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DOCTORS IN TRAINING

How to approach jaundice in the MRCP PACES exam

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Abstract

For every medical trainee, the Membership of the Royal College of Physicians' Practical Assessment of Clinical Examination Skills (PACES) exam is one of the most difficult exams they must face in their career. It is designed to assess the clinical knowledge and skills of the trainee doctors who are entering higher specialist training. It sets rigorous standards to ensure the competence of the candidates across a range of skills. This article discusses a systematic approach to a patient with jaundice, which is a commonly encountered station in the exam, so that candidates will become more familiar with common causes and how to differentiate between these, as well as important bedside examination skills.

Key words: Bilirubin; Clinical competence; Diagnosis; Differential; Jaundice; Medical history taking

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Introduction

Jaundice is yellowish discolouration of the skin and sclera caused by deposition of bilirubin pigment. It is most commonly associated with disorders of the hepatobiliary system, and occasionally with haemolytic disorders (Vitek and Ostrow, 2009). Myriad conditions can present with jaundice, some of which are more serious, such as malignancy. It is important to know how to systematically approach and perform a thorough clinical assessment of patients with jaundice (Winger and Michelfelder, 2011).

As a common clinical presentation, jaundice is a reoccurring topic in the Membership of the Royal College of Physicians' Practical Assessment of Clinical Examination Skills exam (MRCP PACES), for station 1 (examination station), station 2 (history-taking) or station 5 (brief clinical consultation). The clinical skills required include comprehensive history taking, along with a systematic clinical examination and formulating a list of possible differential diagnoses. Key to the assessment of jaundice is the determination of whether it is pre-hepatic, hepatic or post-hepatic in origin, before filtering out the most probable diagnosis from the list of differentials.

This article gives general guidance on the systemic approach to patients with jaundice. Exploring the patient's history and ensuring that all important points have been covered can be difficult. In a time-pressured setting, like the PACES exam, it is helpful to have a list of differential diagnoses and some checklists. On approaching patients with jaundice, there are five key questions that can help clinicians to reach the most probable diagnosis more easily:

1. Is it pre-hepatic, hepatic or post-hepatic?
2. Is it painful or painless?
3. Is it acute or chronic?
4. Is it associated with any other coexisting symptoms and signs?
5. Is it associated with complications (chronic liver insufficiency, portal hypertension)?

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History taking

Symptom analysis

Most stations start with prompts such as: 'This patient has been sent by their GP because of deranged liver function tests/jaundice. Please advise on the possible likely diagnosis and management' or 'Please examine this patient with jaundice'. Sometimes, the presenting

complaint could initially be tiredness or abdominal pain, but jaundice could be discovered on further probing. A very thorough symptom analysis will help with differentiation between the pre-hepatic, hepatic and post-hepatic causes of jaundice.

Although relatively less common in PACES exams, pre-hepatic jaundice, also known as haemolytic jaundice, is associated with haemolytic disorders, such as autoimmune haemolytic anaemia or hereditary spherocytosis. A disproportionate breakdown of red blood cells exceeds the ability of the liver to conjugate and is associated with unconjugated hyperbilirubinaemia (Beckingham and Ryder, 2001). The patient can present with anaemia and jaundice. There is usually a family history of haemoglobinopathies or autoimmune disorders (Beckingham and Ryder, 2001).

In hepatic jaundice, the liver loses its ability to conjugate bilirubin. In cases of cirrhosis, it compresses the intrahepatic portions of biliary tree to cause a degree of obstruction. Therefore, hepatic jaundice can present with a mixed picture of conjugated and unconjugated hyperbilirubinemia (Fevery, 2008). Post-hepatic jaundice, also known as obstructive jaundice, presents with partial or complete obstruction of the extrahepatic biliary drainage system. It is associated with a classic triad of pruritus, dark-coloured urine and pale-coloured or acholic stool, owing to lack of bile pigments (Wilkinson et al, 2017).

System review and other relevant history

Once the type of jaundice has been determined, it is important to look for the presence of complications, such as haematemesis, ascites, hepatic encephalopathy, malnutrition or coagulopathy (Wilkinson et al, 2017).

Symptom analysis should be followed by a detailed system review, which can give clues to the aetiology. Presence of fever could indicate viral hepatitis, parasitic or bacterial infections (Gadia et al, 2017). If chills are associated with fever, this could indicate possible biliary obstruction. Red flag symptoms, such as loss of weight or appetite and blood in stools, should not be missed.

A patient's medical history and past surgical procedures can provide comprehensive information. Approximately 70% of patients with primary sclerosing cholangitis have underlying inflammatory bowel disease, most frequently ulcerative colitis (de Vries, 2015). Drug history is very important, since most drugs undergo metabolism in the liver. It is also essential to enquire about family history, as some conditions, such as hereditary haemochromatosis and Wilson's disease, can be inherited (Pavlovic Markovic et al, 2022). Recent travel, blood transfusions, needlestick injuries, injections, piercings, tattoos or alcohol use should not be missed (Wilkinson et al, 2017).

Impact on patients' lives

Managing patients' concerns and maintaining patient welfare are key skills assessed in the PACES exam. Candidates should not forget to ask about the patient's main concerns and how the symptoms are affecting their daily activities, as it is important to address this – for example, itchiness can be so severe that it affects a patient's sleep. Failing to address patients' quality of life will result in lost marks, so bear this in mind.

Table 1 outlines several conditions that present with jaundice, along with their associated systemic features.

Physical signs

Identifying physical signs is one of the seven key skills assessed in the PACES exam. Candidates need to obtain at least 14 marks in order to pass the exam. Having a good examination routine, starting with general inspection and following with an abdominal examination, will improve the candidate's ability to correctly identify relevant physical signs.

General examination

This is very important, as abdominal examination may reveal no physical signs and diagnosis is only obtained from a general inspection. Table 2 summarises the key features to look out for when examining a patient with jaundice. An extremely thorough visual survey needs to be carried out to see if there are any associated complications of jaundice, such as portal hypertension and chronic liver insufficiency. Features of portal hypertension are:

Table 1. Some associated symptoms, physical signs and investigations for common causes of jaundice

Cause	Associated symptoms	Physical signs	Investigations
Obstructive jaundice	Depends on underlying cause (eg common bile duct stones, pancreatic or biliary malignancy) and associated features of obstructive jaundice, such as pale-coloured stool, dark-coloured urine and pruritus	Jaundice; scratch marks from pruritus; occasionally mass in abdomen	Ultrasound scan (abdomen); magnetic resonance cholangiopancreatography for common bile duct stones
Viral hepatitis	Non-specific symptoms (low grade fever, arthralgia, myalgia); eating contaminated food; exposure (blood transfusion, piercing). It is important to distinguish between acute viral infections and chronic leading to cirrhosis when jaundice is part of liver failure or cirrhosis	Jaundice; tender hepatomegaly, risk (tattoo marks, piercings)	Hepatitis serology or polymerase chain reaction
Alcohol-related liver disease	Detailed history of chronic alcohol consumption. Important to distinguish between alcohol-associated hepatitis or alcohol-related liver disease cirrhosis	Dupuytren's contracture; parotid enlargement	Aspartate aminotransferase levels higher than those of alanine aminotransferase (usually 2:1)
Non-alcoholic fatty liver disease	Associated metabolic syndrome; type 2 diabetes mellitus; smoker; tiredness	Increased body mass index; acanthosis nigricans; hepatomegaly (10% of cases)	Diagnosis of exclusion Non-alcoholic fatty liver disease fibrosis score Transient elastography
Primary biliary cholangitis	Female > male; middle-aged women (40–60 years) (1:9); asymptomatic; pruritus; tiredness; associated with other autoimmune diseases	Orbital xanthelasma; skin xanthoma; scratch marks	Increased levels of alkaline phosphatase and antimitochondrial antibody and hyperimmunoglobulinaemia, especially IgM; liver biopsy
Primary sclerosing cholangitis	Fatigue; pruritus; weight loss; recurrent biliary infection. Associated with inflammatory bowel disease (especially ulcerative colitis)	Features of inflammatory bowel disease (stoma; scar; mouth ulcer; erythema nodosum)	Increased levels of alkaline phosphatase; magnetic resonance cholangiopancreatography
Haemochromatosis	Only causes jaundice as part of end-stage liver failure; classic triad of fatigue, arthralgia (pseudogout), hypogonadism; bronze diabetes; family history (+)	Slate grey-coloured skin; venesection and joint replacement scars; hepatomegaly; small testes	Increased ferritin; transferrin saturation; liver biopsy; genotyping
Autoimmune hepatitis	Female>male, two peaks – perimenopausal and teenage years, fatigue, pruritus, abdominal pain, association with other autoimmune diseases	Jaundice, scratch marks	Increased anti-nuclear antibody, anti-smooth muscle antibody and anti-liver kidney microsomal antibody; hypergammaglobulinaemia
Wilson's disease	Autosomal recessive disorder; jaundice; neuropsychiatric symptoms (young onset Parkinsonism, personality changes, intellectual impairment); arthropathy	Kayser–Fleischer ring; signs of Parkinson's disease	Increased urinary copper; decreased serum ceruloplasmin; liver biopsy; genetic testing
Gilbert's syndrome	Autosomal recessive disorder. Asymptomatic in most patients. In some cases, triggered by stress, dehydration, intercurrent illness, etc	Mild jaundice	Unconjugated hyperbilirubinaemia

Table 2. Key features of chronic liver disease on general examination	
Nails and hands	■ Clubbing ■ Leukonychia ■ Palmar erythema ■ Dupuytren's contracture ■ Asterixis
Skin	■ Scratch marks from pruritus ■ Bruises ■ Slate-grey colour ■ Venesection scars ■ Joint replacement scars ■ Tattoo marks ■ Skin piercings ■ Cutaneous abscesses at intravenous injection sites
Face	■ Jaundice ■ Xanthelasma ■ Parotid enlargement
Trunk and lower limbs	■ Gynaecomastia ■ Spider naevi ■ Dilated veins on the abdomen ■ Peripheral oedema

- Splenomegaly
- Ascites
- Spider naevi
- Presence of collaterals (varices, caput medusae).

Abdominal examination

Exposure

It is recommended that the patient's garments are pulled down to a level about halfway between the iliac crest and the pubic symphysis to avoid embarrassment to the patient (who are volunteers), although the patient's external genitalia should ideally be examined; if this is not possible, candidates should suggest to the examiner that they would do this in the clinical situation (Ryder et al, 2012).

Positioning

When performing the abdominal examination, positioning the patient correctly is vital. Candidates must ensure that the patient is lying supine while performing the assessment (Ryder et al, 2012). In a time-pressured setting like the PACES exam, this can be easily overlooked.

Sequence of abdomen examination

Candidates must make sure that they maintain eye contact with the patient during palpation, as the examiner will be alert to any patient's response to mild tenderness, such as a grimace, that may have been missed by the candidate. Examine in the systematic sequence of

1. Inspection
2. Palpation
3. Percussion
4. Auscultation.

Candidates should perform light palpation with the pulps of the fingers first, before deep palpation of the organs, such as the liver, spleen and kidneys (Ryder et al, 2012). Note their size, surface, consistency and tenderness. Look for dullness to percussion in the flanks and, if present, search for shifting dullness that is suggestive of ascites. Candidates

Key points

- Thorough history taking and examination is key to differentiating the various types of jaundice.
- Do not forget to address the concerns of the patients appropriately.
- Always start with a thorough head-to-toe assessment to look for any clues that will aid the diagnosis, followed by abdominal examination in the sequence of inspection, palpation, percussion and auscultation.
- Positioning and exposure of the patient are small things that can be easily overlooked but they really do matter.

Curriculum checklist

This article addresses the following requirements from the general internal medicine training curriculum.

- Managing an acute unselected take
- Managing an acute specialty-related take
- Managing patients in an outpatient clinic, ambulatory or community setting, including management of long-term conditions.

must not forget to examine the lymph nodes. Candidates may find it helpful to suggest to the examiner that they would usually complete the abdominal examination by examining the hernial orifices and performing a rectal examination.

Investigations

Baseline investigations include blood tests, ascitic tap and ultrasound of the hepatobiliary system. Viral serology, autoimmune screening, ceruloplasmin and ferritin levels should be sent out. Laboratory findings of the conditions frequently encountered in the PACES exam are listed in Table 1.

Conclusions

Jaundice and chronic liver disease are common in everyday practice, which is why they are often included in the PACES exam. It is important to achieve early diagnosis, so that appropriate interventions can be taken to improve the patient's outcome. There are many conditions that can present with jaundice. Using the systematic approach described in this article can provide a helpful guide for clinicians, to aid them in more accurate diagnosis and better performance during the PACES exam.

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Conflicts of interest

The authors declare that there are no conflicts of interest.

References

Beckingham IJ, Ryder SD. ABC of diseases of liver, pancreas, and biliary system: investigation of liver and biliary disease. BMJ. 2001;322(7277):33–36. https://doi.org/10.1136/bmj.322.7277.33

de Vries AB. Distinctive inflammatory bowel disease phenotype in primary sclerosing cholangitis. World J Gastroenterol. 2015;21(6):1956–1971. https://doi.org/10.3748/wjg.v21.i6.1956

Fevery J. Bilirubin in clinical practice: a review. Liver Int. 2008;28(5):592–605. https://doi.org/10.1111/j.1478-3231.2008.01716.x

Gadia CLB, Manirakiza A, Tekpa G et al. Identification of pathogens for differential diagnosis of fever with jaundice in the Central African Republic: a retrospective assessment, 2008–2010. BMC Infect Dis. 2017;17(1):735. https://doi.org/10.1186/s12879-017-2840-8

Pavlovic Markovic A, Stojkovic Lalosevic M, Mijac D et al. Jaundice as a diagnostic and therapeutic problem: a general practitioner's approach. Dig Dis. 2022;40(3):362–369. https://doi.org/10.1159/000517301

Ryder REJ, Mir MA, Freeman EA. An aid to the MRCP PACES. 4th edn. Hoboken (NJ): Wiley-Blackwell; 2012

Vitek L, Ostrow J. Bilirubin chemistry and metabolism; harmful and protective aspects. Curr Pharm Des. 2009;15(25):2869–2883. https://doi.org/10.2174/138161209789058237

Wilkinson IB, Raine T, Wiles K et al. Oxford handbook of clinical medicine. 10th ed. Oxford: Oxford University Press; 2017

Winger J, Michelfelder A. Diagnostic approach to the patient with jaundice. Prim Care. 2011;38(3):469–482. https://doi.org/10.1016/j.pop.2011.05.004