Short-term effect of pancreatic duct drainage procedures in obstructive chronic pancreatitis using secretin-enhanced MRCP

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Background: Chronic pancreatitis is a continuous inflammatory and fibrotic process leading to gradual destruction of the pancreatic parenchyma. Impairment of exocrine secretion outflow due to stones and/or strictures is associated with pain and further functional loss. Endoscopic decompression procedures are realized mainly to relieve pain and to improve pancreatic drainage into the duodenum. Current diagnostic methods to assess pancreatic exocrine function are either invasive or lack of sensibility and specificity. In this study we propose secretin-enhanced MRCP as a non-invasive tool for the functional assessment of the exocrine pancreas by quantifying pancreatic flow output (PFO) and total excreted volume (TEV).

Purpose: to evaluate short-term effect of pancreatic duct drainage procedures on pancreatic exocrine function in patients with obstructive chronic pancreatitis.

Material and Method: Group 1: 10 healthy volunteers (3 male, 7 female, age range 22-34 years) underwent two S-MRCP at one week interval. Group 2: 20 consecutive patients (15 male and 5 female; age range 32-71 years) with obstructive chronic pancreatitis underwent to S-MRCP before and after treatment. The MRCP protocol consisted of dynamic coronal multislice turbo spin-echo, heavily T2-weighted, with fat-suppression. The acquisition time for each dynamic was 12.5 sec within a single breath-hold. After the first dynamic acquisition, 20 mg of an antiperistaltic drug (Hyoscin butylbromide, Boehringer Ingelheim, Germany) was injected intravenously followed by the bolus of secretin (1 CU/kg, Secrelux®, Sanochemia, Neuss, Germany). Thirty dynamic acquisitions were repeated at intervals of 30 seconds for 15 minutes. The quantification method was based on an individual calibration procedure providing a linear relationship between MR signal intensity and volume of gastro-intestinal fluid. For this purpose, six additional acquisitions were performed, after ingestion of 120 mL of water in 6 increments of 20 mL. PFO and TEV were derived from a linear regression between MR calculated volumes and time.

Results: In all subjects pancreatic fluid volume secreted during secretin stimulation increased linearly with time. Normal values for PFO and TEV were 6.8mL/min ± 1.4 and 97 mL ± 22 respectively. The intra-individual reproducibility for PFO was good (mean absolute difference 0.8 mL/min). Before treatment reduced PFO (less than 5.4 mL/min, i.e. mean normal PFO - 1 SD) was found in 10/20 patients. The remaining 10 patients had normal values of PFO before treatment. After treatment, three patients presented mild acute pancreatitis with reduced PFO and TEV. Table 1 shows the results obtained before and after treatment. A statistically significant increase of PFO and TEV was observed in patients with impaired exocrine function.

TABLE 1

Pancreatic Flow Output and Total Excreted Volume in Patient Group after exclusion of patients with mild post procedural acute pancreatitis

	Patients with impaired exocrine function (n=8)		Patients with preserved exocrine function (n=9)	
	PFO (mL/min) Mean ± SD	TEV (mL) Mean ± SD	PFO (mL/min) Mean ± SD	TEV (mL) Mean ± SD
Before Treatment	3.5 ± 1.8	42 ± 28	8.3 ± 0.6	108 ± 13
After Treatment	5.6 ± 2.7	72 ± 44	8.9 ± 3.2	113 ± 37
P Value	0.007	0.006	0.30	0.35

Conclusion: Quantitative S-MRCP provided reproducible values of PFO and TEV in normal subjects and demonstrated significant short-term improvement of PFO and TEV after treatment in patients with impaired exocrine function.