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Exam Corner

MCQs – Adult Pathology – Single Best Answer

1. All of the syndromes below are examples of incomplete spinal cord injury except:
   Answer: a. Lateral cord syndrome.
   All of the other options (central cord syndrome, anterior cord syndrome, posterior cord syndrome, Brown–Sequard syndrome) are examples of incomplete spinal cord injuries.¹

2. Which of the following nerves could potentially be injured while performing a surgical repair of a ruptured tendon Achilles?
   Answer: c. Sural nerve.
   The sural nerve passes lateral to the tendon Achilles and can be injured during repair of the tendon. This risk can be reduced by making a skin incision slightly medial to the tendon Achilles when performing a surgical repair.

3. The primary cause for hallux valgus is:
   Answer: d. Inappropriate footwear in adulthood. Genetics and inappropriate footwear are felt to be the primary contributors to this deformity.¹

4. Lateral epicondylitis is associated with a tear in the fibres of which muscle?
   Answer: b. Extensor carpi radialis brevis (ECRB).
   Lateral epicondylitis most commonly involves a tear in ECRB but may also involve extensor carpi radialis longus and extensor carpi ulnaris tendons.¹

5. Which is the most common site of entrapment for the posterior interosseous nerve?
   Answer: c. The arcade of Frohse.
   This is the most common site but compression can also be caused by a fascial band at the radial head, the recurrent leash of Henry, the edge of ECRB and the distal edge of the supinator muscle.¹

Vivas

Adult Pathology

A 68-year-old patient presents with a history of pain in both her feet. This is her clinical photograph (Fig. 1).

1. Describe the clinical photograph.
   Answer: This patient has bilateral valgus deformity of the great toe. The condition is worse in the left foot. The left hallux is pronated and there is also under-riding of the third and fourth toes on the right.

2. What is your diagnosis?
   Answer: Bilateral hallux valgus.

3. This is the radiograph of the foot of another patient with similar problems (Fig. 2). Describe the abnormality.
   Answer: There is an increased inter-metatarsal angle of 20° (normal range <10°) and an increased hallux valgus angle of 30° (normal range <15°). There is also some medial migration of the first metatarsal head leaving the sesamoids uncovered.

4. How would you grade the severity of this condition?
   Answer: I would grade this as a moderate hallux valgus deformity.

5. What are the options of treatment for the patient in Figure 1?
   Answer: The treatment options are conservative and surgical. The conservative measures are limited to accommodating the deformity. This would include prescribing shoes with an increased toe-box. The deformity will not be corrected using orthotics. The main surgical option here would be an osteotomy of the first metatarsal which would allow correction of the deformity.

6. What treatment would you offer her at this stage? Why?
   Answer: I would offer this patient a scarf osteotomy. The deformity is too great for a chevron osteotomy. The deformity is too great for a chevron osteotomy and is within the limits that can be corrected by a scarf osteotomy. If the deformity was worse, a proximal metatarsal osteotomy may be suitable.

7. What are the technical goals of a first ray osteotomy?
   Answer: The technical goals include a correction of the inter-metatarsal angle, maintenance of the first metatarsalphalangeal joint and prevention of recurrence.

8. If you did decide to intervene surgically, what possible complications would you warn her about?
A 22-year-old student fell off his bicycle and landed on his arm sustaining this injury (Fig. 3).

**Fig. 3a**

**Fig. 3b**

1. Describe the abnormality in the radiographs.
   **Answer:** The elbow joint is congruent and there is a comminuted fracture of the radial head.

2. How would you classify this fracture?
   **Answer:** This is a Mason Johnston type 3 fracture.²

3. How would you treat this patient?
   **Answer:** If there was no evidence of an Essex-Lopresti injury or medial collateral ligament injury, I would offer this patient an excision of the radial head. The other option would be open reduction and internal fixation of the radial head.

4. Could you provide any evidence to support your answer?
   **Answer:** Yes.³

5. What are the indications for surgical intervention in this type of fracture?
   **Answer:** Open reduction internal fixation (ORIF) can be offered to Mason 2 fractures with a mechanical block to rotation. ORIF excision or radial head replacement can be offered to patients with a Mason 3 fracture.¹,⁵

6. What is the expected outcome?
   **Answer:** ORIF can also be considered for Mason 3 fractures but the results are less successful if there are more than three articular fragments. Radial head arthroplasty is the preferred treatment for these fractures.

**Hands**

A 62-year-old patient sustained an intra-articular, comminuted fracture of her left distal radius. She underwent volar locking plate for fixation of her fracture. On examination, at six weeks following removal of her plaster cast, she noticed an abnormality in her thumb (Fig. 4).

**Fig. 4**

1. Describe the clinical photograph.
   **Answer:** The clinical photograph demonstrates an extension lag of the interphalangeal joint of the left thumb and loss of full extension of the metacarpophalangeal joint.

2. What is the diagnosis?
   **Answer:** Extensor pollicis longus (EPL) tendon rupture.

3. What is the mechanism by which she sustained this injury?
   **Answer:** EPL tendon rupture following ORIF of the distal radius is a well described complication of this procedure often attributed to screw or drill penetration of the third extensor compartment and particularly likely in a dorsally comminuted fracture.²,⁷ Such is the risk to the EPL tendon within the third compartment, particularly with certain locking plate systems, that some authors advocate a low threshold for open assessment through a mini-dorsal incision ulnar to Lister’s tubercle.⁸ While in this patient’s case iatrogenic rupture of the EPL tendon is the most likely cause, late delayed spontaneous rupture has been reported in the literature following a Colle’s fracture.⁹ Delayed rupture is thought to be a consequence of microvascular disturbance secondary to increased pressure present in the non-ruptured tendon sheath compromising blood supply to pre-disposed poorly vascularised parts of the tendon causing degeneration and rupture.¹⁰

4. How would you manage her at this stage?
   **Answer:** I would perform plain X-rays to determine whether the EPL tendon rupture is attributable to penetration of metalware into the third extensor compartment and request an ultrasound scan to assess tendon integrity, site of rupture and tendon gap. I would then plan to perform an extensor indicis proprius transfer to the distal EPL tendon where results suggest a satisfactory functional outcome.¹¹

5. What are the zones of flexor tendon injuries in the hand?
   **Answer:** The contents and boundaries of the zones of flexor tendon injuries in the hand are as follows:
   - The contents and boundaries of the zones of flexor tendon injuries in the hand are as follows:
     - i) Flexor digitorum profundus: Extends from the finger-tip to the middle of the middle phalanx
     - ii) Flexor digitorum superficialis and flexor digitorum profundus: Extends from the middle of the middle phalanx to the distal palmer crease
     - iii) Lumbricals: Begins at the distal palmar crease extending to the distal edge of the flexor retinaculum
     - iv) Flexor digitorum superficialis and flexor digitorum profundus: Under the flexor retinaculum
     - v) Proximal to the wrist joint.

6. How do flexor tendons in the hand receive nutrition?
   **Answer:** Flexor tendons are nourished mainly by synovial fluid passive diffusion with a lesser contribution from intrinsic vascular perfusion. This process of passive diffusion of solutes is encouraged by active mobilisation and in a study investigating flexor tendon nutrition using radioactive tracers a comparison is made to a synovial joint with a significant nutritional contribution to the tendon through synovial fluid. This explains why early active mobilisation is crucial to rehabilitation following a flexor tendon repair.¹²

7. What are the commonly used techniques for flexor tendon repair?
   **Answer:** The flexor tendon repair is a composite of core and peripheral epitendinous sutures. The techniques differ according to the number of strands of suture that cross the repair, the loop configuration (locking or grasping), core suture purchase and knot placement. The commonly used core sutures are the two-strand Kessler and modified Kessler techniques. A number of other single stranded suture techniques are also used including the cruciate non-locked, cruciate locked, four-strand Savage, augmented Becker
in addition to the double and triple modified Kessler and the six-strand Savage suture. High repair tensile strength is required to enable the patient to commence early active mobilisation, which, as discussed, facilitates synovial tendon nourishment. While the two-strand modified Kessler suture can withstand the forces transmitted during passive movement they are at risk of rupture during active movements hence the increasing use of the six-strand Savage suture.10

Children’s Orthopaedics

This child presented with a progressive varus deformity of her right ankle. As an infant she had been in intensive care for treatment of a severe chest infection (Fig. 5).

1. What is the condition and its likely cause?
   Answer: Growth plate injury likely due to extravasation during intravenous therapy.

2. How would you treat it?
   Answer: Ablate the remaining growth plates in tibia and fibula, correct the deformity either acutely by supramalleolar osteotomy or gradually by Ilizarov technique and reassess any residual limb length discrepancy later in childhood.

3. This is the radiograph of a nine-year-old child who injured his right wrist three weeks earlier (Fig. 6). What is the injury and how would you treat it?
   Answer: Salter–Harris Type II Injury.14 Symptomatic treatment only. The injury will remodel. Fig. 7 shows the appearances one year later.

Basic Science

1. What is a radiograph?
   Answer: Radiographs (X-Rays) are a form of high-energy electromagnetic radiation with a wavelength of 0.01 to 10 nanometers.

2. How does a MRI scan work?
   Answer: During an MRI, a strong static magnetic field is applied to protons in tissues (hydrogen nuclei) causing their nuclear spin to align with the longitudinal axis of the scanner. A rapid excitation radiofrequency pulse is then applied to the patient resulting in realignment of the axis of proton nuclear spin including currents in the receiving coils of the scanner and the changes in these currents is used by software to construct an image.16

3. What are the contraindications to the use of a MRI scan? Why?
   Answer: The contraindications to MRI are as follows:
   a) Permanent cardiac pacemaker and/or defibrillator
   b) Cerebral aneurysm clips
   c) Vascular clips (less than two weeks old)
   d) Metal in the orbit of the eye
   e) Internal hearing aid
   f) Dorsal column stimulator
   These contraindications are a consequence of the risk that the strong electromagnetic field can cause movement or dislodgement of ferromagnetic material potentially harming the patient. In the case of cardiac pacemakers and defibrillators the MR environment can cause movement and heating of pacing leads, temporary or permanent modification of the device, and deactivation of the device.

4. How would you measure the bone density of a patient who has sustained a distal radius fracture?
   Answer: I would perform a dual-energy X-ray absorptiometry scan to assess bone mineral density.

5. How are images acquired with the use of a CT scan?
   Answer: CT images are obtained by rotating a fan shaped X-Ray beam around the patient with sensitive detectors positioned to record the attenuated X-Rays that pass through the body.

6. What are the uses of ultrasound in orthopaedics?
   Answer: Ultrasound is used statically and dynamically to assess tendons, to characterise superficial masses (to determine relationship to surrounding structures, boundaries and contents), investigate for joint effusions (particularly useful when assessing the hip in a limping child) and guide joint injections (such as the acromioclavicular joint).

References