Self-assessment/CPD answers

Below, you can find the answers to the self-assessment questions published in this chapter.

Answers

Clinical and biochemical assessment of symptomatic and asymptomatic liver disease

Question 1

Correct answer: C. The likely diagnosis is cirrhosis with complicating ascites from both non-alcohol-related fatty liver disease and a direct alcohol effect as the platelet count is low. The serum albumin to ascitic albumin gradient will confirm transudative ascites. Transient elastography (A) can be helpful in diagnosing cirrhosis but is inaccurate in the presence of ascites. Aspartate aminotransferase (B) concentration increases in both cirrhosis and heavy drinkers, and ascitic lactic dehydrogenase (D) is not helpful in distinguishing between a transudate and an exudate. A liver biopsy (E) would confirm cirrhosis and its cause but, in the presence of ascites, should be done via the transjugular route.

Question 2

Correct answer: D. This is an acute hepatitis demonstrated by the high transaminase concentration. Autoimmune liver disease should be first excluded, in addition to acute viral hepatitis from hepatitis A, B or E, cytomegalovirus and Epstein–Barr virus infection. Alcohol (A) does not lead to alanine aminotransferase (ALT) concentrations >250 IU/litre. Ferritin rises in acute liver injury, and a transferrin saturation <55% militates against a diagnosis of haemochromatosis (B), which is not associated with high ALT levels. The presence of normal platelet and albumin results is against a diagnosis of cirrhosis (C). Although Wilson's disease can cause elevated transaminase the ALT is a little too high and the alkaline phosphatase level is usually lower than normal

Question 3

Correct answer: B. The liver blood tests are cholestatic with an elevated alkaline phosphatase and extrahepatic biliary obstruction has been excluded with an ultrasound and so intrahepatic biliary disease caused by primary biliary cholangitis needs to be excluded. Although immunoglobulin (Ig) M concentrations can rise in primary biliary cholangitis, this is not diagnostic, and autoimmune liver disease, for which high IgG levels (A) help with diagnosis, usually causes hepatitis liver biochemistry. Elastography assesses liver fibrosis but does not provide a diagnosis, and in hepatitis C liver biochemistry is either normal or hepatitic with a raised alanine aminotransferase (ALT) concentration (C). Haemochromatosis is associated with mildly elevated ALT rather than alkaline phosphatase concentrations, and the Fibrosis-4 test assesses liver fibrosis but does not identify a cause for it (D). (E) Haemaochromatosis is not associated with cholestatic biochemistry and itching

Imaging the liver and biliary tract

Question 1

Correct answer: A. The first-line imaging investigation of right upper quadrant pain is ultrasonography, allowing accurate assessment of the gallbladder with high diagnostic accuracy for gallstones and cholecystitis. Ultrasound can also be sensitive for biliary dilatation. Magnetic resonance cholangiopancreatography (MRCP) (E) is a second-line investigation to assess the bile ducts if the patient fails to respond to medical management or the ducts are dilated on ultrasound scanning. Endoscopic retrograde cholangiopancreatography (ERCP) (C) is reserved for therapeutic indications only, for example for the extraction of bile duct stones. Computed tomography (B) and hepatobiliary iminodiacetic acid (HIDA) (D) scans both carry a radiation risk for this young patient.

Question 2

Correct answer: B. Patients with cirrhosis are at significantly increased risk of developing hepatocellular carcinoma (HCC). The National Institute for Health and Care Excellence (NICE) guidelines therefore recommend 6-monthly ultrasonography for patients with established cirrhosis to screen for HCC as patients identified in the early stage of disease have a greater range of treatment options, including liver transplant, and have improved 5-year survival. CT (A) and MRI (C) are used to characterize lesions identified on ultrasonography, but not for primary screening in the UK, as this has not been shown to be cost effective. Elastography is not required as portal hypertension implies established cirrhosis in the clinical context, furthermore it provides no information on the presence of focal lesions. Positron emission tomography with CT (PET-CT) has limited sensitivity for HCC, is expensive and is associated with a large radiation dose.

Question 3

Correct answer: B. In this demographic, the lesion is likely to be benign, and the most common hypervascular lesion in a young woman is focal nodular hyperplasia (FNH). The most specific finding for FNH is concentration of hepatocyte-specific contrast agent; this helps to differentiate it from haemangioma, hepatocellular adenoma or the very rare fibrolamellar HCC, which are potentially within the differential diagnosis. Given the low pre-test probability of malignancy and the high specificity of MRI biopsy is not indicated as the risks outweigh the potential benefits.

Histological assessment of the liver

Question 1

Correct answer: D. This patient is most likely to have hereditary haemochromatosis. The heavy hepatic iron deposition seen in this condition would be identified by the Perls' stain. The haematoxylin van Gieson (A) and orcein (B) stains would be important in assessing the degree of fibrosis but would not help to identify the underlying aetiology. The periodic acid–Schiff diastase (C) and rhodanine (E) stains are unlikely to be of particular help in this case, although they remain important for identifying unexpected or second pathologies (periodic acid-Schiff diastase may identify concurrent α_1-antitrypsin deficiency and the rhodanine stain may show copper deposition in chronic biliary disease).

Question 2

Correct answer: A. From the clinical details provided, it is very likely that this patient has autoimmune hepatitis. The primary purpose of the biopsy is therefore to determine the degree of fibrosis for prognostic purposes rather than establish the aetiology. The presence of bridging fibrosis with incomplete nodule formation indicates advanced fibrosis, with possible progression to early cirrhosis. The features in B–E are all typical of autoimmune hepatitis and are therefore compatible with the clinical presentation.

Question 3

Correct answer: E. The 'onion-skin' appearance, together with the other biliary features described above, is indicative of sclerosing cholangitis. Whilst this could well be primary sclerosing cholangitis (PSC) (D), it is not possible to distinguish primary from secondary causes without further clinical information and hence a definitive diagnosis of PSC based on the information provided is not appropriate. Primary biliary cholangitis (C) is characterized by granulomatous inflammatory bile duct lesions rather than concentric periductal fibrosis. There is little evidence of portal inflammation to suggest chronic autoimmune hepatitis (A) or drug-induced chronic hepatitis (B).

Investigation of jaundice

Question 1

Correct answer: B. The normal liver blood test results other than the bilirubin suggest a pre-hepatic process. This could be either Gilbert's syndrome (B) or haemolytic anaemia (E). (A), (C) and (D) would typically cause a derangement in the serum transaminases or alkaline phosphatase. The history of the association between the jaundice and episodes of illness or fasting make Gilbert's syndrome most likely. If this patient were to have repeat liver bloods after resolution of her illness, it is likely that the bilirubin concentration would be normal. A rise in bilirubin after a period of prolonged fasting can be helpful in making a diagnosis of Gilbert's syndrome.

Question 2

Correct answer: B. The presence of loss of appetite and weight loss in an older patient should immediately lead the clinician to suspect a neoplastic process. The cholestatic picture of liver blood results, the recent diagnosis of diabetes mellitus, and the absence of fever or other features to suggest an acute infection make pancreatic cancer the most likely option. The patient has Courvoisier's sign, i.e. the presence of a painless palpable gallbladder in the right upper quadrant, which suggests that the underlying cause of the jaundice is not gallstones. This observation arises from the fact that gallstones typically form over a prolonged duration of time, causing the formation of a shrunken, fibrotic gallbladder that does not distend easily. A palpable gallbladder suggests pathology that causes a more acute obstruction of the biliary tree, such as a pancreatic malignancy, leading to passive distension from back pressure.

Question 3

Correct answer: A. This patient has jaundice associated with abdominal pain and fever – these three symptoms constitute 'Charcot's triad', which points towards a diagnosis of cholangitis. The cholestatic picture on the blood tests is consistent with this. The immediate priority is to adequately resuscitate her before imaging. Imaging will involve ultrasonography as a first-line investigation, and then endoscopic retrograde cholangiopancreatography if gallstones are confirmed. After discharge, the patient should be offered outpatient follow-up for consideration of cholecystectomy.

Prescribing in liver disease

Question 1

Correct answer: B. The likely diagnosis is muscular pain related to her coughing bout. Paracetamol will help in controlling the pain until it settles down, but often needs to be used regularly rather than occasionally. In patients with cirrhosis, paracetamol should initially be used at lower doses (2–3 g/day). Non-steroidal anti-inflammatory drugs (C) will increase the risk of bleeding in this patient, while opioids (A) can cause encephalopathy. If the pain does not settle, or becomes intractable, other causes should be excluded, and in those situations opioids could be used, with caution. Reassuring the patient if course important, but given that the patient has attended hospital, the pain is likely to be severe enough to warrant analgesia rather than just reassurance. Herbal therapies have been used for pain relief but their efficacy is uncertain, and some herbal medicines can themselves cause liver injury and/or interact with other drugs. As with all analgesics, the patient should be regularly monitored and the drug stopped when the pain subsides.

Question 2

Correct answer: C. The likely diagnosis is spontaneous bacterial peritonitis (SBP). Proton pump inhibitors such as lansoprazole are known to increase the risk of SBP in patients with ascites. This is thought to be caused by the acid-suppressing activity of the drugs, which leads to bacterial colonization, overgrowth and gut translocation. The need for lansoprazole should be assessed in this patient, and the drug

stopped if not required. If it needs to be continued, the lowest dose that relieves symptoms should be used. Ciprofloxacin (A) is often used to treat SBP, but care should be taken in this patient because of the risk of increasing QT interval prolongation. The other drugs listed above are frequently used in patients with alcoholic cirrhosis for treatment of portal hypertension (D), for preventing both hepatic encephalopathy (B) and Wernicke's encephalopathy (E).

Question 3

Correct answer: E. Oxazepam is a benzodiazepine that can be used for treatment of alcohol withdrawal in patients with liver impairment. Oxazepam undergoes phase II metabolism via glucuronidation, which is less likely to be affected than phase I metabolism (cytochrome P450) by cirrhosis of the liver. There is of course a risk in this patient of a pharmacodynamic interaction with fluoxetine and oxazepam, but this is also likely to occur with diazepam. Co-prescription with diazepam (B) would be further complicated by inhibition of the metabolism of diazepam by fluoxetine (a pharmacokinetic interaction), which would increase the levels of diazepam, lead to increased sedation and potentially cause hepatic encephalopathy. Alcohol (A) has been used in some patients who are withdrawing from alcohol but would not be recommended in this patient. Increased doses of fluoxetine (C) and propranolol (D) will not treat withdrawal symptoms and could cause further adverse effects.

Alcohol and the liver

Question 1

Correct answer: D. This patient has alcohol withdrawal syndrome. The cornerstone of treatment is benzodiazepines. Short-acting benzodiazepines such as lorazepam given in a symptom-triggered fashion are probably safer for patients with liver disease and subsequent poor synthetic liver function. An abdominal ultrasound scan is important in the assessment of liver disease but has limited use in the immediate management of alcohol withdrawal syndrome. Fixed dose treatment with diazepam may be used in patients who are at risk of alcohol withdrawal outwith advanced liver disease. Lactulose is used in the management of hepatic encephalopathy and prednisolone is used in the treatment of selected cases of alcoholic hepatitis.

Question 2

Correct answer: C. The clinical presentation is consistent with alcoholic hepatitis. The duration of onset of jaundice is suggestive of alcoholic hepatitis, with the AST to ALT ratio of >1.5 being compatible with this. Patients with a Glasgow Alcoholic Hepatitis Score (GAHS) score <9 have a much better 28-day and 84-day mortality and are managed well with supportive care concentrating on optimization of nutrition fluid and electrolyte disturbances. Those with a GAHS >9 should be considered for treatment with corticosteroids. Broad-spectrum antibiotics and intravenous albumin are used in the treatment of spontaneous bacterial peritonitis. Anticoagulation with a therapeutic dose of LMWH) or other oral anticoagulants is used as the primary management of acute portal vein thrombosis. Pentoxifylline is no longer used routinely in the treatment of alcoholic hepatitis. Spironolactone is used to manage ascites.

Question 3

Correct answer: E. High liver stiffness measurement using transient elastography is highly suggestive of underlying fibrosis and is an effective non-invasive parameter to screen for liver cirrhosis. However, it can overestimate liver fibrosis if the patient is actively drinking or there is active liver inflammation (AST >100U/litre). Liver stiffness also correlates strongly with the histological stage of fibrosis as well as with portal pressure and its complications.

Non-alcoholic fatty liver disease

Question 1

Correct answer: E. The most likely diagnosis is non-alcoholic fatty liver disease (NAFLD). A diagnosis can be made in a patient with evidence of hepatic steatosis and metabolic risk factors in the absence of hazardous alcohol intake and in the absence of other cause of chronic liver disease. In practice this can be achieved through blood tests (E). A percutaneous liver biopsy can provide information to support the likely diagnosis and to stage the disease severity. A liver biopsy is required for the diagnosis of non-alcoholic steatohepatitis (NASH), but a diagnosis of NAFLD/NASH also requires exclusion of hepatic co-morbidity (A, B, C, D). Liver biopsy is therefore not the most appropriate investigation at this stage in this case (A). Magnetic resonance imaging applications can quantify liver fat and provide some information on the presence or absence of hepatic iron. Newer techniques allow assessment of disease severity. MRI techniques are not widely available in clinical practice (B). Transient elastography (FibroScan®) is now widely available in clinical practice providing a measure of liver stiffness that correlates with fibrosis staging. The controlled attenuation parameter (CAP) provides a measure of the attenuation of ultrasound waves through liver tissues, with increased attenuation in steatotic tissue. CAP is not widely used in clinical practice as the quantification of steatosis (rather determination of its presence) does not affect the diagnosis of NAFLD (C). Although at least one feature of the metabolic syndrome is required to diagnose NAFLD, assessment of all components is not required to make a diagnosis (D). However, when managing a patient with NAFLD, it is important to establish the components of the metabolic syndrome which should be optimized to reduce all-cause mortality.

Question 2

Correct answer: E. The likely diagnosis is non-alcoholic fatty liver disease (NAFLD). Normal liver biochemistry is not reassuring (A, B) and >50% of patients with non-alcoholic steatohepatitis (NASH) cirrhosis have normal alanine aminotransferase (ALT) values. Monitoring of ALT is unhelpful. Magnetic resonance elastography (C) is a sensitive marker of liver fibrosis but not widely available, and certainly not used as a first-line test. Liver biopsy (D) is not required at this stage

as the diagnosis is not in doubt. There are many approaches to risk stratification, and the choice depends on local availability and expertise. Combinations of simple markers such as the FIB-4 have a good negative predictive value for excluding advanced disease and are cheap and widely available. The use of risk stratification tools is recommended by the National Institute for Health and Care Excellence to detect advanced fibrosis in NAFLD/NASH, and the Enhanced Liver Fibrosis (ELF) test is advocated. FibroScan® is a widely used measure of liver stiffness that correlates with the severity of liver fibrosis in many liver diseases, including NAFLD/NASH.

Question 3

Correct answer: D. Optimization of cardiometabolic risk factors is central to the management of non-alcoholic fatty liver disease (NAFLD) as cardiovascular disease is the chief cause of mortality. This patient has advanced non-alcoholic steatohepatitis (NASH), obesity, poorly controlled diabetes mellitus and inadequately controlled hypertension. Weight loss correlates closely with a reduction in liver fat and improvement in histological markers of steatohepatitis. Sulfonylureas (A, B) cause weight gain and increase risk of hypoglycaemia, although twice-daily blood sugar monitoring is unlikely to be required. Insulin also causes weight gain, while β-adrenoceptor blockers can reduce awareness of hypoglycaemic episodes (E). Glucagon-like peptide 1 (GLP- 1) analogues (C, D) lead to significant improvement in glycaemic control with significant weight loss and a mortality benefit. A Phase II study (LEAN) suggested an improvement in NASH in individuals taking liraglutide versus placebo. Angiotensin-converting enzyme inhibitors (D) are preferred to calcium channel blockers as antihypertensives in patients with type 2 diabetes mellitus as they protect against diabetic renal disease.

Drug-induced liver injury

Question 1

Correct answer: D. Markers of autoimmunity such as positive antinuclear antibody (ANA) and elevation of serum IgG level raise a possibility of autoimmune hepatitis. Liver biopsy is an essential test in this clinical scenario. International Autoimmune Hepatitis Score (A) includes scores attributed to histological features and HLA typing. Serum bile acid (B) estimation is not helpful in establishing the drug-induced liver injury (DILI) diagnosis or its prognosis.

Accuracy of the lymphocyte transformation test (C) is not high enough to be used in clinical practice.
Ultrasound has excluded biliary obstruction, so magnetic resonance cholangipancreatography (E) is not indicated.

Question 2

Correct answer: E. Withdrawal of the causative agent is the most immediate action required. Temporal relationship with diclofenac suggests that to be the causative agent.

(A) Negative anti-smooth muscle antibody and normal immunoglobulins indicate that autoimmune hepatitis is an unlikely diagnosis, so, liver biopsy is not necessary. Simvastatin exposure (B) for 5 years makes it an unlikely cause of DILI. DILI from diclofenac has not been associated with HLA allele (C). Evidence does not support corticosteroid treatment (D)in DILI.

Question 3

Correct answer: D. HLA-B*5701 has a very high negative predictive value to exclude flucloxacilin associated DILI. Antibody to soluble liver antigen (A) is seen in a small proportion of patients with autoimmune hepatitis. (B) Flucloxacillin-induced liver injury doesn't have a diagnostic histological feature. (C) A minority of cases of DILI from a variety of drugs would have peripheral eosinophilia. (E) Biliary obstruction has been excluded by ultrasound examination.

Hepatitis E, A and other hepatotropic viruses

Question 1

Correct answer: C. HEV is now the commonest cause of acute viral hepatitis rather than hepatitis A (A). It presents with associated neurological symptoms in 5–8%. The history suggests no recent drug changes as the major differential diagnosis would be drug-induced liver injury (B). Ischæmic hepatitis can cause a severe transaminitis, but is usually seen in the context of a severe illness associated with prolonged hypotension, which is not the case here

Question 2

Correct answer. A. If safe from the transplant viewpoint, reducing immunosuppression will resolve HEV infection in around 30% of patients. Ribavirin (B) is used as second line with good response rates. Interferon (C) therapy runs a significant risk of rejection in organ transplant recipients. Tenofovir (D) is therapy for hepatitis B. Sofosvabir therapy (E) has been tried in such patients but fails to achieve viral clearance

Question 3

Correct answer B. HAV is endemic in India. HAV vaccine is available for high-risk groups such as travellers to endemic areas. Hepatitis B vaccination entered NHS routine practice in 2018, but medical staff, including medical students, have been vaccinated for many years Medical students are required to be able to demonstrate they are immune to HBV. Hepatitis E vaccine is only available in China. Yellow fever is not endemic in India. There is no EBV vaccine available.

Hepatitis B and D

Question 1

Correct answer: A. The patient clearly has HBeAg-positive chronic infection (formerly categorized as the immune tolerant phase). In view of his young age at diagnosis, absence of a family history of cirrhosis or HCC, or extrahepatic manifestations, no treatment is required. High HBV

DNA serum level alone would not justify treatment, unless associated with elevated transaminases or moderate/severe necroinflammation or fibrosis.

Question 2

Correct answer: E. A protracted course of jaundice (E) (>4 weeks), coagulopathy and prevention of acute or subacute liver failure are the main indications for treatment. Acute liver failure refers to the rare clinical entity when individuals without underlying chronic liver disease present with transaminitis and impaired liver function (jaundice and INR>1.5), associated with an altered level of consciousness as a result of hepatic encephalopathy.

Question 3

Correct answer: C. In patients with decompensated HBV cirrhosis and any detectable level of hepatitis B virus DNA, nucleot(s)ide analogues are the treatment of choice. Pegylated interferon is contraindicated in decompensated liver disease.

Hepatitis C

Question 1

Correct answer: A. Co-infection with HIV (B), gender (C) and age (E) can all affect the likelihood of patients with hepatitis C developing cirrhosis; however, consumption of excessive alcohol conveys the highest risk. Injecting heroin (D) is not known to increase the risk of disease progression.

Question 2

Correct answer: E. Of these options, transient elastography is the best approach to assess this patient for significant liver fibrosis or cirrhosis. Liver ultrasonography (C) is not an accurate modality to assess for liver cirrhosis, and liver biopsies (D) are not recommended ahead of non-invasive methods. Serum alanine aminotransferase (A) and the serum aspartate transferase/alanine aminotransferase ratio (B) are not used to assess for liver fibrosis or cirrhosis in patients with hepatitis C.

Question 3

Correct answer: A. Minimizing alcohol intake and engaging with opiate substitution therapy should form part of his ongoing management plan. However, people who inject drugs can receive treatment for hepatitis C and they do not need to be abstinent from alcohol. The patient should also be offered antiviral therapy irrespective of his viral load and severity of liver disease.

Tropical liver disease

Question 1

Correct answer: B. The presentation suggests acute hepatitis: the most likely causes within 6 weeks of visiting a country such as Sudan are enterically transmitted hepatitis A (HAV) or hepatitis E (HEV), both of which have clinical incubation periods of approximately 2–6 weeks. The absence of fever or thrombocytopenia makes malaria (E) less likely, and the degree of transaminase disturbance is disproportionate for jaundice caused by malaria. Drug- or alcohol-induced (A, D) hepatitis should always be considered but one would expect a higher γ-glutamyltransferase level and a less dramatic rise in alanine aminotransferase levels. Immersion in fresh water in Africa carries risks of acute schistosomiasis (usually associated with eosinophilia) but this rarely causes jaundice. The most relevant questions relate to his likely immunity to hepatitis A: the patient on which this case is based was born and raised in the Sudan, emigrating to the UK at the age of 18. As expected, his serology on admission showed raised HAV IgG antibodies, confirming past asymptomatic infection in childhood (rather than a raised IgM compatible with acute infection). Like many migrants who are 'Visiting Friends and Relations' in their country of origin, he had not considered the possibility of acquiring hepatitis A and had not been immunized before his trip. Acute HEV infection was confirmed by strongly positive polymerase chain reaction (PCR) of serum for HEV and very high HEV IgM levels. High levels of ALT are commonly seen in acute HEV infection.

Question 2

Correct answer: A. The main differential diagnoses here is between amoebic or pyogenic liver abscess, or an infected hydatid cyst. The radiological description does not sound like typical cystic hydatid disease, although such cysts can become infected with bacteria and present similarly to a pyogenic abscess, with or without rupture. Although liver abscesses do not always need aspiration for diagnosis or treatment, there are red flags suggesting that urgent decompression is needed, as he has a large cyst in the left lobe of the liver, carrying risk of rupture into the pericardium. Cyst fluid can be cultured for bacteria and examined for amoebae, which are rarely found on microscopy but can be detected by PCR. It would also be appropriate to start metronidazole (C), often accompanied by antibiotics to cover pyogenic infection until confirmation of aetiology. Once the abscess has been treated, he should receive a course of paromomycin (D) or other antimicrobial active against vegetative amoebae in the gut, to prevent recurrence (as non-invasive amoebae in the bowel are not eliminated by metronidazole). Albendazole and/or praziquantel (B, E) would only be considered for hydatid disease.

Hepatobiliary tumours

Question 1

Correct answer C. The diagnosis is hepatocellular carcinoma on the basis of characteristic imaging in a cirrhotic liver and an α-fetoprotein of >400 ng/ml. There is no need for further imaging before considering therapy, and although contrast ultrasonography (B) can add to diagnostic certainty in some settings it is not required here. Biopsy (A, E) is not required either, it has a small risk of seeding in the biopsy track and a risk of bleeding, the transjugular biopsy route does not usually allow targeting of a focal liver lesion. Appropriate treatment may well result in cure (D).

Question 2

Correct answer: C, radiofrequency ablation (RFA). The diagnosis is hepatocellular carcinoma, but his α-fetoprotein suggests a high risk of recurrence and in the UK he would not currently be eligible for transplant listing (A). He has compensated cirrhosis and a good performance status so again resection would be considered but he has evidence of portal hypertension which renders surgery (B) much higher risk. RFA of a 2 cm lesion has a >70% chance of cure of that lesion with minimal risk so it is the therapy of choice. Transarterial chemoembolization (TACE) (D) is not a curative therapy. Levantinib is a palliative therapy with no chance of cure (E).

Question 3

Correct answer: C. Further imaging with magnetic resonance cholangiopancreatography (MRCP) will define the level of obstruction with this presumed cholangiocarcinoma. It is essential to know if the bifurcation of right and left ducts is involved as this makes surgical intervention unlikely possible. MRI is used to look for an associated liver mass and to confirm the vessels are clear, again a prerequisite for surgery. Endoscopic retrograde cholangiopancreatography (ERCP; A) has a risk of pancreatitis and may not be able to adequately delineate the anatomy to determine operability. Percutaneous transhepatic cholangiography (PTC; B) may be a later intervention if the presumed cancer is non-operable; it may offer better palliation of jaundice than ERCP as both left and right ducts can be accessed at PTC with bilateral stenting. CA19.9 levels (D) are unhelpful in jaundiced patients. Laparotomy is a major intervention only undertaken if preoperative imaging suggested curative resection is possible and the patient is fit enough to stand major surgery. This is uncommon in 80-year-old patients.