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How to explore and analyze a complicated pancreatic pseudocyst using computer tomography

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ABSTRACT

Pancreatic pseudocysts are often complications of acute pancreatitis and chronic pancreatitis, secondary to pancreatic trauma or pancreatic duct obstruction. Computer tomography (CT) is the standard investigation for the diagnosis of pancreatic pseudocysts, but Magnetic Resonance Imaging (MRI) is a better alternative for the detection and characterisation of this pathology. We present a case of a 43 year old male admitted with ascites who was investigated mainly by CT, both pre and post-operative, but also by MRI. The presented case illustrates an arterialized pancreatic pseudocyst, which is a rare complication associated with chronic pancreatitis. This case shows the importance of CT examination in pancreatic cystic lesions with vascular involvement. For unstable patients and modified cystic mass content, CT is the best imaging choice for evaluation and characterization.

Key words: Pancreatic pseudocysts, Computer Tomography, Magnetic Resonance Imaging

INTRODUCTION

Pancreatic pseudocyst represents a well-defined fluid collection located intrapancreatic or peripancreatic, delimited by a prominent wall, with no solid material content. Pancreatic pseudocysts are often complications of acute pancreatitis and chronic pancreatitis, secondary to pancreatic trauma or pancreatic duct obstruction. Abdominal ultrasonography, an inexpensive and noninvasive investigation, is recommended as a first step in the diagnosis of pancreatic pseudocysts, with a 75-90% sensitivity. Computer tomography (CT) is the standard investigation for the diagnosis of pancreatic pseudocysts, with a 82-100 % sensitivity and a 98 % specificity. Magnetic resonance imaging (MRI) is a good alternative to CT for the detection and characterization of this pathology, with good accuracy in characterizing pancreatic and peripancreatic collections, as containing fluid or parafluid material. MRI cholangiopancreatog-

raphy (MRCP) can replace, sometimes, the endoscopic retrograde cholangiopancreatography (ERCP) in the evaluation of the pancreatic duct. (1, 2, 3)

CASE REPORT

Forty-three year old male patient, known with the diagnosis of Myasthenia Gravis, presents with ascites, for which diagnostic and evacuatory paracentesis was performed, 4000 ml of fluid with pancreatic ascites characters being externalized, establishing the diagnosis of chronic pancreatitis. He was further investigated in order to establish the therapeutic conduct.

The first computer tomography (CT) examination showed pancreatic atrophy of the body and neck region, showing homogeneous enhancement, except for the neck, which looks hypo enhanced, with some parenchyma micro calcifications and irregular pancreatic duct dilatation in the body and tail region. Massive ascites and a retrocephalic circumscribed fluid collection, delimited by a thick and regular wall, compatible with a pseudocyst, were emphasized. (*figure 1*)

The second CT examination, performed approximately 10 days after, presented the same aspect as the first one, so a magnetic resonance imaging (MRI) was realized (because of the degrading condition of the patient and the impossibility of breath hold, i.v. contrast was not administrated). The MRI showed tail and body pancreatic hypotrophy, with moniliforme Wirsung duct dilatation at this level, and abrupt decalibration in the pancreatic neck region, without an identifiable MRI cause. The retrocephalic pancreatic pseudocyst previously described maintained relatively stable dimensions, slightly heterogeneous content - hyposignal/discreet hypersignal in T1 wi, predominantly hypersignal in T2 wi (arrow). (*figure 2*)

Because the patient's status was declining, a 3rd CT was executed (approximately 30 days after the first examination). The native phase found that the pancreatic pseudocyst, located posterior of the cephaloisthmic pancreatic area and superior mesenteric vein, has grown in size and has modified content (hyperdensed). After i.v. contrast agent administration, a saccular image was emphasized, with the same enhancement as the arterial vessels, which suggested that the pseudocyst was currently eroding the posterior slope of the

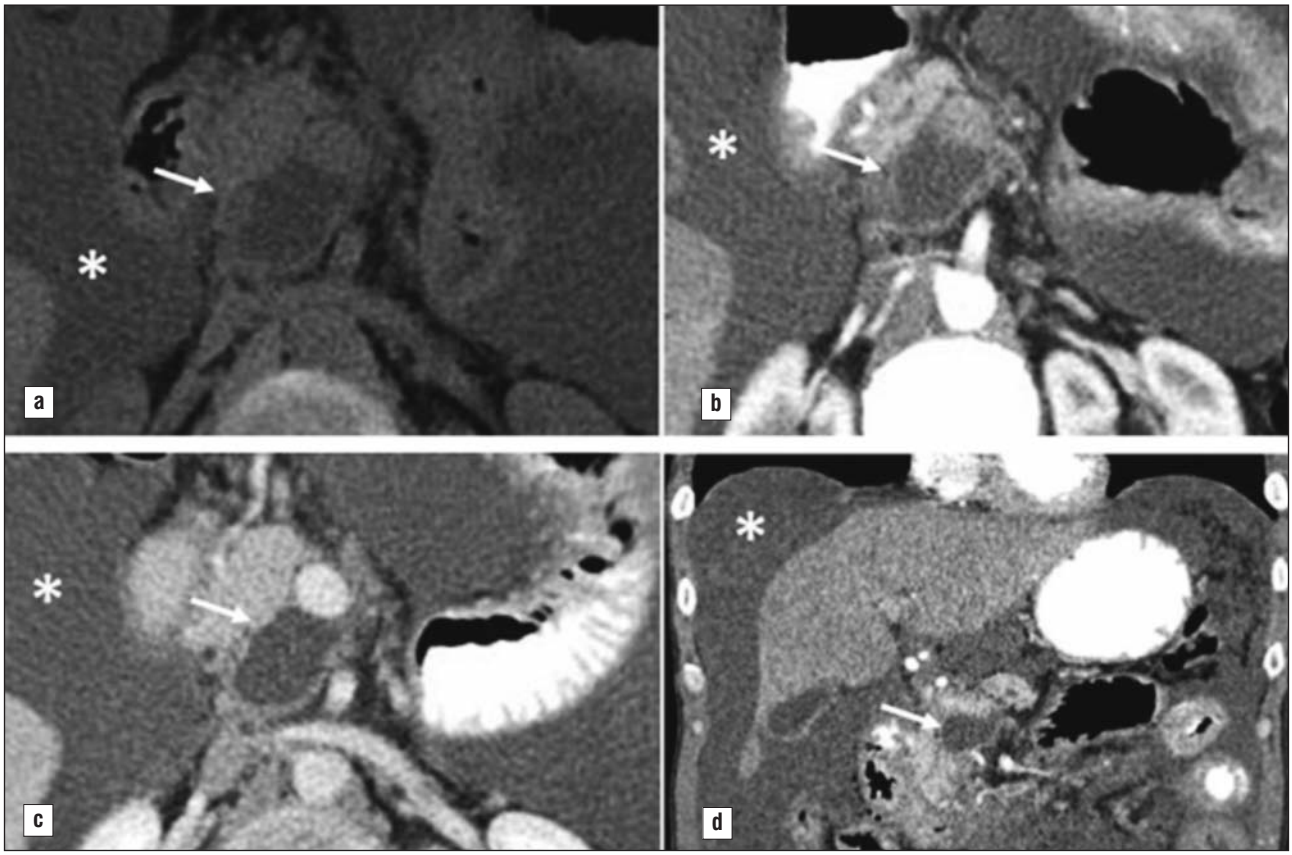

Figure 1 - Retrocephalic pancreatic pseudocyst (arrow); Voluminous ascites (asterix) - (a) native CT; (b) CT + contrast, arterial phase; (c) CT + contrast, portal phase; d) coronal reconstruction CT + contrast arterial phase

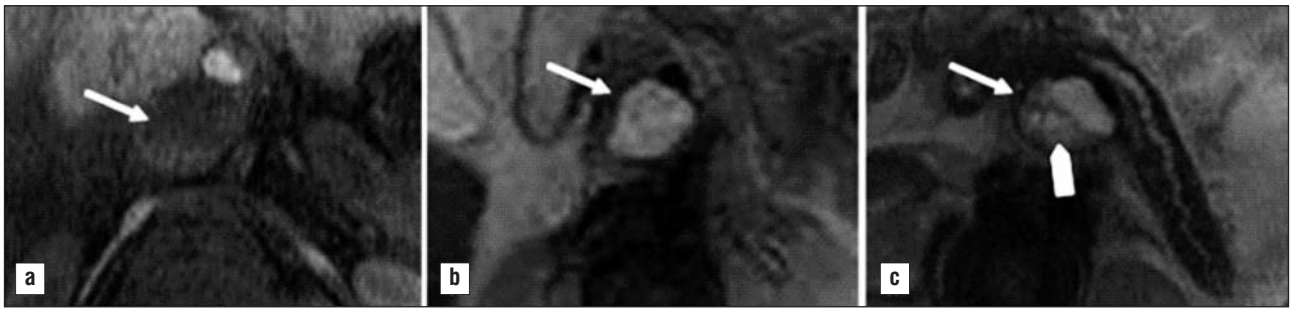

Figure 2 - Retrocephalic pancreatic pseudocyst (arrow); – (a) T1 weighted image (wi) with fat saturation (FS); (b) T2 wi with FS; (c) T2 wi with short TE – internal debris (arrow head)

anterior rami of the inferior pancreatic-duodenal artery, with a pseudoaneurysm-like dilated aspect and, during arterial phase, associated extravasation of contrast substance in the cavity of the described pseudocyst, this last one appearing in dimensional progression. (*figure 3*)

Conservative treatment was established and electrolytic and rehydration therapy was practiced, leading to an improvement of the biohumoral parameters.

The CT reevaluation after seven days showed the dimensional progression of the arterialized pseudocyst. (*figure 4*)

At this point, a surgical approach was decided. During the surgical procedure, more severe lesions of chronic pancreatitis are detected, the pancreatic pseudocyst is adherent to the portal vein and a vascular fistula is noticed, as well as portal vein thrombosis, multiple hepatic hilum lymphadenopathies and ascites. Common hepatic artery biopsy, lymph node biopsy and pancreas body biopsy were practiced. Anterograde cholecystectomy and ligation of the gastroduodenal artery (GDA) were performed. Intraoperative ultrasound highlights: cephalo-pancreatic lesion with rela-

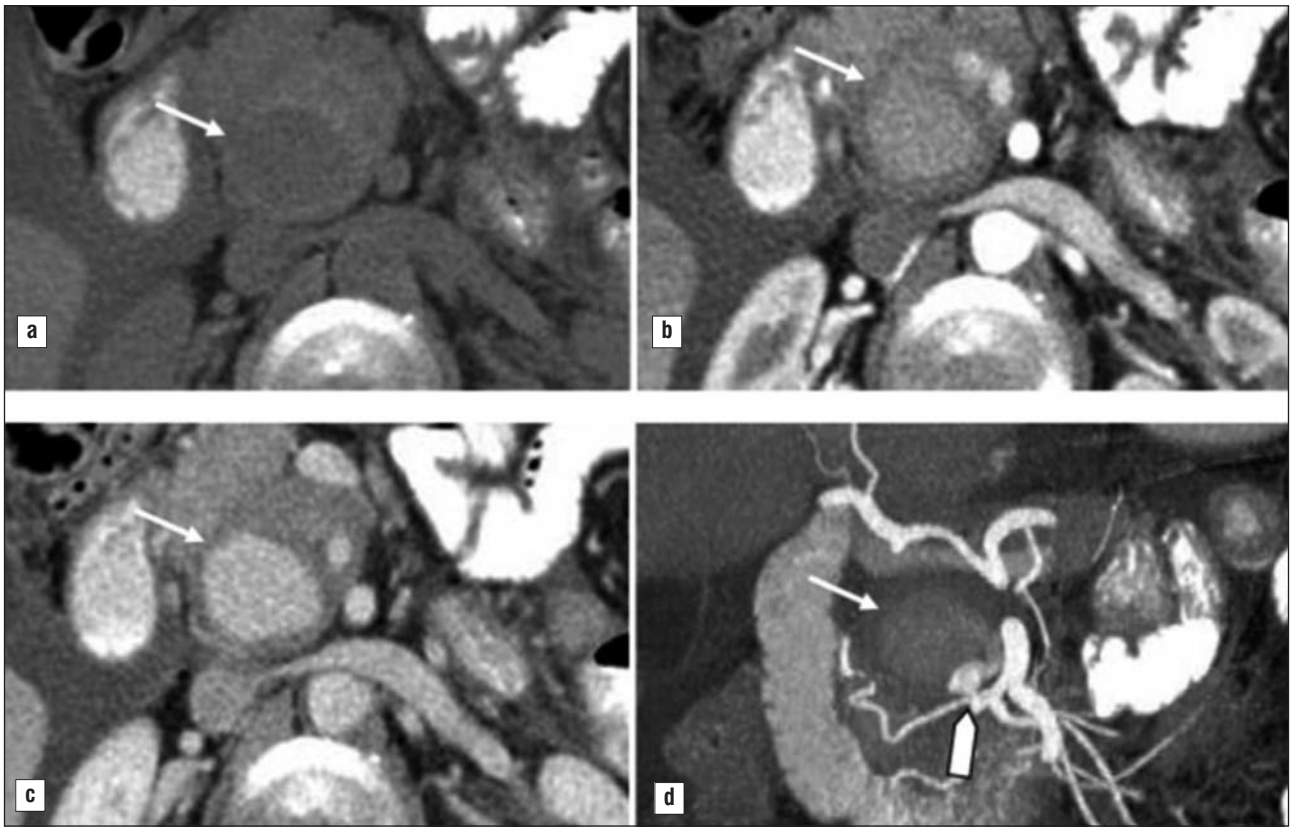

Figure 3 - Pancreatic pseudocyst (arrow) – (a) native CT – the pseudocyst has grown in dimension, showing a hyperdense content; (b) CT + contrast, arterial phase; (c) CT + contrast, portal phase; (d) coronal MIP CT + contrast arterial phase - pseudoaneurysm from the inferior pancreatic-duodenal artery with extravasation of contrast material into the pseudocyst (arrow head)

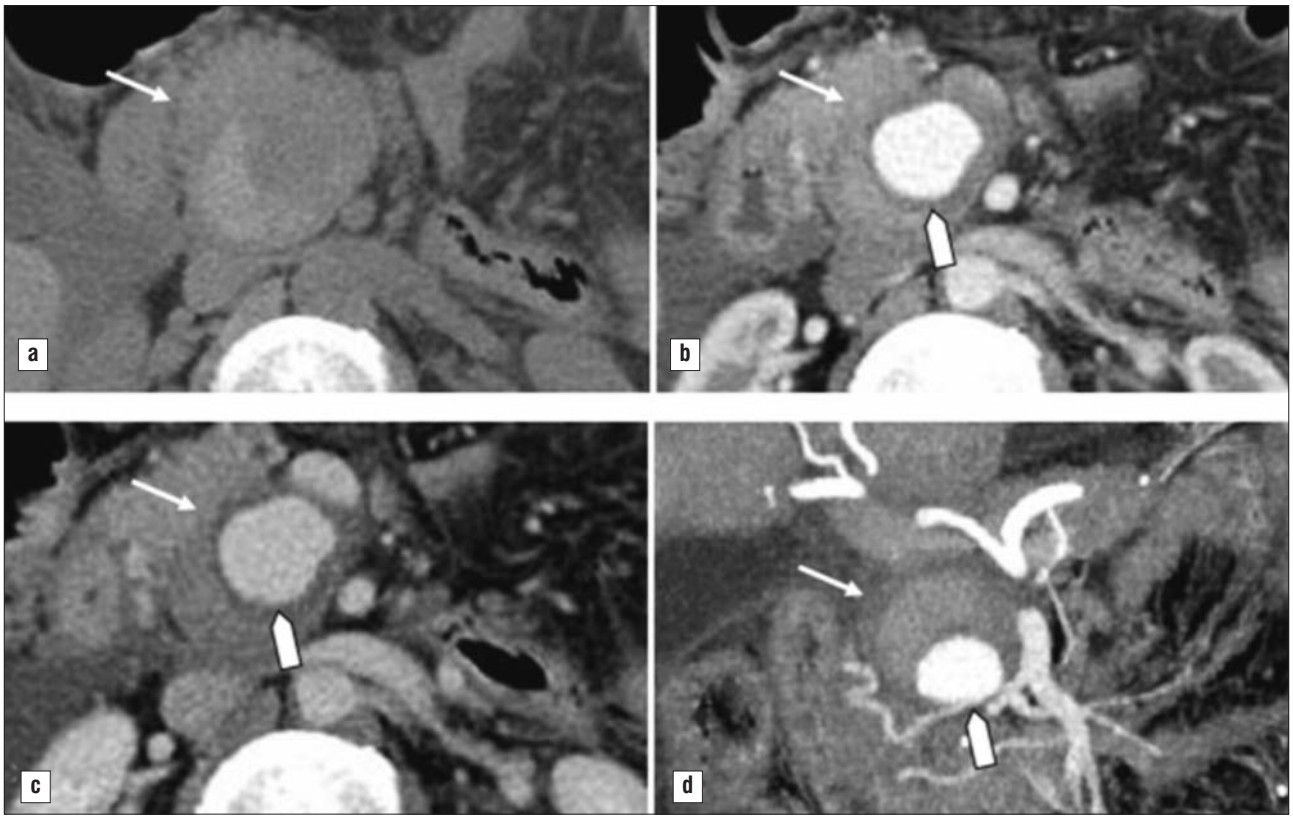

Figure 4 - Dimensional progression of the retrocephalic pancreatic arterialized pseudocyst (arrow) and of the pseudoaneurysm (arrow head) – a) native CT; b) CT + contrast, arterial phase; c) CT + contrast, portal phase; d) coronal MIP CT + contrast, arterial phase

tively well defined wall, which included multiple transonic images, with arterial Doppler signal present, compression of the portal trunk which appears to have a thrombus inside, but with Doppler signal present (both upstream and downstream).

Postoperative CT examination (after 6 days) showed a small pseudoaneurysm adjacent to the pancreaticduodenal inferior artery, synchronous contrast enhancing with the superior arterial abdominal aortic system and superior mesenteric system. No signs of active bleeding in the known cephalo-uncinate pancreatic pseudocyst were seen. (*figure 5*)

The patient was discharged with good general condition, afebrile, resuming bowel movement and good digestive tolerance.

DISCUSSIONS

The presented case illustrates an arterialized pancreatic pseudocyst. Pancreatic pseudoaneurysm formation is a rare complication associated with chronic pancreatitis, which is formed due to the leaked pancreatic juice, secondary to the erosion of pancreatic or nearby vessels. This persistent vessel erosion is ongoing and generates a permanent communication between the invaded vessels and the pseudocyst, causing the formation of a pancreatic pseudoaneurysm. (4)

The superior and inferior pancreaticoduodenal arteries arise from the gastroduodenal artery and from the superior mesenteric artery. The superior pancreaticoduodenal artery divides into anterior and posterior branches, which communicate with corresponding branches of the inferior pancreaticoduodenal artery. The inferior pancreaticoduodenal artery may arise directly from the superior mesenteric artery or from the first jejunal branch (in our case) and divides into anterior and posterior branches. The posterior arcade runs posterior to the head of the pancreas. Often, multiple arcades may exist. (5)

Even though MRI is considered to be the best method for morphological characterization of pancreatic cystic lesions, CT is a faster procedure, helping to investigate unstable patients and to detect complicated pancreatic pseudocysts with vascular involvement. This aspect is highlighted in our case, in which CT with CT angiography acquisition was more useful for the diagnosis. It is very important to use a correct examination protocol. Native sequences should be performed in

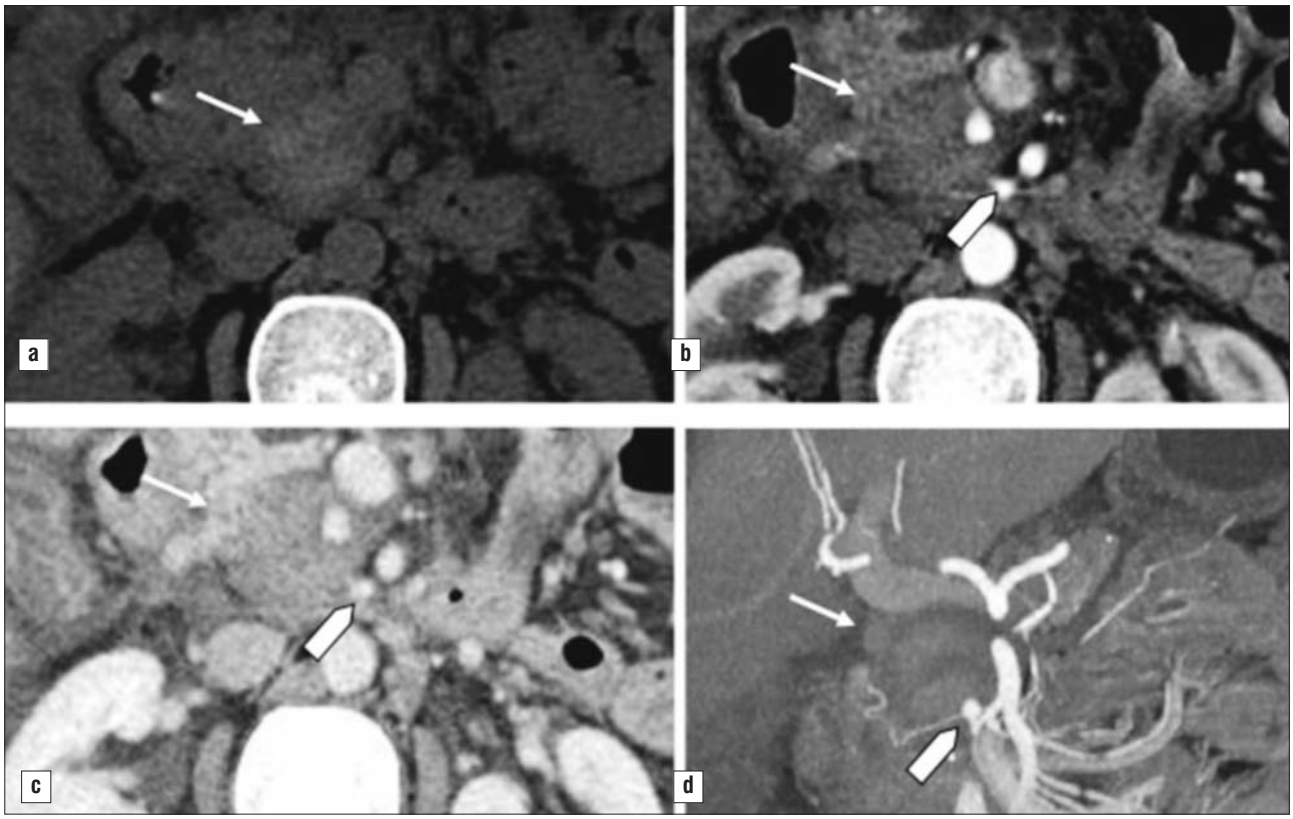

Figure 5. Dimensional regression of the retrocephalic pancreatic pseudocyst (arrow); persistence of a small pseudoaneurysm (arrow head) – (a) native CT; (b) CT + contrast, arterial phase; (c) CT + contrast, portal phase; (d) coronal MIP CT + contrast, arterial phase

order to visualize changes regarding pancreatic dimension and structure (hypotrophy, atrophy, calcifications, dilation and moniliforme aspect of Wirsung duct, cysts/ pseudocysts with the possibility of detecting intracystic densities). (6,7)

Post contrast protocol must contain three phases, in case of chronic pancreatitis associating modified content pseudocyst:

- early phase - arterial - 20-25 sec post injection - in order to certify an eventual vascular erosion with the extravasation of the contrast agent
- pancreatic phase - in order to evaluate the degree of enhancement of pancreatic tissue (approximately 40 sec post injection)
- late portal phase - in order to quantify permeability of venous structures in the portal system and highlight eventual thrombosis or portal post thrombotic cavernoma. (7)

Using this three phase CT protocol in the presented case, with an early arterial phase (between 20-25 sec post injection), we were able to have the best enhancement of the abdominal aorta and its emergences (celiac trunk, hepatic artery (HA), superior mesenteric artery (SMA), GDA), and to detect the vascular involvement of the retrocephalic pancreatic pseudocyst, demonstrating the erosion of an anterior pancreatic-duodenal arcade branch, which also lead to the imaging changes of the described pseudocyst. Multiplanar (MPR) and multiple intensity projection (MIP) reconstructions offer the possibility of detecting the vascular rami affected by the pseudocyst and distinguish its connection with the main vascular axis. (4)

The MRI protocol must include, besides T1 and T2 weighted sequences, with and without fat saturation, MRCP acquisitions, including long TE, short TE and 2D or 3D multiphase contrast acquisitions, or in case of arterialized pseudocyst suspicion, MR angiography 3D multiphase acquisitions with MIP, MPR and volume rendering technique (VRT) reconstructions. (6)

Positive diagnostic criteria of an arterialized pseudocyst:

- unenhanced CT (NECT): round hyperdense lesion/ lobulated, heterogeneous, mixed density lesion (due to hemorrhage).
- contrast enhanced CT (CECT): enhancement of thin rim of fibrous capsule, communication with an arterial branch from the GD artery or with the SMA , HA, SA.
- MRCP: hyperintense or heterogeneous cystic mass contiguous with dilated pancreatic duct.

Hyperintense cyst on T1Wi due to methemoglobin. (2,3)

Complications occur in case of pseudocysts larger than 4-5 cm in size (incidence – 5-10% of cases) and consist of: compression of adjacent bowel or bile duct, spontaneous rupture into the peritoneal cavity, infection, erosion into the adjacent vessels, hemorrhage or pseudo aneurysm rupture and hemorrhage - the last two being the prime causes of death secondary to pancreatic pseudocyst.

Considered differential diagnosis entities are other pancreatic cystic masses - cystadenoma, congenital cyst, intraductal papillary mucinous neoplasm and endocrine nonsecretory pancreatic cystic tumors.

Depending on the imaging aspects, interventional or surgical approach may be considered.

For the current case, surgical treatment was chosen. Intraoperative findings were suggestive for a more severe grade of chronic pancreatitis than previously estimated on imaging.

CONCLUSION

This case presents the importance of CT examination in pancreatic cystic lesions with vascular involvement. For unstable patients and modified cystic mass content, CT is the best imaging choice for evaluation and characterization.

Acknowledgement

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