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Pancreatic cyst pathology in our department; A combined review of cases and overview of recent medical literature

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Abstract

Pancreatic cysts are quite frequent, and are usually incidentally diagnosed, their management depends on the type, potential malignancy, size, location, clinical and biological consequences of the tumor. In this report, we review a number of cases involving cystic tumors of the pancreas and how they were treated in our Department of Visceral Surgery 1 at the Mohamed V Military Training Hospital in Rabat, Morocco. A comparative analysis is made with approaches described in the most recent studies of pancreatic cysts.

Keywords: Pancreas; Pancreatic cysts; IPMN; SPN; Mucinous neoplasms; Serous cysts; Pseudocysts; Surgery.

Introduction

Pancreatic cysts are frequently seen, with a prevalence of around 3% at age 50, rising to between 10 and 15% at age 75, and exceeding 20% after age 80 [1]. Mostly asymptomatic, they are often discovered incidentally during abdominal imaging. These tumors include serous cystadenomas, mucinous cystic neoplasms, intraductal papillary mucinous neoplasms, and solid pseudopapillary neoplasms, each with distinct characteristics affecting prognosis and treatment. With advancements in imaging techniques like MRI and EUS, their detection has increased, highlighting the need for a deeper understanding of their clinical implications. Managing pancreatic cysts can be a therapeutic challenge due to the distinction between precancerous (IPMN) and non-precancerous tumors (pseudocysts), leading to varied management approaches. In a developing country like ours, with an often-late-stage discovery of pancreatic cysts, they present a real public health problem due to their frequency, risk of degeneration, cost (surveillance and treatment), and post-operative follow-up if surgery has been performed.

Presentation of clinical cases

For this study we included patients who had undergone surgery for pancreatic cysts. The 1st case is about a 46-year-old female patient with no pathological history who was admitted for epigastric pain associated with vomiting and radiating to the right hypochondrium, clinical examination was normal. Abdominal ultrasound showed a 3.5 cm diameter heterogeneous retropancreatic mass at the pancreatic head. Abdominal CT scan showed a tumor in intimate contact with the pancreatic head. The roughly rounded mass measured 4 cm in diameter, was heterogeneous with a dual tissue and fluid component; there was no obvious enhancement after contrast injection.

2nd case is about a 39-year-old woman with no medical history who consulted for epigastric pain radiating to the left hypochondrium, associated with vomiting. Abdominal examination revealed a palpable mass in the epigastric region.

Abdominal ultrasound showed a solid cystic tumor process in the tail of the pancreas measuring 9 x 8.4 cm. Abdominal CT scan (Figure 2) showed a well encapsulated formation with a

dual cystic and tissular component enhanced after contrast injection measuring 85 x 86 x 87 mm, pushing back the stomach, splenic vein and superior mesenteric vein. MRI (Figure 3) shows a large solid cystic mass in the same location, iso-signal T2, hypersignal in diffusion, enhanced after injection of gadolinium, measuring 90 x 84 x 89 mm, in contact with the spleen and repressing the splenic vein and splenic artery.

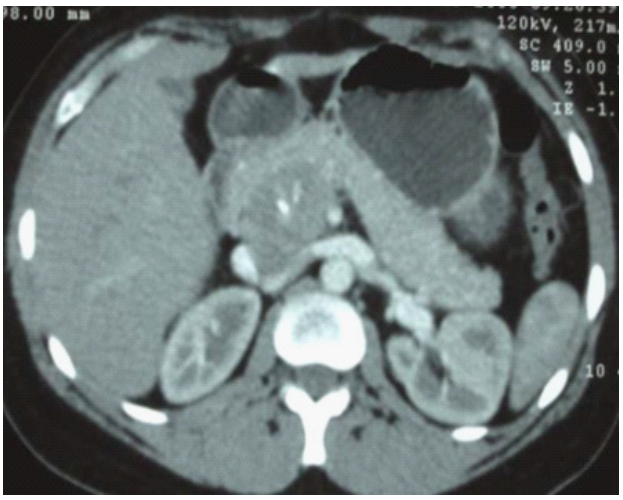

Figure 1: Abdominal CT scan showing a cystic tumor of the head of the pancreas, heterogeneous with calcifications.

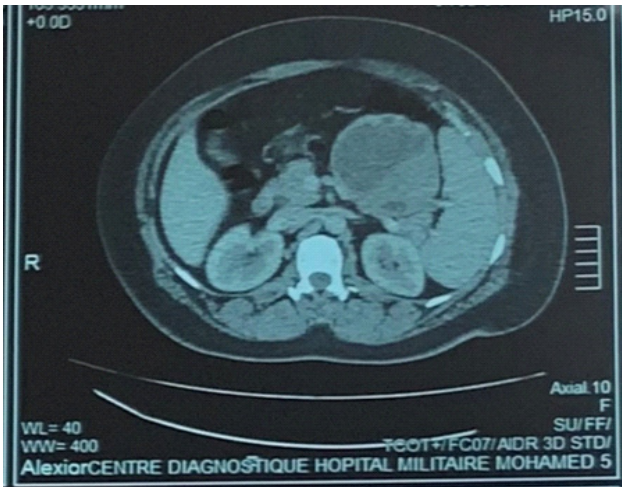

Figure 2: Abdominal CT scan showing a pancreatic tail mass with tissular and cystic components.

Clinical examination found a laparotomy scar on inspection and an epigastric mass on palpation, the rest of the examination being unremarkable. An abdominal CT scan showed a corporal-caudal process with adenopathy above and below the transverse mesocolon graded T4N2M0, (Figure 4). Pancreatic MRI showed a process on the tail of the pancreas with a dual solid and cystic component (pseudopapillary and cystic).

4th patient, is a 61 years old male, with no previous pathological history, who was admitted to our department for management of chronic abdominal pain, with notion of altered general condition and weight loss of 6 kg over the last 6 months. Physical examination revealed a mass in the epigastric region. Biological tests were without abnormalities, Abdominal ultrasonography showed a well-limited mass with a diameter of 16 cm with a mixed texture. Abdominal CT revealed a cystic mass of the head of the pancreas; this lesion was heterogeneous, with

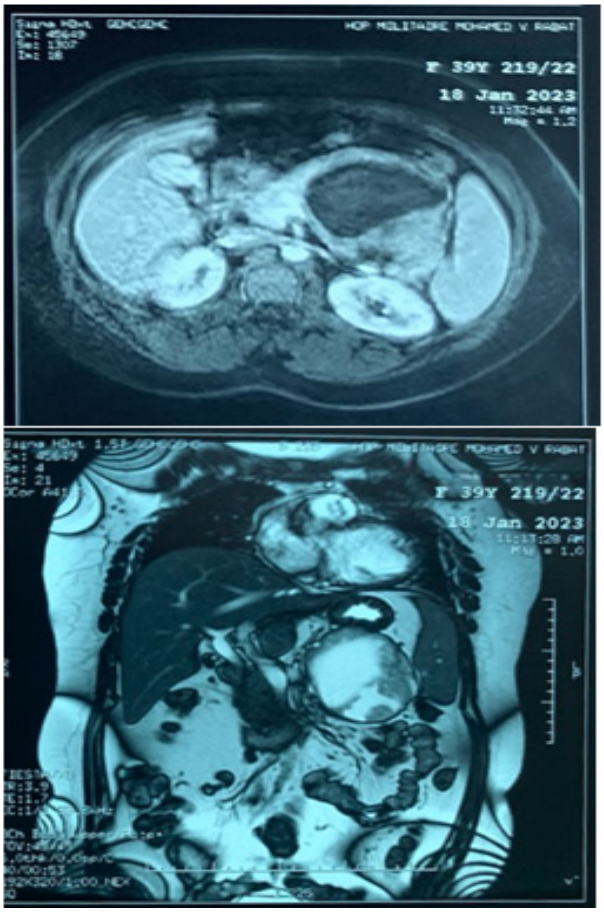

Figure 3: MRI showing a large solid cystic mass in the tail of the pancreas.

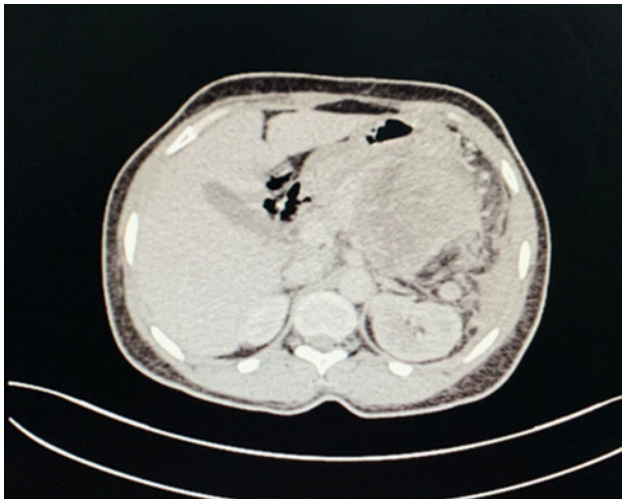

Figure 4: Abdominal CT scan showing a 10 cm pancreatic mass.

no secondary lesions or enlarged intra-abdominal lymph nodes (Figure 5).

5th patient is a 55-year-old female, with a history of cervical cancer, treated and cured, admitted to our department for chronic pain of epigastric area radiating to the left hypochondrium. Physical examination revealed tenderness of the left hypochondrium on palpation, with no detectable mass on examination. Abdominal CT scan revealed a cystic mass in the tail of the pancreas, suggestive of a serous or mucinous cystadenoma (Figure 6). Abdominal MRI showed a mucinous cyst of the pancreatic tail (Figure 7).

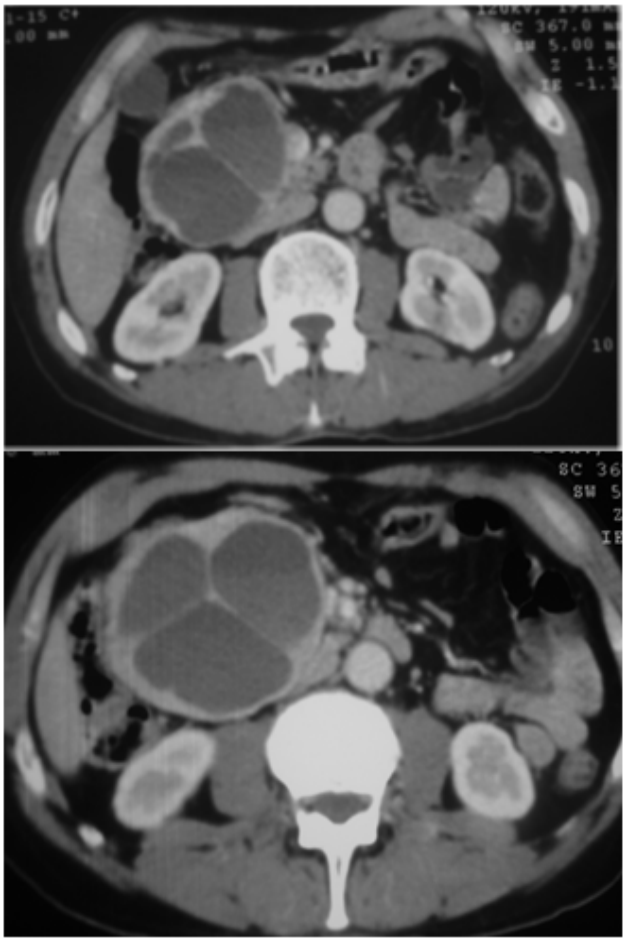

Figure 5: Contrast enhanced abdominal CT scan showing a solid cystic lesion of the pancreatic head.

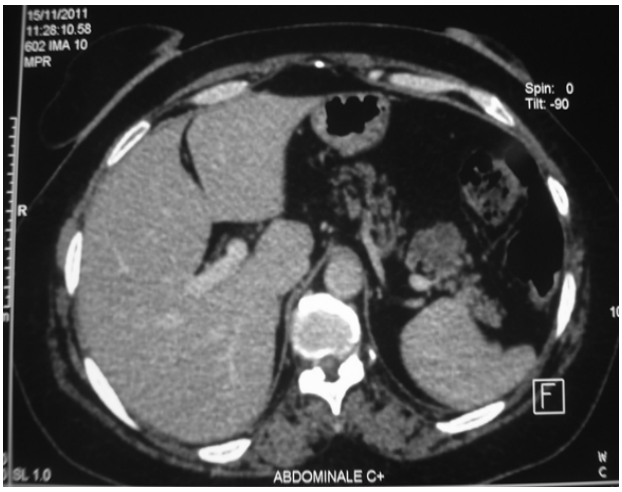

Figure 6: Abdominal CT scan showing a tumor in the tail of the pancreas.

6th patient is a 69-year-old man with a history of chronic smoking was admitted to our clinic with abdominal pain in the right hypochondrium, progressively setting in over 1 month, associated with nausea and vomiting. Abdominal examination revealed slight tenderness of the right hypochondrium, with no palpable mass.

Abdominal CT showed a process occupying Winslow's small pancreas, with no signs of locoregional extension other than sheathing of the main bile duct and no dilatation of the intrahepatic bile ducts (Figure 8).

7th patient is a 65 years old female, with a pathological history of arterial hypertension, and had undergone surgery 20

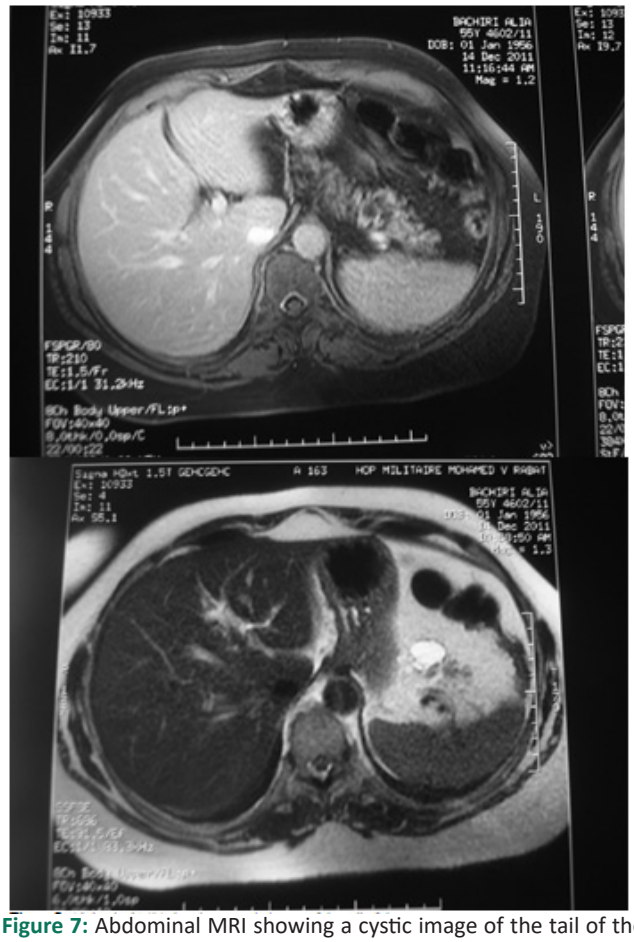

Figure 7: Abdominal MRI showing a cystic image of the tail of the pancreas.

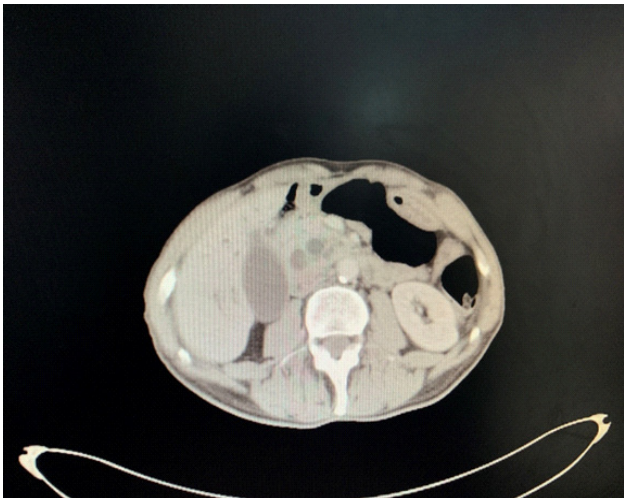

Figure 8: Abdominal CT scan showing a tumor in the tail of the pancreas.

years ago for a cervical tumor. She had been admitted to our clinic for the management of chronic pain of the epigastric area lasting 2 months, associated with vomiting. Abdominal examination revealed a palpable mass in the epigastric region. Abdominal ultrasonography revealed a cystic formation in the left hypochondrium, and additional scans revealed a cystic lesion in the pancreatic body, measuring 40 x 37 mm in fluid density (Figure 9). Abdominal MRI revealed a 40 mm cystic formation in the body and tail of the pancreas (Figure 10).

Results

In our case series, 5 of our patients were female, i.e. 71% of cases, and 2 male, i.e. 29% of cases. Our patients age at diagnosis varied from 33 to 69, with a median age of 55 [42.5-

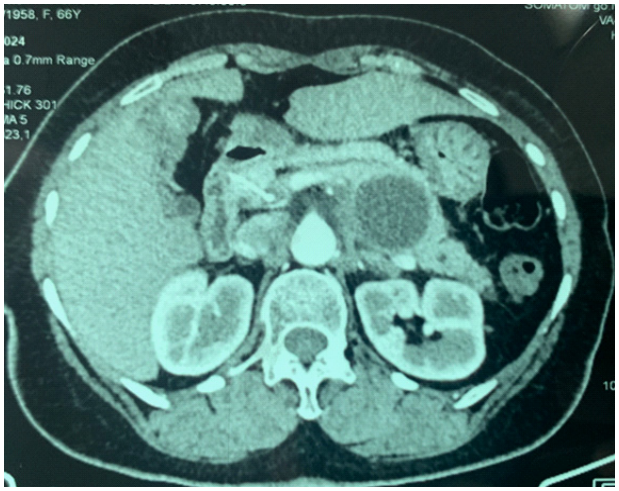

Figure 9: Abdominal CT scan showing a 40 mm diameter cyst of the pancreas body and tail.

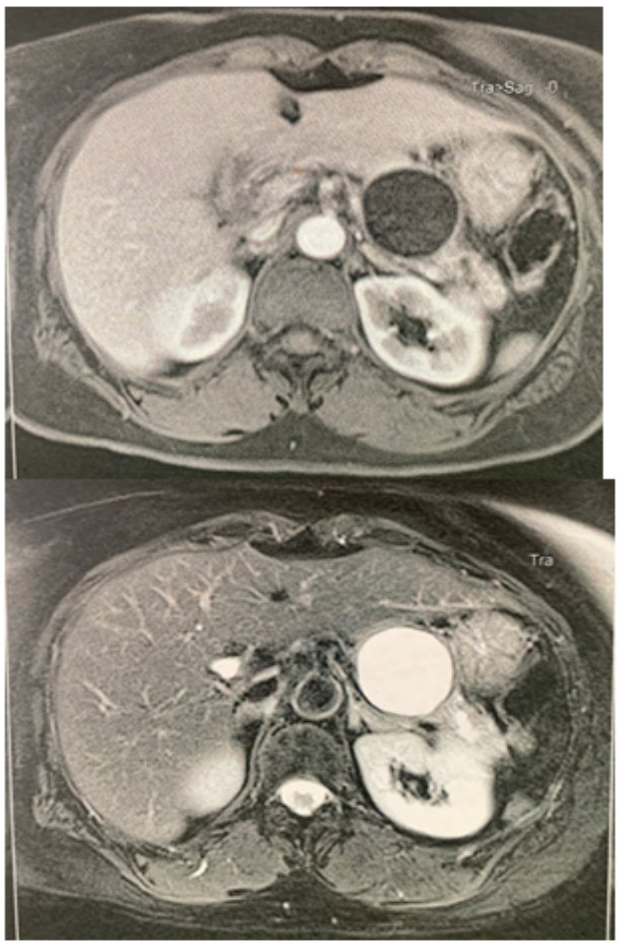

Figure 10: Abdominal MRI showing a cystic lesion of the body and tail of the pancreas.

63]. In terms of general condition, 4 of our patients were ASA 1, i.e. 57%, and 3 were ASA2, i.e. 43%. 3 of our patients had no notable pathological history (43%), 1 patient was diabetic on oral antidiabetics, 1 patient was being treated for arterial hypertension, 1 patient was being treated for cervical cancer, and 1 patient was a long-term smoker. The main symptom in our series was chronic abdominal pain, found in all our patients. This pain was of epigastric origin in 5 patients, i.e. 71% of cases, and in the right hypochondrium in 3 patients, i.e. 43% of cases. It was associated with vomiting in 3 patients and altered general condition and weight loss in 1 patient. Clinical examination revealed a palpable mass in 4 patients (57% of cases), tenderness of the left hypochondrium in 2 patients (28% of cases), and no abnormalities on physical examination in 1 patient. Abdominal ultrasound was performed immediately in 4 patients, i.e. 57% of cases, and revealed a cystic mass in all. All our patients underwent CT imaging, which revealed the presence of cystic or solid-cystic formations in all our patients. These swellings were located in the cephalic region in 3 patients (43% of cases), while they were located in the body and tail of the pancreas in 4 patients (57% of cases). Abdominal MRI was performed in 4 of our patients, i.e. 57% of cases, to better define the characteristics of the lesions.

In terms of treatment, all our patients underwent surgery: 3 patients underwent left pancreatectomy, 2 patients underwent tumorectomy with excision of the tumor implantation base, 1 patient underwent left splenopancreatectomy, and 1 patient underwent cephalic duodenopancreatectomy. The post-operative course was marked by the occurrence of a grade B pancreatic fistula in 2 patients, whereas it was uncomplicated in 5 patients, i.e. 71% of cases. Pseudopapillary and solid tumors of the pancreas were diagnosed in 3 patients (43% of cases), endocrine tumors of the pancreas in 1 patient, serous cystadenomas of the pancreas in 1 patient, pseudocyst of the pancreas in 1 patient, and IPMN in 1 patient.

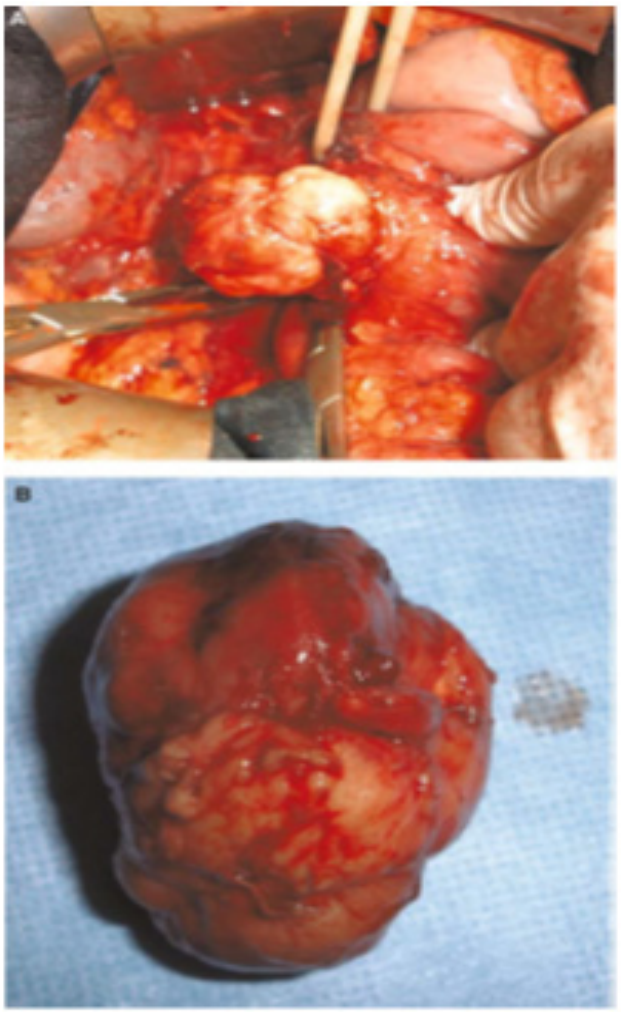

Figure 11: Patient 1.
(A) Intraoperative image of a pancreatic tail tumor.
(B) Image of resected tumour.

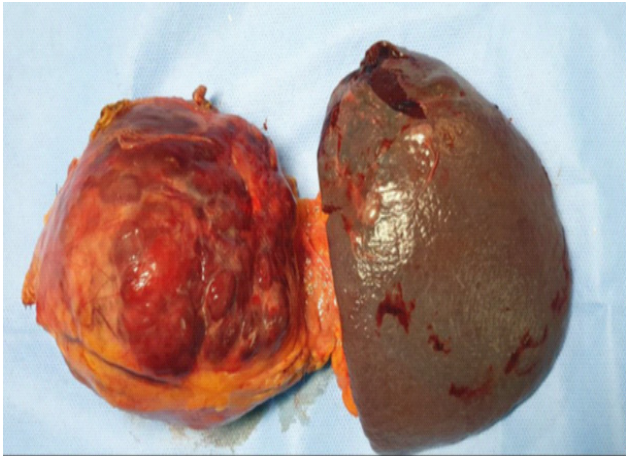

Figure 12: Patient 2: Image showing the tail of the pancreas and the spleen.

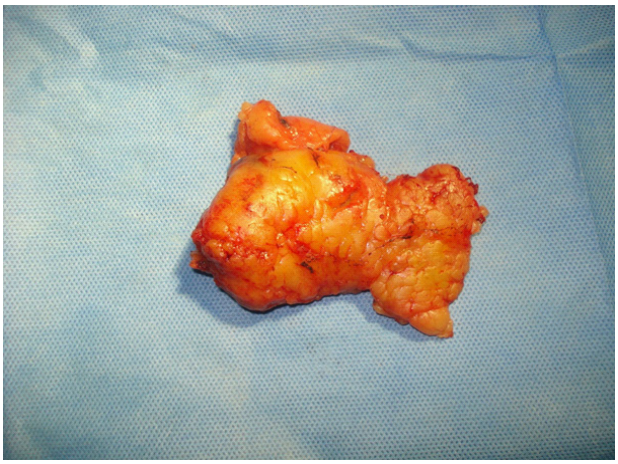

Figure 13: Patient 4: Tumorectomy specimen of a pancreatic tail mass.

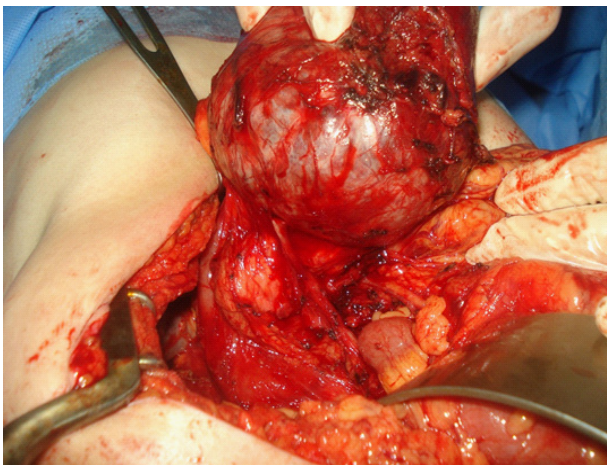

Figure 14: Patient 5: Intraoperative image of a pancreatic tail tumor.

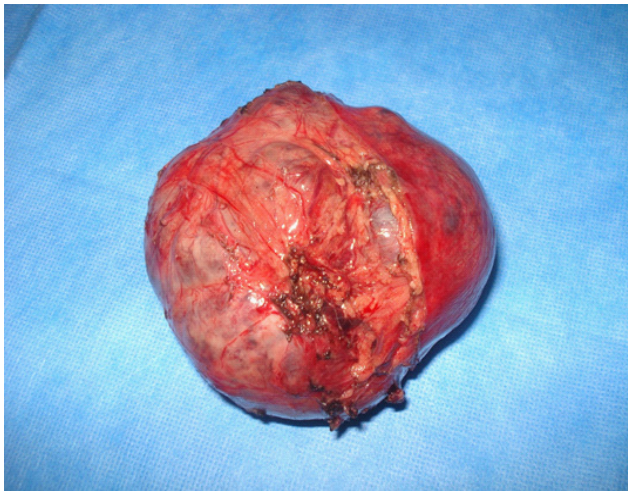

Figure 15: Patient 5: Left pancreatectomy specimen.

Discussion

Pancreatic cysts encompass a varied collection of diagnostic entities, ranging from congenital, inflammatory, to neoplastic lesions. There are six histological categories of cystic tumors of the pancreas [2], which can be classified as precancerous (also known as premalignant) cystic tumors as IPMN and mucinous cysts, and non-precancerous cystic tumors as pseudocysts and serous cysts. Solid pseudopapillary tumors and pancreatic neuroendocrine tumors are two less frequent types of malignant cystic neoplasms. Pancreatic cysts are often discovered incidentally during abdominal imaging (such as ultrasound or CT scan, occasionally MRI or endoscopic ultrasound) carried out for a different symptomatology.

The clinical presentation can guide the diagnosis: a young female with a large cystic and solid mass in the pancreatic tail is probably diagnosed with a solid pseudopapillary tumor of the pancreas [3]. The presence of a cystic lesion after acute pancreatitis or in a patient with chronic pancreatitis pain should initially evoke the diagnosis of a pseudocyst.

- Solid pseudopapillary neoplasms typically arise in females during their second to fourth decade of life [4]. These abnormalities, found across the pancreas, exhibit a clearly defined, mixed appearance of both solid and fluid-filled areas and, at times, abnormal calcifications [5]. Most of solid pseudopapillary neoplasms have a low likelihood of metastasis.

- IPMN are mucin-producing epithelial tumors arising from pancreatic duct epithelium (papillary), it occurs in both women and men with a sex ratio of 1, and a peak of age at 60-70 years of age [6], main symptoms are nausea, vomiting, abdominal discomfort, jaundice (in case of biliary obstruction) [7]. The diagnosis is based on abdominal MRI or CT scan, they present as single or multiple pancreatic cystic hypodense lesions with or without main duct dilatation >5 mm.

- Mucinous Cystic Neoplasia (MCN) are solitary, round tumors with uni or multilocular cysts lined by mucin-forming cells they represent approx. 10% of cystic tumors of the pancreas and occur mostly in the body-tail area [7]. Considered as potential precursor for pancreatic cancer.

- In 95% of cases, it occurs on women between 40-60 years of age, in 20% it's asymptomatic or present non-specific abdominal complaints [7]. CT Scan/MRI help to establish the diagnosis.

- Pancreatic neuroendocrine tumors (NET) are uncommon tumors. They proliferate from endocrine cells, we distinguish two types of NET of the pancreas: functional NET (gastrinoma, insulinoma, VIPoma …): produce and release pancreatic hormones, and non-functional NET who represents 95% of pancreatic NET [8], those nonfunctional NET manifest clinically by abdominal discomfort and weight loss, occasionally they can be found incidentally, while functional NETs are clinically manifested by the hormone they secrete, insulinoma presents with the Whipple triad, gastrinoma with ulcerous gastric pain, VIPoma with massive diarrhea, and electrolyte imbalances.

- Serous cysts are benign tumors consisting of numerous cysts, localized in pancreatic corpus and tail in 70% of cases,

- It occurs in women more than men with a sex ration of 5/1 and a frequency peak at >60 years of age. Pancreatic serous cysts are mostly asymptomatic, sometimes abdominal discomfort with nausea and vomiting may be present as non-specific symptoms.

- Pancreatic pseudocysts are complications of chronic pancreatitis. Typically, they are diagnosed through CT scans. Endoscopic ultrasound with fine needle aspiration is now the favored method to differentiate pseudocyst from other pancreatic cystic lesions.

The size and duration of the pseudocyst do not reliably predict whether it will resolve or lead to complications, but typically, larger cysts are more likely to cause symptoms as abdominal discomfort. The management of pancreatic cystic tumors can be complex, involving experts in pancreatic surgery, a technical platform for digestive endoscopy and diagnostic and interventional radiology. Experts have categorized the risk of pancreatic cyst transformation into malignancy based on clinical, biological, and especially radiological indicators, we distinguish worrisome signs and high-risk features.

Table 1: Radiographic features of pancreatic cysts [7].

Precancerous cystic tumors presentation on MRI or CT scan	
Worrisome signs	High risk signs
Diameter of the main pancreatic duct between 5 and 9 mm	Main pancreatic duct diameter >10 mm
Cyst >3 cm in diameter	
Intra-cystic wall nodule enhancing <5 mm in diameter	
Thickening of the cystic wall enhancing	Intra-cystic wall nodule enhancing >5 mm in diameter
Abrupt change in diameter of the main pancreatic duct with atrophy of the upstream parenchyma	
Presence of a supra-centimetric lymph node	
Rapid evolution of the cyst size with a diameter increase of more than 5 mm in 2 years	

On a clinical and biological level, asymptomatic tumors have a good prognosis, while jaundice and an elevation of CA 19.9 constitute a high-risk factor of malignancy for the first and a worrying sign for the second [7].

According to these indicators, the management plan for pancreatic cysts is as follows [9]: for low-risk tumors; surveillance is suggested or sometimes abstaining from any further activity, for intermediate-risk tumors; additional tests are performed and intensified surveillance is considered after a multidisciplinary discussion. However, high-risk tumors, should undergo surgery after multidisciplinary discussions, as it is the sole curative option. Depending on the location and size of the tumor, the surgical procedure may consist of simple removal of the cyst or major pancreatic surgery such as pancreaticoduodenectomy (PD) or left pancreatectomy.

Pancreaticoduodenectomy requires a high level of technical skill. This is made more complex by the fact that many abnormalities in the hepatic arterial system are frequently found [10]. The PD is classically divided into clearly defined steps to allow safe removal of the pancreatic head, duodenum, bile duct, and gallbladder + distal stomach [11]. These are Kocher maneuver, then exposure of superior mesenteric vein, portal dissection, stomach/pylorus/duodenum transection, jejunal and ligament of Treitz transection, and pancreas transection and uncinate dissection. Reconstruction is done according to Child; the first step consists on bringing the proximal jejunum through transverse mesocolon and performing a duct to mucosa pancreaticojejunal anastomosis. Then, a choledocho-jejunal anastomosis is constructed, finally a gastrojejunostomy is performed by a two-layer anastomosis.

PD is a complex surgical procedure. Even with recent advances in surgical techniques and perioperative management, mortality rate has dropped from 30% to under 5% [12-14]. Despite these improvements, the levels of morbidity related to PD continue to be high [15]. Several complications following surgery are linked to PD, as postoperative pancreatic fistula (POPF) and delayed gastric emptying (DGE) which are among the most prevalent issues, POPF and DGE together can impact close to half of the patients who are undergoing PD [16]. For tumors of body or tail of pancreas, central or left pancreatectomy with or without splenectomy are more commonly used to manage pancreatic endocrine tumors and cystic neoplasms. The most serious complication after a distal pancreatectomy is pancreatic leakage, and the rate of pancreatic leakage after LP is reported to range from 10% to 33% [17,18].

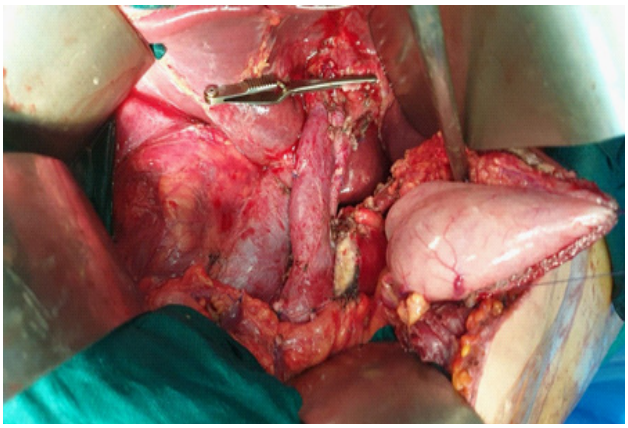

Figure 16: Pancreaticoduodenectomy performed for IPMN.

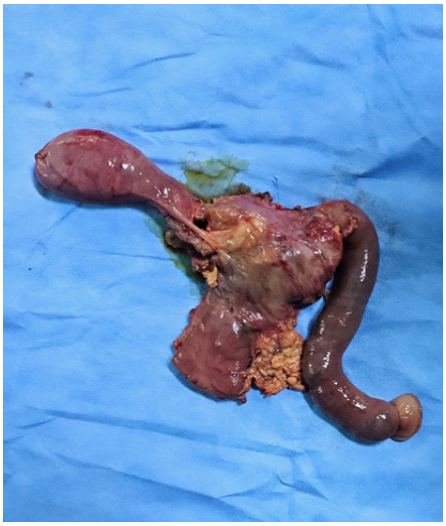

Figure 17: Specimen resected of PD for an IPMN.

Conclusion

With development of medical imaging and improved access to healthcare services, pancreatic cysts are more frequently diagnosed. MRI with properly performed MRCP plays a major role in the diagnosis and surveillance of pancreatic cysts. Endoscopic ultrasound allows sampling in cases of diagnostic doubt. "Worrisome" signs are not very effective in assessing the prognosis of pancreatic cysts. On the other hand, signs indicating a "high risk of malignancy" are very predictive of poor outcome. Surgery remains, despite the morbidity and mortality associated with pancreatic surgery, the only curative treatment and can prevent transformation into malignancy. This surgery should be indicated after multidisciplinary consultation and performed by a surgeon experienced in pancreatic surgery.

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