Pancreatic masses: What is there besides cancer

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Learning objectives

To illustrate the radiological features of the most frequent pseudotumoral pancreatic conditions.

To describe the characteristics that may be useful in the differential diagnosis with primary pancreatic cancer.

Background

Although the advances in imaging have increased the diagnosis of pancreatic masses, their correct identification as a nonneoplastic process is still difficult. Approximately 5% to 10% of pancreatectomies performed with the clinical diagnosis of pancreatic cancer prove on microscopic evaluation to be pseudotumors. Pancreatic pseudotumors represent multiple distinct categories of lesions characterized by a benign enlargement of the gland, which clinically resembles a true neoplasm so closely as to often be mistaken for such.

Imaging findings OR Procedure details

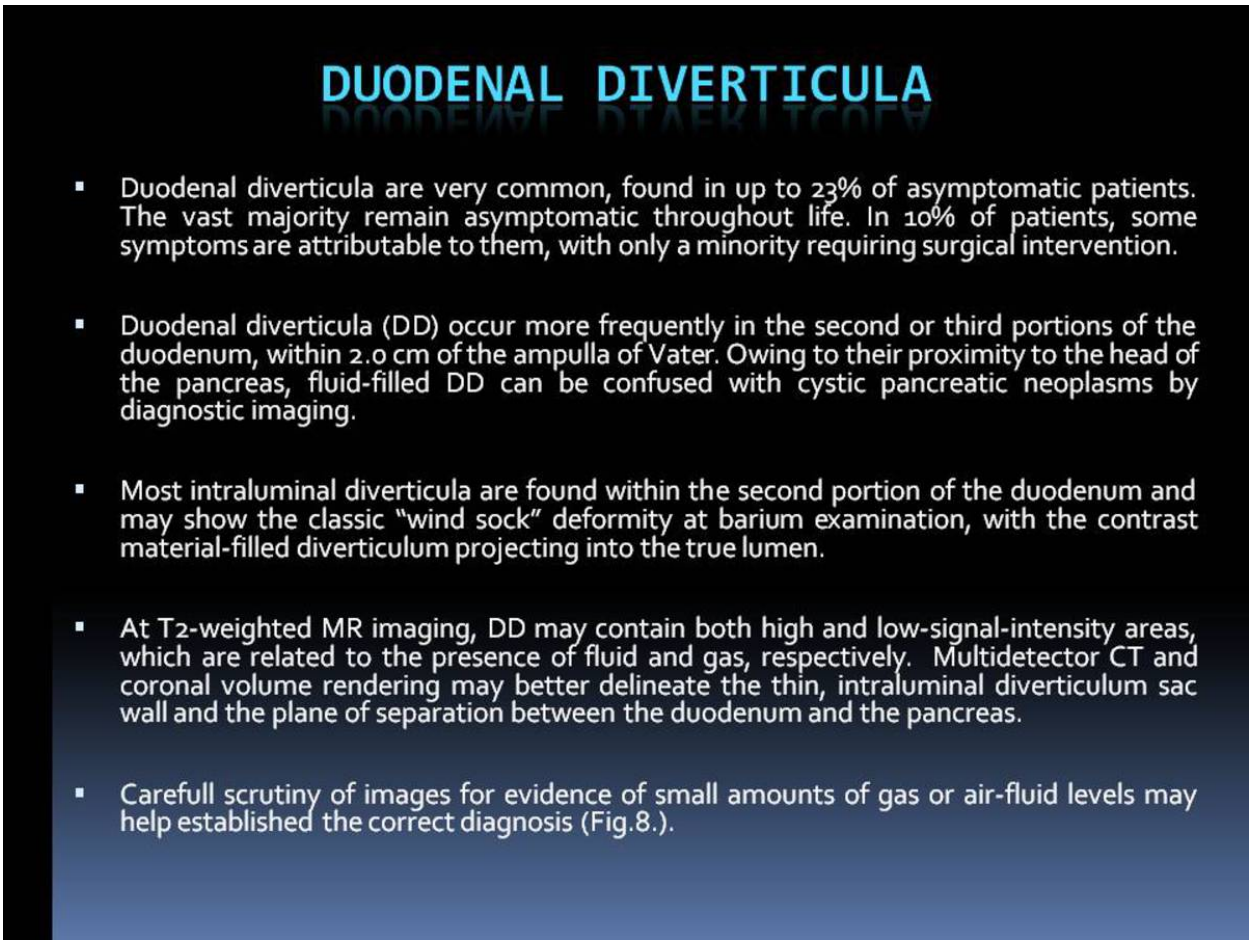

Fig.: 16
References: M. A. Portilha; Radiology, Hospitais da Universidade de Coimbra, Coimbra, PORTUGAL

Fig.: fig.1.
References: M. A. Portilha; Radiology, Hospitais da Universidade de Coimbra, Coimbra, PORTUGAL

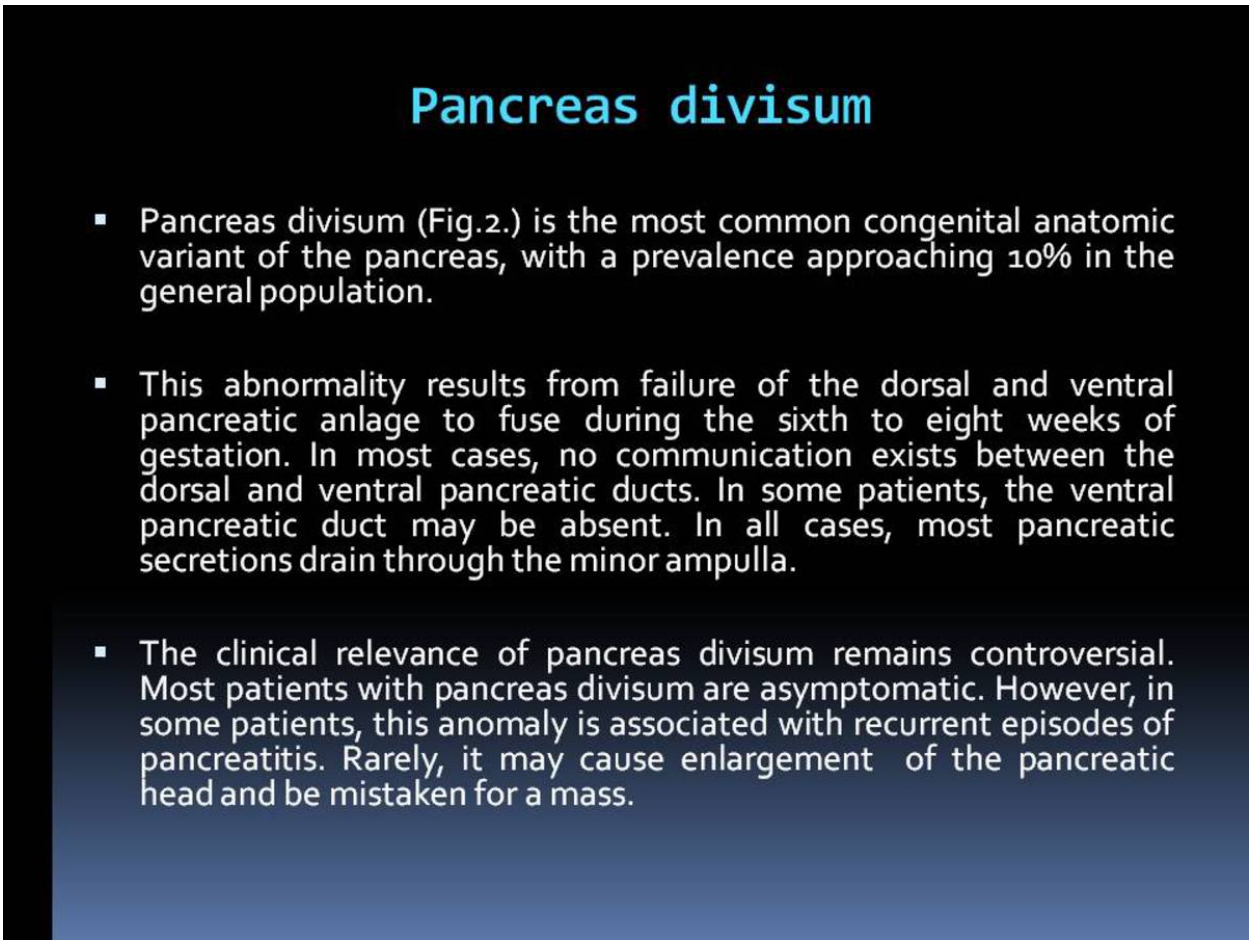

Fig.: fig6
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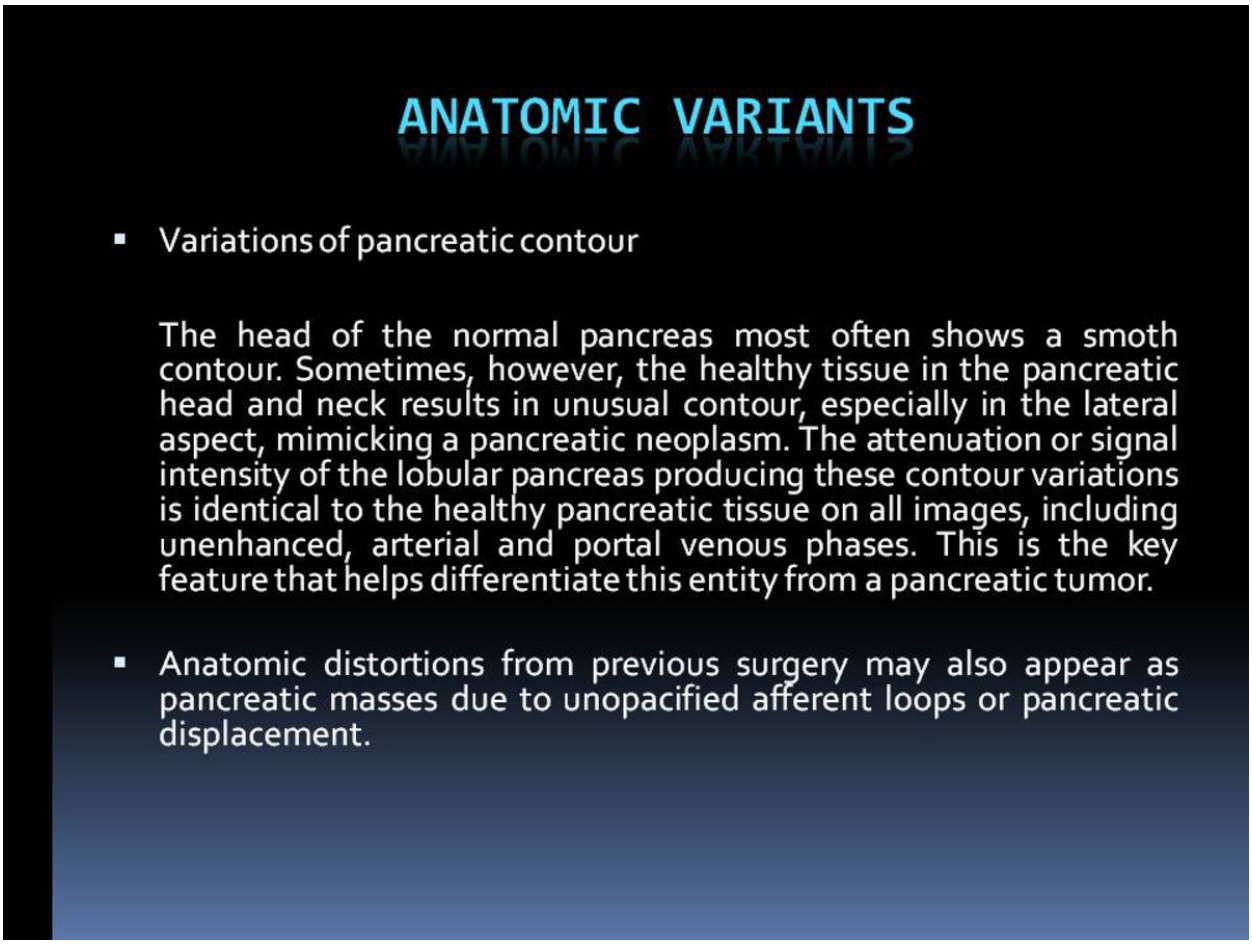

Fig.: fig.4
References: M. A. Portilha; Radiology, Hospitais da Universidade de Coimbra, Coimbra, PORTUGAL

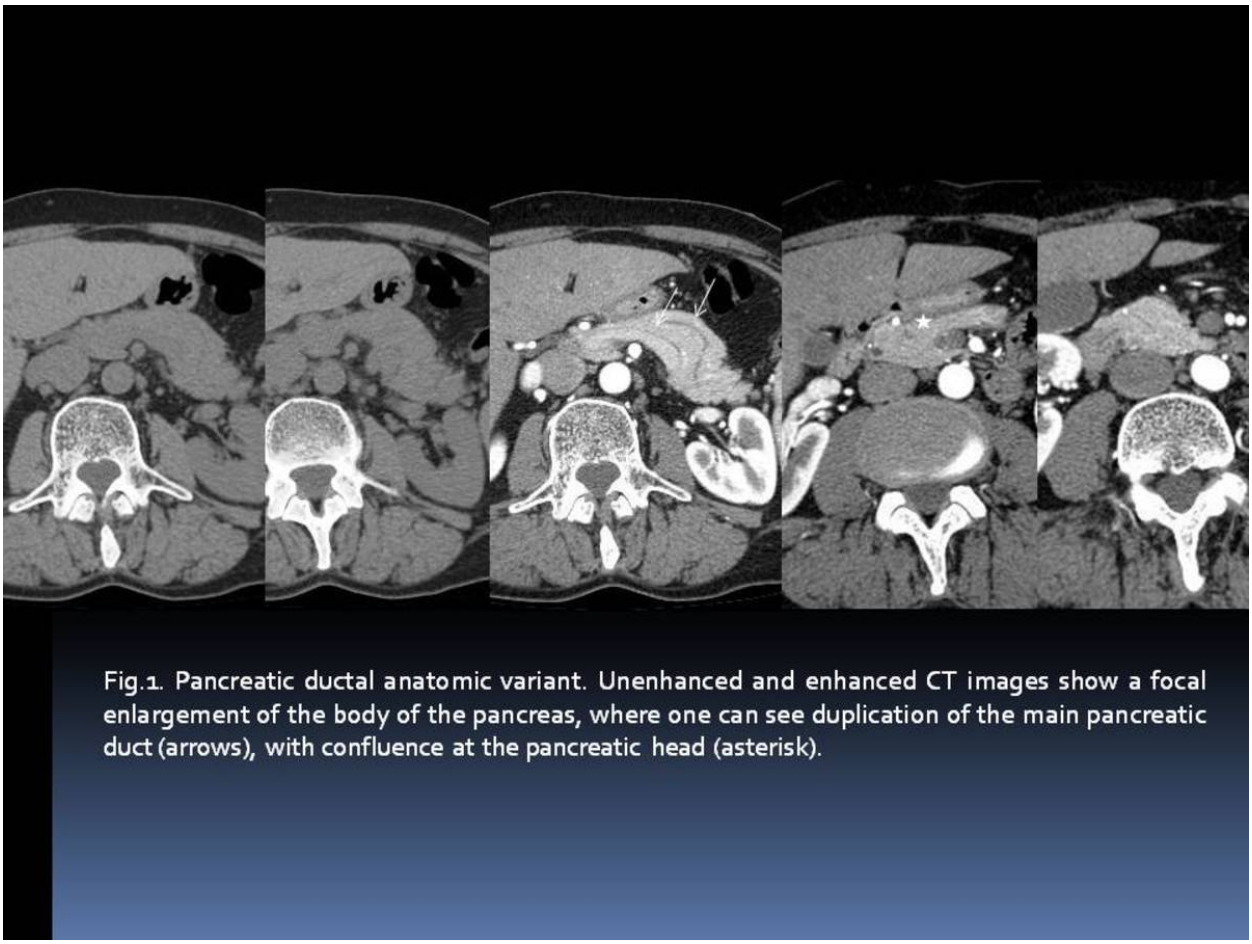

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Fig.: fig.1.
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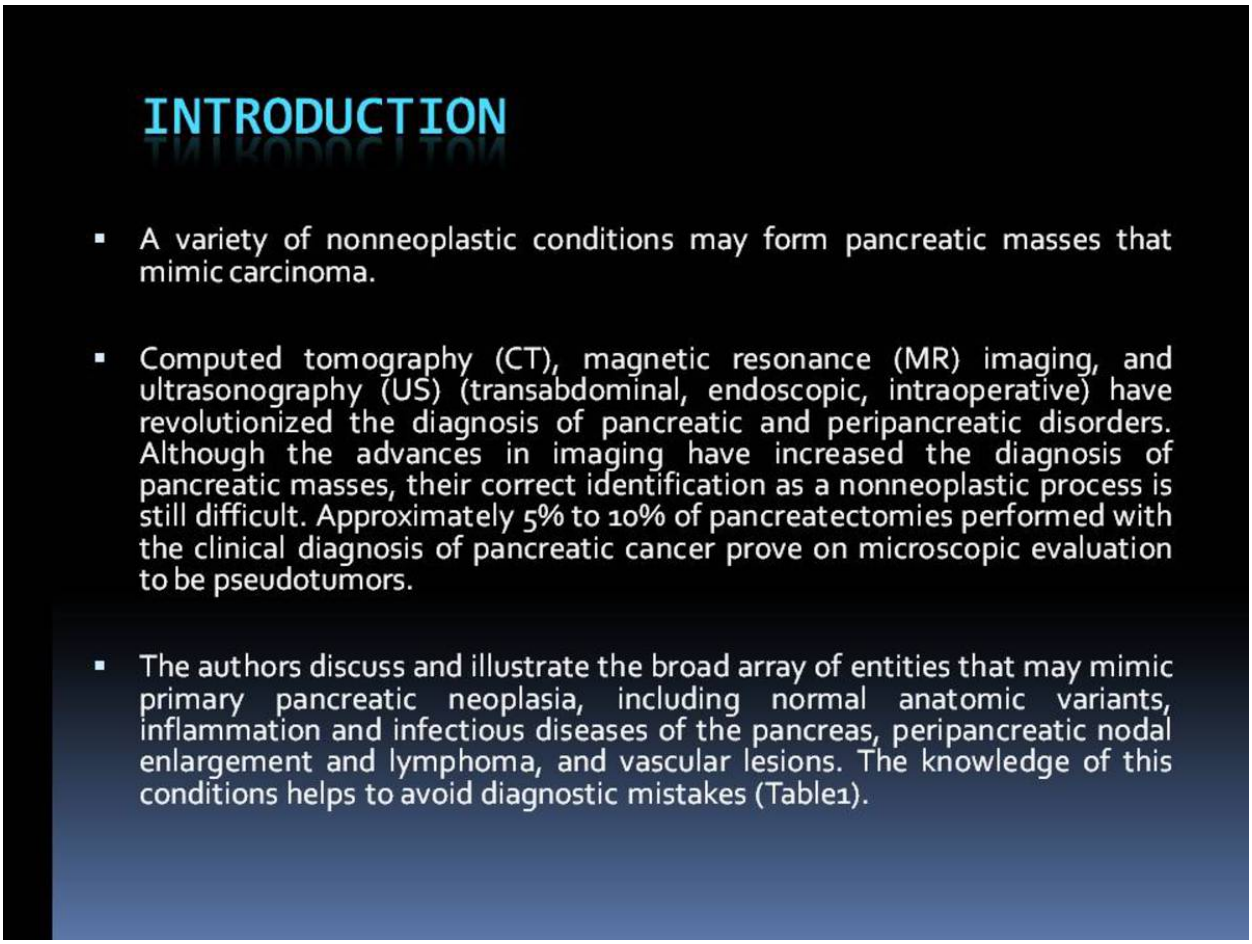

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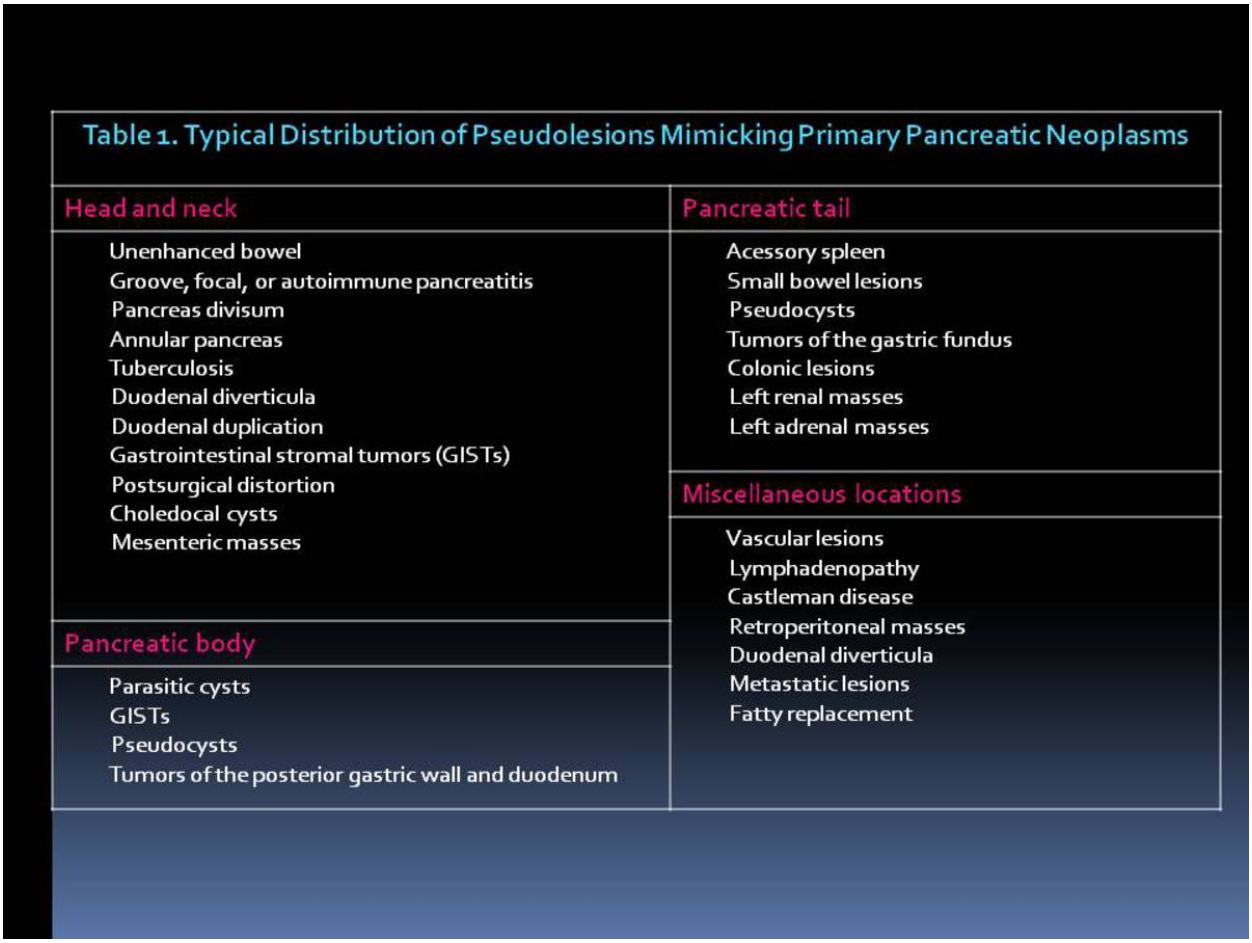

Fig.: fig.3
References: M. A. Portilha; Radiology, Hospitais da Universidade de Coimbra, Coimbra, PORTUGAL
Discuss the broad array of entities that may mimic primary pancreatic neoplasia, including normal anatomic variants, inflammatory and infectious diseases of the pancreas, vascular lesions and disease in surrounding structures.

Images for this section:


PANCREATIC MASSES:
WHAT IS THERE BESIDES CANCER
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HOSPITAIS DA UNIVERSIDADE DE COIMBRA

Fig. 1: fig.1.

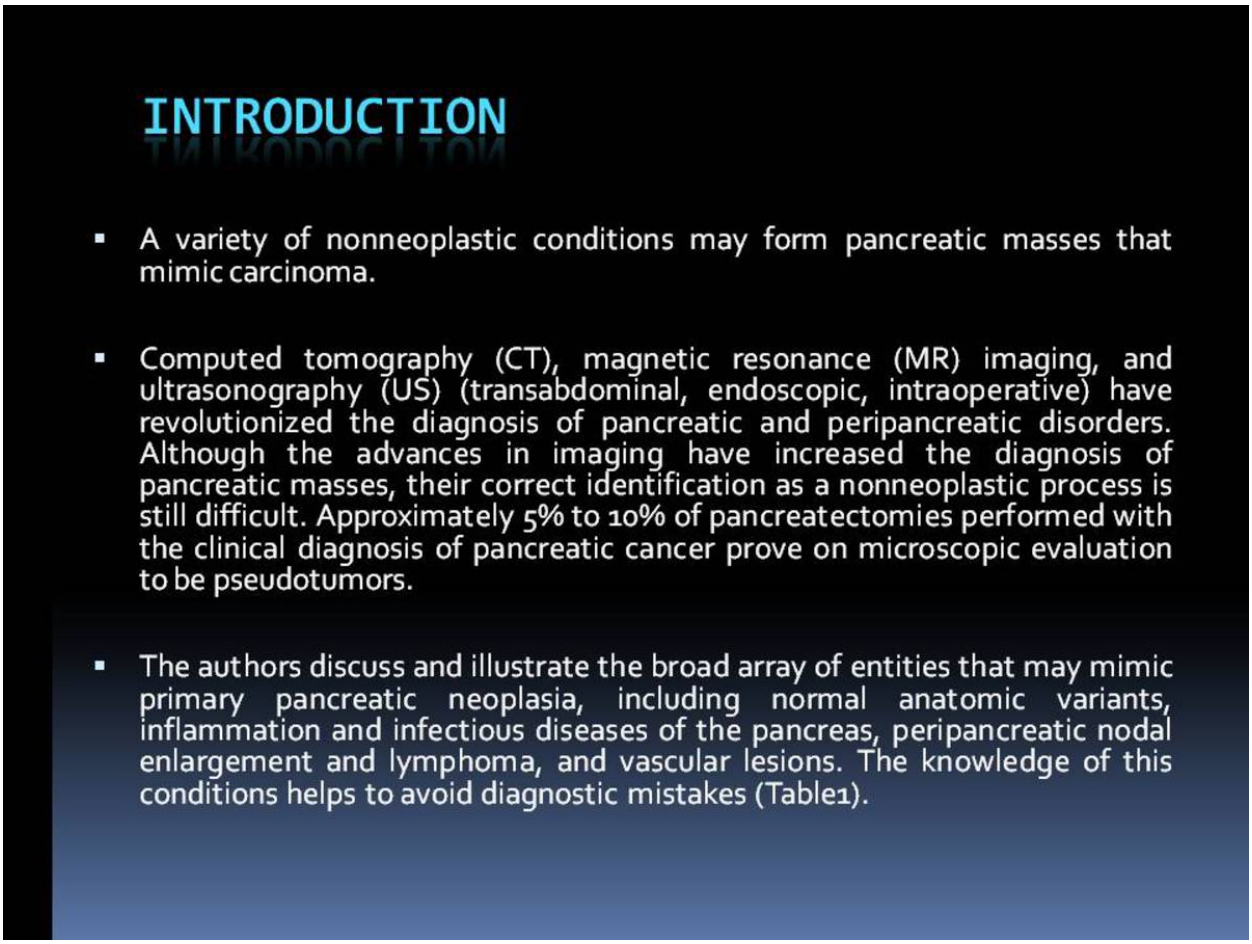
INTRODUCTION
A variety of nonneoplastic conditions may form pancreatic masses that mimic carcinoma.
Computed tomography (CT), magnetic resonance (MR) imaging, and ultrasonography (US) (transabdominal, endoscopic, intraoperative) have revolutionized the diagnosis of pancreatic and peripancreatic disorders. Although the advances in imaging have increased the diagnosis of pancreatic masses, their correct identification as a nonneoplastic process is still difficult. Approximately 5% to 10% of pancreatectomies performed with the clinical diagnosis of pancreatic cancer prove on microscopic evaluation to be pseudotumors.
The authors discuss and illustrate the broad array of entities that may mimic primary pancreatic neoplasia, including normal anatomic variants, inflammation and infectious diseases of the pancreas, peripancreatic nodal enlargement and lymphoma, and vascular lesions. The knowledge of this conditions helps to avoid diagnostic mistakes (Table1).

Fig. 2: fig.2

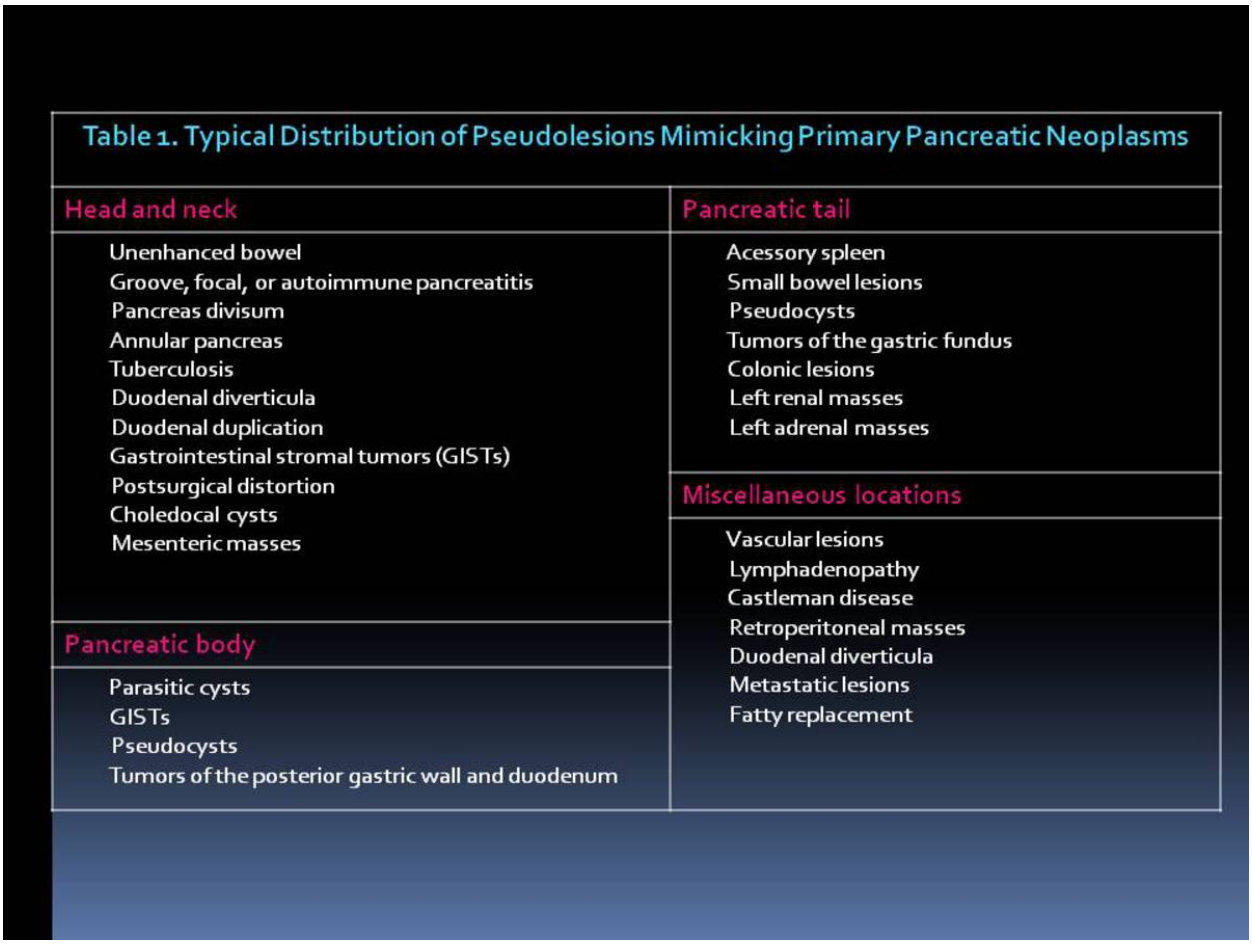
Table 1. Typical Distribution of Pseudolesions Mimicking Primary Pancreatic Neoplasms
Head and neck
Unenhanced bowel
Groove, focal, or autoimmune pancreatitis
Pancreas divisum
Annular pancreas
Tuberculosis
Duodenal diverticula
Duodenal duplication
Gastrointestinal stromal tumors (GISTs)
Postsurgical distortion
Choledocal cysts
Mesenteric masses
Pancreatic body
Parasitic cysts
GISTs
Pseudocysts
Tumors of the posterior gastric wall and duodenum
Pancreatic tail
Acessory spleen
Small bowel lesions
Pseudocysts
Tumors of the gastric fundus
Colonic lesions
Left renal masses
Left adrenal masses
Miscellaneous locations
Vascular lesions
Lymphadenopathy
Castleman disease
Retroperitoneal masses
Duodenal diverticula
Metastatic lesions
Fatty replacement

Fig. 3: fig.3

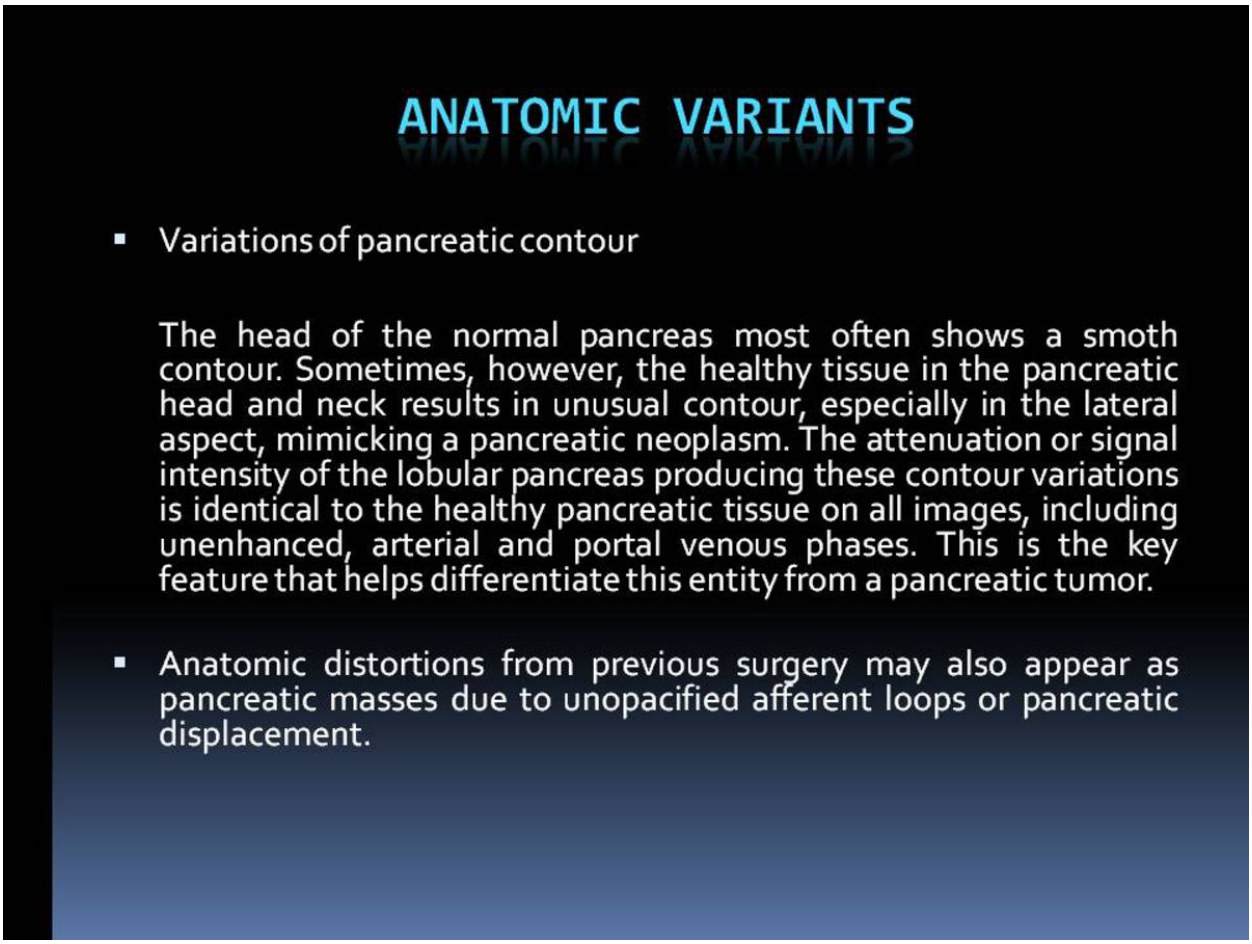
ANATOMIC VARIANTS
Variations of pancreatic contour
The head of the normal pancreas most often shows a smoth contour. Sometimes, however, the healthy tissue in the pancreatic head and neck results in unusual contour, especially in the lateral aspect, mimicking a pancreatic neoplasm. The attenuation or signal intensity of the lobular pancreas producing these contour variations is identical to the healthy pancreatic tissue on all images, including unenhanced, arterial and portal venous phases. This is the key feature that helps differentiate this entity from a pancreatic tumor.
Anatomic distortions from previous surgery may also appear as pancreatic masses due to unopacified afferent loops or pancreatic displacement.

Fig. 4: fig.4

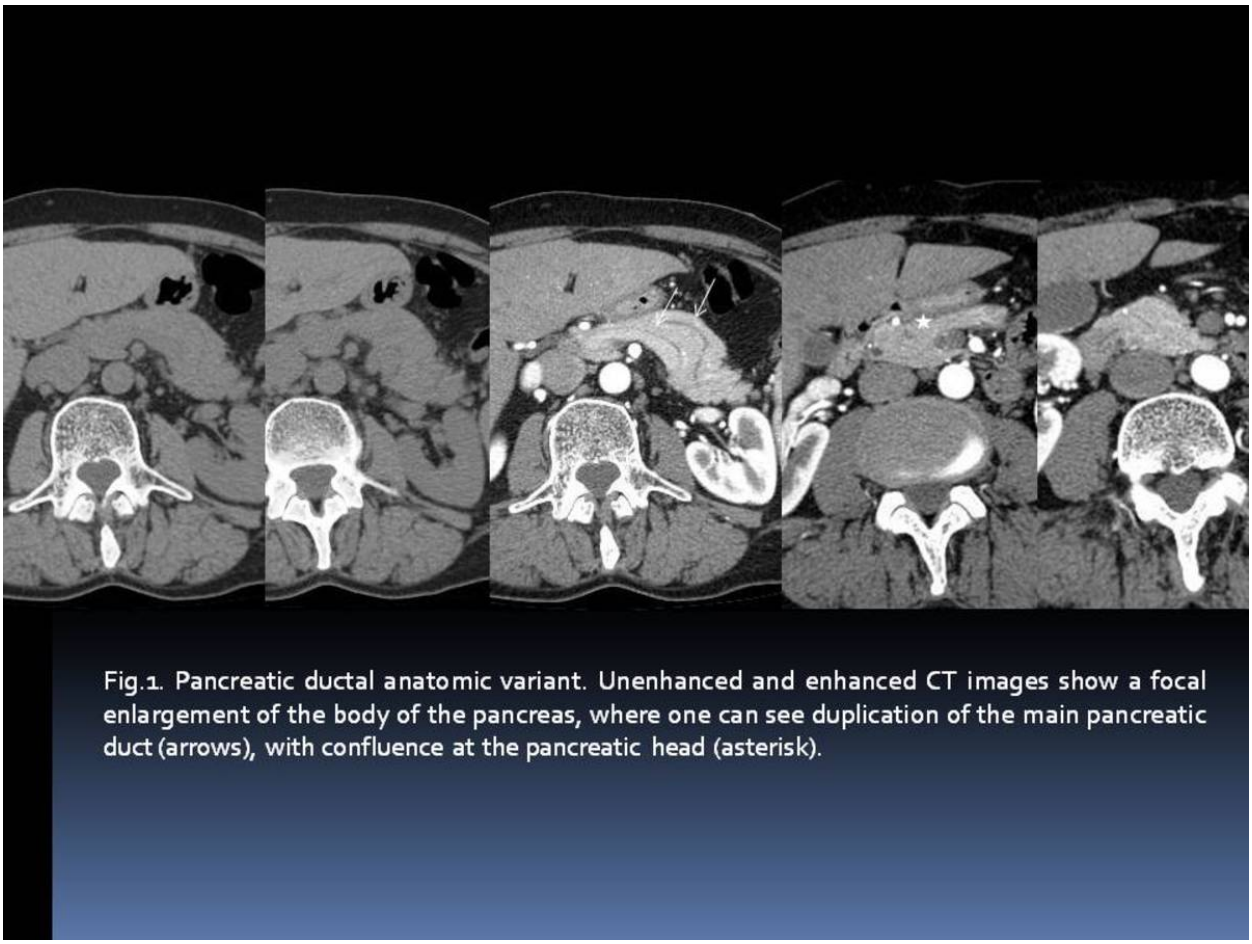
Fig.1. Pancreatic ductal anatomic variant. Unenhanced and enhanced CT images show a focal enlargement of the body of the pancreas, where one can see duplication of the main pancreatic duct (arrows), with confluence at the pancreatic head (asterisk).

Fig. 5: fig.5

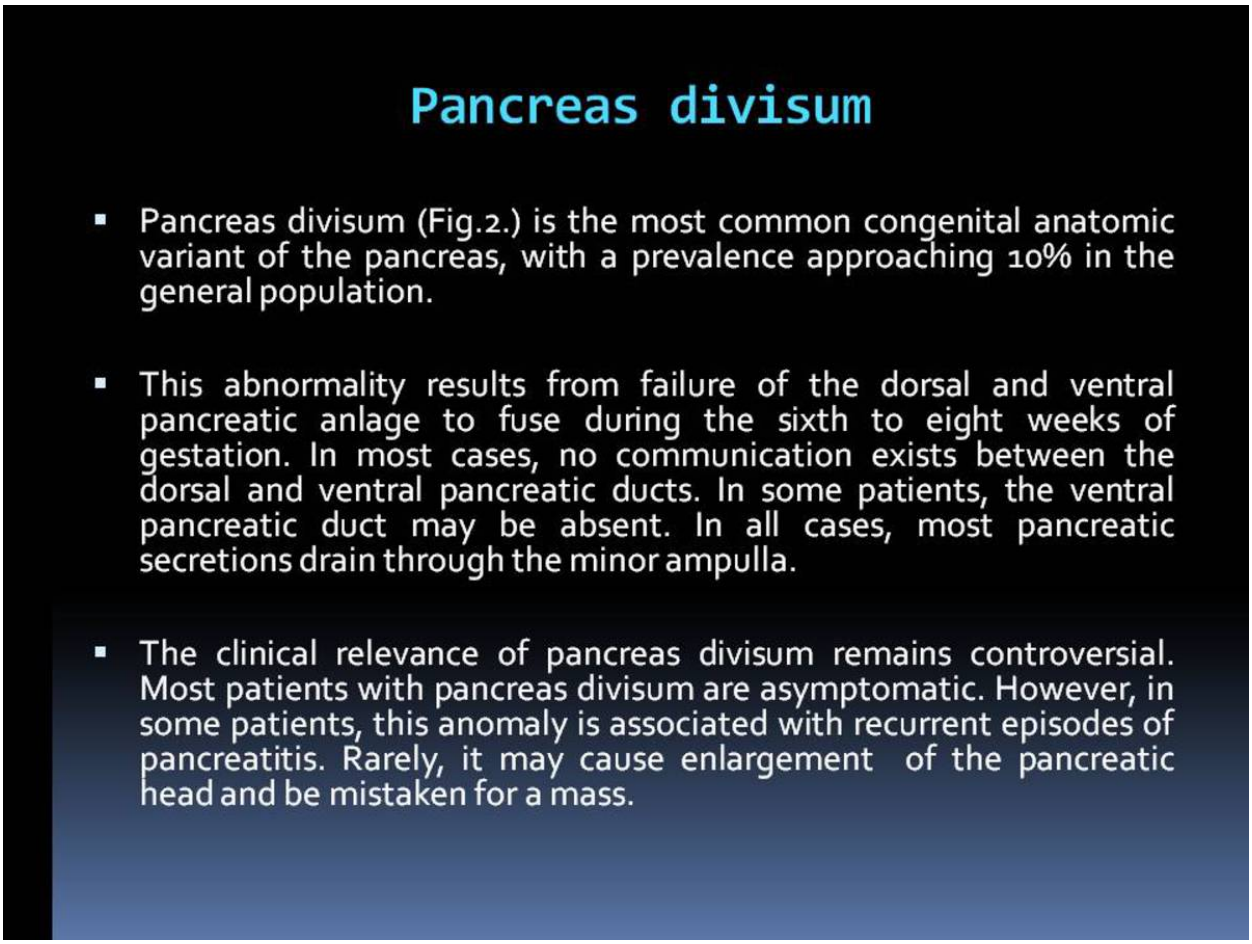
Pancreas divisum
Pancreas divisum (Fig.2.) is the most common congenital anatomic variant of the pancreas, with a prevalence approaching 10% in the general population.
This abnormality results from failure of the dorsal and ventral pancreatic anlage to fuse during the sixth to eight weeks of gestation. In most cases, no communication exists between the dorsal and ventral pancreatic ducts. In some patients, the ventral pancreatic duct may be absent. In all cases, most pancreatic secretions drain through the minor ampulla.
The clinical relevance of pancreas divisum remains controversial. Most patients with pancreas divisum are asymptomatic. However, in some patients, this anomaly is associated with recurrent episodes of pancreatitis. Rarely, it may cause enlargement of the pancreatic head and be mistaken for a mass.

Fig. 6: fig6

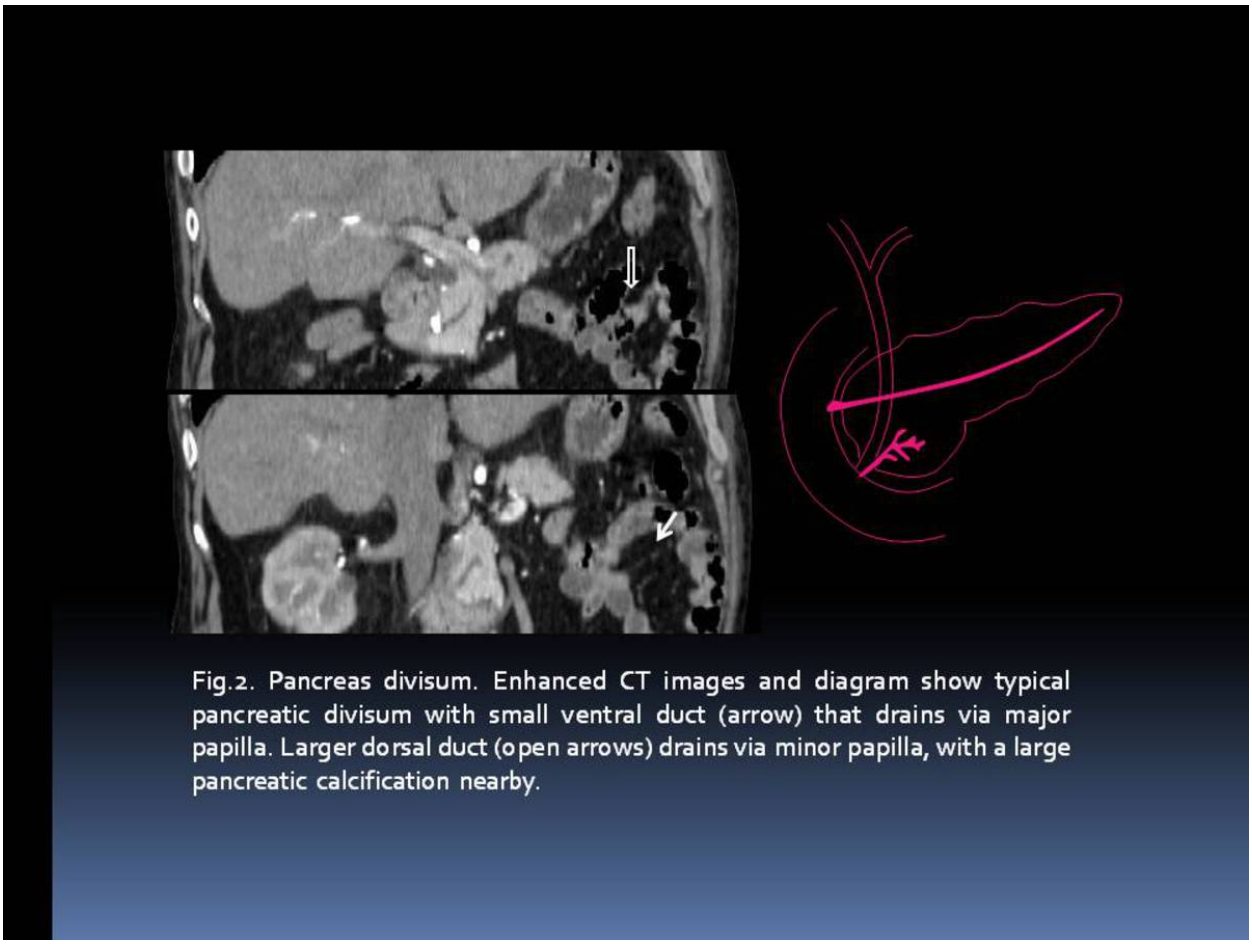
Fig.2. Pancreas divisum. Enhanced CT images and diagram show typical pancreatic divisum with small ventral duct (arrow) that drains via major papilla. Larger dorsal duct (open arrows) drains via minor papilla, with a large pancreatic calcification nearby.

Fig. 7: fig7

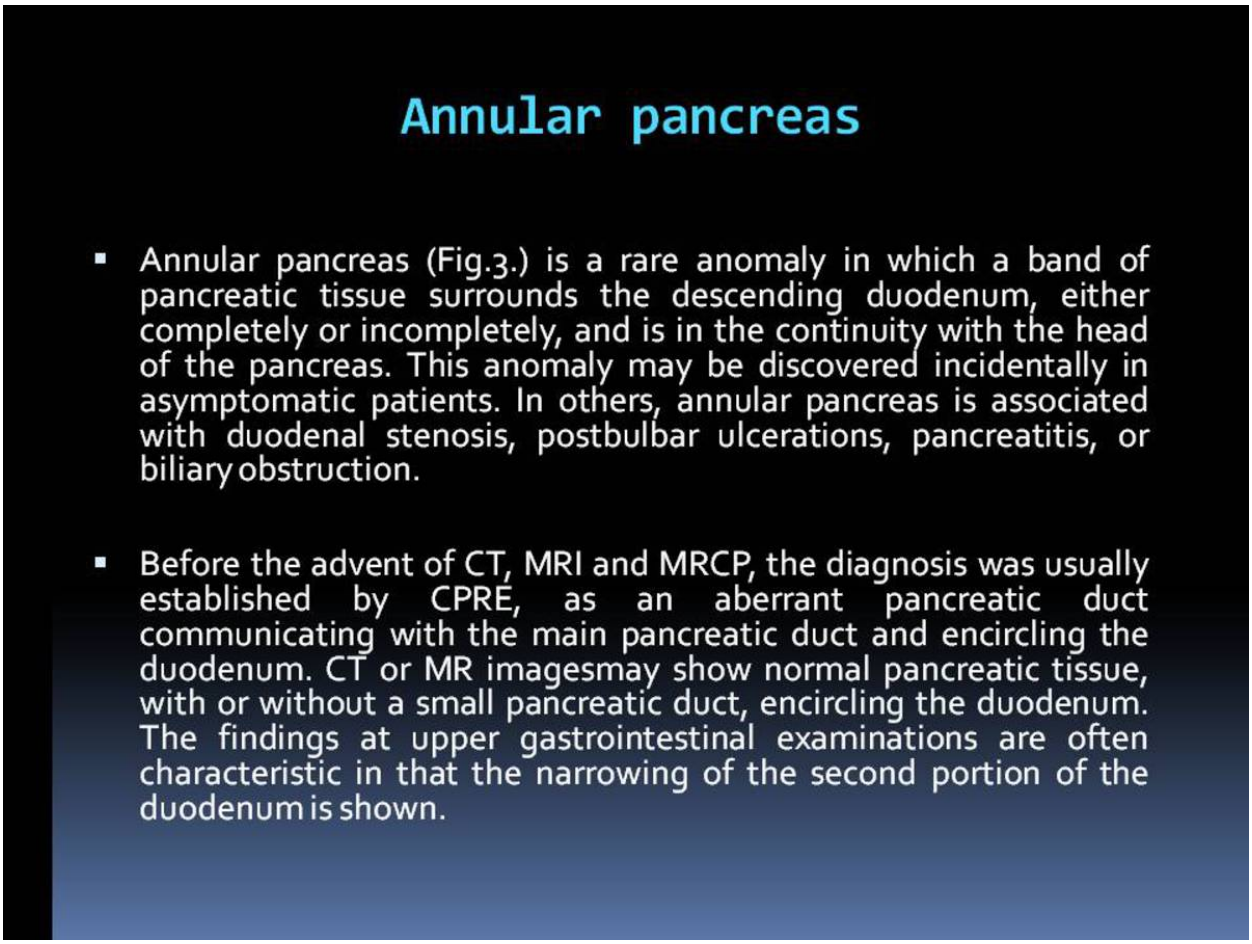
Annular pancreas
Annular pancreas (Fig.3.) is a rare anomaly in which a band of pancreatic tissue surrounds the descending duodenum, either completely or incompletely, and is in the continuity with the head of the pancreas. This anomaly may be discovered incidentally in asymptomatic patients. In others, annular pancreas is associated with duodenal stenosis, postbulbar ulcerations, pancreatitis, or biliary obstruction.
Before the advent of CT, MRI and MRCP, the diagnosis was usually established by CPRE, as an aberrant pancreatic duct communicating with the main pancreatic duct and encircling the duodenum. CT or MR imagesmay show normal pancreatic tissue, with or without a small pancreatic duct, encircling the duodenum. The findings at upper gastrointestinal examinations are often characteristic in that the narrowing of the second portion of the duodenum is shown.

Fig. 8: 8


Fig.3. Annular pancreas in a cirrhotic patient, with ascitis and obstructive jaundice caused by choledocholythiasis. Axial and coronal oblique enhanced CT images show a band of pancreatic tissue (*arrows*) encircling the descendind duodenum (*asterisk*).

Fig. 9: 9

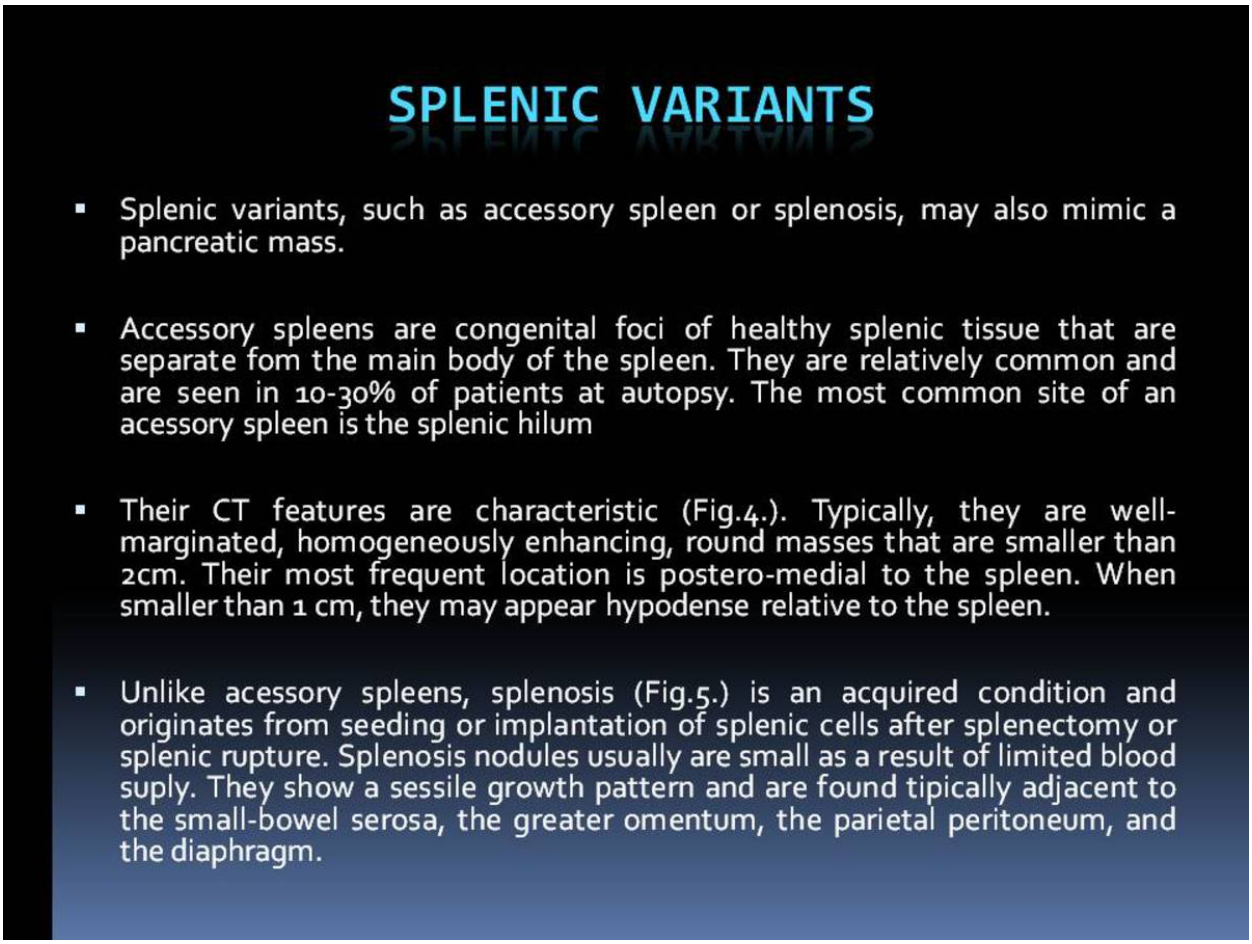
SPLENIC VARIANTS
Splenic variants, such as accessory spleen or splenosis, may also mimic a pancreatic mass.
Accessory spleens are congenital foci of healthy splenic tissue that are separate fom the main body of the spleen. They are relatively common and are seen in 10-30% of patients at autopsy. The most common site of an acessory spleen is the splenic hilum
Their CT features are characteristic (Fig.4.). Typically, they are well-marginated, homogeneously enhancing, round masses that are smaller than 2cm. Their most frequent location is postero-medial to the spleen. When smaller than 1 cm, they may appear hypodense relative to the spleen.
Unlike acessory spleens, splenosis (Fig.5.) is an acquired condition and originates from seeding or implantation of splenic cells after splenectomy or splenic rupture. Splenosis nodules usually are small as a result of limited blood suply. They show a sessile growth pattern and are found tipically adjacent to the small-bowel serosa, the greater omentum, the parietal peritoneum, and the diaphragm.

Fig. 10: 10

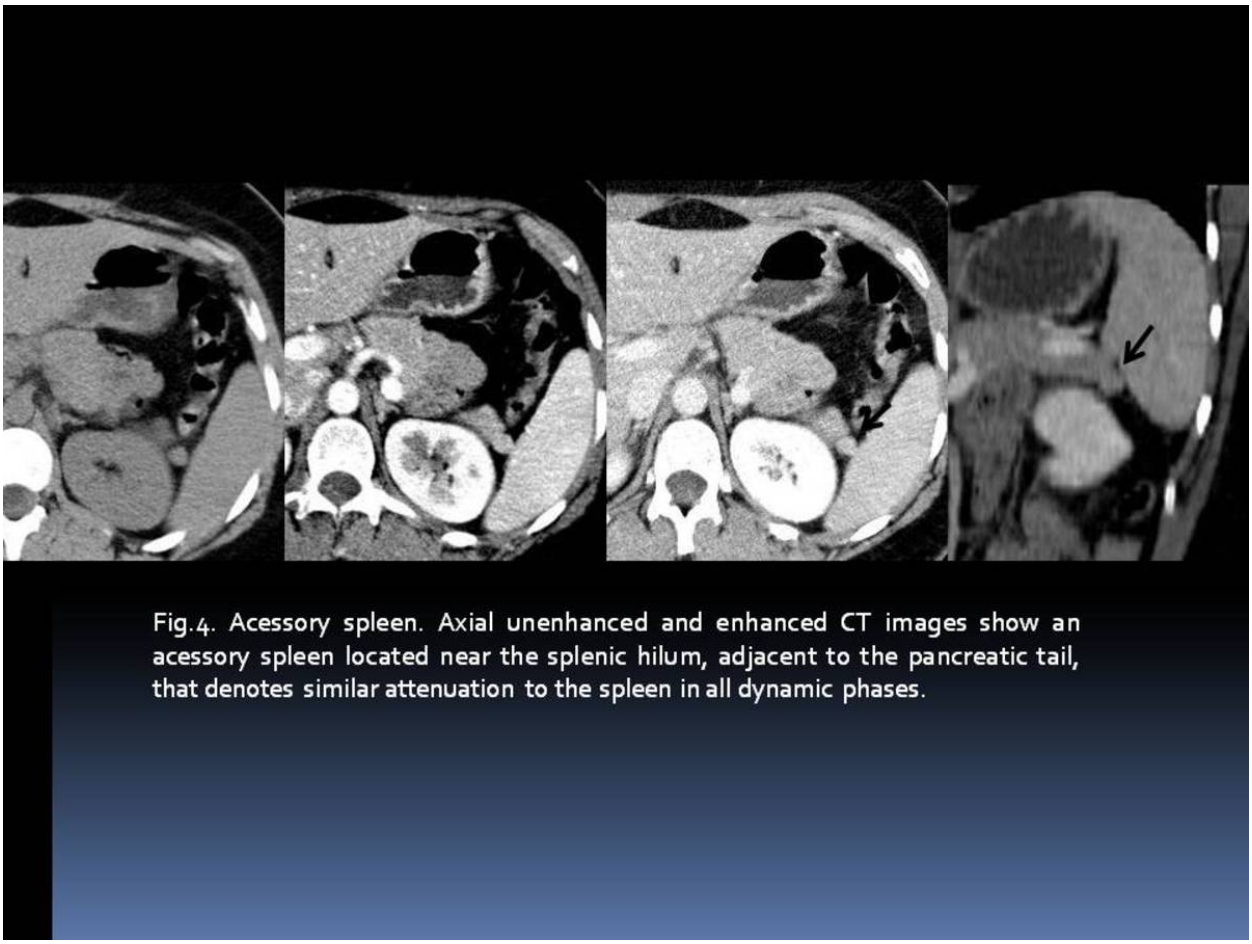
Fig.4. Acessory spleen. Axial unenhanced and enhanced CT images show an acessory spleen located near the splenic hilum, adjacent to the pancreatic tail, that denotes similar attenuation to the spleen in all dynamic phases.

Fig. 11: 11


Fig.5. Splenosis in a 60-year-old woman with previously partial gastrectomy.

Fig. 12: 12

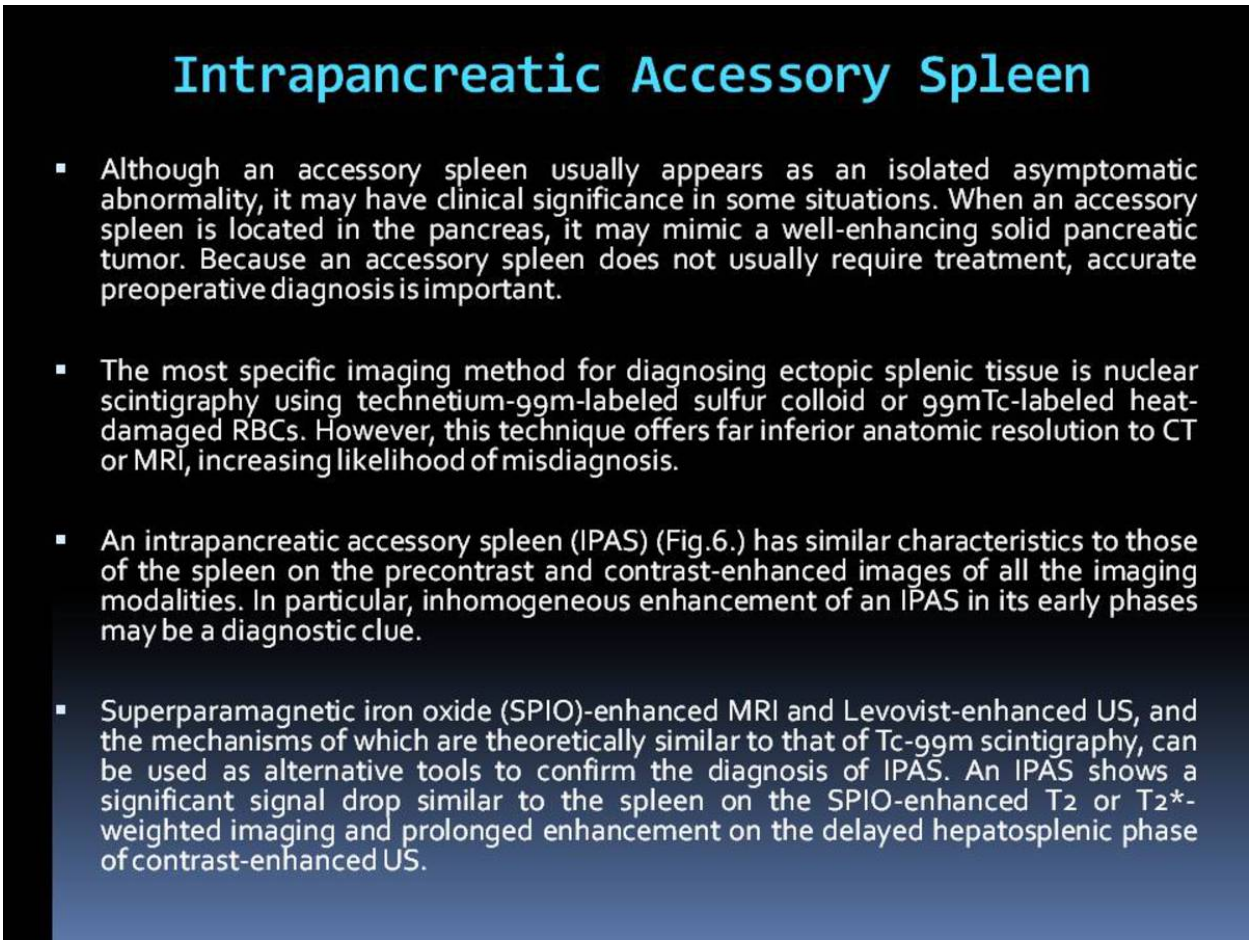
Intrapancreatic Accessory Spleen
Although an accessory spleen usually appears as an isolated asymptomatic abnormality, it may have clinical significance in some situations. When an accessory spleen is located in the pancreas, it may mimic a well-enhancing solid pancreatic tumor. Because an accessory spleen does not usually require treatment, accurate preoperative diagnosis is important.
The most specific imaging method for diagnosing ectopic splenic tissue is nuclear scintigraphy using technetium-99m-labeled sulfur colloid or 99mTc-labeled heat-damaged RBCs. However, this technique offers far inferior anatomic resolution to CT or MRI, increasing likelihood of misdiagnosis.
An intrapancreatic accessory spleen (IPAS) (Fig.6.) has similar characteristics to those of the spleen on the precontrast and contrast-enhanced images of all the imaging modalities. In particular, inhomogeneous enhancement of an IPAS in its early phases may be a diagnostic clue.
Superparamagnetic iron oxide (SPIO)-enhanced MRI and Levovist-enhanced US, and the mechanisms of which are theoretically similar to that of Tc-99m scintigraphy, can be used as alternative tools to confirm the diagnosis of IPAS. An IPAS shows a significant signal drop similar to the spleen on the SPIO-enhanced T2 or T2*-weighted imaging and prolonged enhancement on the delayed hepatosplenic phase of contrast-enhanced US.

Fig. 13: 13

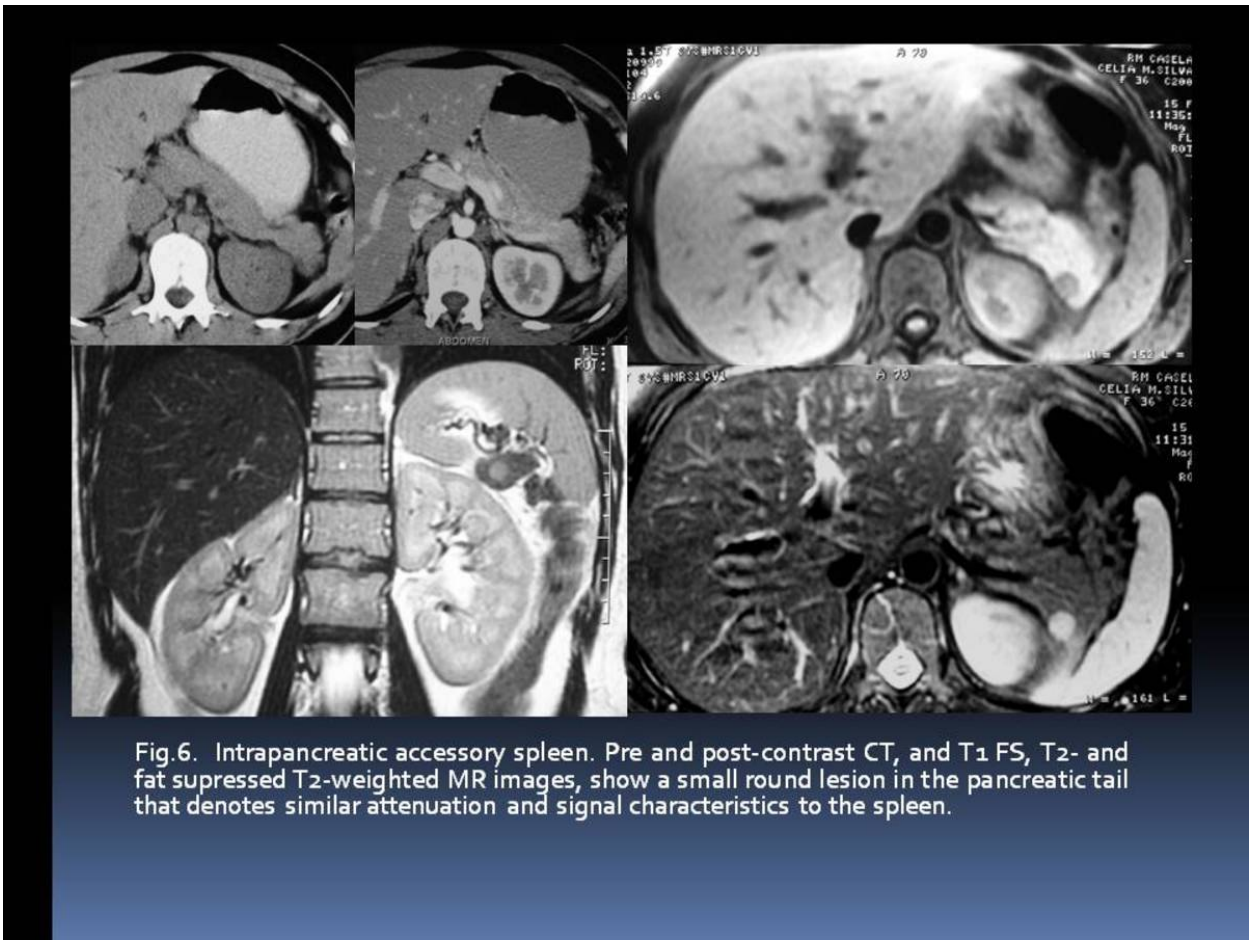

Fig.6. Intrapancreatic accessory spleen. Pre and post-contrast CT, and T1 FS, T2- and fat supressed T2-weighted MR images, show a small round lesion in the pancreatic tail that denotes similar attenuation and signal characteristics to the spleen.

Fig. 14: 14

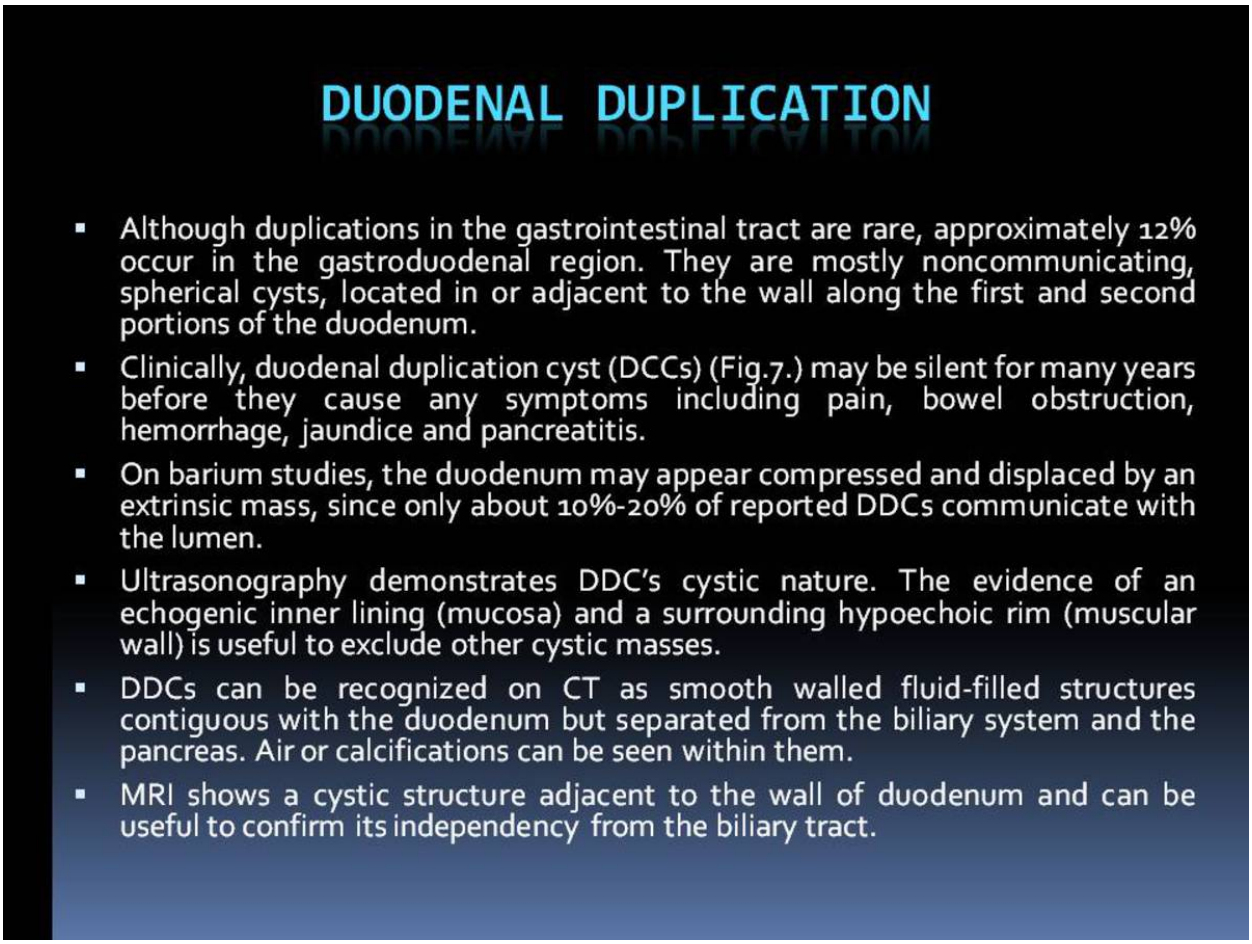
DUODENAL DUPLICATION
Although duplications in the gastrointestinal tract are rare, approximately 12% occur in the gastroduodenal region. They are mostly noncommunicating, spherical cysts, located in or adjacent to the wall along the first and second portions of the duodenum.
Clinically, duodenal duplication cyst (DCCs) (Fig.7.) may be silent for many years before they cause any symptoms including pain, bowel obstruction, hemorrhage, jaundice and pancreatitis.
On barium studies, the duodenum may appear compressed and displaced by an extrinsic mass, since only about 10%-20% of reported DDCs communicate with the lumen.
Ultrasonography demonstrates DDC's cystic nature. The evidence of an echogenic inner lining (mucosa) and a surrounding hypoechoic rim (muscular wall) is useful to exclude other cystic masses.
DDCs can be recognized on CT as smooth walled fluid-filled structures contiguous with the duodenum but separated from the biliary system and the pancreas. Air or calcifications can be seen within them.
MRI shows a cystic structure adjacent to the wall of duodenum and can be useful to confirm its independency from the biliary tract.

Fig. 15: 15

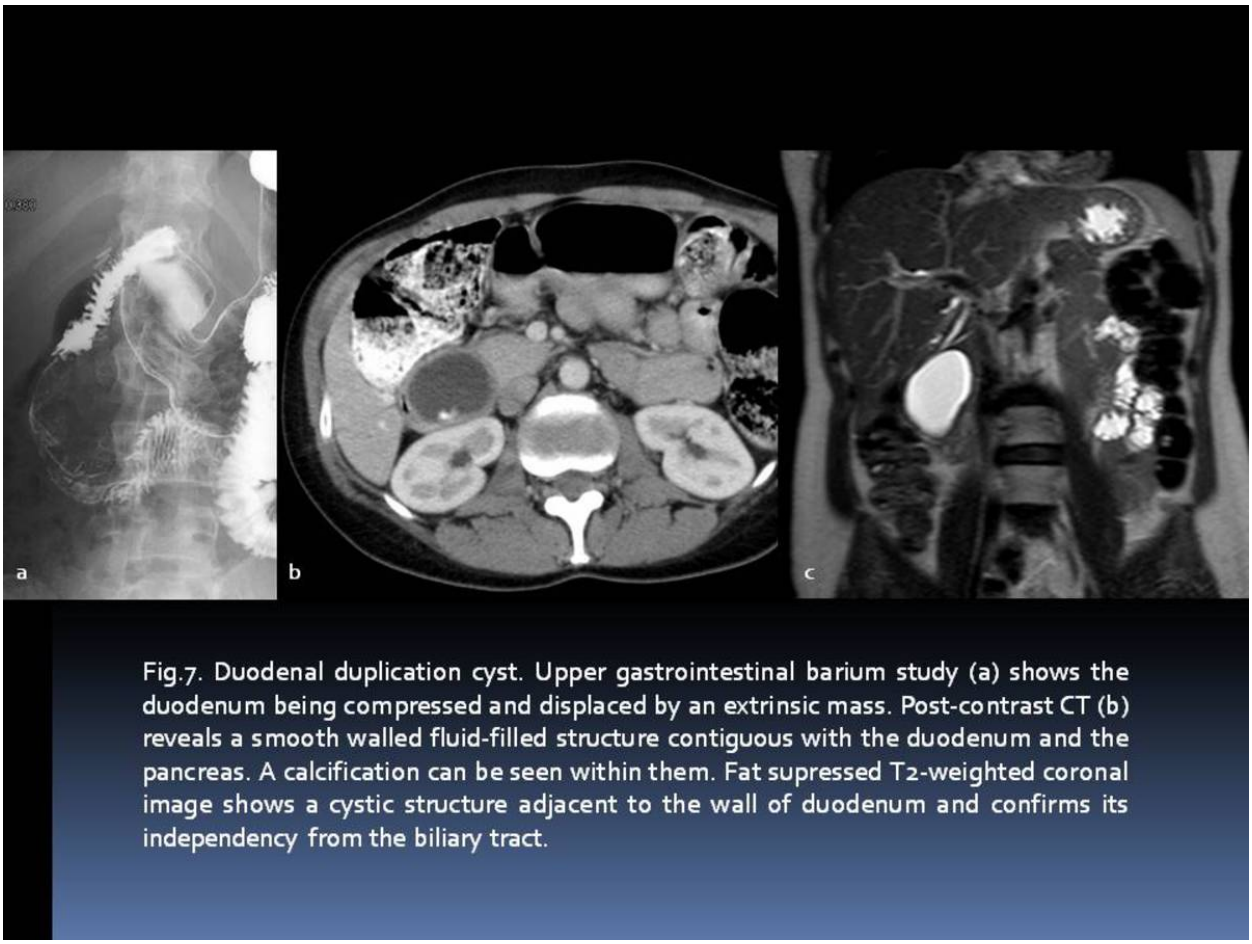
a
b
c
Fig.7. Duodenal duplication cyst. Upper gastrointestinal barium study (a) shows the duodenum being compressed and displaced by an extrinsic mass. Post-contrast CT (b) reveals a smooth walled fluid-filled structure contiguous with the duodenum and the pancreas. A calcification can be seen within them. Fat supressed T2-weighted coronal image shows a cystic structure adjacent to the wall of duodenum and confirms its independency from the biliary tract.

Fig. 16: 16

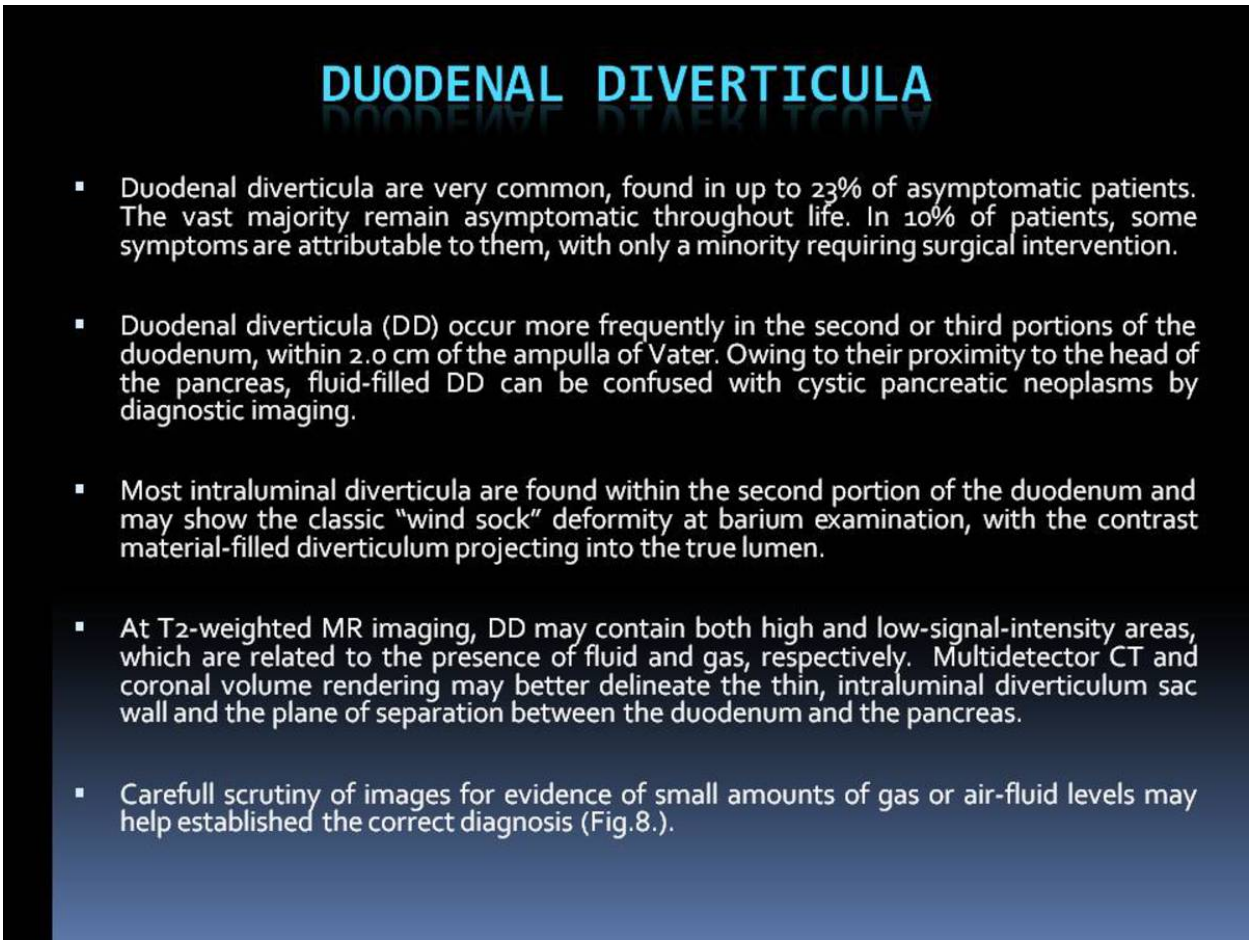
DUODENAL DIVERTICULA
Duodenal diverticula are very common, found in up to 23% of asymptomatic patients. The vast majority remain asymptomatic throughout life. In 10% of patients, some symptoms are attributable to them, with only a minority requiring surgical intervention.
Duodenal diverticula (DD) occur more frequently in the second or third portions of the duodenum, within 2.0 cm of the ampulla of Vater. Owing to their proximity to the head of the pancreas, fluid-filled DD can be confused with cystic pancreatic neoplasms by diagnostic imaging.
Most intraluminal diverticula are found within the second portion of the duodenum and may show the classic "wind sock" deformity at barium examination, with the contrast material-filled diverticulum projecting into the true lumen.
At T2-weighted MR imaging, DD may contain both high and low-signal-intensity areas, which are related to the presence of fluid and gas, respectively. Multidetector CT and coronal volume rendering may better delineate the thin, intraluminal diverticulum sac wall and the plane of separation between the duodenum and the pancreas.
Carefull scrutiny of images for evidence of small amounts of gas or air-fluid levels may help established the correct diagnosis (Fig.8.).

Fig. 17: 16

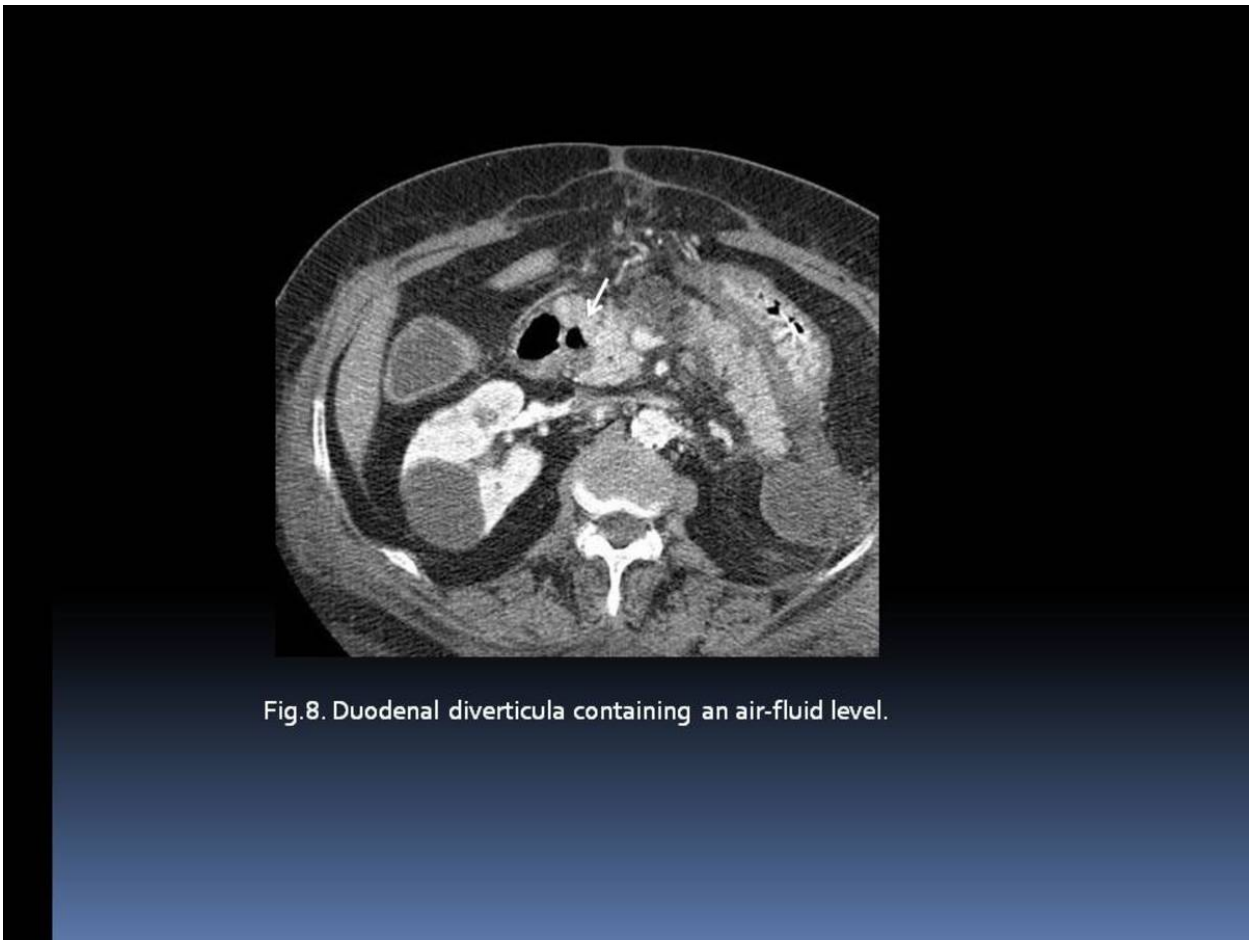

Fig. 18: 18

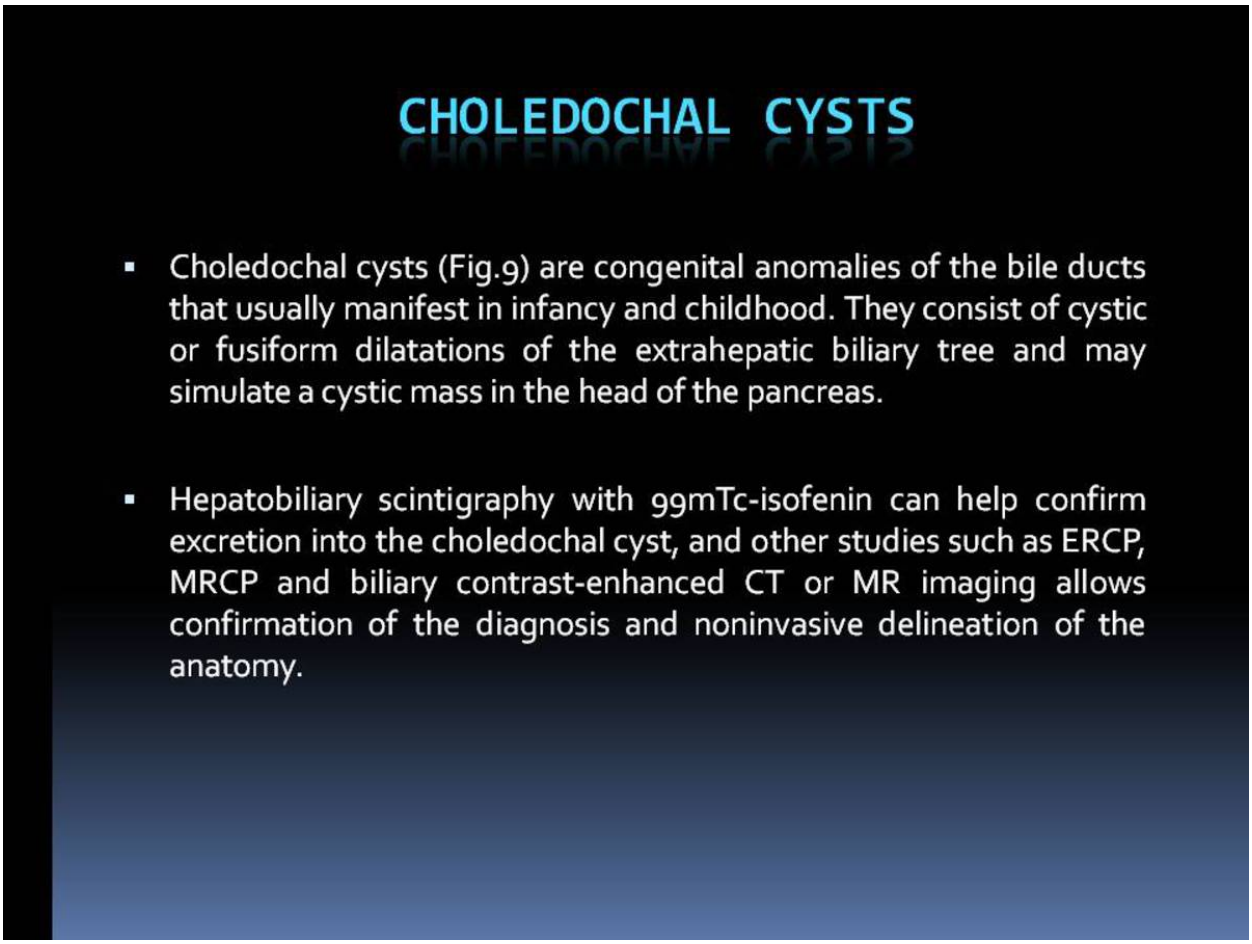
CHOLEDOCHAL CYSTS
Choledochal cysts (Fig.9) are congenital anomalies of the bile ducts that usually manifest in infancy and childhood. They consist of cystic or fusiform dilatations of the extrahepatic biliary tree and may simulate a cystic mass in the head of the pancreas.
Hepatobiliary scintigraphy with 99mTc-isofenin can help confirm excretion into the choledochal cyst, and other studies such as ERCP, MRCP and biliary contrast-enhanced CT or MR imaging allows confirmation of the diagnosis and noninvasive delineation of the anatomy.

Fig. 19: 19

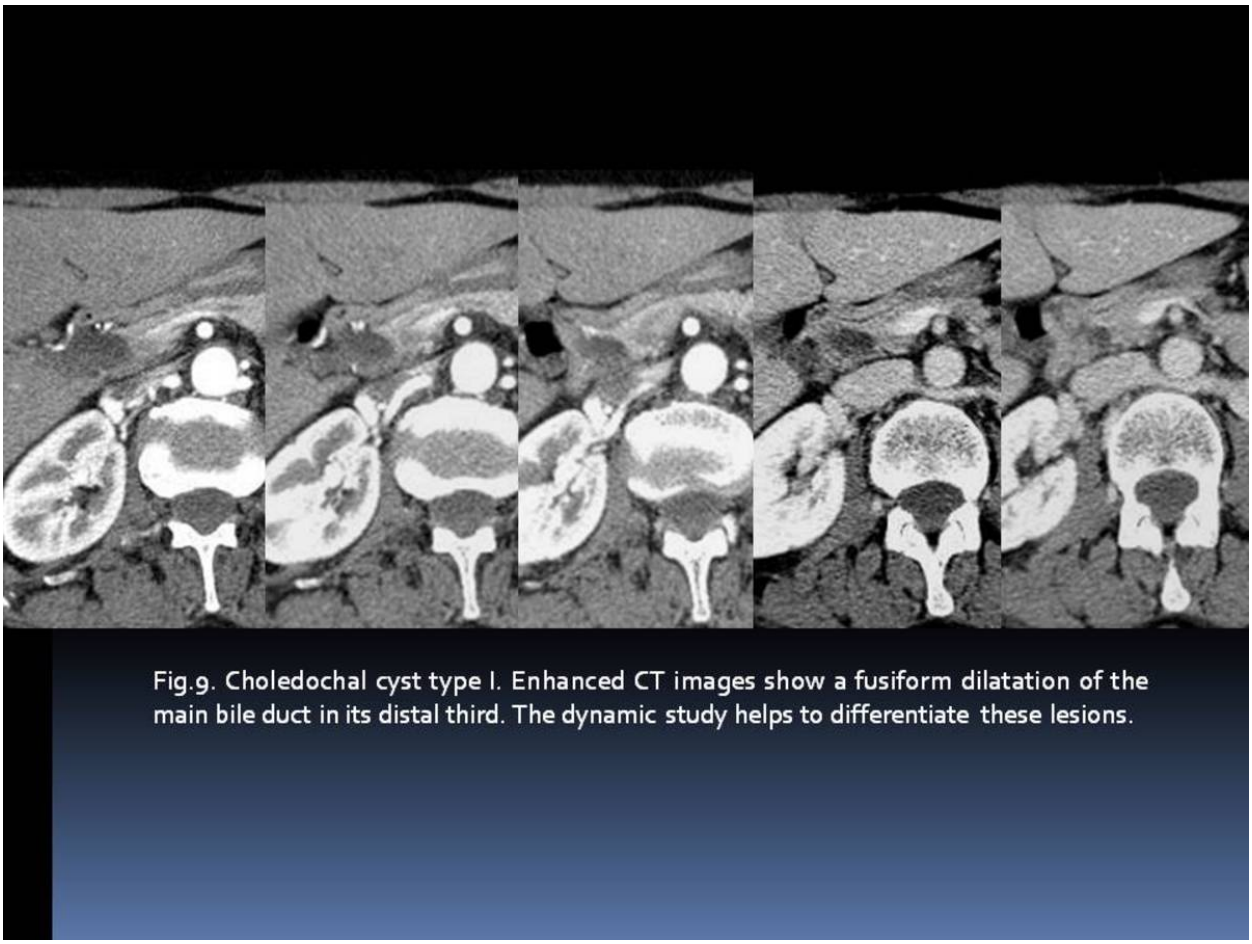
Fig.9. Choledochal cyst type I. Enhanced CT images show a fusiform dilatation of the main bile duct in its distal third. The dynamic study helps to differentiate these lesions.

Fig. 20: 20

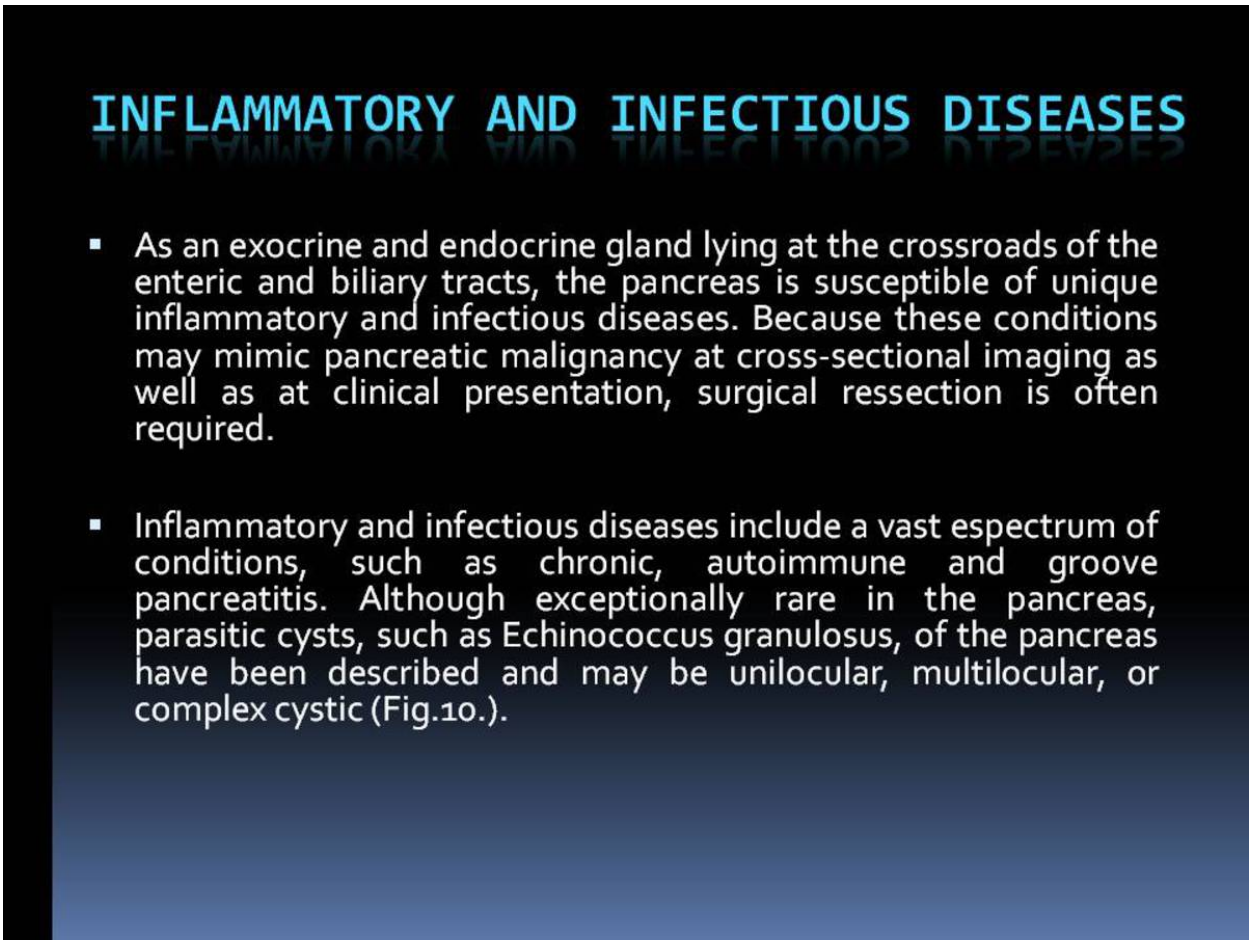
INFLAMMATORY AND INFECTIOUS DISEASES
As an exocrine and endocrine gland lying at the crossroads of the enteric and biliary tracts, the pancreas is susceptible of unique inflammatory and infectious diseases. Because these conditions may mimic pancreatic malignancy at cross-sectional imaging as well as at clinical presentation, surgical ressection is often required.
Inflammatory and infectious diseases include a vast espectrum of conditions, such as chronic, autoimmune and groove pancreatitis. Although exceptionally rare in the pancreas, parasitic cysts, such as Echinococcus granulosus, of the pancreas have been described and may be unilocular, multilocular, or complex cystic (Fig.10.).

Fig. 21: 21

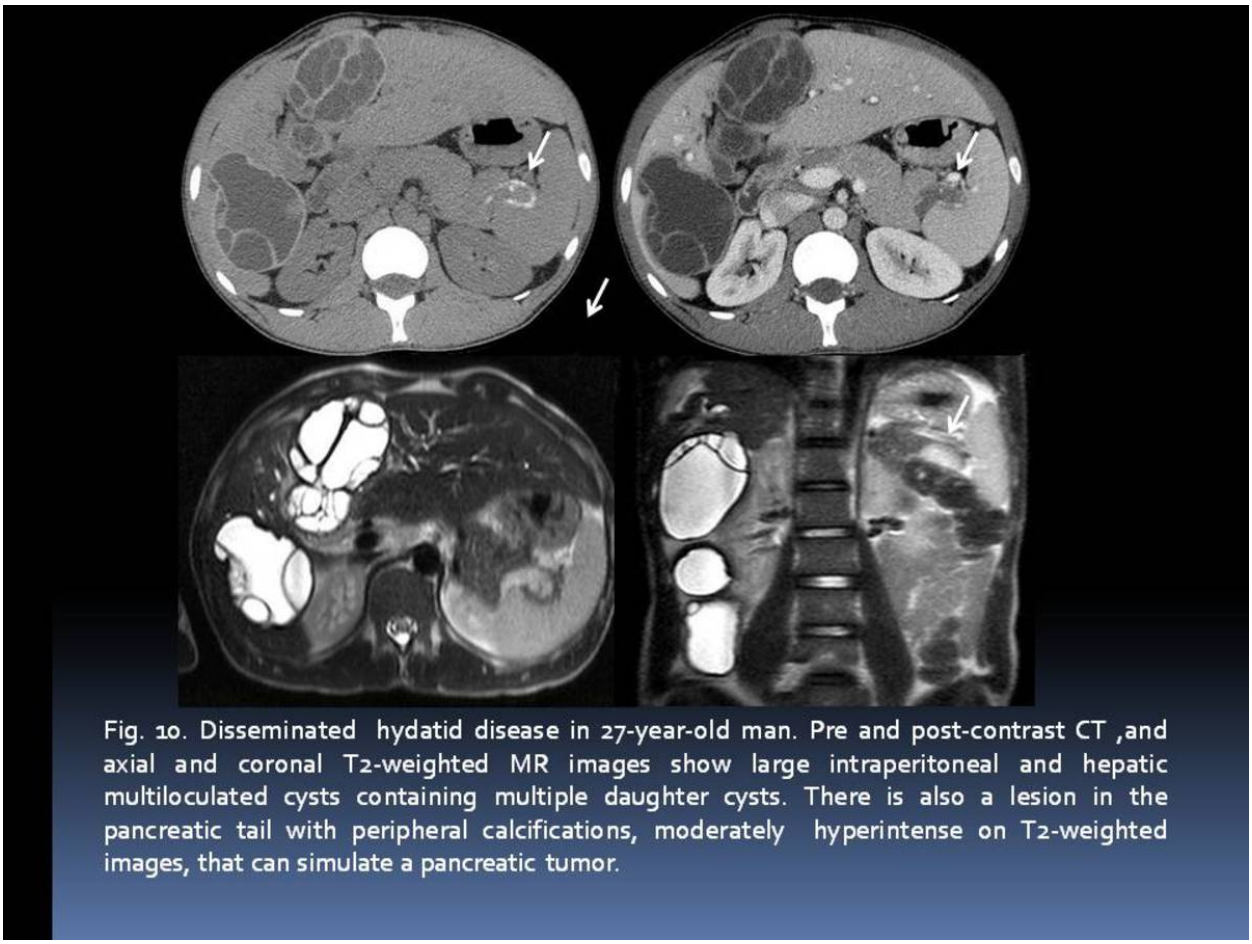
Fig. 10. Disseminated hydatid disease in 27-year-old man. Pre and post-contrast CT ,and axial and coronal T2-weighted MR images show large intraperitoneal and hepatic multiloculated cysts containing multiple daughter cysts. There is also a lesion in the pancreatic tail with peripheral calcifications, moderately hyperintense on T2-weighted images, that can simulate a pancreatic tumor.

Fig. 22: 22

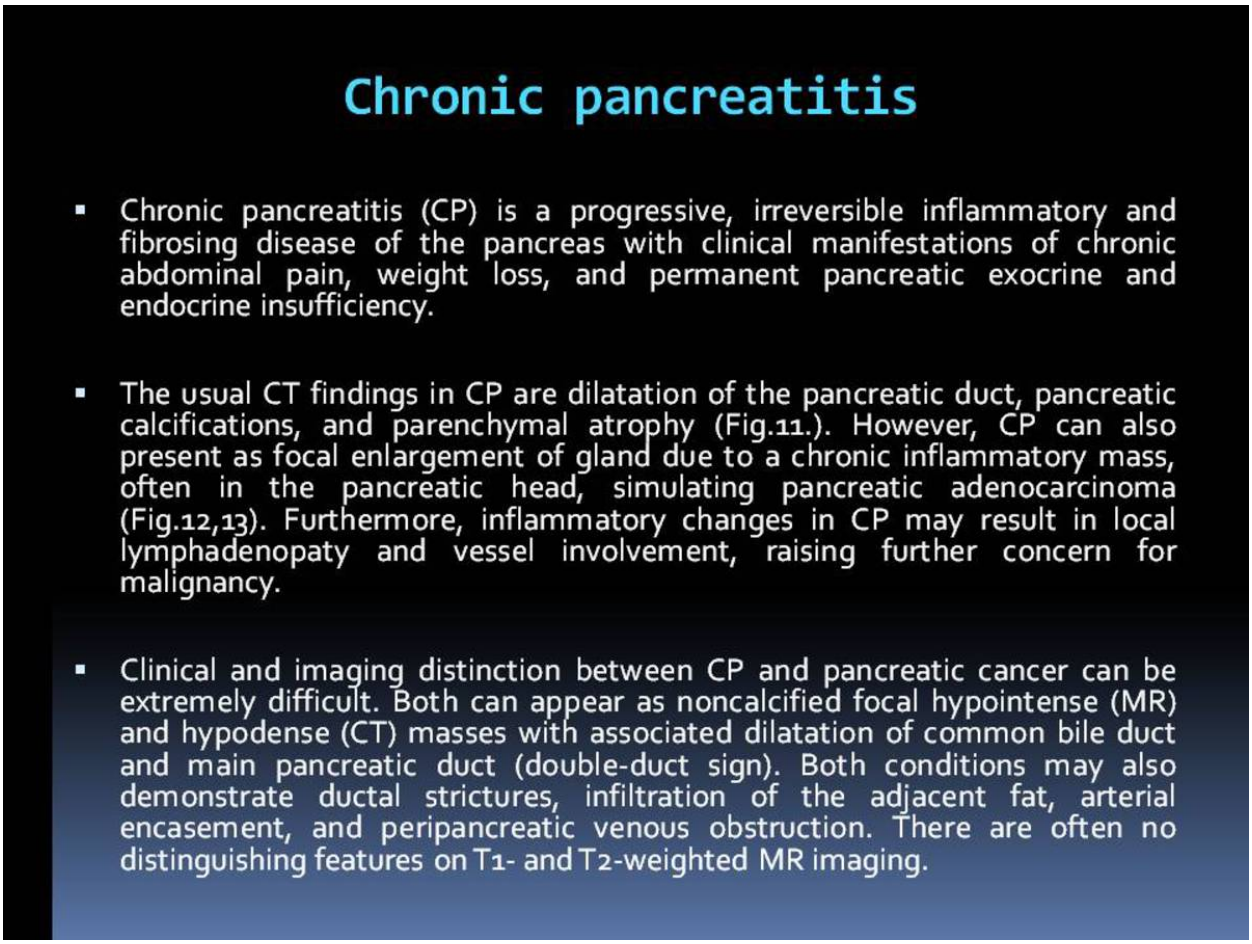
Chronic pancreatitis
Chronic pancreatitis (CP) is a progressive, irreversible inflammatory and fibrosing disease of the pancreas with clinical manifestations of chronic abdominal pain, weight loss, and permanent pancreatic exocrine and endocrine insufficiency.
The usual CT findings in CP are dilatation of the pancreatic duct, pancreatic calcifications, and parenchymal atrophy (Fig.11.). However, CP can also present as focal enlargement of gland due to a chronic inflammatory mass, often in the pancreatic head, simulating pancreatic adenocarcinoma (Fig.12,13). Furthermore, inflammatory changes in CP may result in local lymphadenopaty and vessel involvement, raising further concern for malignancy.
Clinical and imaging distinction between CP and pancreatic cancer can be extremely difficult. Both can appear as noncalcified focal hypointense (MR) and hypodense (CT) masses with associated dilatation of common bile duct and main pancreatic duct (double-duct sign). Both conditions may also demonstrate ductal strictures, infiltration of the adjacent fat, arterial encasement, and peripancreatic venous obstruction. There are often no distinguishing features on T1- and T2-weighted MR imaging.

Fig. 23: 23

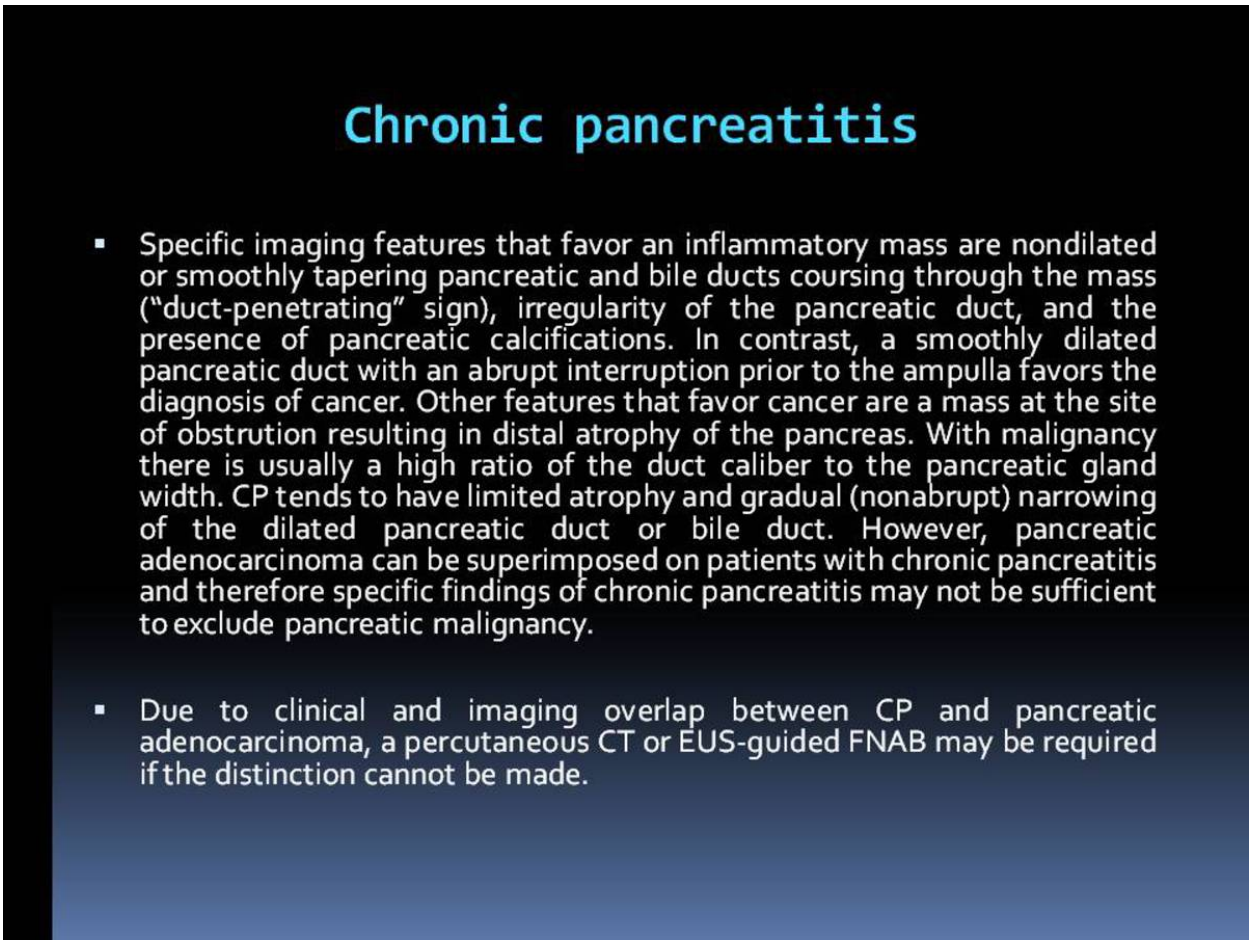
Chronic pancreatitis
Specific imaging features that favor an inflammatory mass are nondilated or smoothly tapering pancreatic and bile ducts coursing through the mass ("duct-penetrating" sign), irregularity of the pancreatic duct, and the presence of pancreatic calcifications. In contrast, a smoothly dilated pancreatic duct with an abrupt interruption prior to the ampulla favors the diagnosis of cancer. Other features that favor cancer are a mass at the site of obstrution resulting in distal atrophy of the pancreas. With malignancy there is usually a high ratio of the duct caliber to the pancreatic gland width. CP tends to have limited atrophy and gradual (nonabrupt) narrowing of the dilated pancreatic duct or bile duct. However, pancreatic adenocarcinoma can be superimposed on patients with chronic pancreatitis and therefore specific findings of chronic pancreatitis may not be sufficient to exclude pancreatic malignancy.
Due to clinical and imaging overlap between CP and pancreatic adenocarcinoma, a percutaneous CT or EUS-guided FNAB may be required if the distinction cannot be made.

Fig. 24: 24

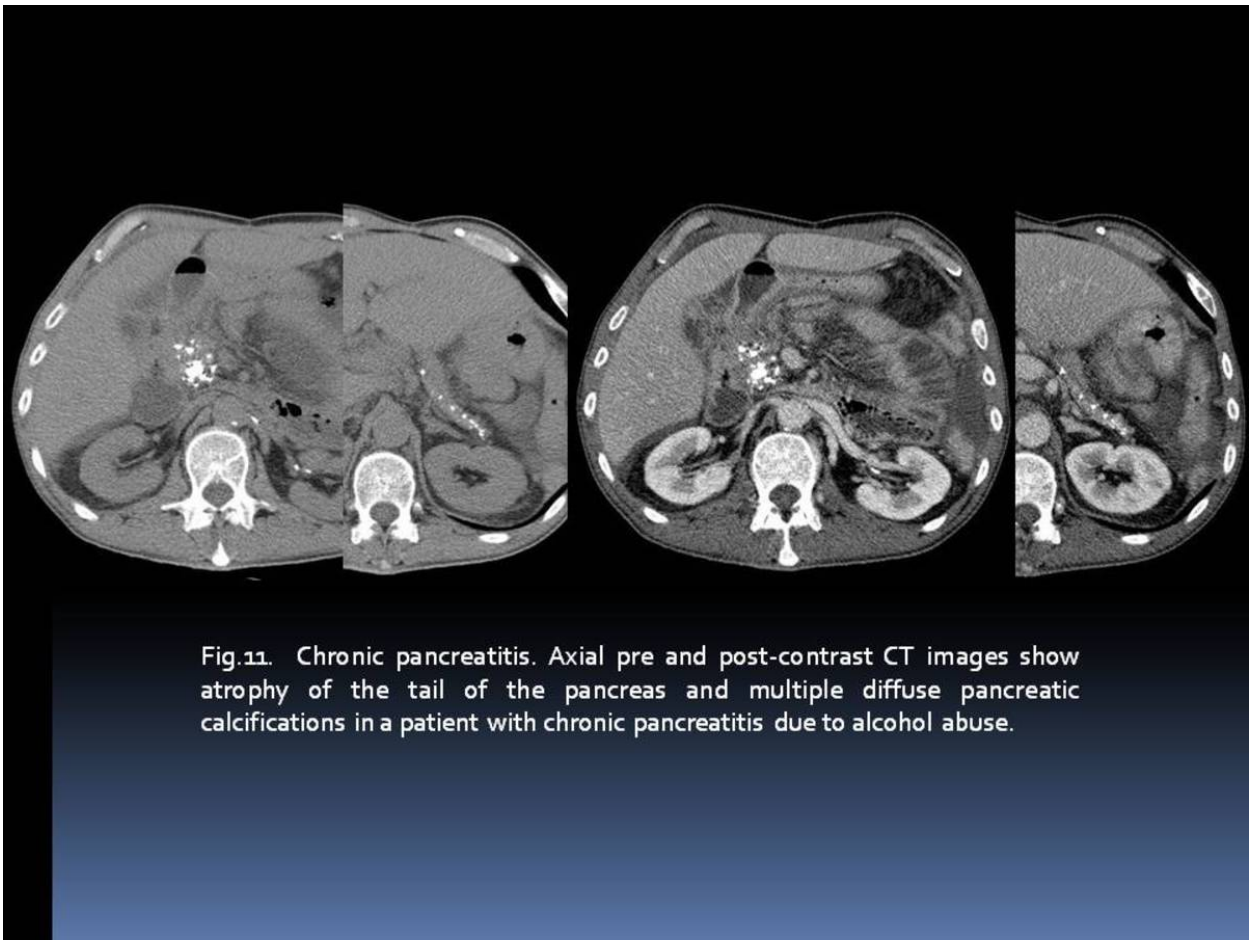
Fig.11. Chronic pancreatitis. Axial pre and post-contrast CT images show atrophy of the tail of the pancreas and multiple diffuse pancreatic calcifications in a patient with chronic pancreatitis due to alcohol abuse.

Fig. 25: 25

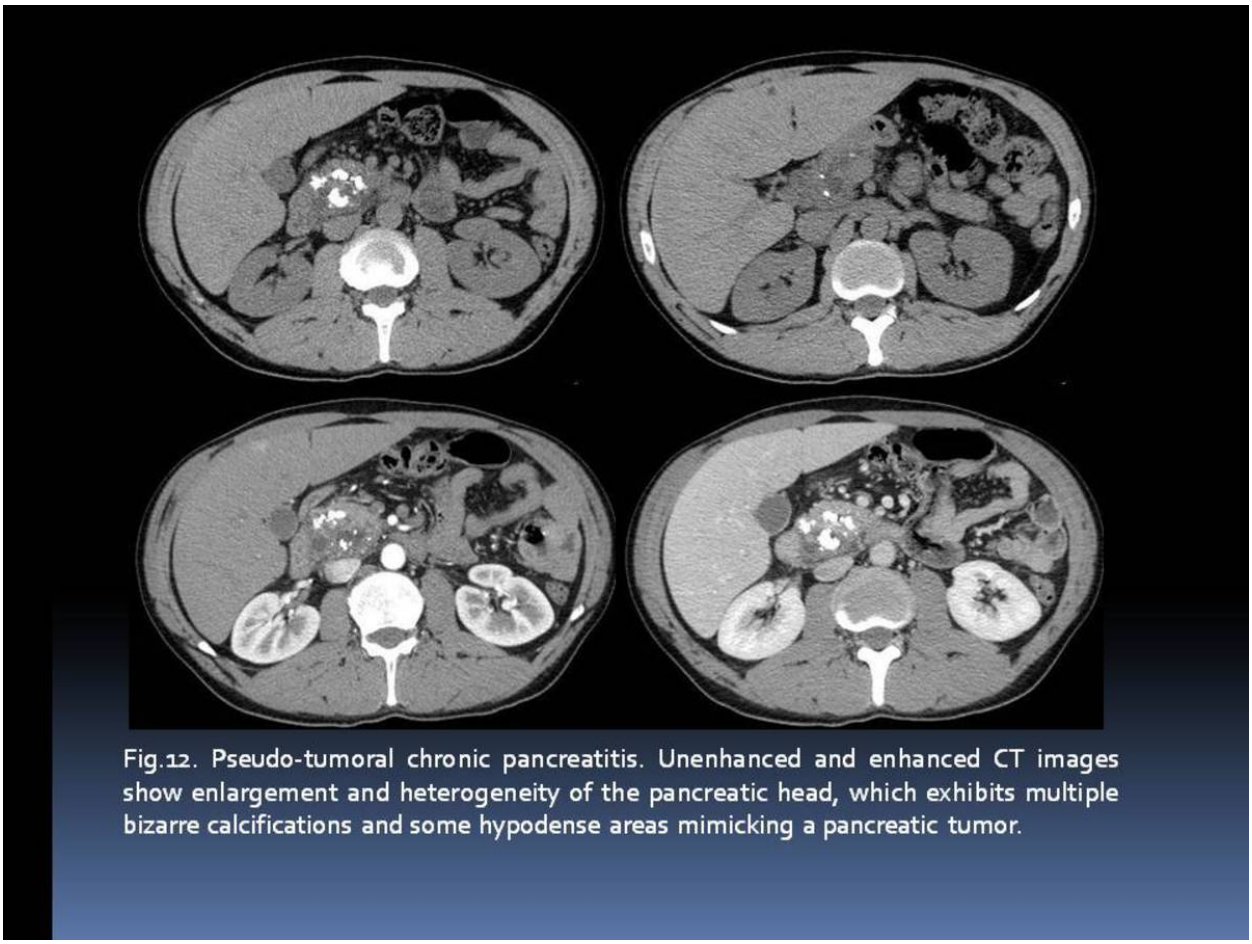
Fig.12. Pseudo-tumoral chronic pancreatitis. Unenhanced and enhanced CT images show enlargement and heterogeneity of the pancreatic head, which exhibits multiple bizarre calcifications and some hypodense areas mimicking a pancreatic tumor.

Fig. 26: 26

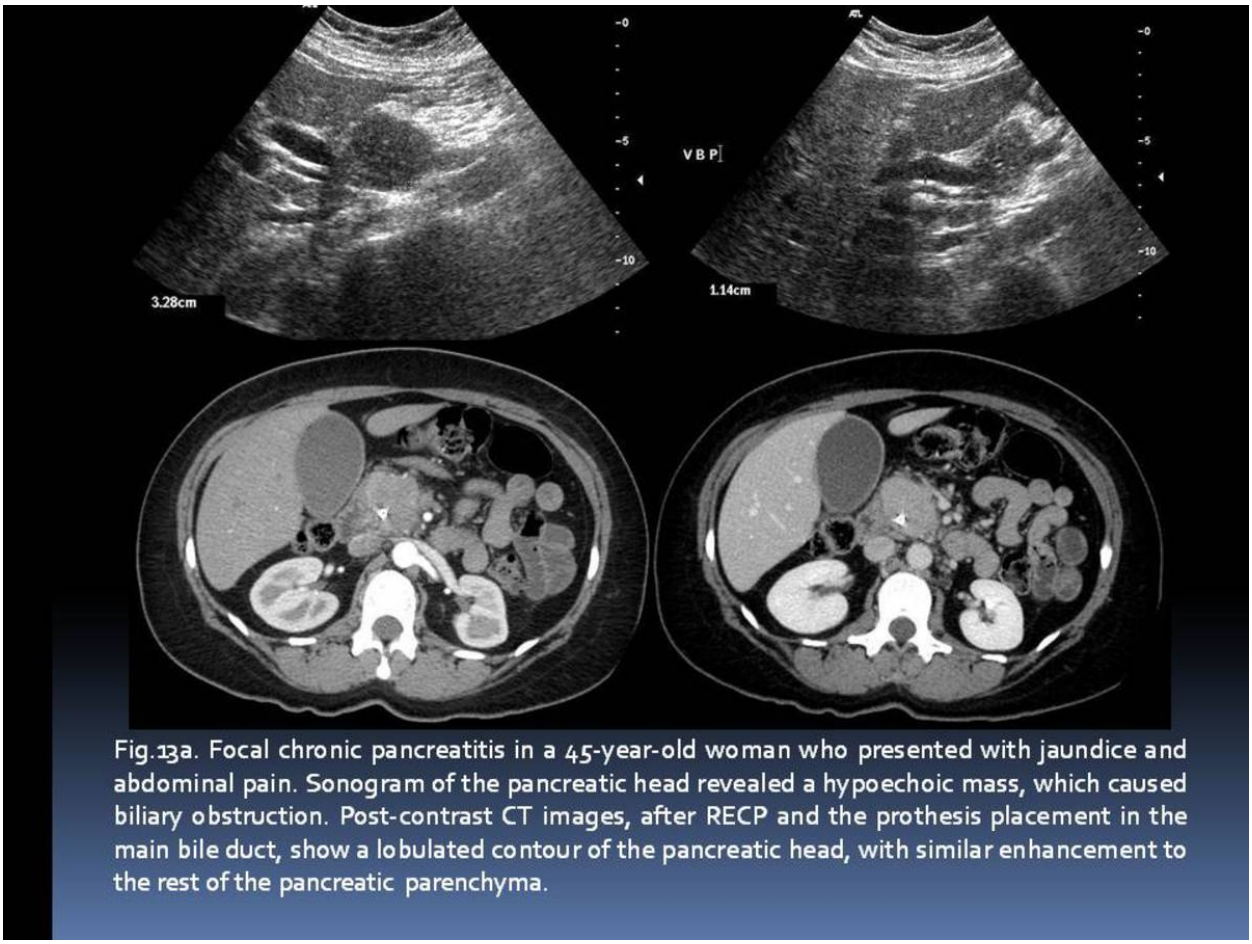
3.28cm
VBP
1.14cm
Fig.13a. Focal chronic pancreatitis in a 45-year-old woman who presented with jaundice and abdominal pain. Sonogram of the pancreatic head revealed a hypoechoic mass, which caused biliary obstruction. Post-contrast CT images, after RECP and the prothesis placement in the main bile duct, show a lobulated contour of the pancreatic head, with similar enhancement to the rest of the pancreatic parenchyma.

Fig. 27: 27

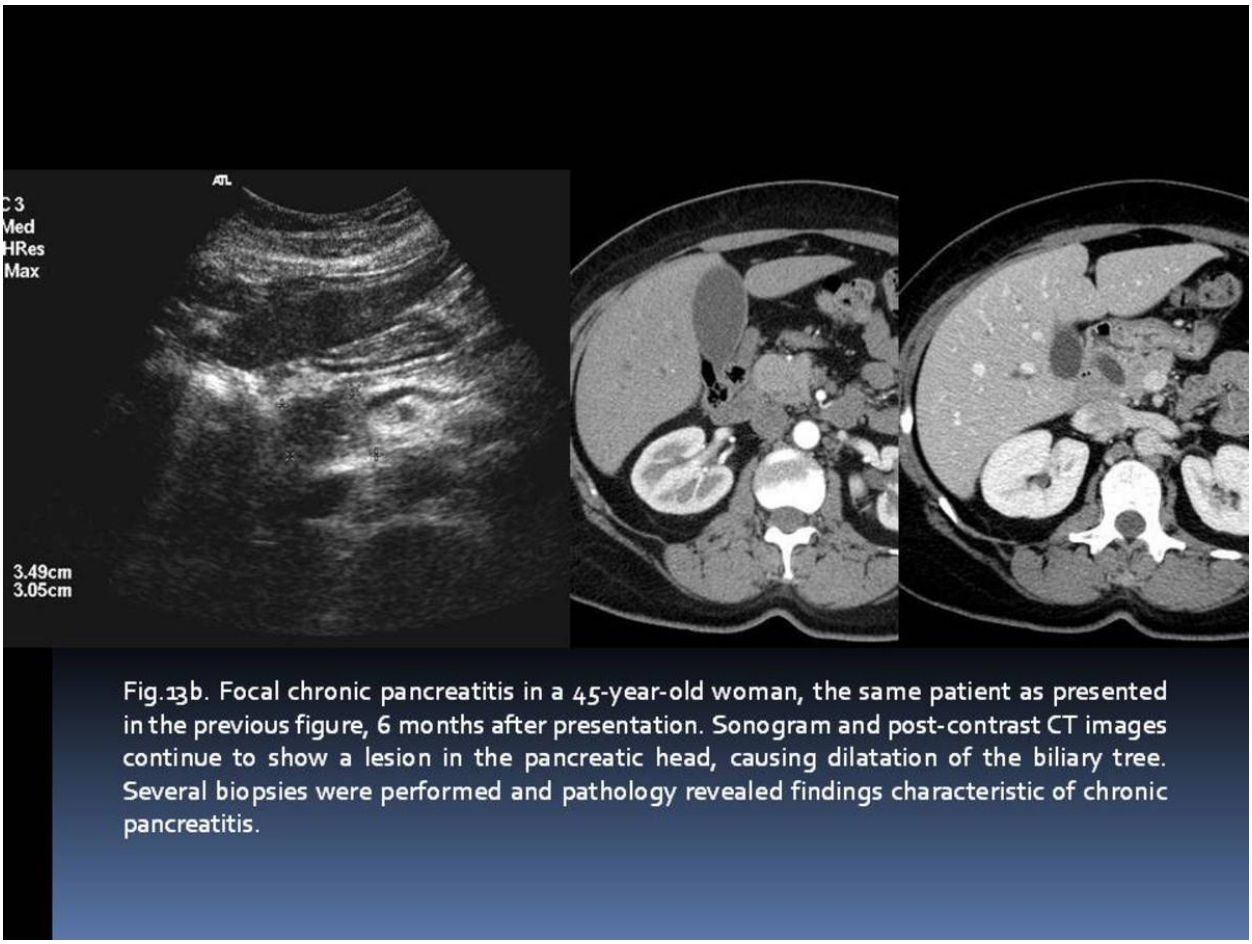
C3
Med
HRes
Max
3.49cm
3.05cm
Fig.13b. Focal chronic pancreatitis in a 45-year-old woman, the same patient as presented in the previous figure, 6 months after presentation. Sonogram and post-contrast CT images continue to show a lesion in the pancreatic head, causing dilatation of the biliary tree. Several biopsies were performed and pathology revealed findings characteristic of chronic pancreatitis.

Fig. 28: 28

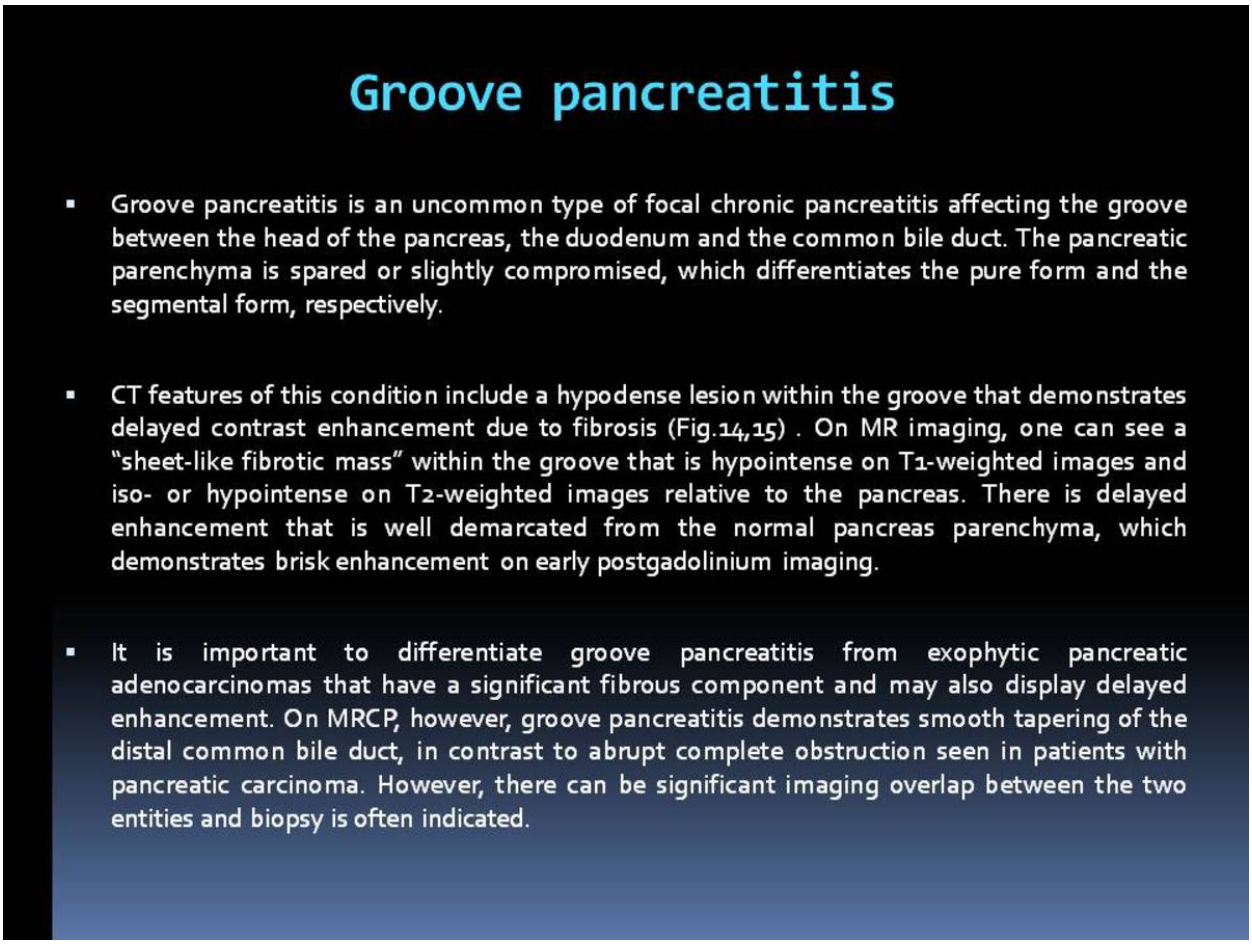
Groove pancreatitis
Groove pancreatitis is an uncommon type of focal chronic pancreatitis affecting the groove between the head of the pancreas, the duodenum and the common bile duct. The pancreatic parenchyma is spared or slightly compromised, which differentiates the pure form and the segmental form, respectively.
CT features of this condition include a hypodense lesion within the groove that demonstrates delayed contrast enhancement due to fibrosis (Fig.14,15) . On MR imaging, one can see a "sheet-like fibrotic mass" within the groove that is hypointense on T1-weighted images and iso- or hypointense on T2-weighted images relative to the pancreas. There is delayed enhancement that is well demarcated from the normal pancreas parenchyma, which demonstrates brisk enhancement on early postgadolinium imaging.
It is important to differentiate groove pancreatitis from exophytic pancreatic adenocarcinomas that have a significant fibrous component and may also display delayed enhancement. On MRCP, however, groove pancreatitis demonstrates smooth tapering of the distal common bile duct, in contrast to abrupt complete obstruction seen in patients with pancreatic carcinoma. However, there can be significant imaging overlap between the two entities and biopsy is often indicated.

Fig. 29: 29

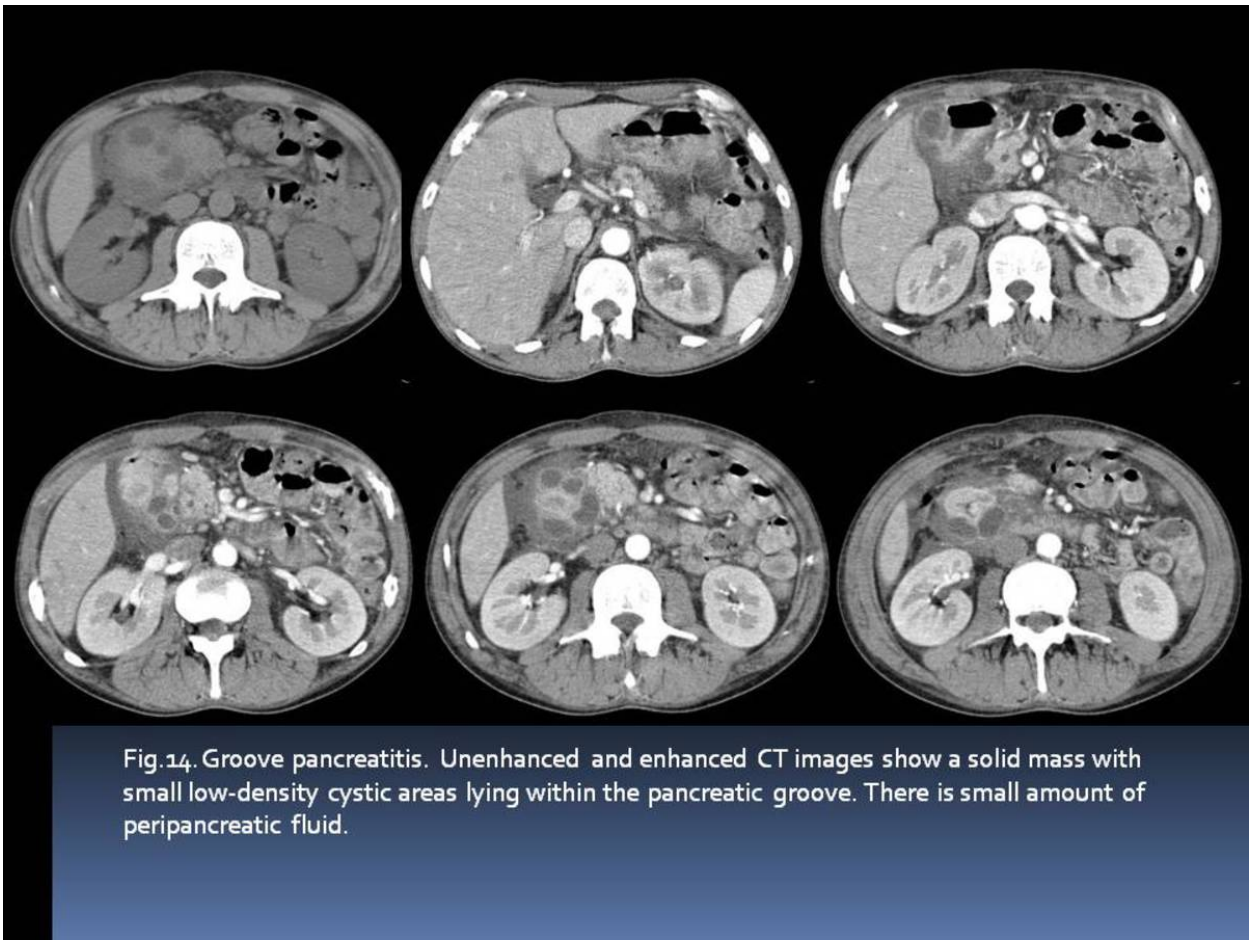
Fig.14. Groove pancreatitis. Unenhanced and enhanced CT images show a solid mass with small low-density cystic areas lying within the pancreatic groove. There is small amount of peripancreatic fluid.

Fig. 30: 30

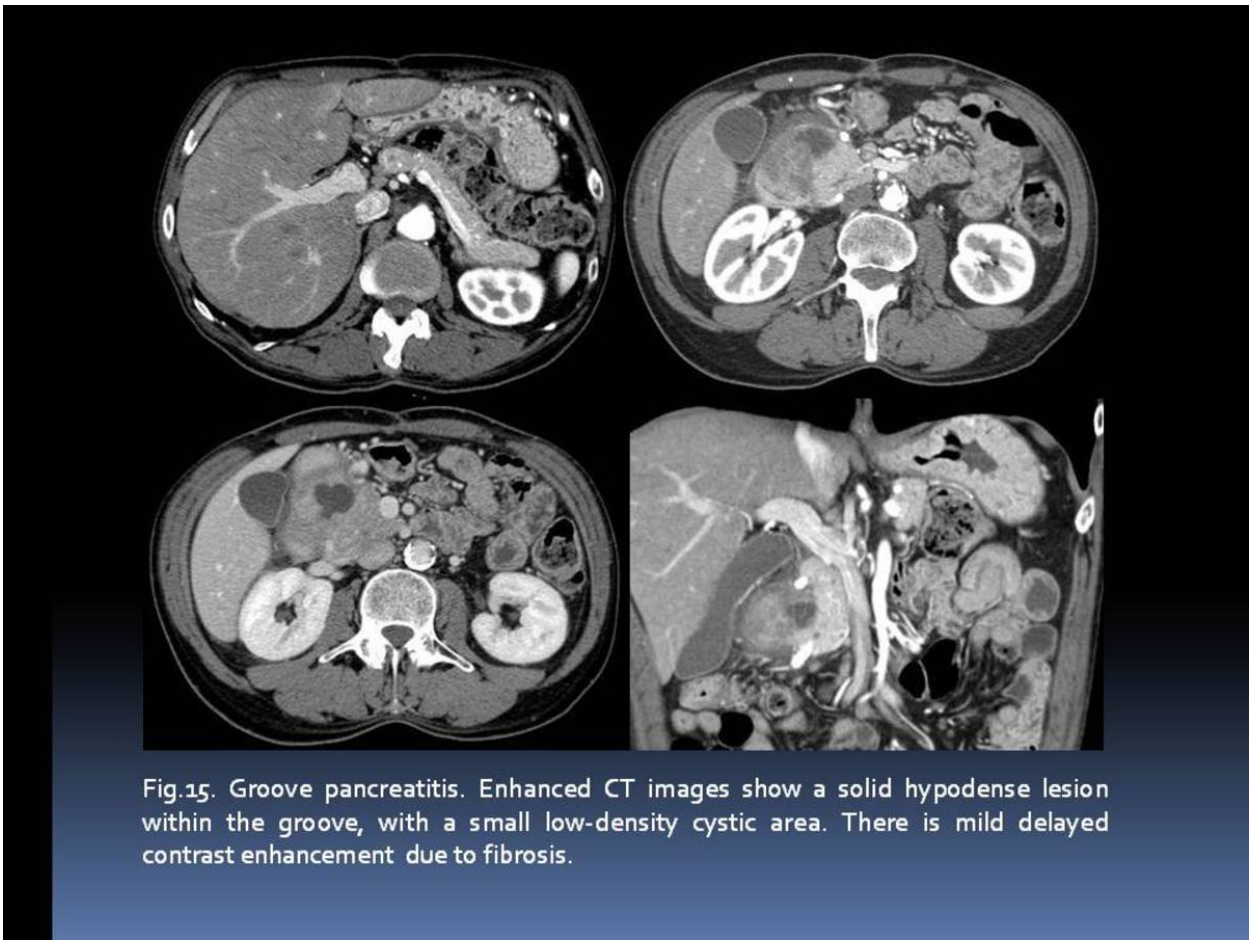
Fig.15. Groove pancreatitis. Enhanced CT images show a solid hypodense lesion within the groove, with a small low-density cystic area. There is mild delayed contrast enhancement due to fibrosis.

Fig. 31: 31

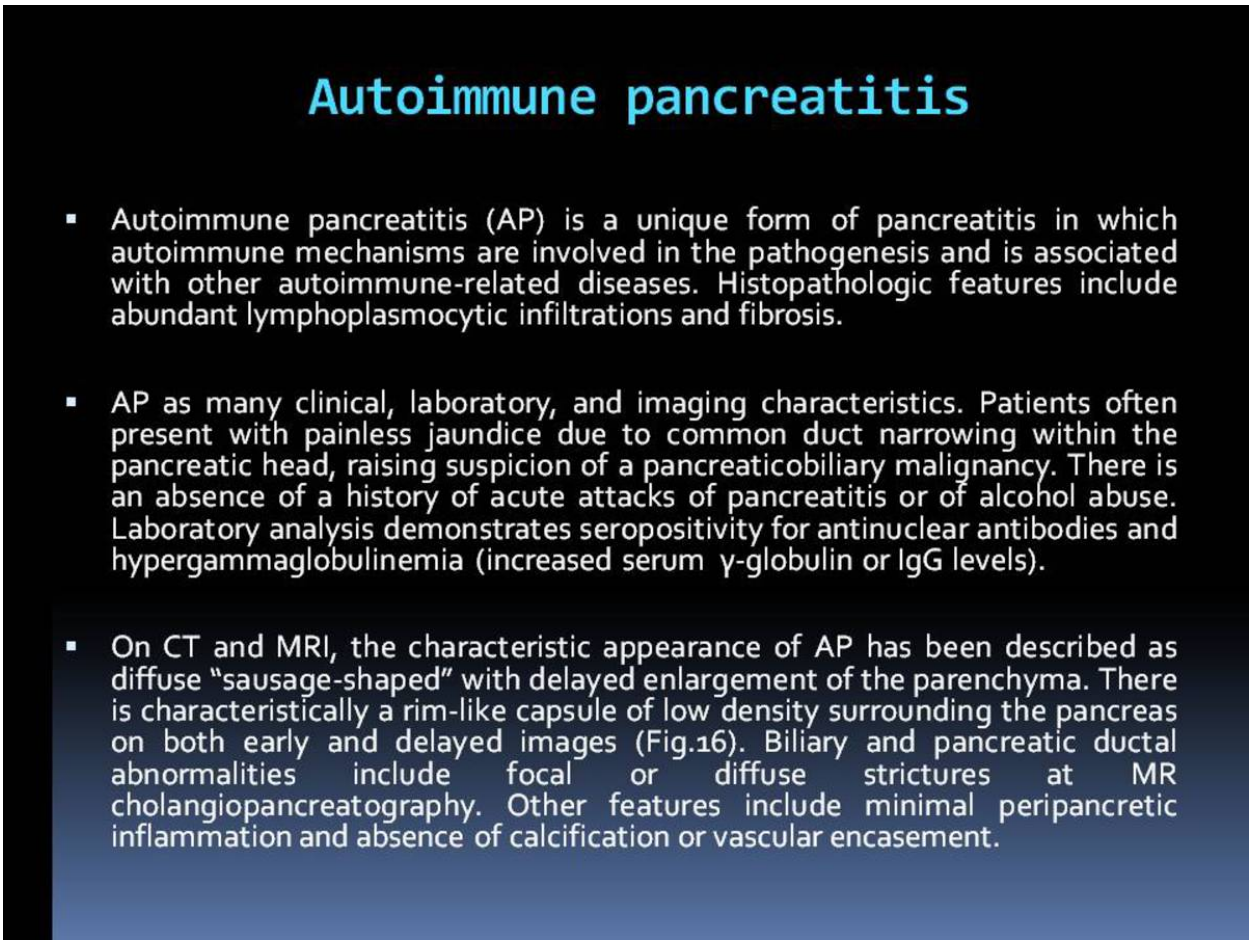
Autoimmune pancreatitis
Autoimmune pancreatitis (AP) is a unique form of pancreatitis in which autoimmune mechanisms are involved in the pathogenesis and is associated with other autoimmune-related diseases. Histopathologic features include abundant lymphoplasmocytic infiltrations and fibrosis.
AP as many clinical, laboratory, and imaging characteristics. Patients often present with painless jaundice due to common duct narrowing within the pancreatic head, raising suspicion of a pancreaticobiliary malignancy. There is an absence of a history of acute attacks of pancreatitis or of alcohol abuse. Laboratory analysis demonstrates seropositivity for antinuclear antibodies and hypergammaglobulinemia (increased serum γ-globulin or IgG levels).
On CT and MRI, the characteristic appearance of AP has been described as diffuse "sausage-shaped" with delayed enlargement of the parenchyma. There is characteristically a rim-like capsule of low density surrounding the pancreas on both early and delayed images (Fig.16). Biliary and pancreatic ductal abnormalities include focal or diffuse strictures at MR cholangiopancreatography. Other features include minimal peripancretic inflammation and absence of calcification or vascular encasement.

Fig. 32: 32

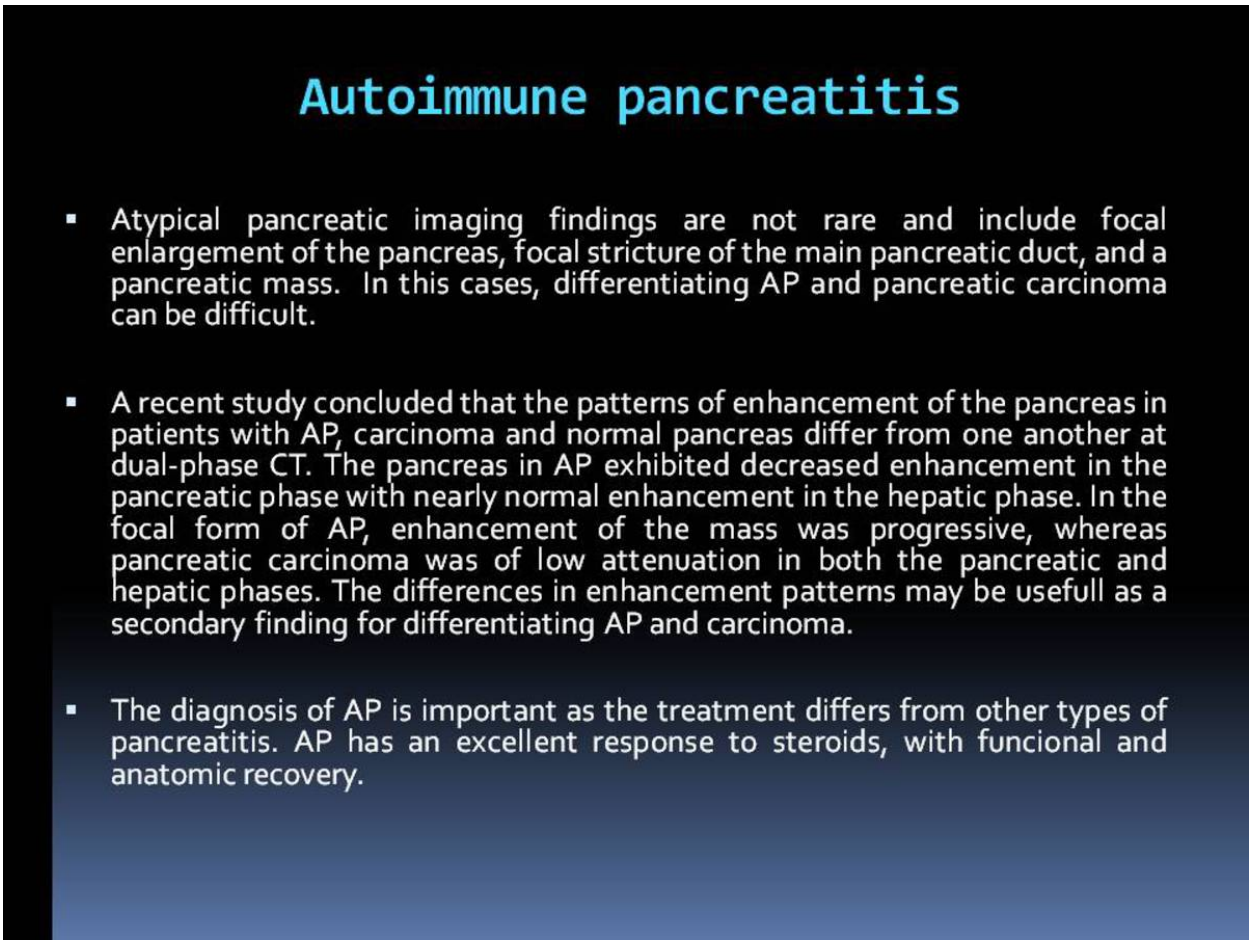
Autoimmune pancreatitis
Atypical pancreatic imaging findings are not rare and include focal enlargement of the pancreas, focal stricture of the main pancreatic duct, and a pancreatic mass. In this cases, differentiating AP and pancreatic carcinoma can be difficult.
A recent study concluded that the patterns of enhancement of the pancreas in patients with AP, carcinoma and normal pancreas differ from one another at dual-phase CT. The pancreas in AP exhibited decreased enhancement in the pancreatic phase with nearly normal enhancement in the hepatic phase. In the focal form of AP, enhancement of the mass was progressive, whereas pancreatic carcinoma was of low attenuation in both the pancreatic and hepatic phases. The differences in enhancement patterns may be usefull as a secondary finding for differentiating AP and carcinoma.
The diagnosis of AP is important as the treatment differs from other types of pancreatitis. AP has an excellent response to steroids, with funcional and anatomic recovery.

Fig. 33: 33

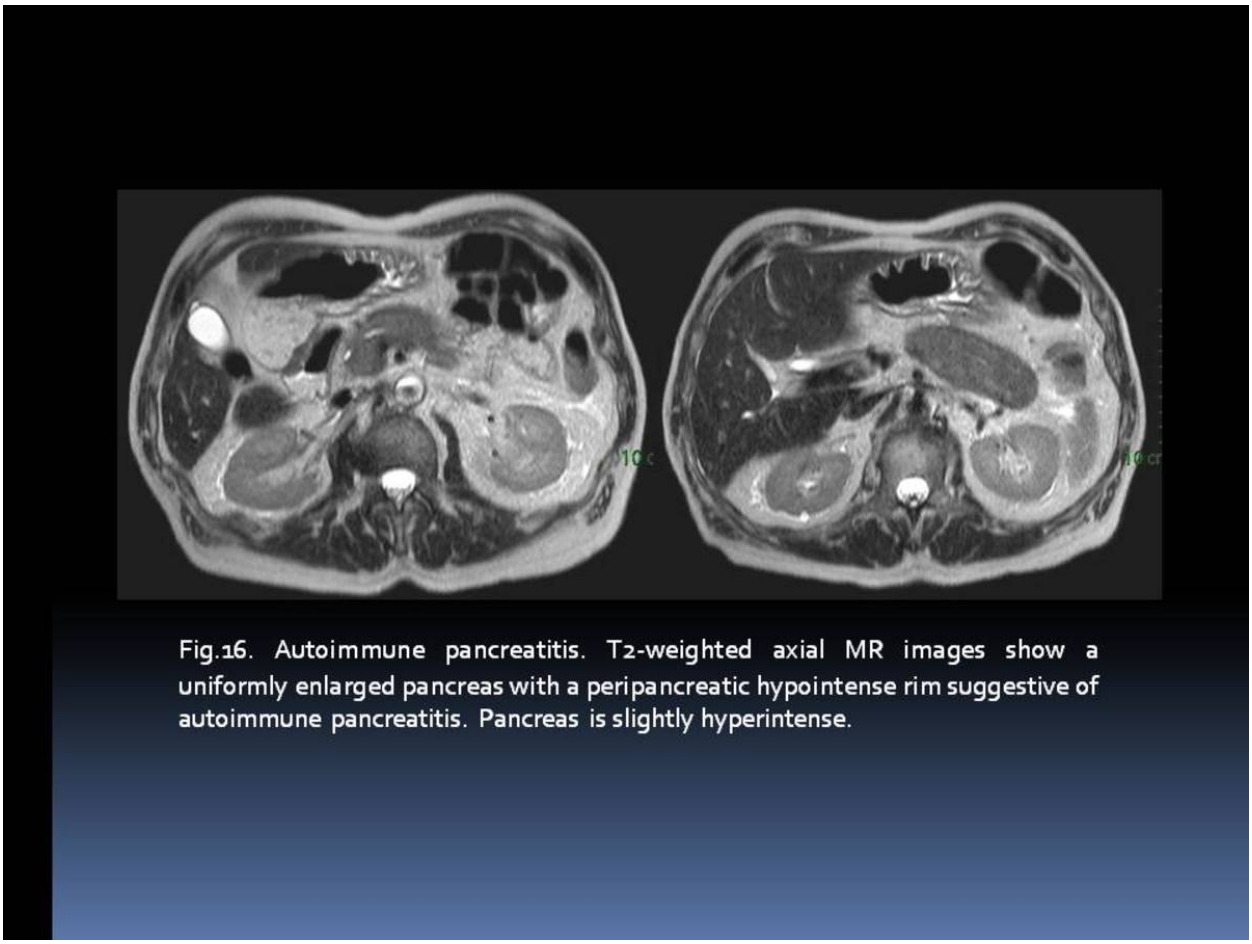
Fig.16. Autoimmune pancreatitis. T2-weighted axial MR images show a uniformly enlarged pancreas with a peripancreatic hypointense rim suggestive of autoimmune pancreatitis. Pancreas is slightly hyperintense.

Fig. 34: 34

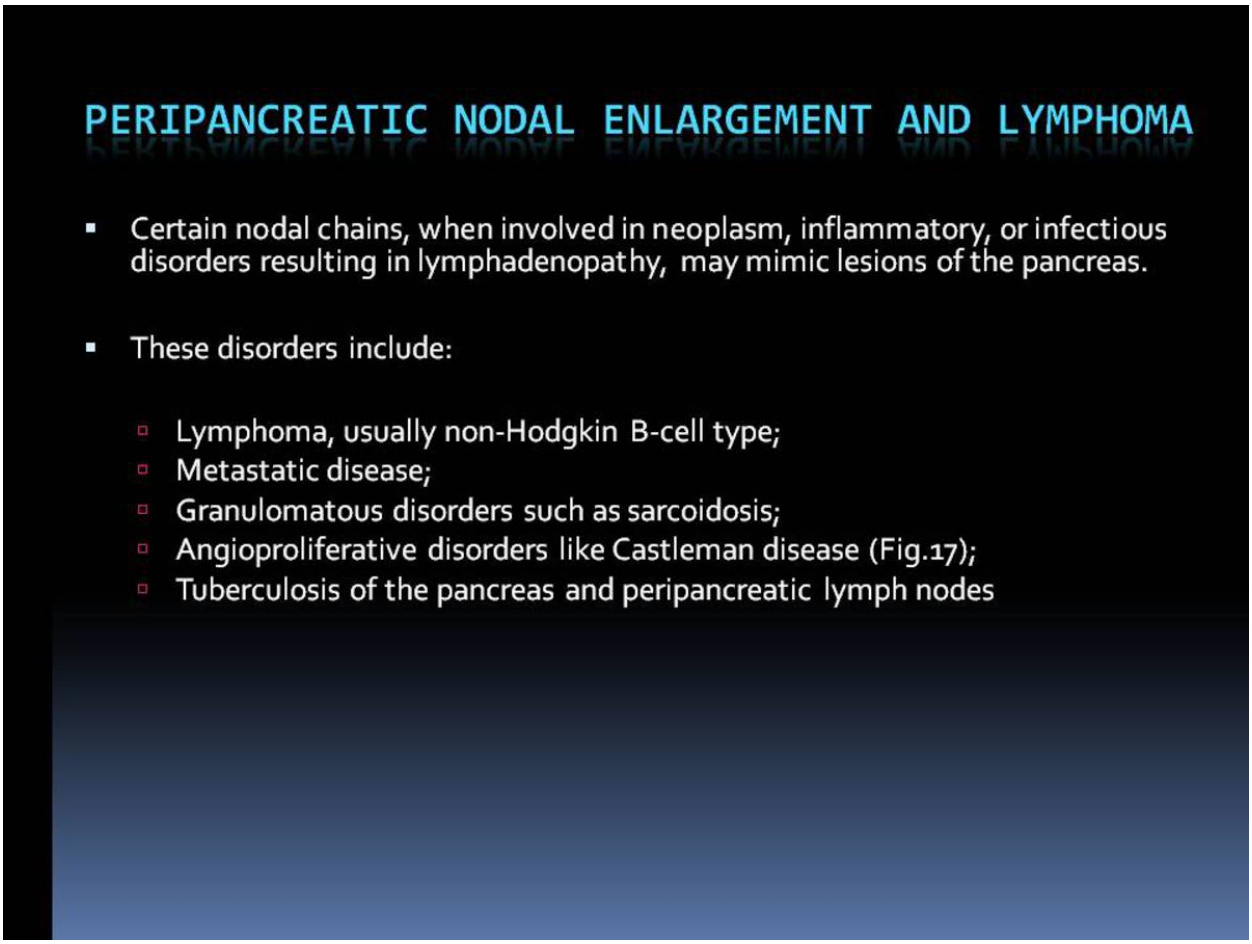
PERIPANCREATIC NODAL ENLARGEMENT AND LYMPHOMA
Certain nodal chains, when involved in neoplasm, inflammatory, or infectious disorders resulting in lymphadenopathy, may mimic lesions of the pancreas.
These disorders include:
Lymphoma, usually non-Hodgkin B-cell type;
Metastatic disease;
Granulomatous disorders such as sarcoidosis;
Angioproliferative disorders like Castleman disease (Fig.17);
Tuberculosis of the pancreas and peripancreatic lymph nodes

Fig. 35: 35

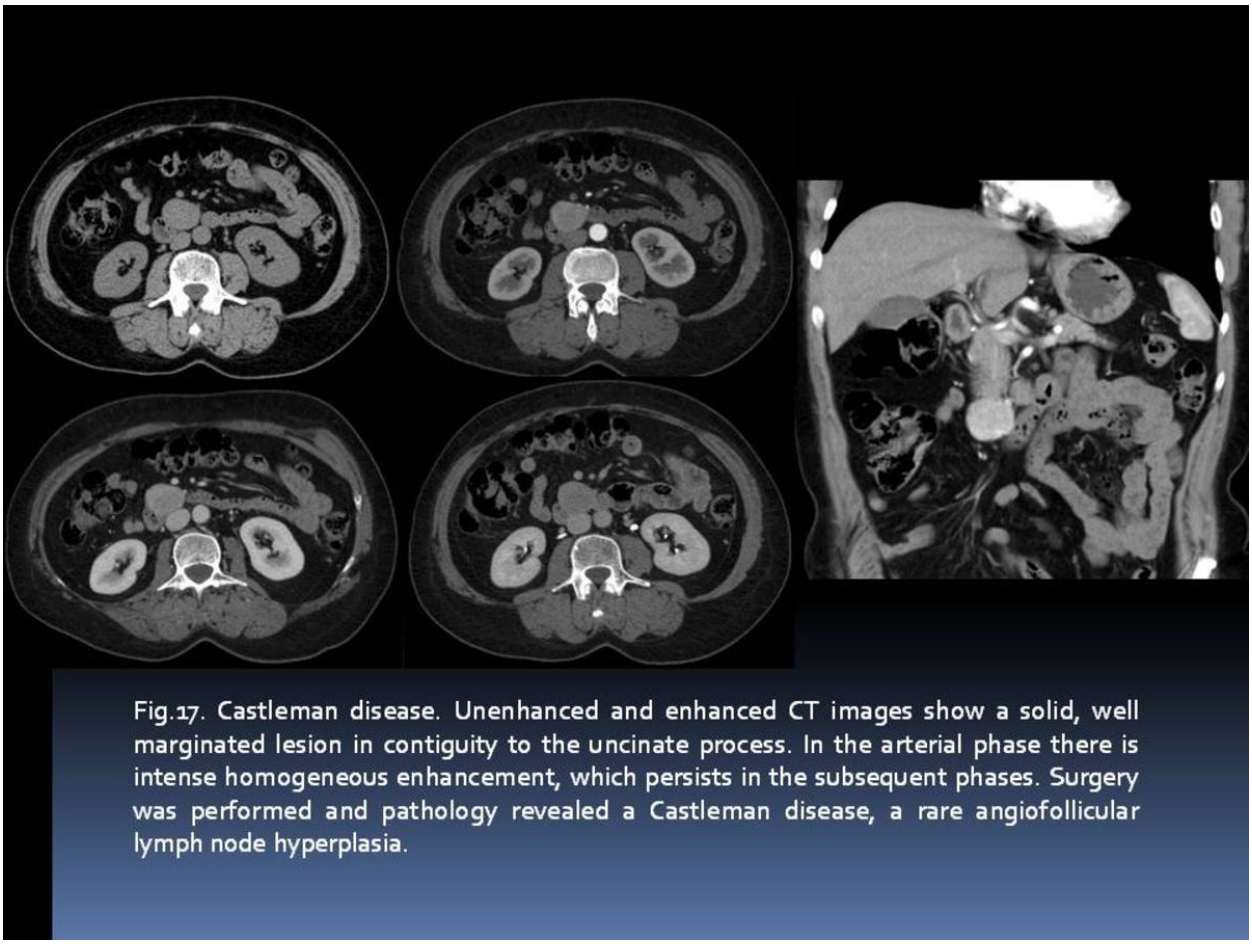
Fig.17. Castleman disease. Unenhanced and enhanced CT images show a solid, well marginated lesion in contiguity to the uncinate process. In the arterial phase there is intense homogeneous enhancement, which persists in the subsequent phases. Surgery was performed and pathology revealed a Castleman disease, a rare angiofollicular lymph node hyperplasia.

Fig. 36: 36

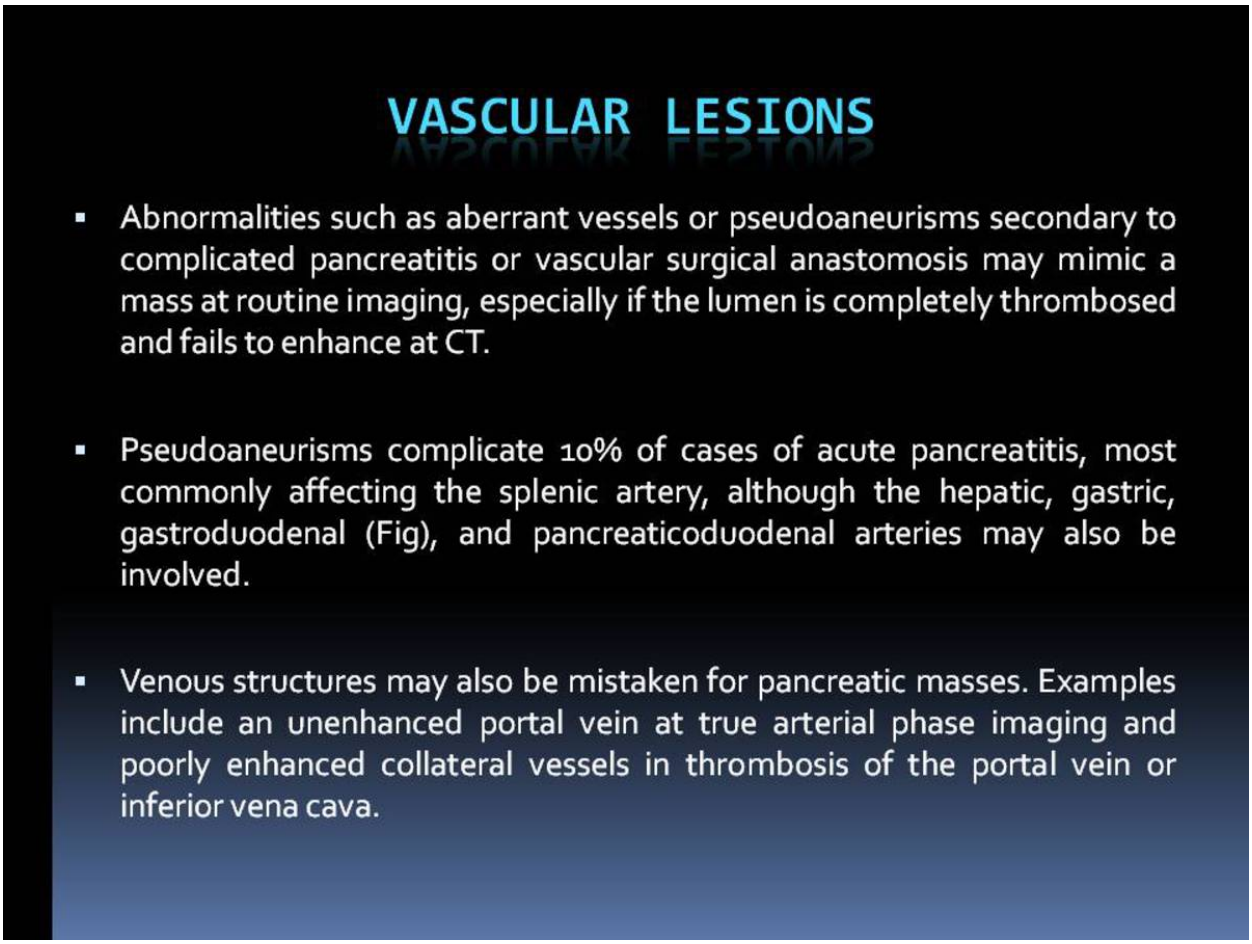
VASCULAR LESIONS
Abnormalities such as aberrant vessels or pseudoaneurisms secondary to complicated pancreatitis or vascular surgical anastomosis may mimic a mass at routine imaging, especially if the lumen is completely thrombosed and fails to enhance at CT.
Pseudoaneurisms complicate 10% of cases of acute pancreatitis, most commonly affecting the splenic artery, although the hepatic, gastric, gastroduodenal (Fig), and pancreaticoduodenal arteries may also be involved.
Venous structures may also be mistaken for pancreatic masses. Examples include an unenhanced portal vein at true arterial phase imaging and poorly enhanced collateral vessels in thrombosis of the portal vein or inferior vena cava.

Fig. 37: 37

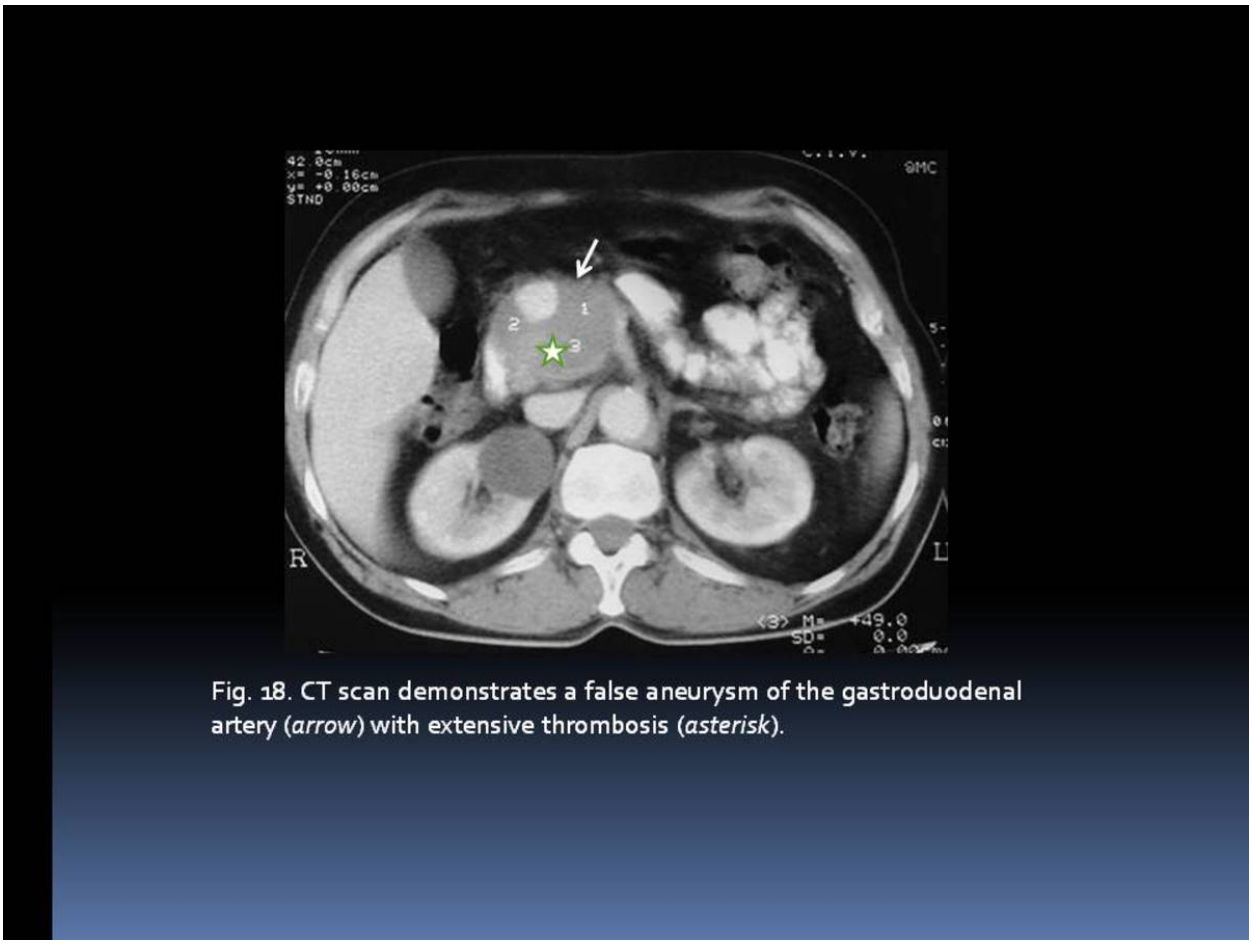

Fig. 18. CT scan demonstrates a false aneurysm of the gastroduodenal artery (*arrow*) with extensive thrombosis (*asterisk*).

Fig. 38: 38

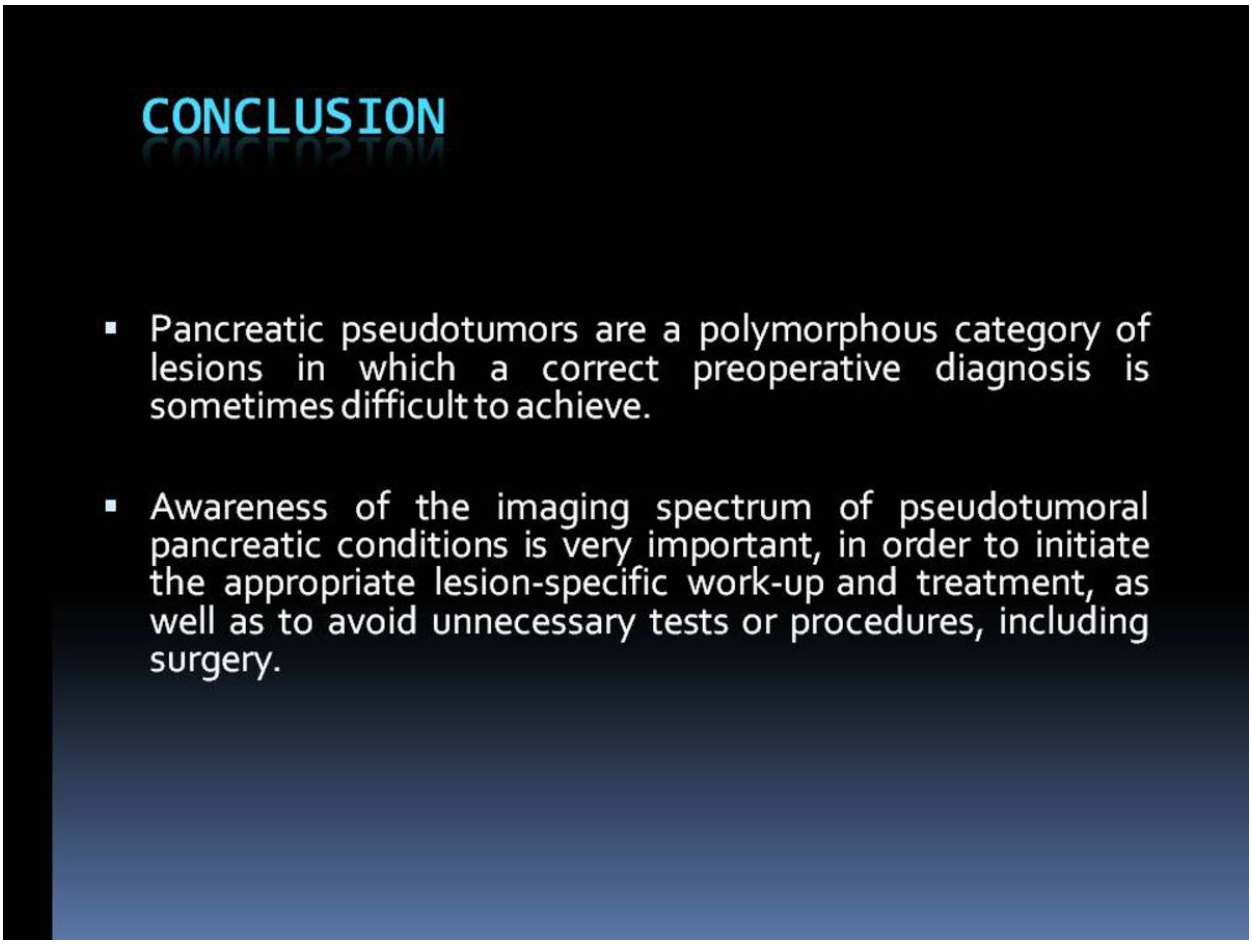
CONCLUSION
Pancreatic pseudotumors are a polymorphous category of lesions in which a correct preoperative diagnosis is sometimes difficult to achieve.
Awareness of the imaging spectrum of pseudotumoral pancreatic conditions is very important, in order to initiate the appropriate lesion-specific work-up and treatment, as well as to avoid unnecessary tests or procedures, including surgery.

Fig. 39: 39

Conclusion

Pancreatic pseudotumors are a polymorphous category of lesions in which a correct preoperative diagnosis is sometimes difficult to achieve.

Awareness of the imaging spectrum of pseudotumoral pancreatic conditions is very important, in order to initiate the appropriate lesion-specific work-up and treatment, as well as to avoid unnecessary tests or procedures, including surgery.

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§Awareness of the imaging spectrum of pseudotumoral pancreatic conditions is very important, in order to initiate the appropriate lesion-specific work-up and treatment, as well as to avoid unnecessary tests or procedures, including surgery.

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