Physiological Function of the Pancreas with Secretin Enhanced MRCP: A Prospective Evaluation

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SYNOPSIS

Elevated pressures in the pancreatic sphincter, related to dysfunction of the Sphincter of Oddi, have been implicated as an etiologic factor in pancreatis. We evaluated the efficacy of secretin-enhanced MRCP to diagnose el elevated pancreatic pressure in 38 patients with suspected Sphincter of Oddi dysfunction; who also underwent clinical ERCP with manometric measurement of pressures. However, in this small trial, we did not find that our MRCP measurements were able to predict the manometric findings.

INTRODUCTION

The flow of enzyme-rich pancreatic juice into the duodenum is regulated by a muscular valve called the Sphincter of Oddi (SO), and abnormal function of this valve, termed Sphincter of Oddi Dysfunction (SOD) is believe to be a contributing factor in some cases of pancreatitis. Diagnosis of SOD is usually diagnosed at UGI endoscopy, during which pressure in the SO and its subcomponents can be measured, a procedure termed Sphincter of Oddi manometry (SOM). The procedure is invasive, and carries a small, but potentially serious, risk. An alternative, non-invasive, test would be desirable.

The recent development of MRCP provides a new tool for evaluation of the morphology of the pancreatic duct; the efficacy of the test is well established. A supplement to MRCP which would allow the non-invasive assessment of SO function would be helpful. Secretin is a physiological hormone, secreted by the human duodenum in response to a meal. It has a number of effects, including stimulation of the pancreatic secretory function. It has been commonly employed in diagnostic ERCP procedures, often to help locate the major or minor papillae orifices. In MRCP, secretin enhances visualization of the pancreatic ductal system, and, more recently, has been used as a tool for accessing pancreatic physiology. The purpose of this investigation was to determine whether MRCP, enhanced with the administration of secretin, could yield physiological information on Sphincter of Oddi function comparable to that obtained with endoscopic manometry.

METHODS

Patients with clinically suspected SOD at our institution typically undergo ERCP with SOM, followed by therapy (usually sphincterotomy) as guided by the ductographic and manometric findings. Individuals who agreed to participate in the present investigation were scheduled for MRCP prior to ERCP; and written informed consent was obtained. The protocol and consent forms were approved by this institution's IRB.

MRCP was performed on a General Electric 1.5 Signa scanner. , The pancreatic duct was imaged using a single shot fast spin echo pulse sequence, with a single 50 mm thick coronal "slab" positioned over the pancreas usually with a 256 x 256 image matrix, and a TE time of approximately 900 msec. Three baseline images were obtained. Following these, secretin was administered intravenously over a one-minute period, followed by a saline flush. Immediately following administration, imaging was performed, with images obtained serially over a 30 minute period.

Images were analyzed visually, and quantitatively on a workstation, with measurements of the diameter of the duct obtained at 3 locations: approximately one and two centimeters from the Sphincter of Oddi, and in the midpoint of the duct; the average of these three numbers were used in the analysis. Clinical SOM was performed on a separate day following MRCP, during ERCP, using standard techniques. Measurements of the pancreatic portion of the sphincter were analyzed for this study with a reading of greater than 40 mm considered abnormal. For analysis, patients were divided into groups with normal and abnormal pancreatic manometry, and the groups compared with Student's t-test

RESULTS

Thirty-eight patients completed the study and were included in the analysis. Thirteen patients had normal pancreatic basal sphincter pressure. Twenty-five patients had abnormal pancreatic basal sphincter pressure. Visualization of the pancreatic duct improved substantially with secretin in 26 of the 38 patients. Quantitative measurements for the two groups are given in the following table.

	Normal Manometry		Abnormal Manometry		t- test
MRCP VARIABLES	Number	Mean ± S.D.	Number	Mean ± S.D.	p-value
Maximum Change (mm)	13*	1.25 ± 0.75	25	0.83 ± 0.7	0.0831
Time to Max (minutes)	13	2.43 ± 0.93	25	2.65 ± 1.54	0.6477
Time to ≥ 0.5 mm (minutes)	11	1.36 ± 0.45	21	1.64 ± 1.14	0.4546
Duration ≥ 0.5 mm (minutes)	11	13.18 ± 12.8	21	5.05 ± 8.16	0.0359

***** *Before secretin administration the caliber of the pancreatic duct was not visible due to small size in 1 of 13 patients and therefore the basal ductal diameter was recorded as 0 mm.*

Thus, in this limited study, the anticipated prolonged ductal dilation in patients with abnormal manometry did not occur, and secretin enhanced MRCP was not able to reliably predict the results of SOM.

DISCUSSION

In the present limited trial, we correlated the findings on secretin enhanced MRCP with the results of endoscopic manometry. We had hoped that in a population of patients with suspected SOD, quantitative evaluation of secretin enhanced MRCP images would correlate with manometric measurements made at ERCP. Our results, unfortunately, did not substantiate this. In fact, patients with abnormal manometry had a trend towards decreased ductal dilatation over baseline, and had a statistically reduced duration of ductal dilatation. Secretin did, however, substantially improve the anatomic visualization of the duct in 26 of 38 subjects, and thus may be useful to enhance diagnosis of duct morphology.