



Cystic Pancreatic Lesions

- **High-resolution multi-detector CT is the preferred imaging modality both for the detection and initial characterization of pancreatic cystic lesions**
- **MRI with MR cholangiopancreatography (MRCP) accurately depicts the cystic morphology and can demonstrate the relationship of the cyst to the pancreatic duct**
- **Imaging with CT and/or MRI can characterize many pancreatic cysts; if indeterminate, endoscopic ultrasound provides high-resolution information and the opportunity to aspirate and biopsy suspicious areas**

As cross-sectional imaging has become more common, there has been a marked increase in the incidental detection of cystic pancreatic lesions. It is estimated that more than a third of these are found in asymptomatic patients. Although knowledge of the natural history of cystic lesions is incomplete at this time, it is known that some cystic pancreatic lesions, including pseudocysts and serous cystadenomas, have an extremely low potential for malignancy while most mucin producing cystic lesions have malignant potential. However, in general, the prognosis for cystic neoplasms is better than pancreatic ductal adenocarcinoma.

Pancreatic resection is major surgery that has a high rate (30%) of complications and may precipitate diabetes. Therefore, accurate characterization of cystic lesions and assessment of the risk of malignancy is essential in order to avoid resection of low risk lesions, especially when they are located at the head of the pancreas. Resection may be considered when symptomatic, large, or pre-malignant lesions are found. In these cases, patients should be referred to a gastrointestinal surgeon specializing in pancreatic surgery, who can weigh the risks and benefits of pancreatic resection for each individual patient.

Our understanding of the biology and the use of imaging for the diagnosis of cystic pancreatic lesions is rapidly evolving. The guidelines recommended here are based on current knowledge and may be revised in the future when more data on sensitivity and specificity become available. Multi-detector CT and MRI can help classify cystic pancreatic lesions by morphology into four sub-types, unilocular cysts, microcystic lesions, macrocystic lesions, and cysts with a solid component.



CT of a pseudocyst, a unilocular cyst (arrow)

Multidetector CT may be sufficient to assess the risk of malignancy and to plan patient management if the cyst is > 3 cm. For smaller cysts, the better image contrast of MRI makes it easier to visualize septa and small solid components and MRCP can be used to visualize a connection between the cyst and pancreatic duct, if present.

CT and MRI can characterize many pancreatic cysts. However, cross sectional imaging can sometimes be confounded by morphological overlap, in which case, endoscopic ultrasound (EUS) combined with ultrasound-

guided fine needle aspiration (FNA) is recommended for further diagnostic evaluation. The aspirated cyst fluid should be examined for mucin, cytology, and tumor markers. The accuracy of EUS alone for distinguishing between mucinous cysts from non-mucinous cystic lesions is 51%, whereas the accuracy of concurrent FNA of the cyst fluid CEA is 79% and cytology 59%.

Unilocular Cysts

Unilocular cysts are those without internal septa, a solid component, or central cyst wall calcification. Of this subtype, pseudocysts are the most common, in which case the patient nearly always presents with a clinical history of pancreatitis. Pseudocyst diagnoses are supported by imaging findings of inflammation, atrophy or calcification of pancreatic parenchyma, and dilatation of and calculi in a typically thin walled cyst. Rarely, communication of a pseudocyst with the pancreatic duct may be seen by MRCP or CT. Pseudocysts are benign and only symptomatic patients need to consider intervention (cyst drainage or surgery).

Less commonly, unilocular cysts may be intraductal papillary mucinous neoplasms (IPMNs), unilocular serous cystadenomas, or lymphoepithelial cysts. In these cases, there is no clinical, laboratory, or imaging evidence of pancreatitis. Multiple unilocular cysts are most often pseudocysts from prior pancreatitis but may also be due to von Hippel-Landau disease or, rarely, IPMN.

Patients with small asymptomatic thin walled unilocular cysts can be monitored with serial CT or MRI but symptomatic patients and those with thin walled unilocular cysts > 4 cm should be evaluated further. Wall thickening, especially if irregular, is suggestive of a more aggressive lesion, which is best evaluated with EUS guided FNA.

Microcystic Lesions

Benign serous cystadenomas are the only microcystic lesions. Typically, they are seen as a pattern of six or more cysts that range from a few mm up to 2 cm in size. In some cases, there may be a single dominant microcavity or there may be a few large cysts (> 2 cm), in which case the diagnosis may be indeterminate and require EUS with FNA for further evaluation. Serous cystadenomas are benign and, therefore, imaging surveillance is generally sufficient in asymptomatic patients although patient management may be influenced by factors such as patient age. If symptomatic or if the serous cystadenoma is > 4 cm, patients should be referred for surgical evaluation.

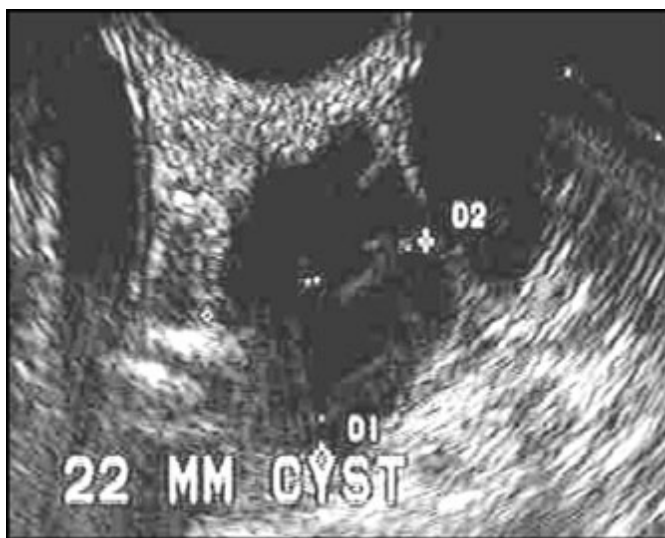
Macroscopic Lesions

Macroscopic lesions not only have larger compartments (> 2 cm in diameter) but also fewer compartments than microcystic tumors. Mucinous cystic neoplasms and IPMNs are found in this category, as well as uncommon non-functioning neuroendocrine tumors and rare congenital malformations.

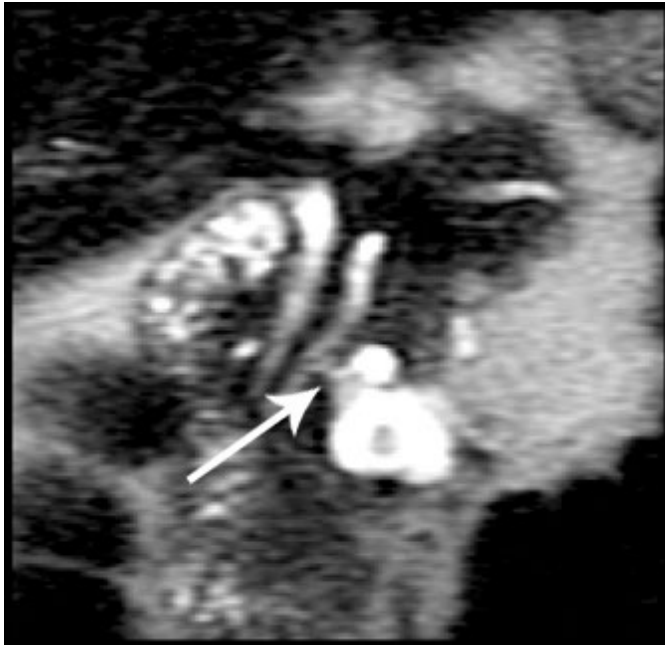
About 75% of mucinous cystic neoplasms are asymptomatic. When symptoms do occur, they are generally due to the mass effect of these lesions, which can be quite large. Mucinous cystic neoplasms do not communicate with the pancreatic duct but can cause partial pancreatic duct obstruction, resulting in symptoms of pancreatitis. Occasionally, they may contain debris or hemorrhage. MRI or EUS can show the complex architecture of the mucinous cystic neoplasms better than CT; but the peripheral "eggshell" calcification seen with CT, although seen in <20% cases, is a feature specific for these lesions and is thought to be predictive of malignancy.

IPMNs may be found in the main pancreatic duct and/or its side branches. Those in the main pancreatic duct are morphologically distinct from cystic pancreatic tumors. However, if an IPMN is in a side branch or extends into the main duct from a side branch, it may difficult to distinguish from a mucinous cystic neoplasm. Although lack of communication with the main duct does not rule out an IPMN, the presence of communication is highly suggestive of an IPMN. Both MRCP and thin-slice high resolution multi-detector CT can be used to look for communication. Thus, endoscopic retrograde cholangiopancreatography is now rarely needed for a diagnosis of IPMN. However, in select patients, EUS-guided FNA may be needed for assessing the risk of malignancy.

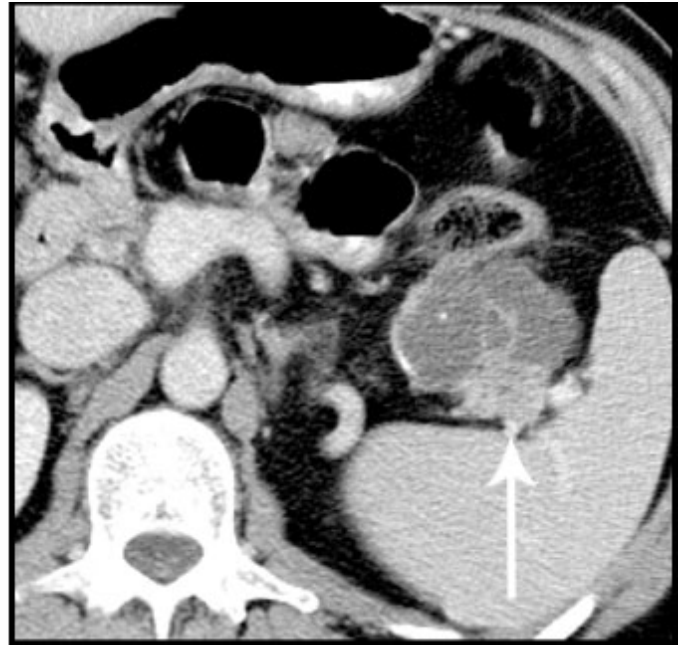
About 60% of IPMNs that affect the main duct are malignant, which is not so for most IPMNs that affect the side branch only. The latter type are considered pre-malignant although preliminary data from MGH suggest that IPMNs < 3 cm have a low potential for malignancy.



Endoscopic US: Demonstrates internal septations in a small cyst



MRCP of a side branch IPMN, a septated cyst communicating with main pancreatic duct (arrow)



CT of a malignant mucinous cyst, a septated cyst with an associated solid mass (arrow)

Pancreatic Cystic Lesion	Malignant Potential	Recommendation
Indeterminate from CT and/or MRI	Unknown	Refer to gastroenterologist for EUS-FNA
Symptomatic pseudocyst	Very low	Refer to surgeon*
Asymptomatic thin wall unilocular cyst, < 4 cm	Very low	Serial imaging at 6 months, 12 months, then annually for 3 yrs
Symptomatic or asymptomatic thin wall unilocular cyst, > 4 cm	Low	Refer to surgeon For poor surgical risk patients, EUS should be used to assess risk of malignancy
Unilocular cyst with irregular, thickened wall	Moderate	Refer to surgeon
Asymptomatic serous cystadenoma, < 4 cm	Very low	Serial imaging annually for 3 yrs
Symptomatic or asymptomatic serous cystadenoma, > 4 cm	Low	Refer to surgeon. For poor surgical risk patients, EUS should be used to assess risk of malignancy
Side branch IPMN	Moderate	Refer to surgeon
Main branch IPMN, mucinous cystic neoplasms with or without solid component	High	Refer to surgeon

*Patients should be referred to a gastrointestinal surgeon specializing in pancreatic resection.

Cysts with a Solid Component

Cysts with a solid component, whether they be unilocular or multilocular, are either malignant or have a high malignant potential. MRI with MRCP is considered to be superior to CT for the detection of small mural nodules. However, inspissated mucin or calcification in the cyst may mimic a mural nodule in MRCP and small nodules may be missed by both MRI and CT. Alternatively, high resolution EUS is sensitive for the detection of nodules.

Scheduling

Appointments for CT, MRI, and MRCP can be scheduled at Mass General West Imaging, Waltham, Mass General Imaging, Chelsea, or at the main MGH campus through the Radiology Order Entry system, <http://mghroe/> or by calling 617-724-9729 (Radiology). MRI and MRCP can also be scheduled at Mass General MRI, Charlestown Navy Yard.

Further Information

For further questions, please contact [Dushyant Sahani, M.D.](#), Abdominal and Interventional Radiology, at 671-726-3937.

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