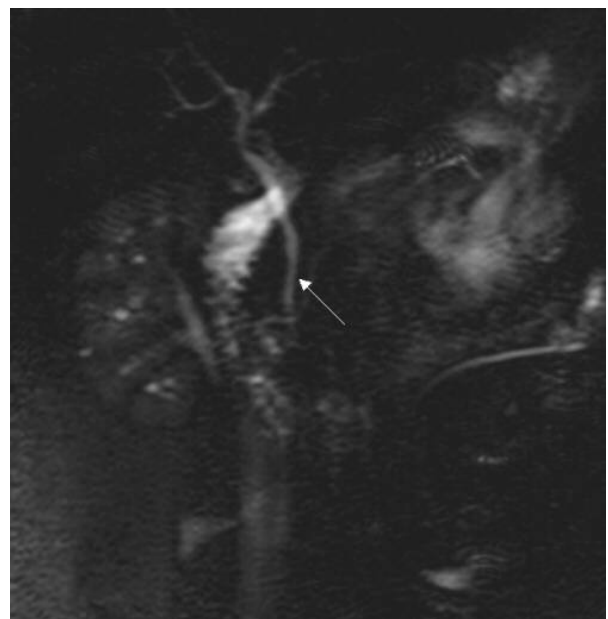


Figure 7. Coronal MR cholangiography in a patient with pancreas divisum. The dorsal pancreatic duct is entering duodenum separately from the bile duct.

The use of intravenous secretin administration enhances the visualization of the pancreatic duct causing a transient increase in the diameter of the duct itself [8].

Secretin can also be applied in doubtful cases of pancreatic duct disruption. The increase in the production of pancreatic juice caused by the drug determines an enlargement of the fluid collection when direct communication with the duct is present.

In conclusion MR imaging of the pancreas in acute pancreatitis is useful in:

- identifying and staging the inflammatory process;
- detecting a biliary cause for the acute inflammation;
- detecting pancreatic duct disruption.

Keywords Diagnosis; Magnetic Resonance Imaging; Pancreatitis, Acute Necrotizing

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