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The aim of this section in the Journal is to focus specifically on the trainees preparing for the exam and to cater to all the sections of the exam every month. The vision is to complete the cycle of all relevant exam topics (as per the syllabus) in four years.

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MCQs – Adult Pathology – Single Best Answer

1. Which of the following muscles is not located in the thenar group of muscles?

Answer: c. Opponens digiti minimi
 Opponens digiti minimi is located in the hypothenar group of muscles.¹ The intrinsic muscles of the hand are in four compartments – Thenar, adductor, hypothenar and central:

Thenar compartment – abductor pollicis brevis, flexor pollicis brevis and opponens pollicis

Adductor compartment – adductor pollicis

Hypothenar compartment – abductor digiti minimi, flexor digiti minimi, opponens digiti minimi

Central compartment – the lumbricals and interossei between the metacarpals

2. In the rheumatoid hand with an intact extensor tendon mechanism, replacement of the metacarpophalangeal joints might be considered if there is?

Answer: d. All of these

The indications for surgery in the rheumatoid patient are listed below in order of importance:

- Impending tendon rupture or severe nerve compression
- Relief of pain
- Improvement in function
- Cosmesis

MP joint arthroplasty will relieve pain effectively and will correct ulnar deviation as long as the carpus is not too radially deviated. If it is, the wrist should be reconstructed first and stabilised employing a radioulnar fusion. However, this should not be carried out, if the wrist is pain-free.^{2,3}

3. A 25-year-old man was involved in a road traffic accident and injured his right knee. The paramedics reported that his knee was dislocated and had to be reduced on the scene prior to being brought to hospital. On examination in hospital there was

reduced sensation on the dorsum of his foot and a good dorsalis pedis was palpable. Radiographs did not reveal any obvious fractures. What investigation would you request at this stage?

Answer: a. Angiogram

More than 50% of knee dislocations present reduced. Vascular injury is present in 5% to 15% of patients and selective arteriography in conjunction with physical examination rather than immediate arteriogram is the standard procedure. Peroneal nerve injury is present in approx 25% of patients and up to 50% partially recover.⁴

4. Which of the following factors is least predictive of a poor outcome after whiplash injury?

Answer: d. Severe pain in first week

The term 'whiplash' is used to denote the mechanism of an indirect flexion-extension soft-tissue injury to the neck resulting from a rear-end motor-vehicle collision. Symptoms associated with a worse outcome are rapid onset of pain, severity of neck pain, acute hospital admission, radiation of pain to the upper limb and headache.⁵

5. Which of the following statements concerning hemiarthroplasty of the hip for a fracture is not correct?

Answer: a. Cemented implants are associated with a lower overall reoperation rate

A recent randomised controlled trial comparing cemented and uncemented hip hemiarthroplasty has demonstrated that the general complication rate is similar between the two groups. There was no difference in mortality but the cemented hemiarthroplasty group had significantly less pain. The intra-operative complication rate was higher for the uncemented group and the overall re-operation rates were similar.⁶

Vivas

Adult Pathology

A 72-year-old man presents to you with a 18-month history of pain in his hip joints. His activities of daily living and his recreational activities have been significantly affected. His walking distance has reduced considerably and he complains of night and rest pain. This is his radiograph (Fig. 1).

1. Describe the abnormal findings and what is your diagnosis?

Answer: Bilateral hip osteoarthritis as evidenced by the typical radiological findings of reduced joint space, subchondral sclerosis, subchondral cysts and peri-articular osteophyte formation.

2. What treatment would you offer him initially?

Answer: Conservative management in the form of



Fig. 1

analgesics and supportive measures such as walking aids. Losing weight and physiotherapy can also be of benefit.⁴

3. If conservative management fails what treatment will you offer him next?

Answer: Total hip replacement.

4. What kind of prosthesis will you use and why?

Answer: Cemented stem, a cemented acetabular component and a metal-on-polyethylene articulation

5. What bearing surface will you use and why?

Answer: Evidence from various national joint registries (NJR) including the United Kingdom and Swedish joint registries supports the use of a metal-on-polyethylene articulation with cementing of both components. The United Kingdom NJR reports a 2.0% (1.8% to 2.3%) revision rate at five years for males aged over 65 with a cemented total hip replacement (THR). The Swedish NJR reports an 83% (81.6% to 84.4%) survival rate at 17 years for patients between 60 and 75 and a cemented THR.^{7,8}

6. What are the surgical goals of a total hip replacement?

Answer: The surgical goals are to relieve pain and improve function. Technical goals are to get the correct offset, the correct leg-lengths, the correct centre of rotation and correct positioning of implants.

7. How would you consent this patient pre-operatively?

Answer: I would inform the patient of possible complications related to total hip replacement. Which are:⁹

Common (2% to 5%): DVT, bleeding, dislocation, altered leg length and prosthesis wear/loosening

Less common (1% to 2%): Infection

Rare (<1%): Neurovascular damage, peri-prosthetic fracture, pulmonary embolus and death.

Hands

A 68-year-old woman presents to you with pain in the metacarpophalangeal joints of her right hand for the past three months (Fig. 2).



Fig. 2

1. What is the diagnosis?

Answer: Rheumatoid arthritis

2. What are the American Rheumatism Association criteria for diagnosis of this disorder?

Answer: The American Rheumatism Association criteria¹⁰ are outlined below:

five out of the following must be present for longer than six weeks

- morning stiffness
- pain on motion, or tenderness in at least one joint
- swelling (soft-tissue thickening or fluid, not bony overgrowth alone) in at least one joint
- swelling of at least one other joint (any interval free of joint symptoms between the two joints)
- poor mucin precipitate from synovial fluid
- characteristic histological changes in synovium
- characteristic histological changes in nodules

3. What deformities can you identify in the photograph?

Answer: Right hand - Swelling of the metacarpophalangeal joint from index finger to little finger. Marked ulna deviation of the fingers. Probable volar subluxation of the middle finger. Swan-neck deformity of the ring finger. Neutral wrist alignment.

4. How would you stage the disease in the photograph?

Answer: Late stage disease.

5. How would you treat this condition at this stage?

Answer: Metacarpophalangeal joint replacement.

6. How would you counsel the patient pre-operatively?

Answer: Expectations of hand surgery need to be realistic. It cannot restore full function in rheumatoid arthritis. It can be very effective in relieving pain, correcting deformity and improving function but is less effective in improving the range of movement (except for tendon reconstruction) or grip strength, which is often very low in patients with rheumatoid arthritis.²

7. What are the possible complications of this procedure?

Answer: Complications include recurrence of ulnar drift, lack of metacarpophalangeal joint extension, prosthesis fracture, silicone synovitis, persistent volar subluxation of the proximal phalanx and infection.¹¹

Trauma

A 54-year-old woman tripped over the pavement and landed on her right hip leading to this injury. These are the radiographs taken in A & E. (Figs. 3a and 3b).

1. Describe the abnormality in the radiographs?

Answer: Displaced intra-capsular subcapital fracture of the right neck of the femur.



Fig. 3a

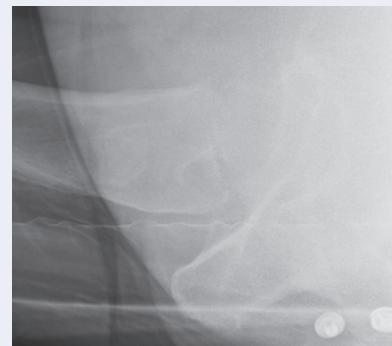


Fig. 3b

2. How would you classify this fracture?

Answer: The classification described by Garden¹² is commonly used to classify an intracapsular neck of the femur fracture and its main clinical application is to differentiate undisplaced and displaced fractures. The fracture in this patient is a type 3 Garden fracture since the trabecular lines in the femoral head are not in line with those in the femoral neck or acetabulum suggesting the head remains rotated. The classification is detailed below:

- Garden 1: Incomplete fracture (impacted valgus fracture)
- Garden 2: Complete fracture without displacement
- Garden 3: Complete fracture with partial displacement
- Garden 4: Complete fracture with full displacement

3. What is the blood supply to the femoral head?

Answer: The blood supply to the femoral head in the adult consists of the extracapsular pertrochanteric anastomosis (leading to the ascending cervical arteries and subsynovial intra-articular ring) with a minimal contribution from the artery of the ligamentum teres. The pertrochanteric anastomosis receives blood from the medial femoral circumflex artery and the lateral femoral circumflex artery posteriorly with minor contributions from the inferior and superior gluteal arteries.

4. How would you treat this fracture?

Answer: The options for management of this patient include internal fixation with percutaneous cannulated hip screws, hemiarthroplasty and THR. Considering the young age of the patient I would manage this displaced intracapsular fracture with a THR.

5. Do you know of any recent studies that support your plan of managing this patient?

Answer: Tidemark et al¹³ conducted a randomised controlled trial (RCT) of THR compared with internal fixation for displaced intracapsular fractures of the neck of the femur and demonstrated a significantly lower hip complication and secondary procedure rate at 24 months follow-up with improved pain and functional scores in the THR group. In an RCT comparing internal fixation with hemiarthroplasty¹⁴ a significantly lower re-operation rate was demonstrated in the hemiarthroplasty group (4.5%) compared with the internal fixation group (40%). A meta-analysis¹⁵ of 106 published reports showed a nonunion rate of 33% of displaced intracapsular fractures treated with internal fixation with avascular necrosis occurring in 16% and re-operation in 20% to 36%. Ravikumar and March¹⁶ published 13-year follow-up results comparing hemiarthroplasty, THR and internal fixation for displaced intracapsular fractures and reported a 24% revision rate in the hemiarthroplasty group, 33% in the internal fixation patients and 6.25% for those receiving THR. A further RCT of 81 patients¹⁷ confirmed improved outcomes of THR *versus* hemiarthroplasty in younger mobile patients with an intra-capsular fracture of the neck of the femur.

6. What is the expected outcome?

Answer: The patient would be expected to achieve a mean walking distance of over two miles at three years follow-up with a satisfactory Oxford Hip Score.

7. What are the possible complications?

Answer: Possible specific complications of THR include dislocation (up to 20% in reported series) and infection while the risks of internal fixation are already discussed including nonunion, avascular necrosis and re-operation.

8. Is there any other medical treatment / advice that you would offer this patient?

Answer: This patient has sustained a pathological fracture and will require investigation with a DEXA (dual energy x-ray absorptiometry) scan for osteoporosis. Osteoporosis treatment consists of secondary prevention with bisphosphonate therapy and oral calcium supplements to reduce the risk of further osteoporotic fractures in addition to controlling other risk factors.

Basic Science

1. What do you understand by the term 'free body diagram'?

Answer: This is a method of determining the forces and

moments acting on a body by isolating the body part and ensuring that it is in static equilibrium.

2. What assumptions are made while constructing a free body diagram?

Answer: The assumptions are listed as follows:¹⁸

- Bones are rigid rods
- Joints are rigid frictionless hinges
- No antagonistic muscle action
- Weight of body is concentrated at the exact centre of body mass
- Internal forces cancel each other out
- Muscles only act in tension
- The line of action of a muscle is along the centre of cross-sectional area of muscle mass
- Joint reaction forces are assumed to be only compressive.

3. Could you draw a free body diagram of a hip joint?

Answer: Free body diagram of a hip joint (Fig 4).

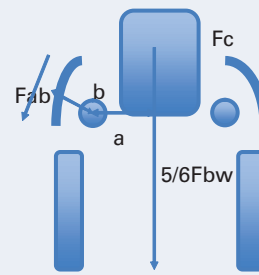


Fig. 4

4. What happens to the joint reaction force in the hip if the patient has osteoarthritis of the hip and is given a walking stick in the opposite hand?

Answer: The joint reaction force is reduced by 67% by using a walking stick in the contralateral hand.

5. Could you represent this on a free body diagram?

Answer: Free body diagram with a walking stick (Fig. 5).

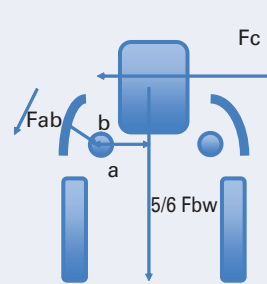


Fig. 5

6. What other methods are used to reduce the joint reaction force in the hip joint?

Answer: Other methods to reduce the joint reaction force include reducing the body-weight moment (reduced body mass, decreased lever arm with Trendelenberg gait or medialised axis of rotation), helping abductors with a suitcase in the opposite hand producing

anticlockwise moment or increasing the lever arm by increasing offset, lateralisation of the greater trochanter or varus implantation of the femoral component.

Children's Orthopaedics

1. What is the likely diagnosis? (Figs. 6a and 6b)

Answer: This child has developmental dysplasia of the left hip. The photograph shows asymmetric groin creases and the radiograph demonstrates disruption of Shenton's line. The femoral head is likely to sit lateral to Perkins line and superior to Hilgenreimer's lines in the superolateral quadrant.

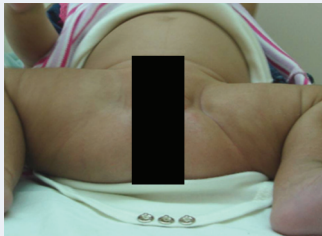


Fig. 6a



Fig. 6b

2. How would you manage this condition at this stage?

Answer: The age of this child is under six months since the femoral ossific nucleus is absent on the plain radiograph. Further investigation is required with an examination under anaesthesia and arthrogram to determine the reducibility of the hip, the factors obstructing reduction and the position of stability.

3. What investigation is this? (Fig. 7)

Answer: This is a right hip arthrogram.

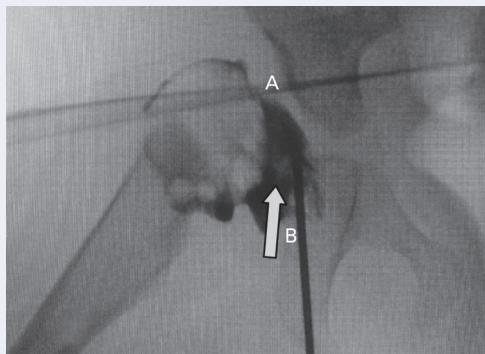


Fig. 7

4. What are structures A and B?

Answer: A: inverted limbus, B: ligamentum teres.

5. What is the diagnosis?

Answer: Dislocated right hip.

6. What is this investigation and when is it used? (Fig. 8)

Answer: Hip ultrasound.



Fig. 8

7. How would you interpret this?

Answer: Graf III, alpha angle less than 43°. Head decentered but not dislocated (Fig. 9).

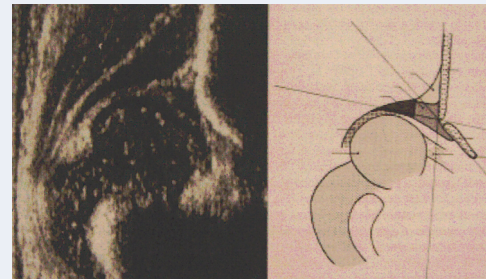


Fig. 9

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