Diagnostic Imaging Pathways - Pancreatitis (Chronic)

Population Covered By The Guidance

This pathway provides guidance on the imaging of adult patients with suspected chronic pancreatitis.

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Quick User Guide

Move the mouse cursor over the PINK text boxes inside the flow chart to bring up a pop up box with salient points.
Clicking on the PINK text box will bring up the full text.
The relative radiation level (RRL) of each imaging investigation is displayed in the pop up box.

SYMBOL	RRL	EFFECTIVE DOSE RANGE
	None	0
	Minimal	< 1 millisieverts
	Low	1-5 mSv
	Medium	5-10 mSv
	High	>10 mSv

Pathway Diagram

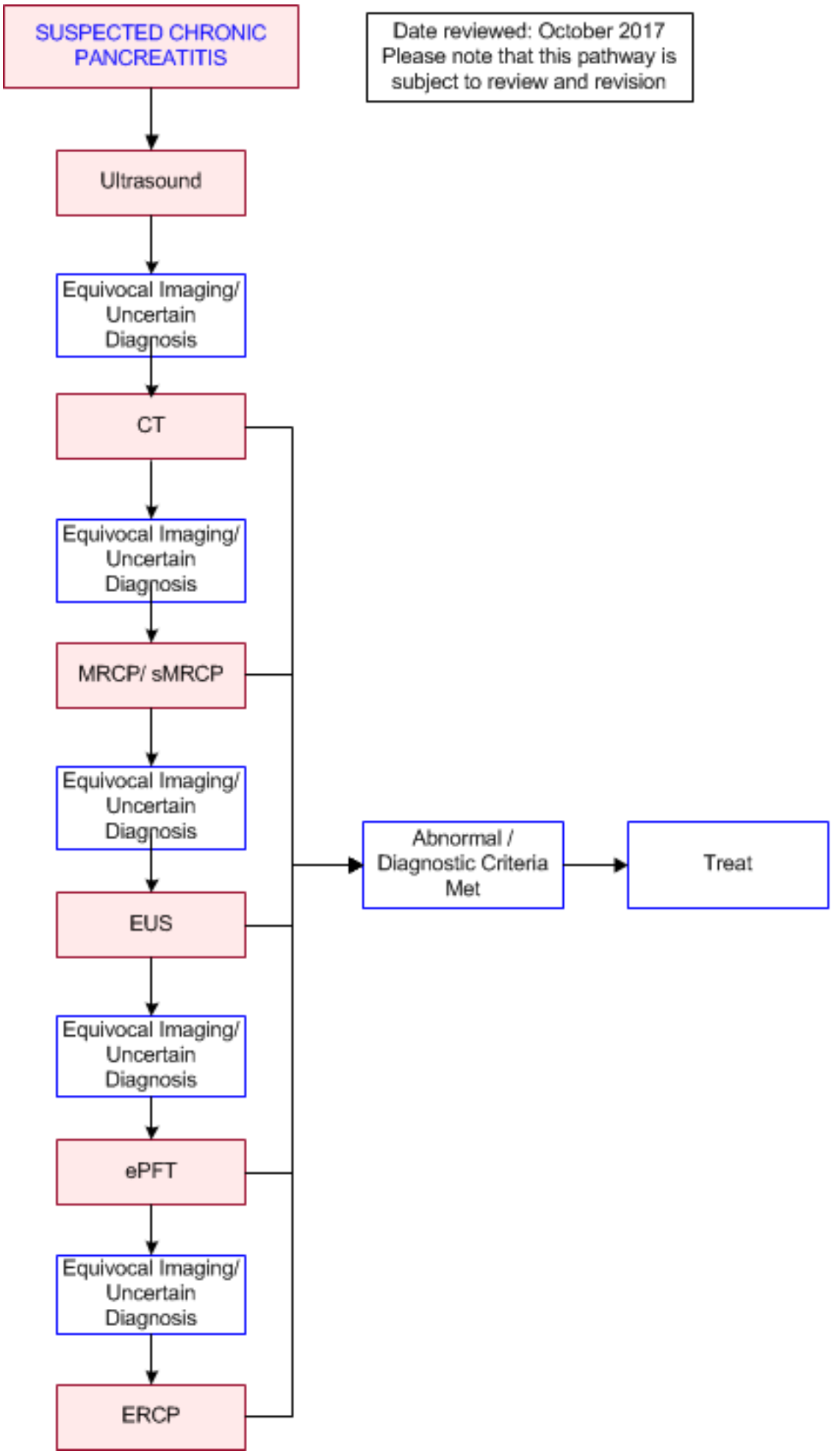
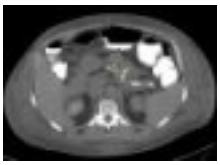


Image Gallery

Note: These images open in a new page

1a

1b



Chronic Pancreatitis

Image 1a and1b (Computed Tomography): Atrophic and heavily calcified (arrow) pancreas reflecting chronic pancreatitis.

Teaching Points

Suggested approach for structural imaging in the diagnosis of chronic pancreatitis:

- Ultrasound is the initial imaging of choice for investigation of biliary tree to assess for gallstone disease
- CT is moderately accurate in diagnosis of suspected chronic pancreatitis and is the first line investigation of choice
- Other modalities, such as magnetic resonance cholangiopancreatography (MRCP), secretin augmented MRCP (sMRCP) and endoscopic ultrasound (EUS) can provide further diagnostic information relatively non-invasively and can help guide interventional management
- CT, MRI, EUS and ERCP have comparably high diagnostic accuracy so the choice of imaging modality may be made based on invasiveness, local availability, experience and costs 1
- In the event that structural imaging (with CT, MRCP and EUS) is equivocal, then ePFT is recommended as the next investigation of choice. This is because of its high negative predictive value (97%), and when combined with EUS it allows reliable exclusion of early chronic pancreatitis 2
- Endoscopic retrograde cholangiopancreatography (ERCP) is rarely recommended solely for diagnosis as MRCP and sMRCP are non-invasive alternatives with comparable accuracy. ERCP should be reserved for situations where non-invasive modalities are not available or therapeutic intervention is required for pancreatic pain and suspected main pancreatic duct obstruction, based on MRCP or EUS 3

Ultrasound

- Modality of choice for initial imaging of the biliary tract 4
- Ultrasound is able to diagnose chronic pancreatitis with a sensitivity of 60-70% and a specificity of 80-98% 1, 5, 6
- Ultrasound features of moderate to severe chronic pancreatitis include 6, 7
    - Pancreatic calcification
    - Pancreatic enlargement or atrophy
    - Asymmetric and irregular contours of the pancreas

    - Dilatation of pancreatic ducts
    - Pancreatic calculi
    - Heterogeneous parenchymal texture pattern with increased echogenicity
- Can be used to identify or follow up complications of chronic pancreatitis including pancreatic cysts or pseudocysts
- Advantages
    - Noninvasive
    - Inexpensive and rapid
    - Useful for follow-up of fluid collections. Pseudocysts or "retention" cysts in chronic pancreatitis rarely undergo spontaneous resolution 6, 8
    - No exposure to ionising radiation
- Disadvantages
    - Limited by patient body habitus and overlying bowel gas
    - Less sensitive than CT, MRI and EUS; 1 majority of findings are neither specific nor sensitive
    - Pancreatic parenchymal echogenicity may be normal or decreased in chronic pancreatitis

Computed Tomography (CT)

- Considered to be the best initial imaging test for chronic pancreatitis 9
- Helpful for the diagnosis of moderate to severe chronic pancreatitis and its complications 7
- Sensitivity of 74-90% and specificity of 85-91% for the diagnosis of chronic pancreatitis 1, 10
- Useful for exclusion of malignancy or mass
- CT features of advanced chronic pancreatitis include: 10, 11
    - Pancreatic calcification and calculi
    - Pancreatic atrophy or enlargement
    - Gross main pancreatic duct changes
- Advantages
    - Superior to transabdominal US in the detection of calcifications and large cystic or pseudocystic lesions and other complications such as splenic or portal venous thrombosis 10, 11
    - Unlike US, not limited by obesity, abdominal gas or operator dependence
    - Able to detect other conditions where symptoms may mimic those of chronic pancreatitis, such as leaking abdominal aortic aneurysm, perforated peptic ulcer or pancreatic cancer
- Disadvantages
    - Not sensitive for detecting features of early-stage or mild-to-moderate chronic pancreatitis
    - Not able to reliably detect anatomic variations such as pancreatic divisum

Magnetic Resonance Cholangiopancreatography (MRCP) and Secretin-Stimulated MRCP (sMRCP)

- Sensitivity of 65-78% and specificity of 90-96% for the diagnosis of chronic pancreatitis. The sensitivity improves to 98% when combined with EUS 1, 12, 13
- More sensitive for the diagnosis of early and mild disease compared to CT and transabdominal US 7
- Secretin-stimulated MRCP (sMRCP) can measure exocrine pancreatic function, with the potential for early diagnosis of chronic pancreatitis, and distinction between early and established disease 14-16

- sMRCP can be useful in identifying pancreatic duct anomalies; e.g. pancreatic divisum 17, 18
- Advantages
    - Non-invasive alternative to diagnostic ERCP, with comparable accuracy 19, 20
    - Easily performed
    - No exposure to contrast agents or radiation
    - MRCP is more cost effective compared to ERCP
- Disadvantages
    - Does not offer opportunity for therapeutic intervention
    - Limited availability

Endoscopic Ultrasound (EUS)

- Sensitivity and specificity of 75-93% and 90-93% respectively for the diagnosis of chronic pancreatitis When combined with MRCP, the sensitivity improves to 98% and the specificity approaches 100% 1, 12
- When EUS is combined with ePFT, the sensitivity for detecting chronic pancreatitis also approaches 100% 2
- Can detect changes of mild chronic pancreatitis that may not be identified on other imaging modalities, but can be confirmed by histology 21-26
- Diagnostic features include 7
    - Main pancreatic duct dilatation (>3mm) and side branch duct ectasia
    - Lobularity of the outer gland margin
    - Heterogeneous echogenicity of parenchyma with small cystic changes
- Advantages
    - Less invasive than ERCP with fewer complications 27
    - Can be used for drainage of pseudocysts and for coeliac plexus blocks
- Disadvantages
    - May over-diagnose chronic pancreatitis, particularly in the elderly 7, 27, 28
    - Inability to perform therapeutic interventions such as sphincterotomy and stent placement in the pancreatic duct
    - High inter-observer variability
    - Requires sedation and endoscopy
    - Limited availability

Direct Pancreatic Function Test: Endoscopic Pancreatic Function Test (ePFT)

- Secretin-induced endoscopic pancreatic function test (ePFT) is the gold standard for assessing exocrine pancreatic function 9
- ePFT has a high negative predictive value and can assist in exclusion of chronic pancreatitis 29-32
- In suspected cases with normal or equivocal pancreatic imaging, ePFT combined with EUS can assist in detection of early or minimal change chronic pancreatitis 2
- Has sensitivity of 86% and specificity 67%. When combined with EUS sensitivity increases to 100% 2
- Chronic pancreatitis is diagnosed when the peak bicarbonate concentration is less than 80mmol on secretin-stimulated PFT
- Advantages
    - Endoscopy is widely available

    - Allows for more reliable collection under direct vision and a shorter collection time
    - Can be safely combined with EUS 33
    - If positive, has a moderately high correlation with histologic evidence of chronic pancreatitis 2
- Disadvantages
    - The potential complications and discomfort of endoscopy
    - Limited availability of secretin
    - Sensitivity to secretin formulations in some patients

Endoscopic Retrograde Cholangiopancreatography (ERCP)

- Previously considered the gold standard for structural imaging of chronic pancreatitis
- Should be reserved for patients where diagnosis has not been established by non-invasive or less-invasive studies or where therapeutic intervention is anticipated in cases of chronic pancreatic pain and suspected main pancreatic duct obstruction (stricture with prestenotic dilatation) based on MRCP or EUS 34
- ERCP is highly effective at visualizing ductal and duct-related findings in chronic pancreatitis, with a sensitivity of 71- 93% and a specificity of 89-100% for the diagnosis of chronic pancreatitis 1, 34
- Main indications for ERCP in chronic pancreatitis are: 35-37
    - To identify biliary or pancreatic ductal abnormality or obstruction
    - To clarify ductal anatomy prior to surgical intervention
    - To define the relation between a fluid collection and the pancreatic duct prior to percutaneous or surgical drainage
- Advantages
    - Superior sensitivity in detecting ductal changes compared with trans-abdominal US
    - Provides therapeutic options, such as dilation, stone extraction, and stenting of the duct
    - Possibility of procuring pancreatic juice during ERCP 37, 38
- Disadvantages 29, 39, 40
    - Invasive procedure with a significant risk (~ 6%) of post-procedure complications such as acute pancreatitis, haemorrhage, perforation, sepsis, strictures, bile leakage and mortality 41-43
    - Does not allow evaluation of the pancreatic parenchyma 9
    - Requires direct cannulation of the common bile or pancreatic duct, unsuccessful cannulation rate of 3-9%
    - Potential confounders to interpretation of ERCP include:
        - Age-related ductal changes
        - Post-acute pancreatitis ductal changes

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