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MCQs – Adult Pathology – Single Best Answer

1. Which of the following statements regarding spinal tumours is false?

Answer: a. About 15% of all bone tumours are primary spine tumours.

Bone tumours can be benign or malignant. They can also be classified as primary (arising from the bone) or secondary (metastases from different sites). Secondary bone tumours make up the vast majority of all bone tumours. Therefore 15% is a significantly greater percentage than the expected figure for primary spinal tumours.¹

2. Which of the following is NOT a cause of leg length shortening?

Answer: d. Klippel-Trenaunay-Weber syndrome
 Klippel-Trenaunay-Weber syndrome is characterised by a triad of port-wine stain, varicose veins, and bony and soft-tissue hypertrophy involving an extremity. It therefore would not lead to leg length shortening.

3. In monostotic fibrous dysplasia, the prevalence of malignant transformation (chondrosarcoma or osteosarcoma) is about:

Answer: a. 0.4%

There is a reported rate of 0.4% risk of malignant transformation. Malignant degeneration of fibrous dysplasia complicates less than 1% of all cases, presenting clinically as pain and swelling. Radiographic findings include cortical destruction and associated soft-tissue masses. The most

common malignancies include osteosarcoma, fibrosarcoma, and malignant fibrous histiocytoma. Transformation to chondrosarcoma has been reported, sometimes erroneously on the basis of the incidental finding of cartilaginous nodules in a specimen. The true number of cases of malignant degeneration is likely to be overestimated given previous irradiation of involved bone in many cases.²

4. Which of the following statements is true regarding an open repair of the ruptured ulnar collateral ligament of the thumb?

Answer: c. A Stener lesion will be found, if present, proximal to the adductor aponeurosis
 During surgical repair it is important to identify branches of the superficial radial nerve in the proximal aspect of the wound. One should aim to identify the extensor pollicis longus. A Stener lesion,³ which has been reported in up to 80% of cases is found proximal to the adductor aponeurosis. The ulnar collateral ligament nearly always separates from the base of first phalanx of the thumb rather than the metacarpal.

5. Which one of the following is necessary for a good key grip?

Answer: c. Function of the first interosseus muscles
 A key pinch grip involves opposing the pulp of the distal phalanx of the thumb to the radial border of the proximal phalanx of the index finger.

Vivas

Adult Pathology

A 68-year-old woman presents with a history of pain in the region of her thumb. This is her radiograph (Fig. 1).



Fig. 1

1. Describe the radiograph. What is the diagnosis?

Answer: The radiograph of the wrist shows evidence of decreased joint space and subchondral sclerosis of the joints between the scaphoid, the trapezium and the trapezoid. The diagnosis is arthritis of the scapho-trapezio-trapezoid (STT) joint.

2. What are the causes of this condition?

Answer: The causes of STT arthritis are age-related osteoarthritis, post-traumatic arthritis (including STT arthritis post-scapoid ORIF), abnormal trapezio-trapezoidal inclination, capito-trapezium ligament laxity and rotatory subluxation.

3. What is the treatment for this condition?

Answer: Non-operative treatment options include rest, splinting, hand therapy, oral anti-inflammatory medication, and intra-articular steroid injection. Surgical options for ongoing symptoms will depend on the extent of symptoms, arthritis and the age and functional demands of the patient. The options include excision arthroplasty, interposition arthroplasty (using tendon or pyrocarbon implant) and arthrodesis. The latter is preferred in the young active patient as it is more likely to result in a stable thumb for high power manual work.

Arthrodesis provides a stable column across the carpus and is a definitive operation to deal with

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pain at the level of the STT joint. It is contra-indicated with radio-scaphoid OA and has a variously quoted non-union rate of 4% to 29%.⁴ Furthermore, there is the risk of altering wrist kinematics permanently resulting in secondary arthrosis of other joints such as the radiocarpal joint as well as 1st Carpometacarpal joint osteoarthritis both of which have been reported in the literature. Kirk-Watson however found no further OA at five years. A key to a successful fusion is maintaining the relationship between individual carpal bones and correcting any secondary deformities. Some of the tips to a successful fusion include:⁵

- Articular surface must be thoroughly denuded of cartilage
- Original external dimensions of the STT joint must be maintained
- Radial styloidectomy must be carried out to prevent impingement

Excision of the distal end of the scaphoid is also a useful procedure in the management of symptomatic STT OA for the following reasons:⁶

- Relatively simple
- Allows flexion and extension of the scaphoid in radial/ulnar deviation therefore does not lead to impingement
- Can be combined with soft-tissue interposition
- Can lead to early mobilisation

However, excision of the distal pole of the scaphoid can increase carpal instability and any pre-existing DISI (dorsal intercalated ligament instability) may be exaggerated.

4. What are the possible complications of surgical intervention in patients with this condition?

Answer: Surgical intervention may lead to a number of complications including ongoing pain, neurovascular injury, infection, thumb instability, deformity, pseudoarthrosis, carpal translation and progressive adjacent arthritis.

Trauma

An 18-year-old male presents with an acutely swollen knee after an incident whilst football training during which he was tackled from the side. These are the radiographs obtained in A&E (Figs 2a & 2b).



Fig. 2a



Fig. 2b

1. Describe the radiographs. What is your diagnosis?

Answer: The radiographs demonstrate a lipohaemarthrosis, a Segond fracture and an avulsion fracture of the tibial spine. Originally described by the French surgeon Paul Segond in 1879 after a series of cadaveric experiments, the Segond fracture describes a cortical avulsion of the tibial insertion of the middle third of the lateral capsular ligament. It is commonly associated with injury to the anterior cruciate ligament.

2. How would you investigate this patient further?

Answer: I would perform a full history and examination and request an MRI scan of the knee, to confirm an ACL injury and to identify any other injuries within the knee to the menisci, collateral ligaments and to the PCL.

3. What is the classification of this injury?

Answer: The Myers and McKee⁷ classification for fractures of the intercondylar eminence is as follows:

- Type I: Undisplaced fracture
- Type II: Partially displaced fracture with anterior elevation of the eminence;
- Type III A: Completely displaced fracture with no contact between

the eminence and proximal end of tibia

Type III B: The eminence is rotated as well as displaced

4. What would your management be? What are the impediments to a successful closed reduction?

Answer: The radiographs show a Type II injury. This could be managed with a trial of closed reduction under anaesthetic.

A block to full extension may be caused by interposition of the anterior horns of either the medial or the lateral meniscus. If full extension is not possible, reduction is not complete. This would necessitate an arthroscopic assisted / open reduction and internal fixation of the tibial spine.

5. If you have to treat this patient operatively, what would be the post-operative management and what would you specifically warn the patient about prior to surgery?

Answer: Post-operatively, I would immobilise the knee in extension for six to eight weeks. At that stage, a knee brace would be employed, gradually increasing flexion by 30° every two weeks. Closed chain exercises would be advocated as per a standard ACL rehabilitation protocol.

I would warn the patient about the usual risks of surgery, but more specifically, the risk of ACL laxity upon fracture healing and also arthrofibrosis with resultant stiffness of the knee.

Hands

A 14-year-old, left-hand dominant boy presents with a painless deformity of his hand. This is the clinical photograph and radiograph (Figs 3a and 3b).



Fig. 3a



Fig. 3b

1. Describe the abnormalities seen in the photograph and the radiograph.

Answer: The photograph and the radiograph show polydactyly of the thumb, with duplication of the proximal and distal phalanges and a broad based metacarpal head.

2. Classify this abnormality.

Answer: The Wassel⁸ classification is used to determine the different types of duplication;

- Type I: Bifid distal phalanx
- Type II: Duplicated distal phalanx
- Type III: Bifid proximal phalanx
- Type IV: Duplicated proximal phalanx (most common)
- Type V: Bifid metacarpal
- Type VI: Duplicated metacarpal
- Type VII: Triphalangia

This case is classified as a Type IV, which is the most common form (43%).⁸

3. Discuss the common inheritance patterns of this condition.

Answer: Isolated duplication is normally unilateral and sporadic, whereas a triphalangeal thumb usually arises from autosomal dominant inheritance. Type VII is also associated with several

syndromes such as Holt-Oram syndrome, Fanconi's anemia, Blackfan-Diamond anemia, imperforate anus and cleft palate.

4. What are the main indications for surgical treatment in this condition?

Answer: Surgical intervention is almost always indicated for better function and cosmetic reasons. This is normally performed from the age of 18 months to 5 years. The type IV polydactyly patient should be treated very early, because if one waits too long, the supernumerary component displaces the normal component into marked radial or ulnar deviation, and growth continues in this direction.

5. What are the principles when considering surgical treatment of this particular case?

Answer: Surgical intervention in this Type IV duplication involves excision of the most hypoplastic (usually radial) thumb, narrowing of the MCPJ articular surface, ligament (especially radial collateral) reconstruction, intrinsic transfer and possibly centralisation of the extrinsic flexor and extensor tendons.⁹

Children's Orthopaedics

This baby is about to undergo an operation (Fig. 4).



Fig. 4

1. What is the condition and the operation planned for it?

Answer: The condition is constriction band syndrome of the right lower leg. The distal limb is significantly oedematous and a small toe is seen. It is possible that there has been auto-amputation of the other toes. Surgical intervention is based on limb salvage with release of the constriction bands and Z-lengthening procedures or amputation of the limb, if it is felt that that salvage is not feasible.

This is the clinical photograph (Fig. 5a) and radiograph (Fig. 5b) of an active, symptom-free boy with severe genu varum.



Fig. 5a

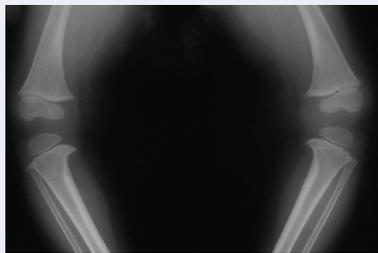


Fig. 5b

2. How would you manage the case?

Answer: The photograph and the radiograph show bilateral genu varum. It is important to know the age of the child, as varus is physiological before the age of two and is definitely pathological after three. It is likely to be physiological as there is symmetric flaring

of the femora and tibiae. I would document height, weight and percentiles for age. Short stature may point to pathological causes of genu varum, including rickets and skeletal dysplasias. Other pathological causes include Blount's disease, trauma, infection, polio and spina bifida.

Examination includes full assessment of the back, pelvis, hips, knees and feet. In addition rotational profile of the lower limb would be measured to document any internal tibial torsion. The intercondylar distance is also important to measure to determine progression.

Management of this case would again depend on the age. In a two-year-old child, I would ask to see the child in a year's time with repeat radiographs. Above the age of three, I would investigate for pathological causes and then consider intervention if the deformity was persistent or progressive. This could include bracing, guided partial growth arrest at an older age, or osteotomy.

Basic Science

1. What is the pathophysiology of Paget's disease?

Answer: The pathophysiology of Paget's includes increased osteoclast size and number. This results in increased bone resorption with haphazard osteoblastic bone formation. Bone is enlarged, hypervascular, deformed and biomechanically weak.

2. What is the aetiology of Paget's disease?

Answer: Aetiology is largely unknown, but one theory includes a viral origin as Pagetic osteoclasts have been shown to contain mRNA from paramyxoviruses and canine distemper virus.

3. What is the mode of presentation in patients' with Paget's disease?

Answer: Paget's disease is usually diagnosed in the fifth decade of life and manifests with pain. They may progress to degenerative joint disease, long bone deformity, cranial nerve compression, high output cardiac failure or a pathological fracture.

4. What are the potential metabolic complications in patients with Paget's disease?

Answer: The potential metabolic complications include a raised alkaline phosphatase, raised serum acid phosphatase and raise urinary hydroxyproline.

5. How would you investigate a patient with Paget's disease?

Answer: Patients with suspected Paget's are investigated with a full history and examination, radiographs and possibly an isotope bone scan to determine the extent and activity of the Paget's disease process. Blood tests including a full bone and liver profile should be performed. Urinary tests for hydroxyproline should also be undertaken.

6. What is the treatment of established Paget's disease?

Answer: Most patients with Paget's disease require no treatment. Medical management is directed at lowering osteoclast activity and numbers. This can be done with calcitonin or bisphosphonates. Pathological fractures of the lower limbs can be extremely hypervascular and targeting of osteoclast function can reduce peri-operative blood loss. Otherwise treatment is directed with dealing with the subsequent complications associated with Paget's disease.

References

1. **Patchell RA, Tibbs PA, Regine WF, et al.** Direct decompressive surgical resection in the treatment of spinal cord compression caused by metastatic cancer: a randomised trial. *Lancet* 2005;366:643-8.
2. **Schwartz DT, alpert M.** The malignant transformation of fibrous dysplasia. *Am J Med Sci* 1964;247:1-20.
3. **Stener B.** Displacement of the ruptured ulnar collateral ligament of the metacarpophalangeal joint of the thumb. *J Bone Joint Surg [Br]* 1962;44-B:869-79.
4. **Rogers WD, Watson HK.** Degenerative arthritis at the triscape joint. *J Hand Surg Am* 1990;15:232-5.
5. **Watson HK, Hempton RF.** Limited wrist arthrodesis. I: the triscape joint. *J Hand Surg* 1980;5:320-7.
6. **Weiss KE, Rodner CM.** Osteoarthritis of the wrist. *J Hand Surg Am* 2007;32:725-46.
7. **Meyers MH, McKeever FM.** Fracture of the Intercondylar Eminence of the Tibia. *J Bone Joint Surg [Am]* 1970;52-A:1677-84.
8. **Wassel HD.** The results of surgery for polydactyly of the thumb: a review. *Clin Orthop Relat Res* 1969;64:175-93.
9. **Yen CH, Chan WL, Leung HB, Mak KH.** Thumb polydactyly: clinical outcome after reconstruction. *J Orthop Surg (Hong Kong)* 2006;14:295-302.