ORTHOPAEDICS
Questions&Answers

Q-1

A 26 year old primigravida pregnant woman at 34 weeks gestation presents with tingling and numbness with occasional pain of her right hand in addition to altered sensation over her right middle and index finger. Tinel test is negative. What is the SINGLE most likely diagnosis?

A. **Carpal Tunnel Syndrome**
B. **Radial nerve entrapment**
C. **Scaphoid fracture**
D. **Median nerve entrapment**
E. **Peripheral arterial disease**

ANSWER:
Carpal Tunnel Syndrome

EXPLANATION:
Because the stem states that Tinel test is negative, you may be tricked into choosing a different answer but remember that the Tinel test has a very low sensitivity for carpal tunnel syndrome. If the patient has a high suspicion of having carpal tunnel syndrome such as the classic tingling and numbness over the median distribution of the hand as well as being pregnant (which is a high risk factor for carpal tunnel syndrome) then you should always choose carpal tunnel syndrome as the answer.

Pregnancy is a known risk for carpal tunnel syndrome. In pregnancy, carpal tunnel is due to fluid retention. The best thing to do is to advise the pregnant women to wear wrist splints until delivery as after delivery, the carpal tunnel syndrome usually resolves.

Q-2

A 15 year old boy presents with fever and pain in the right lower thigh. The pain has been ongoing for the past one month. On examination, there is a 2 cm by 2 cm mass at the lower third of his thigh which is red, warm and tender. An X-ray shows bone destructionwith overlying onion-skin layers of periosteal bone formation and a soft tissue mass. What is the SINGLE most likely diagnosis?

A. **Tuberculous arthritis**
B. **Ewing's sarcoma**
C. **Osteosarcoma**
D. **Osteomyelitis**
E. **Fibrosarcoma**

ANSWER:
Ewing's sarcoma

EXPLANATION:
Ewing's sarcoma
- A malignant round-cell tumour of long bones (typically grows in diaphysis of long bones) and limb girdles, usually presents in adolescents (usually 5 to 15 years old)

Presentation
- As a mass or swelling commonly in long bones of arms and legs, pelvis or chest
- Pain at area of tumour
- Other signs and symptoms include: malaise, anorexia, weight loss, fever

Investigation
- A typical "onion skinning" type pattern is often seen on X-rays. This is due to bone destruction with overlying concentric layers of new bone formation

Q-3

A 15 year old boy complains of pain in his leg which usually settles within an hour of taking aspirin. The pain is described as a dull pain which is persistent but is usually worse at night. What is the SINGLE most likely diagnosis?

A. Leiomyosarcoma
B. Liposarcoma
C. Chondrosarcoma
D. Exostosis
E. Osteoid osteoma

ANSWER:
Osteoid osteoma

EXPLANATION:
The key fact here is the aspirin. The fact that the bone pain responds to aspirin in such a short time period is classic for osteoid osteoma.

Osteoid osteoma
- Benign bone tumor that develops in the long bones of the body such as the femur and tibia
- Pain is unrelated to activity and is relieved quickly by NSAIDS
- Pain usually worse at night
- Frequently affects children and young adults
- Usually less than 1 cm in diameter

Important note to remember: Bone pain relieved well by NSAIDs is characteristic for osteoid osteoma

Q-4

A 33 year old woman fell from playing volleyball and hit her right knee. Valgus stress test is seen to be positive. What is the SINGLE most likely structure that is injured?

A. **Anterior cruciate ligament**
B. **Posterior cruciate ligament**
C. **Lateral collateral ligament**
D. **Medial collateral ligament**
E. **Meniscus**

ANSWER:
Medial collateral ligament

EXPLANATION:
Medial collateral ligament prevents the lateral movement of the tibia on the femur when valgus (away from the midline) stress is placed on the knee.

The valgus stress test is performed with the hip abducted and the knee at 30° of flexion, with one hand placed as a pivot on the knee. The other hand is placed on the foot with an abducting force. The idea is to attempt to force the leg at the knee into valgus. The fingers of the hand at the knee is used to feel the amount of joint-line opening that occurs when valgus stress is applied. If the joint-line is seen to open up on the medial side, this is indicative of a medial collateral ligament damage.

Test for knee ligament injuries
Medial collateral ligament → Valgus stress test
Lateral collateral ligament → Varus stress test
Anterior cruciate ligament → Anterior drawer test, Lachman test
Posterior cruciate ligament → Posterior drawer test

Q-5

A 2 year old girl preseents with a painless limp. On examination, there is unequal skin folds and the left leg is shortner than the right leg. What is the SINGLE most likely diagnosis?

A. **Transient synovitis**
B. **Developmental dysplasia of the hip**
C. **Perthes' disease**
D. **Juvenile idiopathic arthritis**
E. **Slipped capital femoral epiphysis**

ANSWER:
Developmental dysplasia of the hip

EXPLANATION:
Developmental dysplasia of the hip (DDH)
- Formerly referred to as congenital dislocation of the hip (CDH). DDH is now the preferred term to reflect that DDH is an ongoing developmental process.
- Defined simply as abnormal growth of the hip
- More common in the left hip

Risk factors
- An important risk factor to remember is vaginal delivery of babies with breech.
- 80% of cases occur in girls

Barlow test: attempts to dislocate an articulated femoral head

Ortolani test: attempts to relocate a dislocated femoral head.

Ultrasound is used to confirm the diagnosis if clinically suspected. This is used up to 4.5 months of age because the hips remain cartilaginous up to this time. After 4.5 months, an anteroposterior pelvic radiography is more useful.

Management

- Pavlik harness in children younger than 4-6 months
- Surgery is reserved for older children

COMPARING LIMPS IN CHILDREN

The table below gives good keywords and hints that the examiners would include to point you towards a specific diagnosis.

	Developmental dysplasia of the hip (DDH)	**Perthes' disease**	**Slipped Upper Femoral Epiphysis (SUFE)**
Age	0 to 5 years old	5 to 10 years old	10 to 15 years old
Pain	Painless	Chronic pain (slowly developing pain)	Painful
Risk factors	Breech delivery		Obese
On examination	Unequal skin folds One leg shorter	Stiffness and reduced range of hip movement	The affected limb will be shorter and lies in external rotation Abduction is limited. When the hip is flexed, it will rotate externally

	Transient synovitis	**Juvenile idiopathic arthritis**	**Septic arthritis**
Description	Acute hip pain associated with viral infection (most commonly an upper respiratory tract infection)	Arthritis occuring in someone who is less than 16 years old that lasts for more than three months	Acute hip pain associated with systemic upset
Fever	Present (usually mild)	Present if systemic-onset JIA (fever can occur at the same time every day with a spontaneous rapid return to baseline)	Present (continuous fever)
Features usually given in exam	Pain on weight-bearing but not at rest	Blanching rash (salmon pink rash)	Very unwell child

Q-6

An 80 year old woman with mild dementia at a nursing home tripped and fell on her hand. She was brought to the Emergency Department with tenderness throughout her wrist. Distal pulses and sensation of her hand is intact. Her hand looks well perfused. X-ray revealed a fracture of the distal end of the radius with a 10 degree dorsal angulation. What is the SINGLE best management for her?

A. **Closed reduction of the fracturre**
B. **Open reduction and internal fixation**
C. **Above elbow backslap cast**
D. **Closed reduction followed by Plaster of Paris cast below elbow**
E. **Wrist sling**

ANSWER:
Closed reduction followed by Plaster of Paris cast below elbow

EXPLANATION:
To choose the correct answer, we first need to know the diagnosis. This is a Colles' fracture.

Colles' fracture is a fracture of the distal radius with dorsal displacement of fragments. It typically occurs from a fall onto an outstretched hand that results in forced dorsiflexion of the wrist. The characteristic dinner fork deformity makes it easy to recognize, along with the classical history. The management of the type of cast to be used in a Colles' fracture is still heavily debated however, the patient's age and any potential disability should be taken into consideration. We should always aim to tailor management for individual patients and their needs rather than apply generalized rules across the population.

This patient is elderly and she has mild dementia. In this situation, the best type of management for her should be a complete cast below the elbow in order to maximally immobilize her wrist and prevent further injury to her wrist, thus causing potential complications.

A backslab is the preferred method of management for younger patients

Surgical reduction is reserved for intra-articular fractures and if there is any intraarticular incongruity. Since there was no mention of this in the question, open reduction and internal fixation is the wrong choice.

Q-7

A 35 year old male typist suffered a wrist injury after falling on his right outstretched hand. He was treated with a scaphoid cast with the probable diagnosis of a scaphoid fracture. The cast was removed after 2 weeks from the injury for a repeat X-ray. After removing the cast, he noted that he had difficulty in moving his right thumb, index and middle finger. There was also a tingling sensation on those fingers. What is the SINGLE most likely management that would improve his symptoms?

A. **Release of the flexor retinaculum**
B. **Release of common flexor sheath**
C. **Release of palmar aponeurosis**
D. **Ulnar nerve release**
E. **Fasciotomy**

ANSWER:
Release of flexor retinaculum

EXPLANATION:
Carpal tunnel syndrome is characterised by tingling, numbness, or pain in the distribution of the median nerve (the thumb, index, and middle fingers, and medial half the ring finger on the palmar aspect) that is often worse at night and causes wakening. It is due to compression of the median nerve as it passes under the flexor retinaculum.

In this stem, the first hint is that he is a typist. Long hours of keyboard use may lead to or aggravate carpal tunnel syndrome. Flexion or extension injury of the wrist can also be a secondary cause of carpal tunnel syndrome although it is rare that symptoms would arise in such a short time from the injury and immediately from removal of the cast. Given the rest of the options, release of the flexor retinaculum is the only option that would help improve symptoms should this be a diagnosis of carpal tunnel syndrome.

Q-8

A 64 year old diabetic woman presents to the GP surgery with an acutely painful, swollen and hot right knee joint. There is limited range of movement and movements are painful in all directions. There is redness around the joint. An effusion surrounding the entire joint is obvious. There is no history of trauma. She has a pulse rate of 70 beats/minute, and a temperature of 37.8 C. What is the SINGLE most likely diagnosis?

A. **Reactive arthritis**
B. **Septic arthritis**
C. **Viral arthritis**
D. **Bursitis**
E. **Gonococcal arthritis**

ANSWER:
Septic arthritis

EXPLANATION:
She presents with the classic features of septic arthritis. Diabetes mellitus is a risk factor for septic arthritis. She should be referred on to orthopaedics in the hospital for further management which would involve joint aspiration and empirical intravenous antibiotics. In a patient presenting with acute monoarthritis, septic arthritis is the most common diagnosis to exclude as if not treated will result to permanent damage and even death in some patients.

The distractor here is reactive arthritis however unlike septic arthritis, fever is not a typical feature of reactive arthritis. Furthermore, reactive arthritis is more rare a disease compared to septic arthritis and it is typically seen in young adults. The stem would need to include more information for one to pick reactive arthritis wuch as skin or eye manifestations or a recent genitourinary or gastrointestinal infection.

Bursitis tends to result in tenderness and swelling localized to small area with pain on passive movement only felt in certain directions.

Gout would be another differential however it is not in the options. Gout predominantly affects the first metatarsophalangeal joints but of course the knee joint can be affected as well.

REACTIVE ARTHRITIS
A form of seronegative spondyloarthritis clinically associated with back pain,migratory oligoarthritis and extra-articular symptoms that typically follow agastrointestinal or urogenital infection

Presentation:
- Develops 2-4 weeks after a an initial infection which may have been sexually acquired or gastrointestinal in origin
- An asymmetrical, predominantly lower extremity, oligoarthritis is the majorpresenting symptom (usually knees and ankles)
- Skin (circinate balanitis, keratoderma blennorrhagicum, erythema nodosum)
- The complete Reiter's triad of urethritis, conjunctivitis, and arthritis may occur

Remember these points:
- Joints
  - o Arthritis (oligoarthritis of lower limbs)
- Eyes
  - o Conjunctivitis (seen in 50%)
  - o Anterior uveitis
- Skin
  - o Circinate balanitis which are painless vesicles on the coronal margin ofthe prepuce
  - o Keratoderma blennorrhagica which are waxy yellow/brownmaculopapular rash seen on palms and soles
  - o Erythema nodosum which are tender red nodules on the shins
- Urethritis

Mnemonic: "Can't see, can't pee, can't climb a tree."
- *Can't see – Conjunctivitis*
- *Can't pee – Urethritis*
- *Can't climb a tree – Arthritis*

SEPTIC ARTHRITIS
The two most common organisms that cause septic arthritis are:
- Staphylococcus aureus → Most common pathogen for septic arthritis overall
- Neisseria gonorrhoeae → Seen in young, sexually active adults

Most cases of septic arthritis are due to haematogenous spread during transientbacteraemia but can also be introduced by a skin lesion that penetrates the joint or bylocal spread from a contiguous infected site.

Risk factors
- Prior joint damage (rheumatoid arthritis, gout, osteoarthritis)
  It is particularly important to remember rheumatoid arthritis as a risk factor asit is commonly asked

- Immunodeficiency states (HIV, corticosteroid use)
- Diabetes

Presentation
- Single swollen, red joint with pain on active or passive movement
- Fevers and rigors

Remember this triad of fever, pain and impaired range of motion

Investigations
- Aspiration of synovial fluid → Sent for gram staining, leukocyte count,microscopy and culture
- Blood cultures → Remember most cases of septic arthritis are due tohaematogenous spread

Management
- Flucloxacillin for 4 to 6 weeks
- If penicillin-allergic → Use clindamycin
- If gonococcal arthritis → Use cefotaxime or ceftriaxone
- If infection not responding to antibiotics → Perform repeated percutaneousaspiration

In general, intravenous antibiotics are used for 7 days until the swelling subsides andblood cultures become negative. This is followed by a 4 week course of oral antibiotics.

Q-9

A 60 year old female has pain and stiffness in her right hip joint. The pain has been worsening over the past 6 months. The pain increases in intensity as the day progresses and it is usually least pain in the morning. She has noticed nodules in the joints of the fingers of her hands. A recent blood test shows:

Haemoglobin 92 g/L
White cell count 9.8 x 109/L
Platelets 250 x 109/L

What is the SINGLE most likely diagnosis?

A. **Rheumatoid arthritis**
B. **Osteoarthritis**
C. **Gout**
D. **Pseudogout**
E. **Multiple myeloma**

ANSWER:
Osteoarthritis

EXPLANATION:
The first step is recognising that this is osteoarthritis. Pain in one joint that is worse towards the end of the day for a 6 month period are features of osteoarthritis. Hips are also a common joint affected by osteoarthritis.

The nodules in her hand although not specified in the stem are likely to represent Bouchard's nodes or Heberden's nodes which are seen in osteoarthritis.

Anaemia in this stem cannot be explained by choosing osteoarthritis except for the fact that it could be due to prolonged use of NSAIDS causing gastrointestinal bleeding. This is one reason many doctors would have picked rheumatoid arthritis as the answer as rheumatoid arthritis is associated with anaemia of chronic disease. It is estimated that 30-60% of people with rheumatoid arthritis are anaemic (either from anaemia of chronic disease or GI bleed related to nonsteroidal anti-inflammatory drug (NSAID) use. However, we must remember how rheumatoid arthritis presents. Usually more than one joint is involved in rheumatoid arthritis and the hands are almost always affected. With rheumatoid arthritis, the pain and stiffness is usually worst on waking, but gradually improves during the day. This is quite the opposite of osteoarthritis which is represented in this stem.

Osteoarthritis
Features to remember
- Monoarthritis
- Hip and knee are commonly affected
- Joint pain that is exacerbated by exercise and relieved by rest (sometimes gives a history of pain worsening at the end of the day)
- Bony deformity due to osteophytes
  - In fingers this presents as swelling at the distal interphalangeal joints (Heberden's nodes) or swelling at the proximal interphalangeal joints (Bouchard's nodes)

Mnemonic for Heberden nodes and Bouchard's nodes
- Heberden → distal interphalangeal joint (H-D) (High Definition)
- Bouchard → proximal interphalangeal joint (B-P) (Blue Picture)

X ray shows loss of joint space, marginal osteophytes, bone cyst and subarticular sclerosis.

Mnemonic for X-ray features
- L → Loss of joint space
- O→ Osteophytes
- S → Subchondral cysts
- S → Subchondral sclerosis

Management
- Exercise and physiotherapy
- Weight reduction
- Regular paracetamol
- Topical NSAIDs
- Oral NSAIDs
  - *Note: Paracetamol and/or topical NSAIDs should be considered ahead of oral NSAIDs*
- Joint surgery as last option

Q-10

A 33 year old woman with a previous history of pain at the left wrist following a fall on her outstretched hand 4 months ago presents with pain in the same wrist below the thumb. She has not sought any medical advice or treatment prior to this. She says that the pain is aggravated when she holds her baby. What is the SINGLE most likely cause?

- **A. Fracture radial head**
- **B. Scaphoid fracture**
- **C. Carpal tunnel syndrome**
- **D. Colles' fracture**
- **E. Ulnar fracture**

ANSWER:
Scaphoid fracture

EXPLANATION:
The likely diagnosis here is a scaphoid fracture.

A very typical scenario is a young person who falls on his or her outstretched hand with forced dorsiflexion. In this scenario, she fractures her scaphoid 4 months ago. As there was no management in place, likely a non-union would be in the differential. Non-union occurs in approximately 5-10% of nondisplaced scaphoid fractures.

The pain aggravated when she holds baby gives us a little small clue that she may be having pain during supination against resistance.

Signs: Tender in anatomical snuff box and over scaphoid tubercle, pain on axial compression of the thumb, and on ulnar deviation of the pronated wrist, or supination against resistance.

If initial X-rays are negative, cast and re-X-ray in 2 weeks.

Q-11

A 35 year old volleyball player has pain in his right arm and shoulder for the past 2 days. He finds it difficult to perform tasks which involve lifting his arm above his shoulder. His shoulder feels weak. The shoulder pain is worse at night when he is in bed. There is no history of trauma. What is the SINGLE most likely cause of his pain?

- **A. Rupture of the long head of biceps**
- **B. Acromioclavicular ligament tear**
- **C. Sternocleidomastoid injury**
- **D. Supraspinatus tendinitis**
- **E. Shoulder dislocation**

ANSWER:
Supraspinatus tendinitis

EXPLANATION:

Supraspinatus tendinitis

Often associated with shoulder impingement syndrome

History

- The stem would always have a history of either:
- A person with a job that require repetitive overhead activity
- A person who has recently been involved in carrying heavy items e.g. moving to a new house
- An athlete whose sport involves stressful repetitive overhead motions e.g. swimming, volleyball, tennis, badminton

Symptoms

- Pain, weakness and loss of motion
  - o Pain worsens with overhead or above the shoulder activities
  - o Pain is often worse at night and can disturb sleep, particularly when lying on the affected shoulder

Q-12

A 62 year old man has bone pain at his hips and back. On further investigatioin, alkaline phosphatase was found to be elevated in his blood. An X-ray shows multifocal sclerotic patches in the skull. What is the SINGLE most likely diagnosis?

A. Paget's disease
B. Osteoporosis
C. Osteomalacia
D. Multiple myeloma
E. Ankylosing spondylitis

ANSWER:

Paget's disease

EXPLANATION:

Note that the patches of the skull are sclerotic and not lytic. Sclerotic patches represent Paget's disease (osteitis deformans) whereas if it was lytic lesions on the skull it would represent multiple myeloma. Alkaline phosphatase is seen to be raised in both Paget's disease and multiple myeloma however it is usually seen raised in multiple myeloma only when associated with fractures.

Note that there are two types of Paget's disease:

1. Paget's disease of the bone (osteitis deformans)
2. Paget's disease of the breast

Paget's disease (osteitis deformans)

Think of Paget's disease as a bone-making process (bone turnover) becoming faster and out of control. There is increased bone resorption and abnormal osteoclast activity followed by rapid increase in bone formation by osteoblast. The new bone structure ends up being disorganised and mechanically weaker, more bulky, less compact, more vascular, and liable to pathological fracture and deformity.

Paget's disease can affect any bone but is most common in the axial skeleton, long bones, and the skull. The usual sites are the pelvis, lumbar spine, femur, skull and tibia.

Presentation

- It is commonly asymptomatic and is discovered by the incidental finding of an elevated serum alkaline phosphatase or characteristic abnormality on X-ray
- When symptoms occur, the most common complaints are bone pain and/or deformity
  - Bone pain may be present at rest and on movement
  - Bone deformity includes sabre tibia (bowing of the tibia), kyphosis, and frontal bossing of the skull.
  - Other presentations include pathological fractures
  - Deafness and tinnitus may be due to compression of cranial nerve VIII
  - High-output cardiac failure (due to increased blood flow through affected bone)

Investigations

- There are specific X-ray features of Paget's disease that include:
  - A classical V-shaped pattern between healthy and diseased long bones known as 'the blade of grass' lesion
  - The 'cotton wool' pattern in the skull that is also characteristic (multifocal sclerotic patches)
- Serum calcium and parathyroid hormone levels are usually normal but immobilisation may lead to hypercalcaemia
- Alkaline phosphatase is markedly raised

Note: Osteosarcoma is one of the complications thus Paget's needs to be monitored closely.

Management

Bisphosphonates

COMPARING OSTEOPOROSIS, PAGET'S DISEASE AND OSTEOMALACIA

	Osteoporosis	**Paget's disease**	**Osteomalacia**
Serum calcium	Normal	Normal	Low
Serum phosphate	Normal	Normal	Low
Alkaline phosphatase	Normal	High	High

Q-13

A 33 year olf man was painting his wall when he slipped from the ladder and fell from a height of 8 feet landing on his feet. On examination, his left foot is tender and swollen. Which SINGLE bone is most likely to have been fractured?

A. Talus
B. Calcaneus
C. Navicular
D. Cuboid
E. Lateral Cuneiform

ANSWER:
Calcaneus

EXPLANATION:
The Calcaneus is the bone that is most commonly fractured in a vertical fall. In cases of stress fractures, the metatarsals are commonly involved followed by the navicular and calcaneus.

*A good mnemonic to remember is **"CAL".** If the patient falls and lands verti**CAL**ly, look for **CAL**caneal fractures.*

Important note: A common injury with calcaneal fractures are spinal fractures due to the type of force exerted. If a calcaneal fracture is seen on a foot X-ray, examine the patient for spinal fractures as well.

Q-14

A 24 year old man falls on an outstretched hand while playing football. He comes in complaining of pain at the base of the thumb. On physical examination, he is tender to palpate over the anatomical snuffbox. Wrist movement, particularly pronation followed by ulnar deviation is painful. X-rays are read as negative. What is the SINGLE most appropriate next management?

A. Reassurance and analgesia
B. Surgery
C. Immobilization of the wrist and review in 2 weeks
D. Scaphoid cast for 6 weeks
E. High arm sling and rest

ANSWER:
Immobilization of the wrist and review in 2 weeks

EXPLANATION:
This is a typical presentation of a scaphoid fracture.

It is a very debatable question. The answers C and D both may seem right, but the more appropriate answer of the two would be C.

First we need to understand scaphoid fractures.

A very typical scenario is a young man who falls on his outstretched hand with forced dorsiflextion. X-rays are usually negative but if repeated in 2 weeks become positive.

They are also infamous because of a high rate of nonunion.

Signs: Tender in anatomical snuff box and over scaphoid tubercle, pain on axial compression of the thumb, and on ulnar deviation of the pronated wrist, or supination against resisttance.

If initial X-rays are negative, cast and re-x-ray in 2 weeks.

Unfortunately, for this question, re-x ray was not an option. So many candidates would have picked “D. Scaphoid cast for 6 weeks”. We asked orthopaedic registrars regarding this question, and most would agree that “C. Immobilization of the wrist and review in 2 weeks” would be a better answer because you should not cast for 6 weeks without knowing if there is actually a fracture. Thus immobilize for 2 weeks, and review (and obtain X-rays). If fracture is seen after 2 weeks, then cast for another 4 more weeks.

Q-15

A 48 year old woman presented to her general practitioner with the complaint of new onset right shoulder pain and right thoracic spine pain. She says that the pain started a few weeks ago. Initially, it was just a minor discomfort but now it is a constant dull ache, which becomes worse when she lies down. She has had no relief with regular paracetamol or ibuprofen, which she purchased over the counter. She believes that the pain is probably due to her intense gym session last week and has presented today for further evaluation of her pain. Upon further questioning, she reveals that she was diagnosed with breast cancer one year ago. She finished her treatment successfully a few months ago and says that her oncologist reported to her that she was in remission. Upon examination of her shoulder, tenderness could be elicited over the shoulder joint and the surrounding areas. Her left shoulder appears to be normal and an upper limb neurological examination reveals no further abnormalities. An X-ray of her right shoulder was done which showed some degenerative changes. What is the SINGLE most appropriate investigation that you will perform to add in the management of this patient?

A. **DEXA (Dual Energy X-ray Absorptiometry) scan**
B. **CT (Computed Tomography) scan**
C. **Serum calcium**
D. **Skeletal survey**
E. **Bone scintigraphy**

ANSWER:
Bone scintigraphy

EXPLANATION:
This question can be tricky if we see the age and the X-ray findings of the patient which shows degenerative chagnes at the age of 48. In a 48 year old, osteoarthritis may be present coincidentally. However, the pain seen in osteoarthritis is typically made worse by prolonged activity and relieved by rest, and not on lying down which is the first hint that there is possibly more to ti than just osteoarthritis. One should always be considering metastasis when there is a history of breast cancer.

Bone scintigraphy is a type of nuclear medicine imaging technique which would be helpful in looking specifically at bone metastasis.

DEXA scan is not the right option. It is a bone density scan and is used to measure bone loss mainly in patients with suspected osteoporosis.

Serum calcium levels are also performed in suspected bone metastasis because, in bone metastases, calcium can be released into the bloodstream leading to hypercalcemia. However, there is a difference between “SINGLE most appropriate

investigation" and "SINGLE most initial investigation". Serum calcium would be the most initial investigation but not the most appropriate unless of course this patient were to portray signs and symptoms of hypercalcaemia.

Skeletal survey is useful for multiple myeloma where tumours are seen as "punched out" lesions. It is inappropriate for this case.

What if an MRI scan was one of the options?
An MRI scan is considered the gold standard for detecting metastatic spinal cord compressions and NICE recommends this should be performed within 7 days if there is pain alone or within 24 hours if there is pain and neurological signs. MRI scans are a better modality for bone metastasis than scintigraphy, however, there is a great cost to it if a full body MRI would be required. For targeted focal lesions, an MRI can be useful if performed at the site of metastatic disease but since this patient has shoulder and spine involvement without neurological abnormalities, a nucleaer scan would be a better choice.

If there were neurological symptoms (e.g. limb weakness, radicular pain, difficulty in walking, sensory loss or bladder or bowel dysfunction), suspect metastatic spinal cord compression and perform an urgent MRI of the whole spine.

Q-16

A 33 year old woman has complaints of pain in her right arm and shoulder when she abducts it. The pain is worse at night and disturbs her sleep. She finds it difficult to perform task which involve lifting her arm such as combing her hair. She has recently moved to a new house and was involved in carrying heavy items. There is no history of trauma. What is the SINGLE most likely cause of her pain?

A. Rutpure of the long head of biceps
B. Acromioclaviculre ligament tear
C. Sternocleidomastoid injury
D. Supraspinatus tendinitis
E. Shoulder dislocation

ANSWER:
Supraspinatus tendinitis

EXPLANATION:
Please see Q-11

Q-17

A 44 year old man slipped while he was coming down the stairs and he fell on his outstretched arm. X-rays demonstrate an oblique fracture of the middle to distal thirds of the humerus. He is unable to dorsiflex his right wrist. What is the SINGLE most likely associated nerve injury?

A. Radial nerve
B. Musculocutaneous nerve
C. Median nerve
D. Ulnar nerve
E. Axillary nerve

ANSWER:
Radial nerve

EXPLANATION:
The X-ray findings alone which shows a humeral shaft fracture already gives you the answer (a radial nerve injury). If you go on reading, this question gives you a second clue which is a wrist drop (he is unable to dorsiflex his wrist) which is classic for a radial nerve injury

Fracture of the humeral shaft is often caused by a fall on an outstretched arm. These fractures can injure the radial nerve, which courses in a spiral groove right around the posterior aspect of that bone.

The management of humeral shaft fracture is not commonly asked in PLAB but you may want to know it for your own knowledge:

Nonoperative management is adequate for >90% of these fractures. Hanging arm cast or coaptation splint are used, and the nerve function returns eventually. Surgical management may sometimes be needed but are uncommon. These surgical options include intramedullary nailing and compression plating.

It is important to remember the key phrases for nerve damage during PLAB. There are certain phrases you need to memorise to relate it to a specific nerve damages.

Examples:
Wrist drop → Radial nerve
Foot drop → Either common peroneal nerve or sciatic nerve
Claw hand → Ulnar nerve
Paraesthesia of thumb, index and middle finger → Median nerve
Numbness on superior aspect of upper arm just below shoulder joint → Axillary nerve
Fibular neck fracture → Common peroneal nerve
Femur neck fracture or Acetabular fractures → Sciatic nerve
Fracture of humeral shaft → Likely Radial nerve
Fracture of humeral neck → Likely Axillary nerve
Monteggia fracture → Radial nerve
Paraesthesia and impaired sensation in both hands (glove distribution) → Peripheral neuropathy

Q-18

A 20 year old fit man suddenly develops severe low back pain as he is getting up from bed. There is greater pain when he is lying supine with his leg raised. He gives a description of an electric shock pain moving down his left leg. What is the SINGLE most likely diagnosis?

A. **Paget's disease**
B. **Multiple myeloma**
C. **Lumbosacral disc herniation**
D. **Ankylosing spondylitis**
E. **Cervical spondylosis**

ANSWER:
Lumbosacral disc herniation

EXPLANATION:
Sudden onset of lower back pain and felt more during forward bending or similar movement like getting up from bed favours the diagnosis of lumbosacral disc herniation

INTERVERTEBRAL DISC PROLAPSE, SCIATICA

- A herniated disc is most common in those aged below 40 years, whilst degeneration of discs tends to affect those aged over 40 years.
- It most commonly occurs at the L5/S1 level *(L5/S1 disc and L4/5 disc prolapse account for more than 95% of lumbar disc prolapse)*
- If there is nerve entrapment in the lumbosacral spine, this may lead to symptoms of sciatica
- Large herniations can compress the cauda equina

The term sciatica in UK is used as a substitute for pain radiating to legs relating to compressive spinal pathology. This is a preferred term as patients and medical staff tend to use it more frequently than radiculopathy.

Symptoms of sciatica

- Unilateral leg pain which radiates below the knee to the foot/toes
- Symptoms can be acute or gradual
- Leg pain more severe than the back pain
- Associated with numbness and paraesthesia
- Pain usually relieved by lying down
- Pain worsens when walking or prolonged sitting

Always think of the following when dealing with sciatica

- *Look out for features of:*
  - *Spondyloarthritis*
  - *Spinal injury*
  - *Metastatic spinal cord compression or cancer*
- *Look out for cauda equina syndrome symptoms*
  - *Faecal incontinence*
  - *Urinary retention*
  - *Saddle or perianal paraesthesia*

What about imaging?

- Imaging such as MRI is usually not necessary unless there are red flags or if it is likely to change management plan.

Management

- If signs and symptoms are not too severe, it usually resolves spontaneously in about six weeks but can also last for months
- Pain relief such as NSAIDs would be suitable
- For neuropathic pain in sciatica medications include amitryptyline, gabapentin, pregabalin and duloxetine – *Amitriptyline is usually the medication of choice as ifit is the cheapest and there is no evidence that the others are superior*

- If there are red flag signs such as the possibility of cauda equina syndrome, refer to an orthopaedic surgeon or a neurosurgeon URGENTLY

Spinal cord compression or cauda equina syndrome are neurological emergencies that require immediate referral and intervention!

SCIATICA, SITE OF COMPRESSION

Site of compression	Features
L2 nerve root compression (uncommon)	Anterior thigh pain Positive femoral stretch test
L3 nerve root compression	Sensory loss over anterior thigh Absent or decreased knee jerk Positive femoral stretch test
L4 nerve root compression	Sensory loss of anterior aspect of knee Absent or decreased knee jerk Positive femoral stretch test
L5 nerve root compression	Sensory loss dorsum of foot Weakness in ankle dorsiflexion Reflexes intact
S1 nerve root compression	Sensory loss posterolateral aspect of leg and lateral aspect of foot Weakness in plantar flexion of foot Absent or decreased ankle reflex

Positive femoral stretch test

- Positive if the patient experiences anterior thigh pain when prone with hip extension with maximal knee flexion
- Indicates L2, L3 or L4 root pathology
- See video https://www.youtube.com/watch?v=h5YjDsngTN8

Positive straight leg raise test

- If the patient experiences sciatic pain when the straight leg is at an angle of between 30 and 70 degrees
- Indicates herniated disc as cause of pain
- See video https://www.youtube.com/watch?v=uo0vZZdN854

Q-19

A 61 year old female with a history of osteoporosis suddenly falls on her outstretched hand while shopping. She is tender over the wrist and there is visible deformity of the wrist. X-ray of the wrist shows a fracture at the distal radius with a dorsally displaced distal fragment. What is the SINGLE most likely deformity?

A. Cubitus valgus
B. Coxa Vara
C. Mallet finger
D. Dinner fork deformity
E. Garden spade deformity

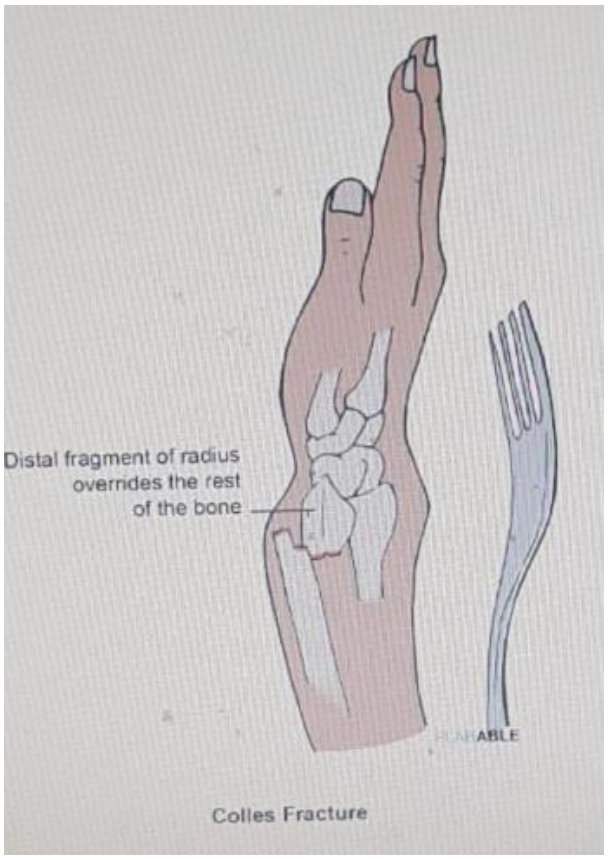
ANSWER:
Dinner fork deformity

EXPLANATION:
Colles' fracture
Results from fall on an outstretched hand, often in old osteoporotic women. The deformed and painful wrist looks like a "dinner fork". The main lesion is a dorsally displaced, dorsally angulated fracture of the distal radius.

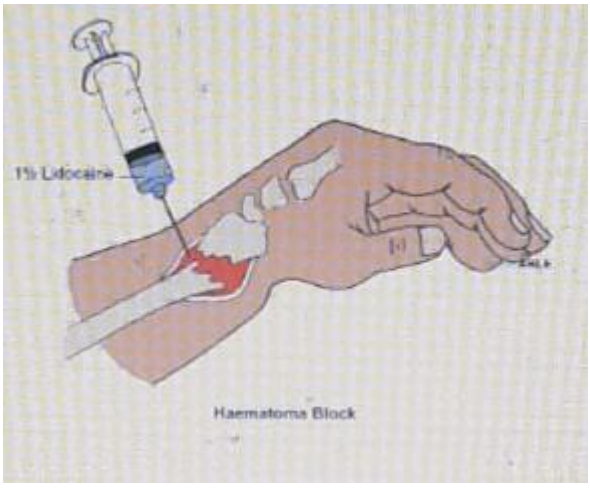
COLLES
Results from fall on an outstretched hand, often in old osteoporotic women. The deformed and painful wrist looks like a "dinner fork,". The main lesion is a dorsally displaced, dorsally angulated fracture of the distal radius.

Management
Involves providing analgesia, reduction and immobilize in a backslab POP and elevate with a sling. This is usually done by an A&E doctor at initial presentation. It is good practice to obtain an X-ray before and after the reduction to ensure that reduction was successful. During reduction, analgesia such as a haematoma block is usually administered. A haematoma block is an analgesic technique where local anaesthetic (i.e. lidocaine) is inserted by needle and syringe through the skin into this haematoma where the fracture site is, allowing bones to be painlessly manipulated back.

Once closed manipulation has taken place, a backslab POP is applied while still holding the wrist in place. The POP is left to dry. A post reduction X-ray is required to ensure that reduction was successful. If successful and fracture is nondisplaced, patients are discharged to be managed back home with a fracture clinic follow-up.



X-ray of Colles' fracture



Q-20

A 44 year old man complains of pain in the ring finger of his left hand, predominantly at the base of his finger. He finds that his finger is usually bent in the mornings when he wakes up and he has to straighten it with his other hand. It usually then straightens with a 'click'. What is the SINGLE most likely diagnosis?

A. **Mallet finger**
B. **Trigger finger**
C. **Carpal tunnel syndrome**
D. **De Quervain's tenosynovitis**
E. **Dupuytren's contracture**

ANSWER:
Trigger finger

EXPLANATION:
Trigger finger is also known as stenosing tenosynovitis. It usually affects the thumb, ring finger or little finger. Usually, flexion is normal but beyond a certain range of motion, the patient would have difficulty extending the flexed finger. A snap is frequently felt as the finger straightens out.

Q-21

A 15 year old boy presents with a limp and pain in the left knee. The pain started acutely. He finds it very difficult to weight bear. Physical examination shows the leg is externally rotated and 2 cm shorter. There are limitations of flexion, abduction and medial rotation of the hips. As the hip is flexed, it externally rotates. What is the SINGLE most likely diagnosis?

A. **Juvenile rheumatoid arthritis**
B. **Osgood-Schlatter disease**
C. **Reactive arthritis**
D. **Slipped upper femoral epiphysis**
E. **Transient synovitis of the hip**

ANSWER:
Slipped upper femoral epiphysis

EXPLANATION:
Slipped Upper Femoral Epiphysis usually cause groin pain on the affected side, but sometimes cause knee or thigh pain. Usually in slipped upper femoral epiphysis, there is limited hip motion, and as the hip is flexed the thigh goes into external rotation and cannot be rotated internally.

SLIPPED UPPER FEMORAL EPIPHYSIS (SUFE)
Slipped upper femoral epiphysis is an orthopedic emergency. The typical patient is a chubby boy, around age 13. They complain of groin (or knee) pain and are noted to be limping.

It is caused by the displacement of the femoral epiphysis (growth plate) in relation to the femoral neck. It is the commonest cause of a limp in a boy aged 12–14 or girl aged 11–13 (growth spurt at puberty). In this age group, it must be actively excluded in a limping child.

The classic presentation is a limping, obese, 13 year old boy with knee pain. The pain can be poorly localised, so it may be seen as hip, groin, thigh or knee pain. Pain may present acutely or with a history of days or weeks.

Risk factors include:
- Obesity
- Rapid growth
- Male—♂:♀, 3:1

Clinical features
- The affected limb will be shorter and lies in external rotation
- Abduction is limited. When the hip is flexed, it will rotate externally

Note: the left side is usually more commonly affected compared to the right side

The link below shows a short video on a patient's experience with SUFE
https://www.youtube.com/watch?v=hX8zYiJ2H18

*Mnemonic for slipped upper femoral epiphysis (**SUFE**)*
***S** – Shortening of the limb*
***U** – Unable to abduct*
***F** – Flexed hip will rotate externally*
***E** – External rotation of the hip is seen*

Q-22

A 20 year old man was brought in by paramedics after jumping from an overpass in a suicide attempt. The paramedics reported obvious deformities of his bilateral lower extremities. He arrived at Accident & Emergency in pain but with normal vitals. Plain films demonstrate bilateral mid-shaft femur fractures and a left tibial shaft fracture. The patient was subsequently placed in bilateral distal femoral traction with a left long-leg splint and admitted to the orthopaedic department for an open reduction. The next day following surgery, he became acutely unwell with a decreased level of consciousness and his observations were recorded as follows:

Heart rate 140 beats per minute
Oxygen saturation of 80% on room air
Temperature 38.2 C

An arterial blood gas (ABG) was also done and the results are as follows:

pH 7.47 (7.35-7.45)
pCO2 3.8 kPa (4.7-6.0 kPa)
pO2 7.3 kPa (10-14 kPa)

Intubation caused an improvement of his hypoxaemia. An ECG done showed sinus tachycardia.

What is the SINGLE most likely cause of deterioration of his condition after surgery?

A. **Pulmonary embolism**
B. **Fat embolism**
C. **Atelectasis**
D. **Post-operative infection**
E. **Intra-abdominal bleeding**

ANSWER:
Fat embolism

EXPLANATION:
The differential in the polytrauma patient with a sudden change in the level of consciousness is broad. In this particulare patient, the history of long bone fractures, sudden hypoxaemic respiratory failure and focal neurological findings suggests a specific aetiology: fat embolism syndrom e.

While it is true that pulmonary embolism in this patient is a distinct possibility since he has just had surgery, it is unlikely in this scenario. By giving you a history of a femur fracture, the examiners are pointing you toward fat embolism as an answer. If the examiners had wanted you to choose pulmonary embolism as an answer, they would not have included the history of the femur fracture.

Although atelectasis presents with low oxygen saturation, increased heart rate and breathlessness in the history points more towards a fat embolism.

The patient is having a respiratory alkalosis from hyperventilating. Eventually, if not intubated, the patient would become acidotic.

Fat embolism syndrome is associated with long bone fractures of the lower extremities, usually the femur. Another group of patients that fat embolism syndrome is commonly seen in are those with pelvic fractures. They typically occur between 24 to 72 hours post fracture.

Fat embolism syndrome is a clinical diagnosis. Imaging is important to rule out other causes of the symptoms however the diagnosis of fat embolism syndrome can be made with the classic triad of hypoxaemia, neurologic deficits, and the petechial rash (especially in axilla) occurs in an appropriate clinical setting. Petechial rash may not always be present like in this stem as only less than half of them have petechial rashes.

The take home points to remember are the clinical manifestations of hypoxaemia and neurological impairment in the absence of other pathologies especially with a history of long bone or pelvic fractures.

Treatment for fat embolism is largely supportive while it resolves spontaneously.

Q-23

A 26 year old man complains of severe pain while trying to grasp objects. It started when he fell during a skiing trip and hit his thumb on the ground while his thumb was abducted. On physical exam there is collateral laxity at the thumb-metacarpophalangeal joint with bruising over the joint. What is the SINGLE most likely deformity?

A. Dinner fork deformity
B. Gamekeeper thumb
C. Mallet finger
D. Cubitus varus
E. Garden spade deformity

ANSWER:
Gamekeeper thumb

EXPLANATION:
Gamekeeper's thumb

- Also known as skier's thumb
- An injury to the ulnar collateral ligament (UCL) of the metacarpophalangeal (MCP) joint (on the medial side of the thumb) due to forced abduction of the MCP
- Historically suffered by gamekeepers when they killed rabbits by dislocating their necks with violent blows with the extended thumb. However in this era, it is seen as a skiing injury when the thumb is abducted and gets stuck in the snow or the ski strap during a fall

Examination

- Collateral laxity at the thumb-metacarpophalangeal joint
- Thumb is hyperextended and laterally deviated with swelling
- Grasp and pinching ability is reduced

Management

- If incomplete ligamental injury and the joint is stable → immobilisation in a thumb spica splint for 4-6 weeks

Q-24

A 60 year old man is brought to the emergency department with a fractured hip. He has been having progressive hearing loss and was recently diagnosed with cardiac failure. Hypercalcaemia was noted on his blood test. What is the SINGLE most likely diagnosis?

A. Paget's disease
B. Osteoporosis
C. Osteomalacia
D. Multiple myeloma
E. Spondylosis

ANSWER:
Paget's disease

EXPLANATION:
History of deafness and heart failure favours the diagnosis of Paget's disease.

Q-25

A 40 year old man presents to the Emergency Department with calf and heel pain. He was playing football when he suddenly felt a pop at the back of his left leg followed by pain at his calf. He says he felt as if someone kicked his leg from behind however no one was near him at that time. He describes himself as an infrequent football player. He has a history of a deep venous thrombosis on his left calf 5 years ago. On examination, Thompson test reveals absent plantar flexion. What is the SINGLE most appropriate action?

A. **Request a D-dimer test**
B. **Refer to orthopaedics**
C. **Refer to physiotherapist as outpatient**
D. **Prescribe analgesia and discharge home with the plan for General Practitioner to follow up**
E. **Request a magnetic resonance imaging of ankle**

ANSWER:
Refer to orthopaedics

EXPLANATION:
This is a classic case of Achilles tendon rupture. It usually occurs in a middle aged man who decides to play a sport after several months or years of not being active.

Thompson test is when the examiner squeezes the calf muscle specifically at the gastrocnemius-soleus complex when the patient is lying prone with his feet over the examination table. If the Achilles tendon is ruptured, there will be absent plantar flexion.

Achilles tendon rupture requires a same day review by either orthopaedics or a sports injury team thus the options for referring to physiotherapist and to GP as outpatient is wrong.

The history of a DVT can throw you off and cause you to pick D-dimers as the answer. Requesting a D-dimer is a wrong answer as we don not suspect a DVT here. There is an association between Achilles tendon rupture and thromboembolism and these patietns are usually sent home with low molecular weight heparin for prophylaxis. The risk of thromboembolism occurs because he is immobile however in this case, he has not developed and we do not suspect a DVT.

If an imaging would to take place, it would usually be an X-ray to rule out calcaneus avulsion fractures or an ultrasound to confirm diagnosis. MRIs for Achilles tendon rupture are rarely needed.

ACHILLES TENDON RUPTURE
History of an Achilles tendon rupture would usually involve a repetitive jumping motion or a burst of sudden activity. The patient would be a middle aged man who is an infrequent sports goer. He would hear an audible snap at his Achilles and would describe it as if someone kicked his heel while playing a sport. Patients would find difficulty walking on tiptoes or plantar flexing against resistance on their affected leg.

Diagnosis
The diagnosis is usually made clinically

The Simmonds' triad is worth remembering for the exam. It involves the patient in a prone position with their feet hanging off the examination table with the following:

- Affected leg rests in a more dorsiflexed position
- Palpable gap at the heel of the affected leg
- No plantar flexion on calf squeeze test of the affected leg

A video of Simmonds' triad can be found here:
https://www.youtube.com/watch?v=8PvgvUV8N8U

Management

- Same day referral to orthopaedics

The Orthopaedic team would usually assess the injury to decide if surgery or nonsurgical management is required. They may request for an X-ray to exclude any calcaneal avulsion fractures. Prophylaxis for thromboembolism may be offered by the orthopaedic team as well as immobilisation may contribute to the development of a DVT.

Majority of cases would go down the non-surgical treatment route involving casting, boot and physiotherapy. The tendon heals on its own but casting is essential to prevent it from healing at different lengths from the other leg.

If the patient is a young athlete, surgery may benefit as it reduces the risk of recurrence.

Q-26

A 74 year old woman has a history of a Colles' fracture three weeks ago after falling on a concrete floor with her right hand. She is otherwise fit and well. What is the SINGLE most appropriate investigation to assess her risk for further fracture?

A. Radionuclide (isotope) scan
B. Dual energy X-ray absorptiometry (DEXA) scan
C. Magnetic resonance imaging (MRI)
D. X-ray of wrist
E. No further investigations needed

ANSWER:
Dual energy X-ray absorptiometry (DEXA) scan

EXPLANATION:
Colles' fracture results from fall on an outstretched hand, ofen in old osteoporotic women as seen in this stem. The diagnosis of osteoporosis centres on the assessment of bone mineral density of which DEXA is regarded as the gold standard technique for the diagnosis. A DEXA scan is the most commonly used investigation to assess fracture risk by measuring bone density and would be the best option here.

OSTEOPOROSIS RISK ASSESSMENT

Elderly patients, especially women with untreated osteoporosis are much more likely to sustain a fracture if they fall. Therefore, patients at risk of osteoporosis should be investigated and treated. The risk for osteoporosis include long-term use of corticosteroids, low body mass index, smoking history, heavy alcohol use, immobility, and untreated premature menopause.

QFracture® and FRAX® are 2 tools used commonly by GPs to assess the risk of hip fractures and major osteoporotic fractures. NICE suggests that QFracture® is the preferred tool to use. Both tools predict the risk of fractures over 10 years. You can find the online tools here to have a try:

- QFracture® – https://qfracture.org/
- FRAX® - https://www.sheffield.ac.uk/FRAX/tool.aspx?country=1

Patients whose fracture risk is more than 10% based on the risk assessment tools are offered DEXA bone scans to measure the bone mineral density (BMD). Once a DEXA bone scan has been performed, the BMD is added into the FRAX tool to recalculate the fracture risk which guides the management. The Qfracture ® cannot be recalculated taking BMD measurements into account. A patient with a bone mineral density on a DEXA scan of greater than/equal to -2.5 standard deviations from the mean of a healthyyoung woman, otherwise known as the T-score, indicates osteoporosis and bone protection would be warranted.

Patients who are at high risk with a history of a hip or vertebrae fragility fracture can skip the DEXA scan and go straight onto bone protection medications.

Q-27

A 55 year old woman has a history of a recent radial fracture. In the last decade, she had a Colles' fracture in the right forearm and supracondylar humerus fracture of the left arm. She used to take corticosteroids for 2 years as part of managing her inflammatory bowel disease. What is the SINGLE most appropriate investigation to perform?

A. **Dual-energy X-ray absorptiometry (DEXA) scan**
B. **Magnetic resonance imaging**
C. **Nuclear bone scan**
D. **Computed tomography**
E. **Bone biopsy**

ANSWER:
Dual energy X-ray absorptiometry (DEXA) scan

EXPLANATION:
It is clear from the given history and the corticosteroid use that this is likely a case of osteoporosis. Other added risk factors in the stem include her sex (female) and her age (postmenopausal). Diagnosis of osteoporosis centres on the assessment of bone mineral density. DEXA is required as the gold standard technique for the diagnosis of osteoporosis.

Q-28

A 50 year old man presents to the Emergency Department with acute back pain radiating down to his right leg. He is unable to weight bear. There is no history of trauma. The pain is relieved when lying down. What is the SINGLE most appropriate investigation?

A. **Magnetic resonance imaging (MRI) of spine**
B. **Computerized tomography of spine**
C. **X-ray spine**
D. **Dual energy X-ray absorptiometry**
E. **Serum paraprotein electrophoresis**

ANSWER:
Magnetic resonance imaging (MRI) of spine

EXPLANATION:
Back pain radiating down to legs which is relieved when lying down are characteristic of lumbosacral disc herniation. If there was an option to pick reassure and prescribe pain relief that would be the better option as an MRI here is not indicated. There are no red flags in the stem. That being said, if an investigation was requied, it would be an MRI.

MRI still remains the most sensitive in showing disc herniations. Plain X-rays may be useful, as they can show misalignments, instabilities and congenital anomalies well but the investigation of choice for a disc prolapse is an MRI.

Q-29

A 33 year old pregnant woman presents with right knee pain worse when moving the joint. The pain has been present for the last 4 months but it is worsening. The pain is noted to be worse at the end of the day. X-ray shows decreased joint space in the right knee. Blood results show a CRP of 12. What is the SINGLE most appropriate management?

A. **Paracetamol**
B. **Oral nonsteroidal anti-inflammatory drugs (NSAIDs)**
C. **Oral steroid**
D. **Intra-articulaer steroid injections**
E. **Disease-modifying antirheumatic drugs (DMARDs)**

ANSWER:
Paracetamol

EXPLANATION:
The first step is recognising that this is osteoarthritis. Pain in one joint that is worse towards the end of the day, decreased joint space and inflammatory markers which are not significantly raised are recognisable features of osteoarthritis. Paracetamol is first line for osteoarthritis. It is also worth noting that she is pregnant and you should avoid prescribing NSAIDs as much as possible in a pregnant woman.

Q-30

A 63 year old man has knee pain and back pain for the last 3 months which is progressively worsening. Bowing of the tibia is noted on examination. He also has pronounced kyphosis. On further investigation, alkaline phosphatase was found to be elevated in his blood. Serum calcium levels were normal. What is the SINGLE most likely diagnosis?

A. **Multiple myeloma**
B. **Osteoporosis**
C. **Osteomalacia**
D. **Paget's disease**
E. **Ankylosing spondylitis**

ANSWER:
Paget's disease

EXPLANATION:
Please see Q-12

Q-31

A 30 year old male presented to the Emergency Department with the complaint of swelling in his left hand. He states that he works in a textile factory and while operating one of the machines, his left hand got stuck in the machine. The incident occurred five hours ago. He has already taken some over the counter medication for pain relief, which proved to be not very helpful. When the patient noticed that the4 pain was not relieved and that his fingers began swelling, he then presented to hospital. The swelling appears to be distributed evenly all over the fingers of his left hand and he has noticed that it has been increasing since his accident. An X-ray was arranged but yielded no evidence of a fracture. On examination, the patient appears to be in obvious pain and clutches his left arm to his abdomen. Swelling is present over his fingers and there is a limited range of movement, namely of flexion and extension. What is the SINGLE most appropriate step in the management of this patient?

A. **Surgery**
B. **High arm sling for three days**
C. **Scaphoid cast**
D. **Plaster cast**
E. **Collar and cuff sling**

ANSWER:
High arm sling for three days

EXPLANATION:
This is a typical case of a sprain injury. A sprain is an injury to a ligament which usually occurs by the ligament being overstretched. To choose the best treatment option for this patient, it is important to know the main aim of treating a sprain injury. The usual initial treatment for a sprain is described as paying the PRICE.

P: Protect
R: Rest
I: Ice
C: Compression
E: Elevation

A high arm sling is the right option for this patient. A high arm sling is a simple shoulder immobiliser to be used following trauma and is designed to maintain the arm in a raised position. The arm slings offer the wearer additional support to their injury and aids recuperation by limiting movement to minimise discomfort to the hand, wrist, arm and shoulder. It is usually advised when there is trauma, but no fracture like in this patient. It will help prevent further swelling caused by oedema.

There is no evidence of a scaphoid fracture on the X-ray furthermore, the patient's history gives no clue about a potential scaphoid fracture. In a scaphoid fracture, the patient usually complains of pain and tenderness on the radial side of the wrist.

Plaster casts are used when a bone is broken. Plaster casts are frequently used for initial stabilisation of fractures until they can be properly assessed or definitively fixated.

SLING TYPES

Broad Arm Sling (use for 3-10 days)

Hands should always be higher than the level of the elbow

Apply in:

- Injuries to the fingers, hand, wrist or distal forearm
- Support requiredabove elbow POP splints/casts

High Arm Sling (use for 3-10 days)

Same as above

Collar and Cuff Sling

Apply in:

- Fracture of clavicle or humerus
- Supracondylar fractures
- Radial head or neck fractures

Q-32

A 78 yearold woman fell with an outstretchedhand after slipping on ince on the pavement. She presents to the EmergencyDepartment with a deformity of the right wrist. On examination, her wrist is tender to touch. There is no scaphoid tenderness. Her distal sensation and pulses are intact. An X-ray of her right wrist shows a posterior and radial displacement of the distal fragment of the radius. What is the SINGLE most appropriate management?

A. Closed reduction followed by Plaster of Paris cast below elbow and a fracture clinic appointment
B. Open reduction and internal fixation
C. Plaster of Paris cast below elboe and a fracture clinic appointment
D. Analgesia, wrist sling and a fracture clinic appointment
E. Closed reduction and admission until surgery can be performed

ANSWER:

Closed reduction followed by Plaster of Paris cast below elbow and a fracture clinic appointment

EXPLANATION:

This is a typical Colles' fracture presentation. Closed reduction followed by Plaster of Paris cast below lbow and a fracture clinic appointment is the most appropriate answer here.

Q-33

A 79 year old man had a fall 2 days ago and since then he is unable to bear weight on his right leg. He presents with deformity and tenderness over the right hip area. X-ray shows fracture of the acetabulum. What is the SINGLE most likely associated nerve injury?

A. Sciatic nerve
B. Gluteal nerve
C. Lateral peroneal nerve
D. Tibial nerve
E. Femoral nerve

ANSWER:
Sciatic nerve

EXPLANATION:
Acetabular fractures and posterior dislocation of the hip
Both acetabular fractures and posterior dislocation of the hip can result in sciatic nerve damage.

Sciatic nerve injury: pain in the distribution of the sciatic nerve, loss of sensation in the posterior leg and foot and loss of dorsiflexion (peroneal branch)

For these fractures always check for sciatic nerve damage → Examine foot dorsiflexion and below knee sensation

Q-34

A 7 year old boy fell on his outstretched arm and presents with pain around the elbow. On examination, radial pulse is absent on the affected hand. What is the SINGLE most likely diagnosis?

A. **Dislocated elbow**
B. **Angulated supracondylar fractures of the humerus**
C. **Undisplaced fracture of radial head**
D. **Posterior dislocation of shoulder**
E. **Pulled elbow**

ANSWER:
Angulated supracondylar fracture of the humerus

EXPLANATION:
Supracondylar fracture of humerus is the most common fracture of childhood, with a peak incidence between the ages of 5 and 7 years. It occurs occur with hyperextension of the elbow in a child who falls on the hand, with the arm extended. These fractures may compromise brachial artery, median, radial or ulnar nerve function so check neurovascular status. Keeping the elbow in extension after injury prevents exacerbating brachial artery damage from the time of injury.

In this question, damage or occlusion of the brachial artery is the cause of absent radial pulse.

Q-35

A 34 year old male presents with the complaint of baqck pain. It occurred two days ago when he and his family were moving home. He sayts that the pain radiates to his left foot and becomes much worse when he coughs. Examination reveals a loss of deep tendon reflexes on his left leg and a postive straight leg raising test. He has sensory loss over the anterior aspect of the knee. What is the SINGLE most likely cause of this patient's symtoms?

A. **Intervertebral disc prolapse**
B. **L5 nerve root compression**
C. **Ilioinguinal ligament strain**
D. **Spinal fracture**
E. **Cauda equina syndrome**

ANSWER:
Intervertebral disc prolapse

EXPLANATION:
This patient has a prolapsed intervertebral disc – a lumbosacral disc herniation.

L5 nerve root compression occurs in a prolapsed lumbar intervertebral disc however if this was the case there would be sensory loss of the dorsum of the foot and intact reflexes.

Spinal fracture and cauda equina syndrome often present with bowel/bladder disturbance. In the exam, when the question writers want you to choose cauda equina syndrome, they will give a history of bowel incontinence, urinary retention or saddle paresthesia.

The ilioinguinal ligament runs from the pubic tubercle to the anterior superior iliac spine. It has nothing to do with this patient's back pain.

Q-36

A 59 year old woman is being investigated for chronic back pain. X-ray of her spine was reported to be normal. Bone scans revealed multiple lesions in the skeleton suggestive of metastatic disease. What is the SINGLE most likely site of the primary?

A. Lungs
B. Cervix
C. Ovary
D. Uterus
E. Breast

ANSWER:
Breast

EXPLANATION:
Bone scan is highly sensitive for osteoblastic or sclerotic metastases.

In females, the most common tumour causing bone metastasis is the breast. Second to that is the lungs.

In males, the most common tumour causing bone metastases is the prostate. Second to that is the lungs.

The most common site for bone metastases to occur is in the spine. Then the pelvis, ribs, skull and long bones.

Q-37

An 81 year old man presented to his GP with the complaint of pain in his right hip that radiates to his right knee. He says that he noticed the pain a few months ago but that it has recently become a lot worse and has now begun to disturb his sleep at night. He mentions as well that the pain is worse when he walks but that it becomes releived somewhat upon rest. He denies the possibility of having sustained trauma to his hip and denies having any joint stiffness in the morning. Physical examination reveals a limp on his right side. Hip examination reveals pain upon passive movement of the joint as well as a reduced range of motion upon active movement. A mild degree of crepitus can also be appreciated. What is the SINGLE most likely diagnosis?

A. **Osteoarthritis**
B. **Femoral neck fracture**
C. **Tenosynovitis**
D. **Bony metastasis**
E. **Perthes' disease**

ANSWER:
Osteoarthritis

EXPLANATION:
This patient has osteoarthritis (OA) of the hip. In the exam, look for an elderly person who has joint pain that is exacerbated by exercise and relieved with rest. The exam scenarios to look for are osteoarthritis of the knee, the hip and the wrist and hand. Questions dealing with the wrist and hand will often attempt to trick you with rheumatoid arthritis (RA) so learn the differences between OA and RA well.

Femoral neck fractures present with the inability to bear weight and some kind of fixed deformity of the hip. The exam stems would give a scenario of an elderly person who has a history of trama (sometimes even no history of trauma but may include a history of dementia) and where there are findings of the affected leg is shorter and found in external rotation.

Tenosynovitis is inflammation of the synovium that surrounds a tendon. It usually occurs in the hands following trauma.

The pain due to bony metastasis generally takes a chronic course. The pain is described as a dull, aching pain that is present constantly.

Perthes' disease or Perthes-Calve-Legg disease is usually seen in children under 15 years of age.

Q-38

A 13 year old boy presents with pain in the groin. He is seen limping. There was no history of trauma. The pain started a few weeks ago but has been worsening. There are limited hip motions, and as the hip is flexed the thigh goes into external rotation and cannot be rotated internally. When the boy is lying down, the left leg is 2 cm shorter than the right leg and it is externally rotated. What is the SINGLE most likely diagnosis?

A. **Juvenile rheumatoid arthritis**
B. **Septic arthritis**
C. **Reactive arthritis**
D. **Slipped upper femoral epiphysis**
E. **Transient synovitis of the hip**

ANSWER:
Slipped upper femoral epiphysis

EXPLANATION:
Slipped Upper Femoral Epiphysis usually cause groin pain on the affected side, but sometimes cause knee or thigh pain. Usually in slipped upper femoral epiphysis, there is limited hip motion, and as the hip is flexed the thigh goes into external rotation and cannot be rotated internally. The pain may be acute but may also be chronic like in this case and symptoms may be present for weeks.

Q-39

A 16 year old boy was rushed to A&E following a road traffic accident. He was found to have swelling and deformity in his right thigh. A femur fracture is suspected. Primary survey has been done and his airway was found to be patent however, examination of his right leg reveals no proximal or distal pulses. There is no visible wound or loss of blood but the patient is severely hypotensive. What is the SINGLE most likely structure to be involved in this patient's fracture?

A. **Femoral artery**
B. **Posterior tibial artery**
C. **Common peroneal nerve**
D. **Dorsalis pedis artery**
E. **Great saphenous vein**

ANSWER:
Femoral artery

EXPLANATION:
This patient has had a high-energy and high-impact injury (road traffic accident). It is usual for patients that have been in high impact collisions to present with injury of the great bones, such as the hip and the femur.

The posterior tibial artery supplies the lower limb and carries blood to the posterior compartment of the leg and plantar surface of the foot. The answer is incorrect.

The dorsalis pedis artery is an artery of the foot. This answer is also incorrect.

The great saphenous vein (long saphenous vein) is a subcutaneous, superficial vein of the leg. If this vessel had been injured during the accident, the patient would have presented with an open wound and clear blood loss. This answer is, therefore, also incorrect.

The only answer that makes sense in the choices is the femoral artery. The femoral artery is a large artery in the thigh and the main arterial supply to the leg. It enters the thigh from behind the inguinal ligament as the common femoral artery. In a high-impact accident that has resulted in a femur fracture, we would be most concerned about injury to the femoral artery. As this patient is severely hypotensive, it indicates an injury to the

femoral artery, most likely from a piece of bone. Injuries to the femoral artery may require reattachment surgery.

Q-40

A 22 year old football goalkeeper was brought to the Emergency Department with a locked right leg and the inability to extend the knee greater than 30 degrees. The injury occurred when he tried to catch the ball and, instead, landed with his leg twisted. What is the SINGLE most likely diagnosis?

A. **Torn medial meniscus**
B. **Stretched anterior collateral ligament**
C. **Fractured patella**
D. **Fractured medial femoral condyle**
E. **Posterior cruciate ligament tear**

ANSWER:
Torn medial meniscus

EXPLANATION:
This is a classic picture of a common sports injury. The player jumps up and lands on a slightly twisted knee hence giving rise to a medial meniscus tear.

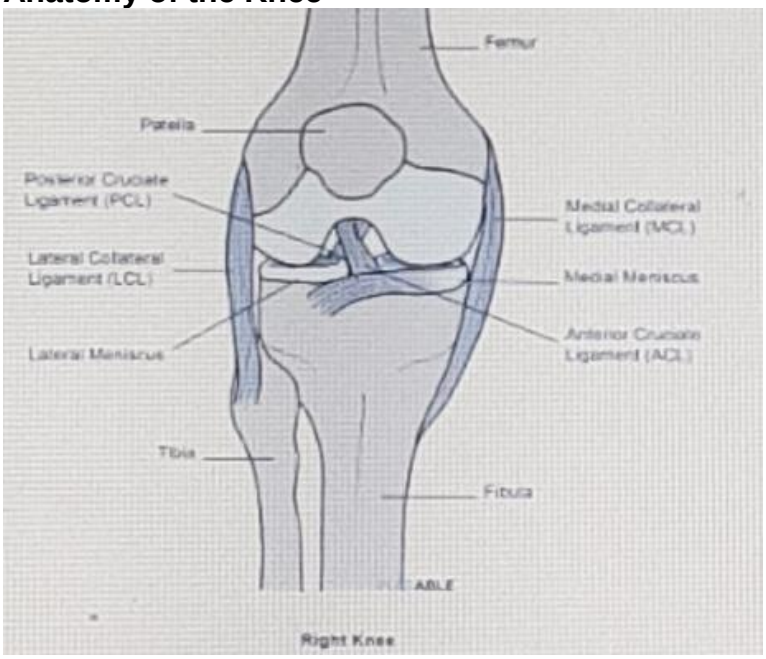
He could very well also have an anterior cruciate ligament injury as meniscal tears are often associated with ACL injury.

If this question had medial collateral ligament tear as a choice, then you would pick that.

If you remember the mechanism of injury for knee trauma, then you will never get a knee question wrong in the exam.

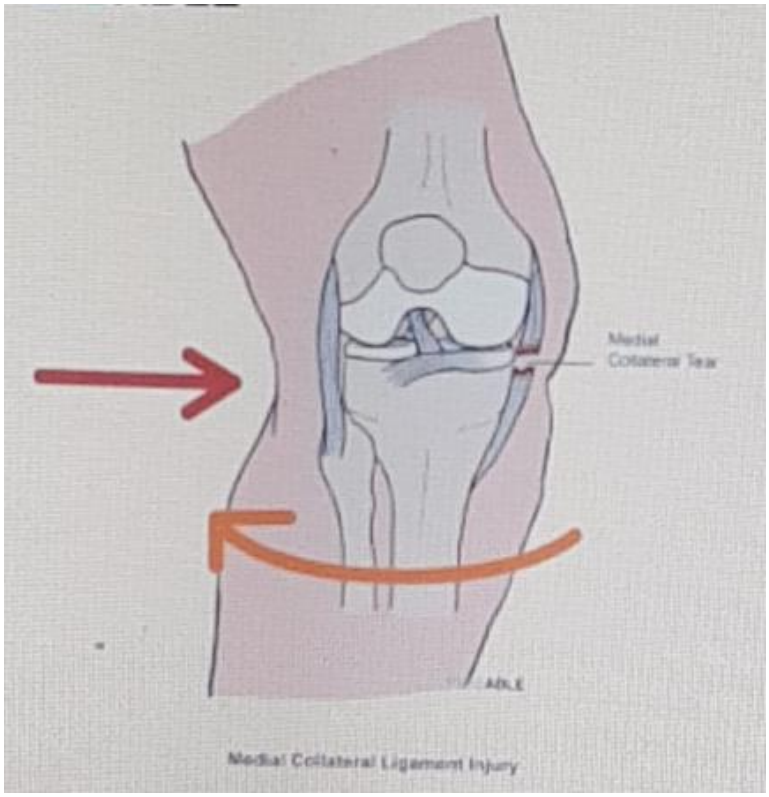
KNEE INJURIES, MECHANISM OF INJURY
For knee injuries, remember a few things about the mechanism of injury

Anatomy of the Knee



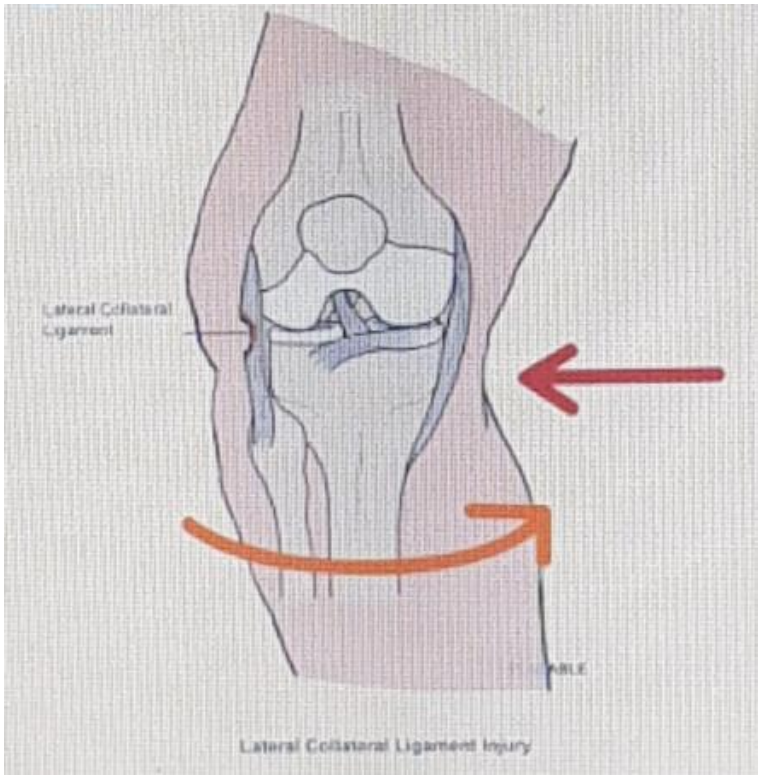
Medial collateral ligament

- Direct blow to the lateral side of the knee or a twisting injury. Often occurs along with meniscal tears



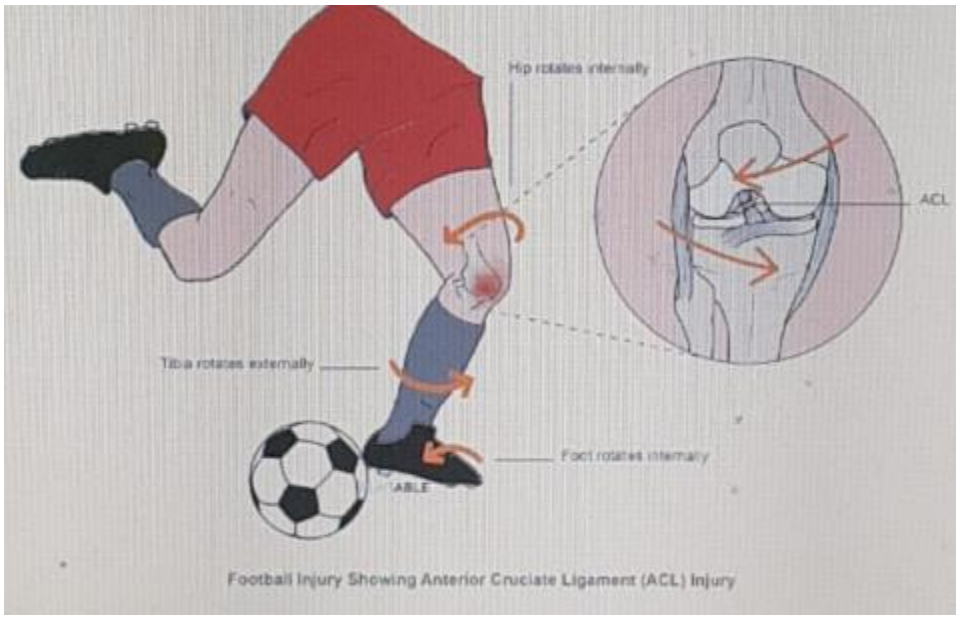
Lateral collateral ligament

- Direct blow to the medial side of the knee or a runner twisting to the direction of the planted foot (twisting inwards)



Anterior cruciate ligament

- Deceleration injury or when the athlete lands hard on the leg and quickly pivots to the opposite direction.
- ACL tears usually have a stem where the foot is fixed on the ground when a rotational force is applied which is followed by a “pop” sound. They would complain that the knee “gives way”



Football Injury Showing Anterior Cruciate Ligament (ACL) Injury

Posterior cruciate ligament

- Hyperflexion injury or a fall onto a flexed knee if the knee hits the dashbord of a car during a road traffic accident
- Look for a history of direct impact on the shin (specifically the proximal tibia) when the knee is bent

Car Dashboard Injury showing Prosterior Cruciate Ligament (PCL) Injusry

Meniscal tears

- Twisting or pivoting, a popping sensation heard at time of injury
- Often associated with ACL injury

Q-41

A 33 year old man who suffers from chronic lower back pain has shooting pain coming down his left leg. He has reduced sensation of the dorsum of his left foot. On examination, he experiences pain while performing a straight leg raise test of his left leg at 45 degrees. There is weakness in left ankle dorsiflexion. Which nerve root is likely to be compressed?

A. L2
B. L3
C. L4
D. L5
E. S1

ANSWER:
L5

EXPLANATION:
L5 nerve root compression can lead to ankle dorsiflexion weakness and reduced sensation on the dorsum of the foot.

Q-42

A 12 year old boy attends A&E with pain after falling off his bicycle. A lateral X-ray of his wrist shows a fracture at the distal radius with the distal fracture fragment displaced anteriorly. What is the SINGLE most likely diagnosis?

A. Dinner fork deformity
B. Cubitus valgus
C. Gunstock deformity
D. Garden spade deformity
E. Coxa Vara

ANSWER:
Garden spade deformity

EXPLANATION:
Smith's fracture

- Also known as reverse Colles' fracture
- It is a fracture of the distal radius that has anterior displacement of the distal fragments (opposite to Colles' fracture where there is dorsal displacement of fragments)
- It is usually caused by falling backwards like a fall onto the palm of the outstretched hand with the arm above it pronating as the body falls. It can also occur if one falls onto flexed wrist.
- The characteristic appearance is called a 'garden spade deformity'
- Lateral view of X-ray of a Smith's fracture is very similar to a Colles' fracture except with the displacement anteriorly instead of posteriorly thus the term reverse Colles' fracture

Q-43

A30 year old lady was playing volleyball when her hand got injured with the volleyball. The right hand is not swollen and there is tenderness under the root of the thumb. Wrist movement, particularly pronation followed by ulnar deviation is painful. X-ray of the wrist shows no presence of fractures. What is the SINGLE most appropriate next step in management?

- **A. Apply arm sling for 1 week**
- **B. Reassurance and analgesia**
- **C. Cast and repeat X-ray in 2 weeks**
- **D. Full arm cast for 1 week**
- **E. Surgical exploration**

ANSWER:
Cast and repeat X-ray in 2 weeks

EXPLANATION:
The likely diagnosis is scaphoid fracture where the initial X-ray may not show the fracture right away.

A very typical scenario is a young person who falls on his or her outstretched hand with forced dorsiflexion. In this scenario, she fractures her scaphoid from a volley. X-rays are usually negative but if repeated in 2 weeks become positive.

They are also infamous because of a high rate of nonunion.

Signs: Tender in anatomical snuff box and over scaphoid tubercle, pain on axial compression of the thumb, and on ulnar deviation of the pronated wrist, or supination against resistance.

If initial X-rays are negative, cast and re-X-ray in 2 weeks.

Q-44

A 12 year olf boy was playing in the park with his younger brother when he accidentally fell onto his outstretched hand. He was subsequently brought to A&E with the complaint of pain around his elbow. Upon examination, generalised swelling was found around the elbow region and he flinches away in pain when the doctor tries to touch his elbow. He was found to have a limited range of motion at his elbow, and passive rotation of his arm yields significant pain. Examination of the radial nerve reveals tenderness over the radial tunnel and the patient complains of pain when his fingers are extended against resistance. What is the SINGLE most likely type of fracture in this patient?

- **A. Radial head fracture**
- **B. Radial neck fracture**
- **C. Intercondylar fracture**
- **D. Condylar fracture**
- **E. Olecranon fracture**

ANSWER:
Radial neck fracture

EXPLANATION:
The stem gives you all the clues to point you in the direction of a radial fracture however, the examiners want you to know that radial HEAD fractures occur more commonly in adults and radial NECK fractures occur more commonly in children. Radial head movement in children is rare.

Radial neck fractures and radial head fractures present with the same signs and these are:

- Swelling over lateral elbow
- Limited range of motion of elbow
- Pain is greatly increased with passive rotation of the elbow

There may be vascular/nerve involvement and so it is necessary to assess the radial nerve for damage. Radial nerve damage can include a wide range of signs but for radial nerve injury occurring at elbow, know tenderness at the radial tunnel and pain when the fingers are extended against resistance.

For the exam, know the mechanism of injury for elbow fractures well. Here are some clinchers that you will see in the stem for **elbow fractures** that will directly point you toward the correct answer.

- Radial neck, radial head, distal humerus fractures: Fall onto an outstretched hand
- Intercondylar fracture: Direct blow to elbow
- Condylar fracture: Direct blow to a flexed elbow
- Olecranon fractures: Pulling of triceps/brachioradialis (elderly), direct blow to elbow (children)

Q-45

A 38 year olf painter has developed burning pain around his right lateral elbow that radiates to his forearm. The pain started two months ago and has gradually worsened over time. The pain is worse when he lifts heavy objects and he finds that his grip strength when using his right hand is reduced. Upon examination, there is tenderness over the lateral epicondyle of his right arm and pain is elicited upon resisted extension of his right wrist. Which is the SINGLE most likely muscle group affected here?

A. Wrist flexors
B. Wrist extensors
C. Forearm flexors
D. Forearm extensors
E. Wrist pronators

ANSWER:
Wrist extensors

EXPLANATION:
This patient is suffering from a condition called tennis elbow or lateral epicondylitis. In this condition, there is pain where the common extensor tendon arises from the lateral epicondyle of the humerus. The muscle group that is affected are the wrist extensors.

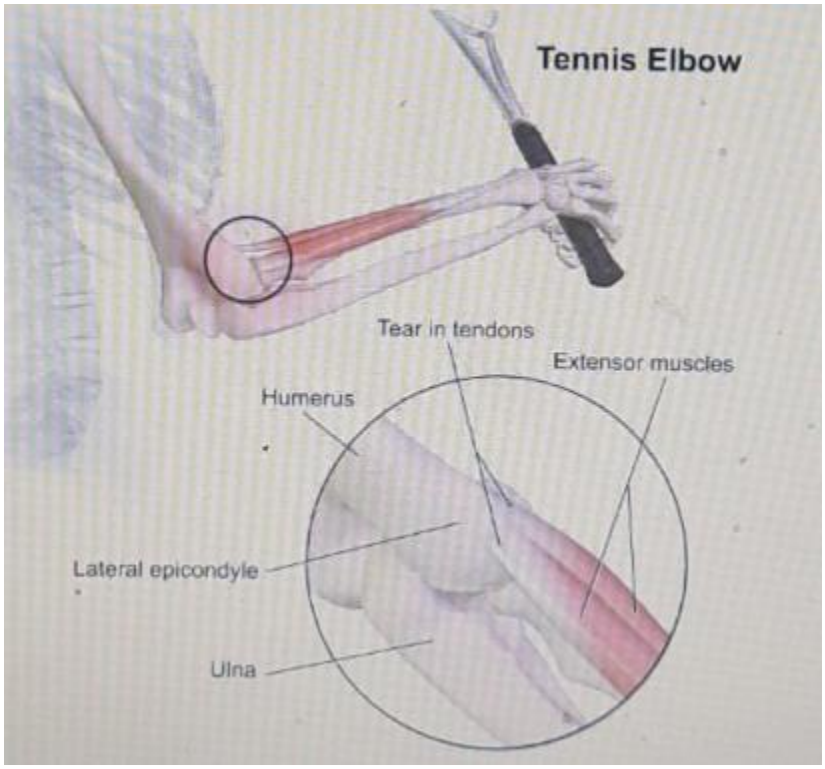
Why is the answer not forearm extensors?
The primary condition affects the extensors of the forearm and the specific muscle that is affected is the extensor carpi radialis brevis muscle. Although this muscle is located in the forearm, its function is to extend and abduct the wrist. Since the question asks for which muscle group is affected, the answer of wrist extensors is therefore correct.

The fact that this person is a painter is a huge clue as the motion of using a paint brush or paint rollers creates stress at the insertions of the extensor muscles which are located at the lateral epicondyle. Painters generally lift heavy objects and heavy tools in a repetitive motin which worsens the symptoms of tennis elbow. The combination of tenderness at the lateral epicondyle and pain upon resisted wrist extension are indicative of a tennis elbow.

TENNIS ELBOW

Remember, tennis elbow does not always have to happen in tennis players and the other term for it which is lateral epicondylitis is not strictly correct either but there are no better terms to use for this condition.

Tennis elbow is causd by overuse and partial tearing of the extensor digitorum muscles which typically cause tenderness over its insertion at the lateral epicondyle of the humerus.



Tennis elbow is developed by doing any form of activity that involves repeatedly twisting your wrist and using your forearm muscles. Some examples:

- Playing racquet sports
- Using shears while gardening
- Using a paint brush or roller while decorating
- Activities that involve fine, repetitive hand and wrist movements

Examination would likely reveal tenderness at the lateral epicondyle and pain (again at the lateral epicondyle) on resisted dorsiflexion of the wrist.

It is a self limiting condition. However, it can often last for several weeks or months. The treatment involves rest to the injured area, cold compress, avoiding activities that strain affected muscles and tendon. Painkillers such as Paracetamol and NSAIDs may help ease mild pain and inflammation. Other treatments involve physiotherapy.

Q-46

A 24 year old man presents to A&E after an injury to his hand while playing basketball. Examination of his hand reveals an avulsion of the extensor digitorum tendon from the distal phalanx. What is the SINGLE most likely deformity?

- **A. Dinner fork deformity**
- **B. Gamekeeper thumb**
- **C. Mallet finger**
- **D. Gunstock deformity**
- **E. Garden spade deformity**

ANSWER:
Mallet finger

EXPLANATION:
A mallet finger is an injury of the extensor digitorum tendon of the fingers at the distal interphalangeal joint. It results from hyperflexion of the extensor digitorum tendon. It occurs when a ball (such as a softball, basketball, or volleyball), while being caught, hits an outstretched finger causing it to bend (flex) further than normal and rupture or stretch the extensor digitorum tendon. Without the use of the extensor digitorum tendon, the finger stays bent (flexed) resembling a mallet.

Splint DIP in extension for 6 to 8 weeks is usually adequate to manage this.

Q-47

A 58 year old woman fell with an outstretched hand. She presents with dinner fork deformity on the right wrist and tenderness over the right arm and wrist. Distal pulses of the limb is felt however she complains of numbness of the right hand. What is the SINGLE most likely associated nerve injury?

- **A. Axillary nerve**
- **B. Radial nerve**
- **C. Musculocutaneous nerve**
- **D. Median nerve**
- **E. Ulnar nerve**

ANSWER:
Median nerve

EXPLANATION:
Please see Q-19

Q-48

A 7 year old boy fell in the playground with arm outstretched an hour ago. He is now seen to be holding his forearm complaining of pain. Examination of his forearm reveals tenderness but no sign of deformity or swelling. An X-ray was performed. What is the SINGLE most likely diagnosis?

A. **Greenstick fracture of distal radius**
B. **Oblique fracture of the mid ulna**
C. **Transverse fracture of the mid radius**
D. **Spiral fracture of the distal ulna**
E. **Comminuted fracture of scaphoid**

ANSWER:
Greenstick fracture of distal radius

EXPLANATION:
In the exam, if a child falls and attains a fracture, it is almost always a greenstick injury. The classical fracture in a child is a greenstick injury. This is when there is an incomplete fracture of the long bones. It occurs when the force applied to a bone results in bending of the bone such that the structural integrity of the convex surface is overcome. This usually occurs to a child who falls on an outstretched arm. Because the bones are soft in children, the bending force applied does not break the bone completely and the concave surface of the bent bone remains intact. The fracture resembles the break that results when a supple green branch of a tree is bent and breaks incompletely.

Q-49

A 78 year old lady has been brought in after a fall in her home. She is now complaining of pain in her left hip and is unable to walk or weight bear. On examination, the left leg is noted to be shorter than the right and is externally rotated. What is the SINGLE most likely diagnosis?

A. **Pelvic fracture**
B. **Fracture of the coccyx**
C. **Fracture of the neck of left femur**
D. **Fracture of shaft of left femur**
E. **Perthes disease**

ANSWER:
Fracture of the neck of left femur

EXPLANATION:
This is a classical presentation of a fracture of the neck of the femur. It is usually seen in old patients secondary to osteoporosis and follows a fall or any other trivial injury involving the hip or bottom. The leg appears shortened and is externally rotated. Typically, they would be unable to weight bear.

This image shows the affected extremity which is the right leg
Shortened and externally rotated compared to the unaffected leg

Q-50

A 15 year old male presents to his GP with the complaint of knee pain. He complains of being unable to sleep at night due to pain in his right knee. Further questioning reveals that he has been having intermittent unilateral pain in his right knee for the past seven months which has gradually worsened. He is concerned because he has had to give up football due to this pain. He has no other complaints and he has no significant past medical history. Examination of the knee reveals a 1 cm by 1 cm smooth, fixed, tender mass on the medial side of his right knee at the level of the tibial tuberosity. He is unable to bear weight on the knee however, his gait appears to be slightly antalgic. The rest of the knee examination revealed no other abnormalities but small lymph node was found in the ipsilateral inguinal canal. What is the SINGLE most likely diagnosis in this patient?

A. **Ewing sarcoma**
B. **Osteosarcoma**
C. **Chordoma**
D. **Chondrosarcoma**
E. **Fibrosarcoma**

ANSWER:
Osteosarcoma

EXPLANATION:
Malignant bone tumoursare uncommon in children but the two that you need to know are osteosarcoma and Ewing's sarcoma as these are the 2 most common malignant bone tumours affecting children.

Osteosarcoma arises most often at the end of bones where growth occurs. It is the most common type of primary bone cancer and it accounts for just over half of childhood bone tumours. Two-thirds of childhood cases occur between 10 to 14 years age. Males are more often affected. The common sites that are affected in osteosarcoma are lower end of femur or upper tibia (60%), upper end of humerus (10%) and pelvic bones (10%). Since the knee is the most commonly affected, in the exam, the stem would always give you a scenario of a teenage boy with pain around the knee. Osteosarcoma is characterised by intermittent, unilateral bone pain that is worse at night. Sometimes patients might present with a sudden, unexplained fracture. This is due to structural weakness of the affected bone. There are often no other complaints associated with this type of cancer.

One of the main differences between osteosarcoma and Ewing sarcoma is that systemic symptoms such as fever, weight loss, and malaise are generally absent in osteosarcoma however they can be present in Ewing sarcoma. The tumour cells in Ewing sarcoma produce cytokines which causes a fever. In reality, the constitutional symptoms and signs of fever, weight loss and malaise are only present in 10-20% of patients with Ewing sarcoma however look out for this in the exam, as if present could help you select Ewing instead of osteosarcoma as the likely diagnosis.

To summarise, the exam will probably give you a scenario of osteosarcoma. This will usually be a teenage boy who presents with the complaint of knee pain. If you see this scenario in the exam, pick osteosarcoma. If the patient in the scenario is a teenage boy complaining of tiredness, fever and weight loss as well as bone pain, pick Ewing sarcoma.

The other options here are less likely.

Chondromas are an extremely rare, slow growing type of bone cancer. They usually grow in the bones of the skull or in the spinal cord.

Chondrosarcoma is a primary bone cancer most often found in adults aged between 30 and 60 years old however, it can affect anyone at any age. It is a cancer of the cartilage cells within the bone.

Fibrosarcoma, as the name suggests, is a cancer of fibroblast cells. It can involve the femur, tibia and mandible in adults.

Q-51

A 7 year old boy falls on his right hand with the arm extended. He has severe pain around the elbow. X-ray imaging showed a supracondylar fracture of the humerus. The distal fragment is displaced posteriorly. What is the SINGLE most likely structure to be damaged?

A. **Anterior ulnar recurrent artery**
B. **Posterior ulnar recurrent artery**
C. **Ulnar artery**
D. **Radial artery**
E. **Brachial artery**

ANSWER:
Brachial artery

EXPLANATION:
Supracondylar fracture of humerus is the most common fracture of childhood, with a peak incidence between the ages of 5 and 7 years. It occurs occur with hyperextension of the elbow in a child who falls on the hand, with the arm extended. These fractures may compromise brachial artery, median, radial or ulnar nerve function so check neurovascular status. Keeping the elbow in extension after injury prevents exacerbating brachial artery damage from the time of injury.

Q-52

A 28 year old man was involved in a road traffic accident. He has severe pain in his shoulder and upper arm. There is loss of shoulder and arm function with bruising seen at the anterior shoulder on examination. X-ray shwos a fracture of the neck of the humerus. What is the SINGLE most associated neurovascular injury?

A. **Suprascapular nerve injury**
B. **Radial nerve injury**
C. **Axillary nerve injury**
D. **Brachial artery injury**
E. **Axillary nerve injury**

ANSWER:
Axillary nerve injury

EXPLANATION:
Neurovascular injury in proximal humeral fractures
- About a third of proximal humeral fractures produce neurovascular injury
- Axillary nerve damage is most common.
- Suprascapular, radial and musculocutaneous nerves can also be affected

Rarer neurovascular injury in proximal humeral fractures
- Axillary artery injury is possible but rarely occurs
- Brachial artery injury also rarely occurs

Q-53

A 33 year old man had fall on his outstretched arm. He is tender over the distal radius with no scaphoid tenderness. There is no obvious deformity on clinical examination. X-ray reveals a non-displaced distal radial fracture. Analgesia was given. What is the SINGLE most appropriate next step in management?

A. **Wrist splint**
B. **Below elbow backslab**
C. **Above elbow backslab**
D. **Full plaster of Paris**
E. **Reassure**

ANSWER:
Wrist splint

EXPLANATION:
Since the fracture is nondisplaced wrist splints would be a better option as it allows patients to have mobility in their hands. The wrist splints used in the UK are often referred to as Futuro splints. "Futuro" is the brand that carries these wrist splints. These are easily removable splints whichare secured by velcro. These splints allow the development and subsequent resolution of swelling.

Below elbow backslab is the distractor here. It can be applied however it may lead to muscle wasting and prolonged recovery time when compared to wrist splints.

A full plaster of paris should not be applied in this case as there would be a risk of compartment syndrome.

In any case, if the patient has an acute swelling whilst wearing a splint, backslab, plaster of paris or bandage, it needs to be removed for an assessment of the wrist.

Q-54

A 33 year old woman who is 39 weeks pregnant is concerned about her child having developmental dysplasia of the hip as she suffered from developmental dysplasia of the hip when she was a child and had to undergo corrective surgery. Which one of the following is a risk factor for developmental dysplasia of the hip?

A. **Breech presentation**
B. **Polyhydramnios**
C. **Male sex**
D. **Previous abdominal surgery**
E. **Caesarean section**

ANSWER:
Breech presentation

EXPLANATION:
The main risk factors for developmental dysplasia of the hip (DDH) are:

- Breech presentation
- Female sex
- Positive family history
- Birthweight more than 5 kg
- Congenital calcaneovalgus foot deformity
- Oligohydramnios

Q-55

A 67 year old woman presents to the emergency department with pain in her left groin. She falls from a chair in the waiting area and now is in severe pain and is not able to move her left leg. She takes alendronate regularly. What is the SINGLE most likely diagnosis?

A. **Pelvic fracture**
B. **Bursitis**
C. **Femoral shaft fracture**
D. **Femoral neck fracture**
E. **Posterior hip dislocation**

ANSWER:
Femoral neck fracture

EXPLANATION:
The use of alendronate indicates that she is likely to be at high risk for an osteoporotic fracture as alendronate is primarily used to prevent fractures in osteoporotic patients. Proximal femur fractures are one of the common areas of fractures seen in osteoporosis. Thus, a fracture of the neck of femur would be the most appropriate answer.

Osteoporosis is the reduction in the amount of bony tissue within the skeleton. Osteoporotic bone is at high risk of fracture, even after trivial injury. It usually is clinically silent until an acute fracture like in this stem. Common osteoporotic fractures are seen in hips, wrist (Colles') and compression fractures of vertebral bodies.

Q-56

A 65 year old man with a three-year history of prostate cancer presents to the GP surgery with worsening thoracic backache over the past few weeks. He started having episodes of urinary incontinence today. He takes regular slow-release morphine for his pain however he still feels back pain at night which prevents a good night sleep. On examination, he has bilateral lower limb weakness. What is the SINGLE most appropriate investigation to request?

A. **Dual Energy X-ray Absorptiometry (DEXA) scan**
B. **Urgent computed tomography scan**
C. **Urgent magnetic resonance imaging (MRI) of the whole spine**
D. **Skeletal survey**
E. **Prostate-specific antigen**

ANSWER:
Urgent magnetic resonance imaging (MRI) of the whole spine

EXPLANATION:
This is an oncological emergency. Patients with spinal metastases often experience pain for several weeks before signs of malignant spinal cord compression (MSCC).

In the exam, suspect malignant spinal cord compression with anyone with back pain, neurological symptoms and a history of cancers of the breast, prostate, or myeloma.

Clinicians should discuss patients with suspected MSCC with the MSCC coordinator and arrange an urgent MRI of the whole spine.