Diagnostic Imaging Pathways - Cholestatic Jaundice

Population Covered By The Guidance

This pathway provides guidance on imaging patients with clinically and biochemically suspected cholestatic jaundice.

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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

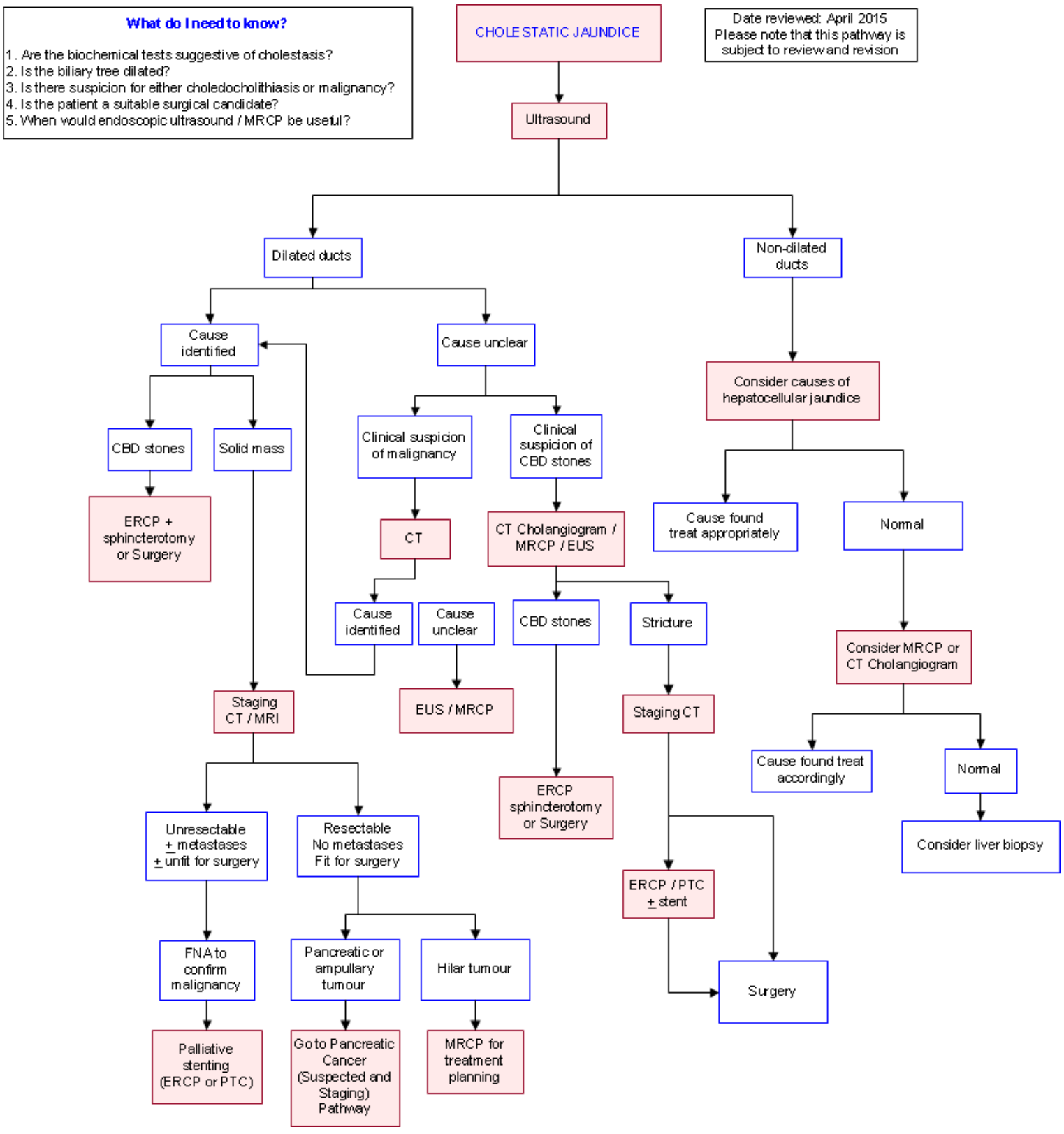


Image Gallery

Note: These images open in a new page

1a **Pancreatic Cancer**

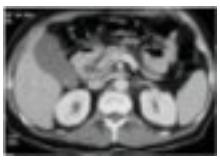
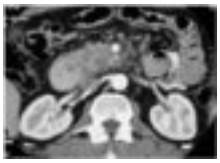


Image 1a, 1b, and 1c (Computed Tomography): Dilated common bile duct, pancreatic duct and gallbladder. There is a mass located in the head of pancreas with involvement of the mesenteric vessels.

1b

1c



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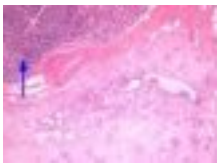
Pancreatic Cancer

Image 2 (ERCP): "Double-duct" sign - strictures are seen in the common bile duct (yellow arrow) and pancreatic duct (grey arrow) with dilatation of the pancreatic duct.

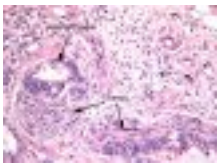
3a



Pancreatic Cancer

Image 3a (H&E, x2.5) and 3b (H&E, x10): Histological sections of a pancreatic adenocarcinoma showing the typical appearance of irregular malignant glands set in abundant desmoplastic stroma. Note, the residual normal pancreatic parenchyma (blue arrow). Image 3b shows the predisposition of this cancer for perineural invasion.

3b



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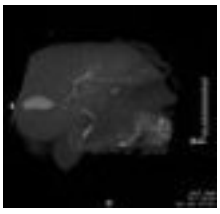

Sclerosing Cholangitis

Image 4 (CT Cholangiogram): Beading of intrahepatic and extrahepatic bile ducts consistent with sclerosing cholangitis.

Teaching Points

- Ultrasound is the first imaging modality used in the algorithm for the investigation of cholestatic jaundice
- Further imaging depends on whether the bile ducts are dilated
    - If the bile ducts are dilated and an ultrasound fails to demonstrate a cause, further imaging depends on a provisional clinical diagnosis. Investigations may include CT scan of the abdomen, CT cholangiogram, magnetic resonance cholangiopancreatography (MRCP) and endoscopic ultrasound (EUS)
    - If the bile ducts are not dilated, hepatocellular causes of jaundice should be excluded prior

to further imaging
- endoscopic retrograde cholangiopancreatography (ERCP) is reserved for therapeutic indications or if there remains ongoing clinical doubt with non-diagnostic imaging studies

Cholestatic Jaundice

- Diagnostic approach for cholestatic jaundice depends on
    - Clinical probability of whether the cause is most likely benign or malignant
    - Whether the patient is a surgical candidate
    - Availability of imaging techniques and the expertise with which they are offered 1

Computed Tomography (CT)

- Indications
    - Cause of obstruction uncertain on US and there is high clinical suspicion of malignant obstruction 3
    - For staging and surgical planning 15
- Compared to US, CT provides a more comprehensive examination that permits evaluation of the liver, biliary tree, pancreas, portal and retroperitoneal lymph nodes, and vascular structures 8,15
- For the diagnosis of pancreatic adenocarcinoma, spiral CT has a superior sensitivity of 91-97% compared to conventional CT (86%), MRI (84%) and US (76%), 16,17 and 76-88% sensitivity and 98% specificity for common bile duct stones 2,18,19
- Limitations 2,18
    - False negatives due to non-enlarged common bile ducts or small stones
    - False positives due to pancreatic calcifications
    - Distinction of inflammatory and neoplastic masses
- 3D-negative CT cholangiopancreaticography (3D-nCTCP) is a potential substitute for the diagnosis of biliary obstruction when compared to 3D-MRCP 20

Computed Tomography Cholangiography / Intravenous Cholangiography (CT-IVC)

- CT-IVC is a non-invasive technique that can be utilised to evaluate biliary anatomy and pathology. 55 It may be an alternative to MRCP, given cost and resource allocation issues with MRI techniques
- Cohort studies have validated spiral CT-IVC when compared to invasive cholangiographic techniques (ERCP or intra-operative cholangiogram). The sensitivity and specificity in the detection of choledocholithiasis has been reported as 95% and 94-97% respectively 56,57
- A limitation of this modality arises in patients with abnormally high bilirubin levels. A level two to three times normal results in lower opacification of the biliary tree, resulting in difficulties detecting abnormal biliary anatomy and pathology 55,56,57
- Advantages
    - Readily available
    - Non-invasive
    - High inter-observer correlation for pathology noted
- Limitations
    - Image degradation in patients with high bilirubin

    - Poor or absent contrast excretion resulting in a low quality scan
    - Need for intravenous contrast

Endoscopic Retrograde Cholangiopancreatography (ERCP)

- "Gold standard" for visualising the biliary tract and for defining the cause of obstruction 2,3,11
- If there is a strong suspicion of common bile duct stones and initial imaging investigations are negative or equivocal, then ERCP is indicated 12
- Preferred in patients who are poor surgical candidates or in whom sclerosing cholangitis is suspected (high likelihood of depicting the biliary tree, diagnoses and treatment of strictures) 11
- Advantages
    - Provides greater range and ease of therapeutic options for relief of the obstruction
- Disadvantages
    - Invasive procedure with significant risk of complications (pancreatitis, perforation, haemorrhage etc.)
    - Mortality (<1%)
    - Failure rate (3-10%) 13,14
- Complications
    - Cholangitis proximal to an obstruction
    - May not adequately visualize bile ducts proximal to stricture

Endoscopic Ultrasonography (EUS)

- Best modality for tumour staging of malignant biliary obstruction (provided mass is not >3cm in size) 6,8,29,38,39,40,41
- Sensitive for very small tumour detection 38,42
- In the evaluation of common bile duct (CBD) stones, the sensitivity of EUS ranged from 84% to 100%, with a diagnostic accuracy rate of 92–99% 40,43
- Used in patients who are good surgical candidates in order to stage a tumour or identify choledocholithiasis 11,42,44
- Comparable sensitivity to that of ERCP for extrahepatic cholestasis 6,11,45
- Superior to US or CT in diagnosis (100% sensitivity) and staging of biliary obstruction 6,46
- Limitations
    - Limited availability
    - Invasive
    - Technically impossible in cases of previous gastric surgery
    - Sometimes difficult to interpret following sphincterotomy or previous stenting procedures of the biliary tract
    - Does not offer therapeutic opportunity
- By performing EUS first in suitable patients, diagnostic ERCP and its related complications can be safely avoided. EUS is a safe and accurate test to select patients for therapeutic ERCP 43,47,48, 49
- In arduous clinical conditions where patients with an enlarged pancreatic head / mass or dilated pancreatic duct with / without dilated CBD and no obstructive jaundice, EUS-FNA proves to be beneficial in the diagnosis of this patient group 50,51,52
- EUS-FNA is similar or superior to ERCP tissue sampling in evaluation of suspected malignant biliary obstruction, with sensitivity and specificity of >96.5% 51,