

MCQs and EMQs – Single Best Answer

- In wound healing, inflammation is triggered by:
b. Platelets
Answer: It is the cytokine release from damaged tissue and degranulated platelets that initiates the inflammatory process. Cytokines (il-1, IL-6 and TGF-B) are then involved in the migration of inflammatory cells (macrophage/monocyte population) into the area of tissue damage.
- Which of the following statements about wound healing is false?
Answer: a. Type II collagen is the major type of collagen found in scar tissue.
Type I collagen is the main type found in scar tissue.
- Which clinical case from the list below is best attributed to the following metabolic abnormality?

1. Hypercalcemia	6. Hyponatremia
2. Hypocalcemia	7. Hypermagnesemia
3. Hyperkalemia	8. Hypomagnesemia
4. Hypokalemia	9. Hyperphosphatemia
5. Hypernatremia	10. Hypophosphatemia

 - A 34-year-old male with acute pancreatitis
Answer: Hypocalcaemia
 - A 64-year-old female with muscular cramps, lethargy and a paralytic ileus post-operatively. An ECG demonstrated U-waves
Answer: Hypokalemia
 - A 50-year-old male who was found to develop tetanic spasm in his hand after the blood pressure cuff was inflated
Answer: Hypocalcaemia (Trousseau Sign)
- Which of the following anatomical structures does NOT form part of the free flap in a Morrison wrap around a transfer for the thumb?
Answer: e. The distal phalanx of the great toe.
The Morrison wrap around transfer involves taking a full thickness flap (including its neurovascular structures and nail) from the great toe and wrapping it around an iliac crest bone graft.¹
- With respect to the knee, which of the following statements is false?
Answer: c. During femoral rollback the medial condyle rolls to a greater extent when compared with the lateral condyle. The medial femoral condyle has a shorter radius of curvature when compared with the larger lateral femoral condyle. Thus during a functional range of movement can be thought of as having a single centre of rotation. The lateral femoral condyle has a more varied centre of rotation and therefore has a larger degree of sliding and rolling movement. The axis for flexion extension may be approximated to the transepicondylar axis. The posterior tibial slope ranges between 5° and 10°. The “screw home” is the external rotation of the tibia by 5° in the last 15° of extension caused by the longer medial tibial plateau articular surface. It locks the knee decreasing the work performed by the quadriceps while standing. The popliteus acts to unlock the knee to initiate flexion.
- Which one of the following statements about blood vessels around the hip is true?
Answer: a. The external iliac artery can be injured by a screw in the anterosuperior quadrant.
Screw placement in the anterior-superior quadrant places the external iliac vein at most risk, but the iliac artery may be damaged as well.

Vivas

Adult Pathology

A 23-year-old male who works as a car mechanic and is right hand dominant has sustained an anterior dislocation of his right shoulder for the third time. The first episode was traumatic and the next two episodes of dislocation have been following fairly trivial trauma.

- What specific features would you look for on examination of this individual?
Answer: I would examine the right upper limb to ensure there is no subtle injury to the axillary nerve. I would then examine the range of movement of the shoulder and assess for anterior apprehension with the patient lying supine and the arm abducted and externally rotated. It sounds as though this is likely to represent a Polar I type of shoulder instability³ but I would also look for signs of generalised ligamentous laxity including a Beighton score.⁴
- How you investigate this patient?
Answer: I would investigate this patient with a MRI arthrogram to assess for structural defects that were contributing to his shoulder instability. I would specifically look for anterior labral pathology including glenoid bone loss and the presence of a Hill-Sachs impaction fracture in the humeral head. If subsequent to the MRI I was concerned about bone defects I would also arrange a CT scan specifically to assess the amount of glenoid bone loss.
- What are the expected findings in these investigations?
Answer: I would expect an anterior labral lesion with a small amount of bone loss and a small Hill-Sachs lesion.
- What are the options of treatment?
Answer: Options remain broadly surgical or non surgical, however in light of his young age and significant instability with minor trauma I would expect to provide a surgical solution. Depending on the results of investigations I would expect to perform an arthroscopic stabilisation. If there was significant bone loss from the glenoid then a bone transfer such as the laterjet⁵ (using the coracoid) may be required,

this may be performed arthroscopically. Similarly if there is a significant (up to 25%) hill sachs then further procedures may be required such as a remplissage⁶ of infraspinatus and posterior capsule to fill the defect.

- How would you manage this patient and if you plan to manage him surgically then please describe your proposed surgical intervention.

Answer: Assuming minimal bony defect I would manage this patient with arthroscopic anterior stabilisation. I would free the capsule anteriorly and then perform a capsular shift. I would hold my capsular shift with three anchors on the anterior glenoid wall.

Trauma

A 19-year-old male presents with the following closed injury to his knee, which he sustained while playing rugby (Figs 1a and 1b).



Fig. 1a



Fig. 1b

- Describe the radiographs

Answer: These are an AP and lateral radiograph of a right knee showing a stellate fracture of the patella. It is minimally displaced.

- Describe the blood supply to the patella.

Answer: The blood supply to the patella is made up of branches of six main arteries: the descending genicular, the superior medial and lateral genicular, the inferior medial and lateral genicular, and the anterior genicular. These branches anastomose, forming the prepatellar arterial network and, with the transverse infrapatellar artery, form the extraosseous patellar supply. The intraosseous or intrinsic circulation consists of two systems, one of which originates from the mid-patellar branches of the peripatellar anastomosis and enters the anterior face of the patella to irrigate the superior half. The other stems from the transverse infrapatellar artery giving rise to the apical vessels, which enter the inferior pole of the bone and thus feed the inferior half. Other smaller arteries originating from the popliteal and quadriceps arteries supply the patella entering at the base and the lateral side.

- What are the options of treatment? What amount of displacement is associated with loss of extensor control? *Answer:* If the extensor mechanism is intact then a course of non-operative management is a possibility. This would necessitate a prolonged period of immobilisation. However as little as 3 mm to 4 mm displacement is associated with loss of extensor function. If an operative course is to be pursued then an open reduction and internal fixation using a cannulated screw construct augmented with wire or fibre wire construct. Cannulated screws have been shown to be biomechanically superior to K wires in the fixation of transverse patella fractures⁷ and fibrewire has also been

shown to be superior to wire⁸ but with possible advantage of less irritation.

- Which technique gives the most stable construct biomechanically? *Answer:* A cannulated interfragmentary screw fixation with a tension band wire construct has the highest load to failure.
- What are the common complications? What is the incidence of early complications? *Answer:* As with all surgery there are risks of infection (which communicates with the knee joint). There are risks related to the fracture such as malunion, delayed or nonunion, chondromalacia and extensor lag and the long term risk of degenerative change within the patellofemoral joint.⁹ Finally there are risks related to the fixation method which include failure of metal work and prominence of metalwork requiring later removal. The risks of reoperation is approximately one in three, with an average rate of infection of 3.2% and nonunion in 1.3% of cases.¹⁰ Other problems include arthrofibrosis and extensor lag.

Hands

A 23-year-old body builder presents with tingling and numbness over his right dominant elbow with a snapping sensation over the elbow area on eccentric loading. He is able to demonstrate this in clinic and has had previous surgery on his ulnar nerve, which did not help his symptoms. A recent EMG/NCT is normal.

- What is the diagnosis?

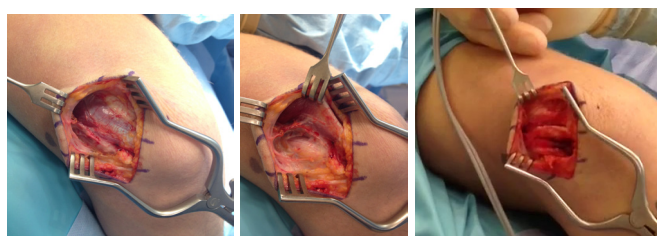
Answer: This gentleman may have instability of his ulnar nerve secondary to previous surgery but his symptoms may also be due to snapping of the medial head of triceps¹¹ called the snapping triceps syndrome. This is an uncommon disorder in which the distal portion of the triceps tendon dislocates over the medial epicondyle while flexing and extending the elbow against resistance. This may be associated with a degree of ulnar nerve neuritis that occurs due to ulnar nerve subluxation and instability. It is important to point out that it is the tendon that causes the snap and not the nerve.

- What is the aetiology?

Answer: The exact aetiology is unclear but may be related to relative hypertrophy of the medial head due to repetitive weight lifting¹² or may be seen following surgical release of the ulnar nerve.¹³ At surgery one finds a narrow transition between the muscular and tendinous insertion of the medial head of the triceps. An abnormal musculotendinous origin of the deep or medial head from the ulnar groove has also been reported.

The picture below demonstrates an unusually bulky medial portion of the triceps with the ulnar nerve lying below it in a subluxed position.

A careful dissection after isolating and decompressing the nerve will demonstrate a band of tissue distinct from the rest of the triceps tendon. This band causes pain as it negotiates the medial epicondyle from a position of flexion to extension.



3. What investigations can be performed?

Answer: The diagnosis tends to be clinical and it is not uncommon for patients to have had previous surgery for ulnar nerve decompression in the past. MRI scans of the elbow in flexion and extension may show inflammation over the medial head of the triceps while dynamic ultrasound can demonstrate the snap better as it can be done in a dynamic setting against resistance.

4. What is the treatment?

Answer: After a short period of conservative management which involves avoiding activities associated with repetitive flexion such as push-ups, weight lifting etc combined with the use of NSAIDs and splinting, most cases tend to need surgery.

At surgery the ulnar nerve is explored as per usual taking care to isolate the medial head of the triceps. This is often found to be bulky and on deep dissection a band of tissue as above can be identified. This can be excised and the elbow and the ulnar nerve is tested in flexion and extension. At this point it is recommended to transpose the ulnar nerve anteriorly as it tends to be unstable.

Children's Orthopaedics

Here are the lateral radiographs of the knee and elbow of a 14-year-old boy (Figs 2a and 2b)



Fig. 2a



Fig. 2b

1. What is the likely diagnosis and how would you manage the elbow condition?

Answer: The radiograph of the elbow shows a posteriorly dislocated radial head. These are almost always congenital in nature and may be associated with nail-patella syndrome.¹⁴ The mainstay of treatment is non-surgical, particularly in the skeletally immature. A completely dislocated radial head is usually pain free but a posterior dislocation may be associated with restrictions in extension and rotation. Occasionally patients may also complain about the prominence of the dislocated radial head. If following skeletal maturity the patient is symptomatic then they should be treated by excision of the radial head through a posterior incision.

2. This neonate in the special care baby unit has multiple fractures (Fig. 3). What is the likely diagnosis and outcome?

Answer: The diagnosis is osteopaenia of prematurity due to insufficient transfer of calcium and phosphorus from the mother during the last trimester. There is no intrinsic deformity in the bones as one might see in a generalised bone dysplasia such as osteogenesis imperfecta. Also, the appearances favour trauma rather than infection.

With good nutrition, likely including supplements of calcium, phosphate and vitamin D, the condition is reversible.



Fig. 3

Basic Science

1. Describe the structural anatomy of the labrochondral junction.

Answer: The acetabular labrum is a fibrocartilaginous structure, which rims the acetabulum anteriorly, superiorly and posteriorly, and which evolves into the fibrous transverse ligament inferiorly. The labrum attaches directly to the nonarticular side of the thin bony rim of the acetabulum and indirectly through a zone of calcified cartilage and by merging with the acetabular articular hyaline cartilage through a transition zone of 1 mm to 2 mm.¹⁵

2. Describe the histology of the acetabular labrum.

Answer: Most of the labrum is composed of thick, type I collagen fiber bundles principally arranged parallel to the acetabular rim to resist hoop stresses, with some fibers scattered throughout this layer running obliquely to the predominant fibre orientation.¹⁶

3. What is the blood and nerve supply to the acetabular labrum?

Answer: The anterior and superior aspects of the labrum are thought to be the most innervated portions, consisting of free nerve endings and sensory nerve end organs. These structures produce pain, pressure, and deep sensation.¹⁷ The vascular supply is provided by the obturator, superior gluteal, and inferior gluteal arteries. The blood supply is believed to be mostly peripheral, with the outer one-third of the acetabular base of the acetabular labrum being vascular, while the remaining majority is avascular.¹⁸

4. What are the risk factors for sustaining a tear of the acetabular labrum?

Answer: Tears to the acetabular labrum may be associated with femoro-acetabular impingement. Repetitive deep flexion particularly when coupled with rotation may cause microtrauma which may lead to tear formation. This may be particularly problematic in some sports such as football, hockey, golf and ballet.¹⁹ There are five main aetiologies related to tears of the acetabular labrum, trauma, FAI, degeneration, capsular laxity and dysplasia.

5. How would you assess the physiology of the articular cartilage in the hip?

Answer: I would use functional MRI scanning to assess the sodium concentration of the articular cartilage. This is a surrogate marker of proteoglycan and has been used to assess the physiology of articular cartilage in the knee. This allows the non-invasive assessment of the cartilage.²⁰

6. Describe the structure and function of the ligamentum teres.²¹
Answer: The ligamentum teres is pyramidal and somewhat flattened in shape. Its mean length is between 30 mm and 35 mm. It has a broad origin, blending with the entire transverse ligament of the acetabulum and attached to the ischial and pubic sides of the acetabular notch by two bands. Microscopically it consists of bundles of collagen (mainly types 1 and 4) arranged parallel to its axis. Its function in adults is debated and it has been thought of as a vestigial structure. However a mechanical role has been proposed. It is tightest in adduction, flexion and external rotation of the hip and as this is the position in which the joint is least stable, it may be providing a stabilising function.

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