

SECRETIN AUGMENTED MRCP

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Magnetic resonance cholangiopancreatography (MRCP) is an imaging technique that is able to non-invasively assess bile and pancreatic ducts, in a multiplanar fashion, without injection of contrast material. MRCP takes advantage of the inherent contrast properties of stationary fluid in the biliary and pancreatic ducts.

Pancreatic ducts are more challenging for MRCP, compared to bile ducts, because the size of the main pancreatic ducts is smaller compared to the bile ducts, resulting in poor signal-to-noise ratios. In patients with chronic pancreatitis, MRCP showed the main pancreatic duct in the head, body and tail of the gland respectively in 79%, 64% and 53% of the cases, showing moderate to high agreement in assessing ductal abnormalities, compared to ERCP (1).

Exogenous administration of secretin stimulates the secretion of fluids and bicarbonates by the exocrine pancreas with consequent increase of the volume of fluids inside the pancreatic ducts. This increase in size and fluid content has already been used to improve the visualization of pancreatic ducts both at ultrasonography and at MR cholangiopancreatography (S-MRCP)(2, 3).

The technique to acquire S-MRCP images employ rapid imaging and a slice thickness that encompasses the entire pancreatic ducts, their emergence in the duodenum and the common bile ducts.

S-MRCP is therefore morphological and functional examination.

Morphology. Secretin improves the visualization of the full length of the main pancreatic duct. This is more evident in patients with normal or minimally dilated pancreatic ducts. This is probably related to the enlargement of the main pancreatic duct that represents the most frequent sign of severe chronic pancreatitis.

The hallmark of ERCP diagnosis of early chronic pancreatitis is represented by the dilatation of side branches. Because of their small size, MRCP is not able to routinely recognize dilated side branches, therefore leading to a high false negative ratio. Secretin administration improves the visualization of the side branches (from 4% to 63% of the patients)(2), helping in this manner in diagnosing chronic pancreatitis in its early stage. This improved visualization of dilated side branches makes S-MRCP a promising alternative to diagnostic ERCP, with endoscopic approach becoming indicated only for therapeutic purposes.

Secretin administration improves also visualization of endoluminal filling defects. This improvement however is not significant in patients with severe chronic pancreatitis, since the main pancreatic duct is enlarged, containing a larger amount of fluid that encompasses the low intensity protein plugs, along most or all their circumference. This improvement is therefore particularly important in mild or moderate chronic pancreatitis with minimally dilated main pancreatic duct, where there might be insufficient pancreatic secretion to delineate the whole circumference of the protein plugs. The detection of endoluminal filling defects, namely

their dimension and position, are important in planning adequate treatment, such as interventional ERCP and/or lithotripsy.

Besides a better visualization of the morphology of pancreatic abnormalities, secretin improves also the accuracy of MRCP, in assessing ductal abnormalities. Comparing MRCP and S-MRCP findings to ERCP ones, in patients with recurrent episodes of acute pancreatitis, MRCP showed an overall sensitivity, specificity and diagnostic accuracy of 53%, 100% and 93% respectively; whereas S-MRCP showed an overall sensitivity, specificity and diagnostic accuracy of 94%, 97% and 97% respectively. The slight reduction in specificity of S-MRCP compared to MRCP is due to 3 false positive findings (2).

Functional evaluation. The dynamic assessment, obtainable with rapid imaging after secretin administration, gives information on the main pancreatic duct flow dynamics and on the hydrodynamic changes induced by the increased fluid secretion and subsequent elimination into the duodenum.

Papillary stricture due to sphincter of Oddi dysfunction, can be detected by means of S-MRCP(4). Papillary stenosis is responsible of persistent dilation of the main pancreatic duct on delayed MRCP images after secretin administration. Ten minutes after secretin administration, the mean maximum diameter of the main pancreatic duct in patients with papillary stenosis was significantly larger than that in the control subjects in patients without papillary stenosis; furthermore there was no overlap

between observed individual values for the patients with papillary stenosis and for the control subjects (4).

Another treatable cause of impeded pancreatic secretion outflow is Santorinicele, when occurs in patients with pancreas divisum.

Santorinicele is a cystic dilatation of the distal dorsal duct, just proximal to the minor papilla. It is termed "Santorinicele" in analogy with ureteroceles and choledochoceles, and it is believed to result from a combination of relative obstruction and weakness of the distal duct wall, either acquired or congenital. Santorinicele has been suggested as a possible cause of relative stenosis of the accessory papilla, which in association with unfused dorsal and ventral ducts, result in high intraductal pressure (5).

The increased intraductal pressure may be responsible of individual attacks of recurrent acute pancreatitis may be caused by temporary obstruction of the minor papilla during passage of protein aggregates. The hypothesis of reduced pancreatic outflow is further sustained by the remarkable reduction in size of the main pancreatic duct and of the Santorinicele in patients that underwent sphincterotomy of the minor papilla, on follow up S-MRCP (5). Furthermore patients that underwent endoscopic sphincterotomy had also a clinical improvement with remission of symptoms.

Papillary stenosis, either idiopathic or due to Santorinicele, is responsible of a delay in duodenal filling after the administration of secretin.

The duodenal filling after secretin stimulation, can be used to semiquantitatively evaluate the pancreatic secretion, that represents an indirect index of the pancreatic exocrine reserve (4). The evaluation of the pancreatic exocrine reserve may be important because can be used to help establish the clinical diagnosis and to monitor the disease and its treatment.

In conclusion the combination of MRCP and secretin administration is able to improve pancreatic duct visualization reducing in this manner the high false negative ratio of MRCP.

References

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