JBR–BTR, 2013, 96: 365-368.

CT FEATURES OF GROOVE PANCREATITIS SUBTYPES

S. Dekeyzer, S. Traen, P. Smeets[1]

Groove pancreatitis is a rare form of chronic pancreatitis affecting the pancreaticoduodenal groove, a potential space bordered by the pancreatic head, duodenum and common bile duct. Two forms of groove pancreatitis have been described: the segmental form, which involves the groove and the pancreatic head; and the pure form, which affects the groove only. Differentiation between groove pancreatitis and pancreatic head carcinoma can be difficult, both clinically and radiologically. In this article we present the clinical and imaging findings of two patients with pure and segmental groove pancreatitis respectively.

Key-word: Pancreatitis.

In 1973 Becker was the first to describe a distinct form of chronic pancreatitis characterized by fibrous scarring of the anatomic space between the head of the pancreas, the duodenum and the common bile duct (1). The term "groove pancreatitis" was introduced in 1982 by Stolte et al to describe this special form of chronic pancreatitis (2). In 1991 Becker and Mischke classified groove pancreatitis into a pure form, involving the groove only, and a segmental form, involving the groove and the pancreatic head (3). Despite increased exposure in the literature since then, the disease remains largely unfamiliar to most physicians and as a consequence the reported prevalence varies greatly, ranging from 2.7% to 19.5% and 24.5% in three series of patients undergoing pancreaticoduodenectomy for chronic pancreatitis (2-4). In this article we present the imaging findings of groove pancreatitis in two patients with pure and segmental groove pancreatitis respectively.

Case presentation 1: pure groove pancreatitis

A 54-year old woman consulted at the department of gastro-enterology because of intermittent right hypochondrial pain radiating to the back occasionally accompanied by vomiting. The pain typically started and gradually increased during and after meals. The patient reported a total weight loss of 3 kilograms over a period of three months. Laboratory investigations, including liver enzymes, inflammatory parameters and tumour markers CEA and CA 19-9 were normal. Serum pancreatic enzymes were not tested.

Abdominal ultrasound (US) ruled out bile stones and showed no other abnormalities. Gastroscopy was negative for gastric or duodenal ulcers, but abnormal duodenal mucosa was observed at the level of the bulboduodenal junction. An endoscopic retrograde pancreaticoduodenography (ERCP) was performed and came back negative. Contrast enhanced computed tomography (CT) of the abdomen revealed a hypodense non enhancing soft tissue lesion in the pancreaticoduodenal groove (Fig. 1A) and extensive infiltration of the fat around the head of the pancreas and the D2 segment of the duodenum (Fig. 1B). A cystic lesion of 2 cm was seen in the medial wall of the duodenum extending to the head of the pancreas (Fig. 1C and 1D). During endoscopic ultrasound (EUS) an irregularly margined hypoechogenic lesion of 16 mm was observed in the bulboduodenal wall extending to the head of the pancreas along with multiple small peripancreatic and perioduodenal lymph nodes. Several small cystic lesions in the medial duodenal wall and a small amount of free fluid were also seen. A fine needle aspiration of the hypoechogenic lesion was performed and no signs of malignancy were found.

On the basis of the clinical features combined with the results of CT and EUS a diagnosis of pure groove pancreatitis was made and the patient was started on an intramuscular somatostatin analogue. Analgesia was prescribed and the patient was advised to avoid smoking and alcohol consumption. At follow-up consultation there was considerable clinical improvement and a follow-up EUS performed after two months showed regression of the hypo-echogenic lesion in the medial bulboduodenal wall and of the small cystic lesions in the medial wall of the D2 segment of the duodenum. The patient remains in further follow-up.

Case presentation 2: segmental groove pancreatitis

A 49-year old man presented at the emergency department with acute intermittent pain in the epigastrium radiating to the chest and the right shoulder. The pain was accompanied by nausea and vomiting. Two weeks earlier the patient experienced a similar episode of epigastric pain. There was anorexia and a total weight loss of 2 kilograms over two weeks. The patient smoked 5 cigarettes a day (one pack a day till 2008) and drank 4 to 10 beers a day. He had a history of coronary artery bypass surgery. Blood analysis showed a normal CRP and white blood cell count. Serum lipase was elevated (258 U/L) as well as gamma-glutamyltransferase (608 U/L) and CA19.9 (55.82 U/L).

Transabdominal US showed a mass of 5 to 6 cm between the gallbladder and the pancreatic head (Fig. 2). The mass contained several small calcifications and cysts. This mass' borders were not clearly definable and could not be distinguished from the pancreatic head. At EUS an irregularly delineated hypo-echogenic mass in the pancreaticuoduodenal groove extending to the head of the pancreas was observed as well as multiple small cysts in the duodenal wall. CT scan before and after contrast administration revealed a soft tissue mass with delayed enhancement in the pancreaticoduodenal groove extending to the head of the pancreas (Fig. 3A). Several small calcifications were seen in the had of het pancreas. The D-2 segment of the duodenum was thickened and the medial duodenum wall contained several small cystic lesions (Fig. 3B).

From: 1. Department of Radiology and Medical Imaging, UZ Gent, Ghent, Belgium.
Address for correspondence: Dr S. Traen, Visserij 160 bus 7, 9000 Gent.
E-mail: Sophie.Traen@UGent.be

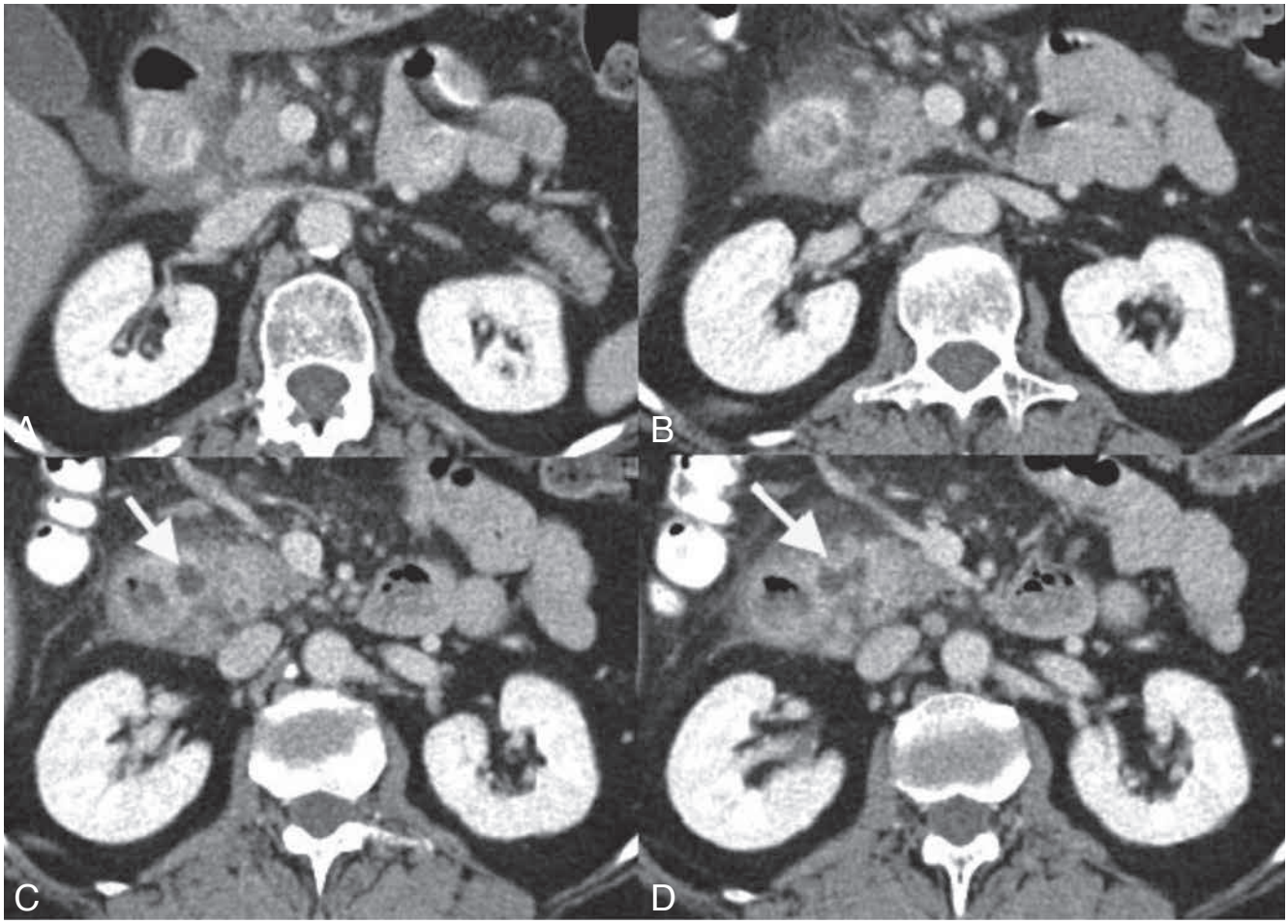

Fig. 1. — Venous-phase CT abdomen in a 54-year old woman with pure groove pancreatitis. Images from cranial to caudal show a hypodense sheetlike mass in the groove between the pancreatic head and the duodenum (A) and extensive infiltration of the paraduodenal fat (B). There is thickening of the medial duodenum wall and a cyst in this thickened duodenal wall extending to the groove area (white arrows) (C-D).

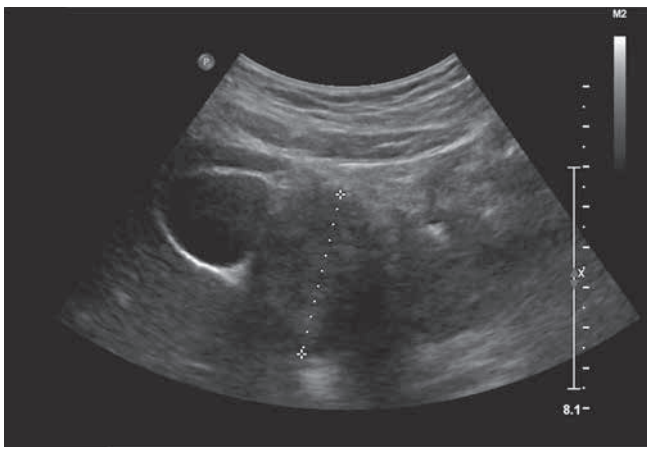

Fig. 2. — Transabdominal ultrasound in a 49-year old man shows a 5-6 cm mass between the pancreas and gallbladder. The mass could not be clearly delineated from the duodenum and pancreatic head and contained several small calcifications and cysts (not seen on this image).

On the basis of the clinical and imaging features a diagnosis of segmental groove pancreatitis was made. Treatment was started with a subcutaneously injected somatostatin analogue. The patient was advised to quit drinking and smoking. During follow-up there was a favorable evolution of the clinical symptoms as well as a decrease in gamma-GT and a normalization of serum lipase and CA 19.9. Control EUS showed complete resolution of the mass in the groove and pancreatic head. After two months the treatment with the somatostatin analogue was stopped.

Discussion

Groove pancreatitis mainly affects middle-aged men with a moderate to severe history of alcohol consumption. The disease has only been sporadically described in women. The clinical presentation resembles that of chronic pancreatitis, with postprandial abdominal pain of varying severity. Impaired motility and duodenal stenosis often lead to early satiety, vomiting and weight loss. Jaundice is unusual. The duration of the symptoms can range from a few

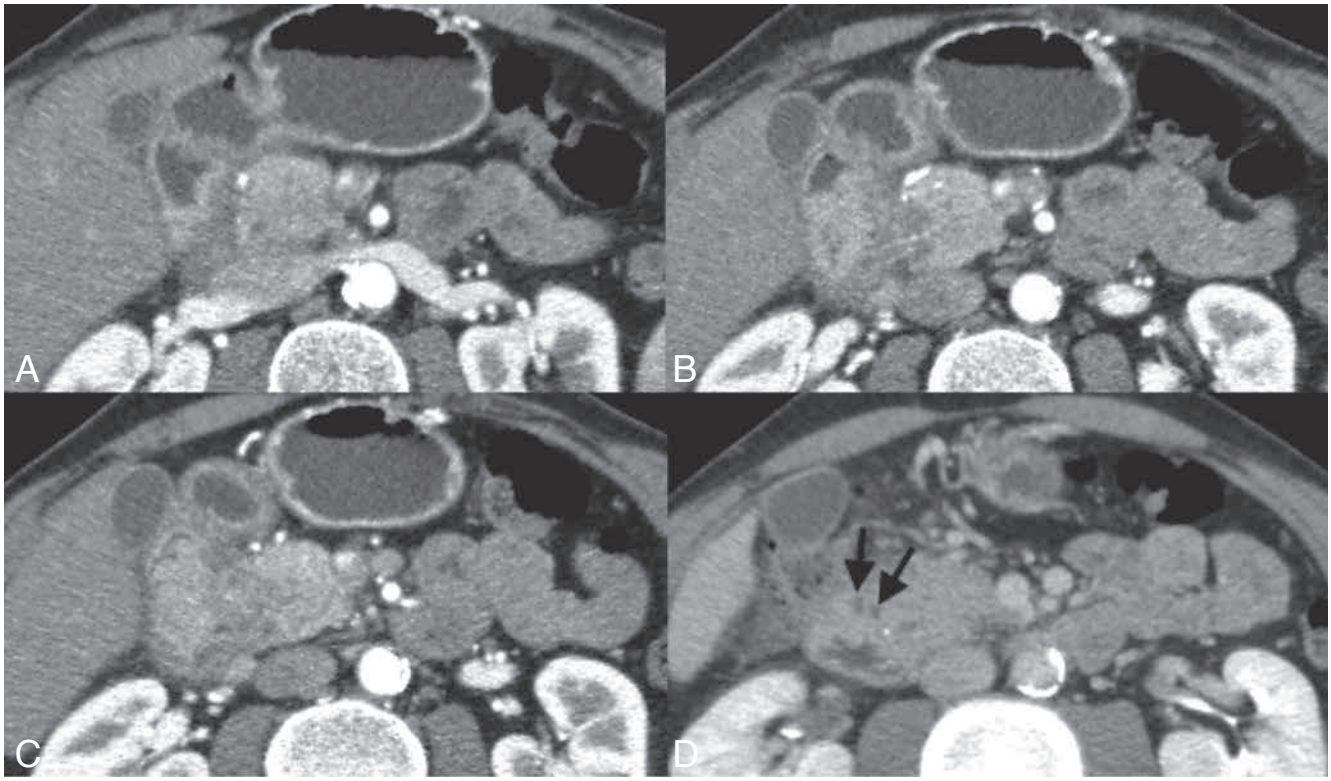

Fig. 3. — Arterial (A-C) and venous (D) phase CT-scan in a 49-year old man with segmental groove pancreatitis. Images from cranial to caudal show a sheetlike hypodense mass in the groove between the pancreatic had and the duodenum (A). Extension can be seen in the pancreatic head and the swollen pancreatic head can not be clearly delineated from the lesion in the groove area (B-C). The duodenal wall is thickened and contains several small cysts (black arrows) (D).

weeks to more than one year. Blood tests often show a slight elevation of serum pancreatic enzyme markers and occasionally of liver function test. Tumour markers are rarely elevated (1-3).

The major histopathologic feature of groove pancreatitis is the presence of scar tissue and fibrosis in the pancreaticoduodenal groove with sparing of the pancreatic parenchyma in the pure form and variable involvement of the pancreatic head in the segmental form. The duodenum is always involved by a chronic inflammatory process leading to fibrosis and stenosis. Concomitant hyperplasia of Brunner's glands is almost always present. Cystic changes in the duodenal wall are often observed. These can reach large size, extending to the groove area and simulating paraduodenal wall cysts, while in fact these represent a dilated accessory duct of Santorini and its branches (2, 3, 5).

The pathogenesis of groove pancreatitis is still unclear. Most patients with groove pancreatitis have a history of alcohol abuse, suggesting that alcohol is at least a precipitating cofactor for the development of the disease. The preferential location of the duodenal lesions around the minor papilla and the typical involvement of the groove region (which is drained by the accessory duct) suggests the presence of some anatomic or functional variation that renders this region particularly susceptible to the injury by alcohol (5). The lack of knowledge on the etiology of groove pancreatitis is reflected in the literature by the numerous names given for this disorder such as cystic dystrophy of heterotopic pancreas, paraduodenal wall cyst, periampullary duodenal wall cyst, pancreatic hamartoma of the duodenal wall and myoadenomatosis. These various terms each represent different microscopic facets of the lesion. Adsay and Zamboni have introduced the term "paraduodenal pancreatitis" in an attempt to unify these different pathologic entities. The authors preferred this term over groove pancreatitis as the findings are predominantly found on the duodenal wall in the area of the minor papilla rather than in the pancreaticoduodenal groove (5). However, to avoid confusion we will stick with the term groove pancreatitis for the remainder of this article.

The imaging manifestations of groove pancreatitis have already been described on several imaging modalities (6-13). On computed tomography (CT) the classic finding in the pure form of the disease is a poorly enhancing plate-like hypodense soft tissue lesion between the pancreatic head and the duodenum. This lesion may demonstrate delayed enhancement reflecting its fibrous nature (6). Additional findings include duodenal wall thickening and stenosis as well as cystic-like lesions in the medial wall of the duodenum or in the groove area. In the segmental form of groove pancreatitis the lesion also involves the pancreatic head. This can result in mild dilatation of the pancreatic duct. In the pure form of the disease the pancreatic duct usually appears normal. Even in cases of extensive disease the peripancreatic vessels are preserved, showing no signs of thrombosis or encasement.

On MRI the most characteristic finding of pure groove pancreatitis is

a sheet-like mass between the head of the pancreas and the duodenum associated with duodenal wall thickening (7). In the segmental form of the disease the pancreatic head is involved as well, and a focal mass-like lesion adjacent to the groove area and extending in the pancreatic head can be seen along with dilatation of the main pancreatic duct. The mass in the groove and/or the pancreatic head is hypo-intense on T1-weighted images and iso- to slightly hyperintense on T2-weighted images (8). The variation in the T2-signal is associated with the duration of the disease with subacute disease exhibiting brighter T2 images because of edema, and chronic disease exhibiting lower signal because of fibrosis (9). Peripheral mass enhancement can be seen on images immediately post gadolinium. On delayed imaging progressive-centripetal enhancement may be observed (10). These imaging features reflect the fibrous nature of the lesions. Cysts are seen in most cases of groove pancreatitis in the groove area and/or in the duodenal wall with high signal intensity on T2-weighted images.

The differential diagnosis of the pure form of groove pancreatitis includes acute pancreatitis with phlegmon along the groove, duodenal cancer and cholangiocarcinoma. MR can be useful for differentiating pure groove pancreatitis from acute pancreatitis with phlegmon in the groove, since the phlegmon in the groove always shows bright signal intensity on T2-weighted images (11). MRCP is useful for differentiating pure groove pancreatitis from distal cholangiocarcinoma, as in groove pancreatitis often a smooth long stricture of the distal intrapancreatic portion of the bile duct is seen, as opposed to an irregular and abrupt stricture in distal cholangiocarcinoma (12).

In cases of segmental groove pancreatitis, the most difficult and challenging differential diagnosis is pancreatic carcinoma. This is particularly true for cases of pancreatic carcinoma that have a significant fibrous component and therefore may display delayed enhancement similar to that seen with groove pancreatitis (13). An important differentiating feature is the normal appearance of the peripancreatic vessels in groove pancreatitis, which may be slightly displaced by the mass, but never show signs of obstruction or encasement. In contrast pancreatic carcinoma extending to the peripancreatic tissue or the duodenum is expected to invade and obstruct the peripancreatic vessels (12). MRCP may also be useful for differentiating segmental groove pancreatitis from pancreatic head carcinoma, as the intrapancreatic portion of the common bile duct in patients with groove pancreatitis has a long, smooth, narrowed configuration, while in patienys with pancreatic head carcinoma a circumscribed, irregular ductal stenosis or complete ductal obstruction tends to be seen (9).

The initial management of the disease consists of conservative treatment, resembling that of chronic pancreatitis and including bed rest, fasting, analgesia and alcohol abstinence. The effectiveness of this treatment on clinical symptoms, laboratory data and imaging findings should be evaluated after 4-6 weeks. The symptoms improve with conservative treatment in most patients. Surgical treatment is reserved for cases of untreatable pain or when imaging alone or in combination with pathology cannot rule out malignancy.

In conclusion, although groove pancreatitis is a rare form of chronic pancreatitis, radiologists should always keep this entity in mind when dealing with a mass in the pancreaticuoduodenal space, especially when associated with duodenal wall thickening and cysts.

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