Exam Corner

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MCQs – Adult Pathology – Single Best Answer

1. Which of the following statements is correct with regards to a therapeutic intra-articular facet joint injection in the lumbar region for low back pain?
   Answer: a. Pain relief on two occasions after a facet joint injection is an indication for facet joint ablation
   If facet joint injection has provided successful pain relief the diagnosis is verified and therefore facet joint ablation is indicated. However the exact number of lumbar facet joint injections required prior to facet joint ablation is disputed.[1]
2. What percentage of success would you quote to patients being offered a coccygectomy for coccygodynia that has been refractory to conservative management?
   Answer: e. > 80%
   Kerr et al[2] reported a favourable outcome in 84% of patients after coccygectomy for refractory coccygodynia.
3. Which one of the following statements is false with regard to the clinical presentation of patients with tarsal tunnel syndrome?
   Answer: d. The presence of hind-foot varus deformity
4. Meta-analysis comparing the intermediate and long-term outcome after total ankle replacement and ankle arthrodesis has shown all of the following except:
   Answer: a. Mean AOFAS (American Orthopaedic Foot and Ankle Society) Ankle-Hindfoot Scale score is higher for patients with ankle arthrodesis
5. With regard to bearing surfaces in artificial joints:
   Answer: b. Polar bearing is more conducive to fluid film lubrication
   With equatorial bearing fluid lubrication is prevented. Although polar bearing is more conducive to fluid film lubrication, mid-polar bearing is ideal as it allows fluid in and out to lubricate the joint.[3,4]

Vivas

Adult Pathology

1. Describe the abnormalities on this radiograph (Fig. 1) taken one year after revision hip arthroplasty.

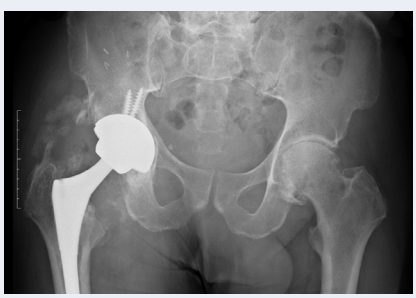

Fig. 1

There is heterotopic ossification (HO) around the right hip joint. I would classify this as Brooker Grade III.[5] There is also significant osteoarthritis of the left hip and there is also an element of leg length discrepancy.

2. Describe the stages of the pathological process seen around the right hip.
   HO is, by definition, the formation of bone within soft tissue. The transformation of primitive cells of mesenchymal origin, present in the connective tissue septa within muscle, into osteogenic cells is thought to be the pathogenesis. Chalmers et al[6] proposed three conditions needed for HO: osteogenic precursor cells, inducing agents, and a permissive environment.
   The heterotopic bone may begin some distance from normal bone, later moving toward it. Studies have also shown that muscle injury alone will not cause the ectopic ossification, concomitant bone damage also being required.[7] Other contributing factors include hypercalcemia, tissue hypoxia, changes in sympathetic nerve activity, prolonged immobilisation and imbalance of PTH and calcitonin.
   Early in the course of HO, oedema with exudative cellular infiltrate is present, followed by fibroblastic proliferation and osteoid formation. The development of HO is extra-articular and bone forms in the connective tissue between the muscle planes and not within the muscle itself. The new bone can be continuous with the skeleton but generally does not involve the periosteum. Mature HO shows cancellous bone and mature lamellar bone, vessels, and bone marrow.
3. What is the common classification used for this disease process?
   The Brooker Classification[5] is used and it is based on an anteroposterior radiograph.
   Class I: represents islands of bone in soft tissues around the hip.
   Class II: includes bone spurs in pelvis or proximal end of femur leaving at least 1 cm between the opposing bone surfaces.
   Class III: represents bone spurs that extend from pelvis or the proximal end of femur, which reduce the space between the opposing bone surfaces to less than 1 cm.
   Class IV: indicates radiologic ankylosis of the hip.

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4. What can be done to reduce the incidence of this process?
   Non-steroidal anti-inflammatory drugs (NSAIDs) have been shown to reduce the incidence of HO.[8] Pre-operative radiation has also been shown to prevent HO. Pakos et al[9] demonstrated the efficacy of combined radiotherapy and indomethacin in preventing heterotopic ossification after total hip arthroplasty.
   Prophylactic measures against HO after hip and knee replacement should be administered before the fifth postoperative day, optimally within 24 to 48 hours.[10] Meticulous clearance of bone debris and avoidance of muscle damage have also been shown to prevent HO.[11]
5. What are the consequences of the other abnormality?
   The other abnormality on the radiograph is leg length discrepancy. This can lead to a limp, pain in the other joints, potentially sciatic nerve injury and more likely legal consequences.

Trauma

A 25-year-old man sustained this injury after a falling from his motorbike (Figs 2a & 2b).

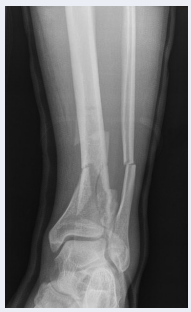

Fig. 2a

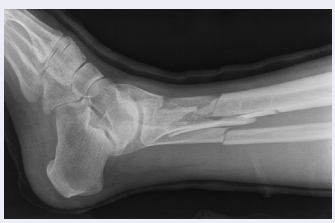

Fig. 2b

1. Describe the abnormalities in the radiographs.
   There is a comminuted distal tibial fracture with intra-articular extension (pilon fracture). Moderately displaced transverse distal diaphyseal fibular fracture. Both fractures show varus angulation.
2. How would you initially manage this patient?
   Initial management would involve an Advanced Trauma Life Support (ATLS) approach to rule out any life threatening injuries. Following this, the limb would be assessed and neurovascular status documented.
   If this was an open injury, intravenous antibiotics would be administered, tetanus prophylaxis given, a photograph would be taken and a preliminary lavage and betadine dressing would be applied.
   This injury represents a significant soft-tissue insult and this must be considered prior to any definitive fixation. The injury would be splinted temporarily in and above knee back slab and temporary external fixation (+/- debridement +/- plastic surgical consultation) would then be undertaken in the operating theatre.
   A CT scan would be ideal pre-operatively to plan definitive fixation.
3. What classification system would you use to describe this injury? Please explain.
   Ruedi-Allgower Classification of Pilon Fractures
   Type 1 - Mild to moderate displacement and no comminution without major disruption of ankle joint
   Type 2 - Moderate displacement and no comminution without significant dislocation of ankle joint
   Type 3 - Explosion fracture with severe comminution and displacement
4. How will you manage this injury definitively?
   Definitive management would involve a CT scan to accurately assess the degree of intra-articular involvement and plan the surgical approach to the distal tibia. The preferred option to restore articular congruity would be open reduction and internal fixation of the distal tibia once the soft tissue insult has been minimised.
   An anterolateral or anteromedial approach could be utilised depending on exact fracture pattern on the CT scan.
   Options for fixation would be ORIF, External fixation (bridging or non-bridging), and combination of internal and external fixation or percutaneous plating.
5. What are the Ruedi-Allgower principles of operative fixation for the management of these fractures?
   The best functional results in the past series were observed in patients treated according to the following four sequential principles:[12]
   1) Reconstruction of the correct length of the fibula
   2) Anatomical reconstruction of the articular surface of the tibia
   3) Insertion of a cancellous autograft to fill gaps left by impaction and comminution
   4) Stable internal fixation of the fragments by a plate placed on the medial aspect of the tibia.

Hands

A 42-year-old woman presents to you with a pain and swelling in the small joints of her hand. These are her radiographs (Figs 3a & 3b).

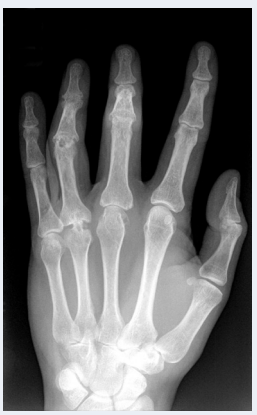

Fig. 3a

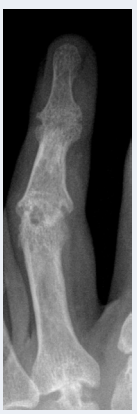

Fig. 3b

1. What is the diagnosis?
   The radiological abnormalities and clinical finding would be consistent with a diagnosis of a seronegative spondyloarthopathy affecting the hand. In this case radiographic features of psoriatic arthritis are present.

2. Which skin condition is associated with this problem?
   Psoriasis.

3. What are the characteristic radiological features?
   The classic radiographic features of psoriatic arthritis that can be seen in this case include joint space narrowing, peri-articular joint erosions, osteolysis, PIPJ/DIPJ ankylosis and the development of a "pencil-in-cup" deformity of marked lysis of the distal end of a phalanx with bony remodelling of the proximal end of the more distal phalanx. Other radiological signs include resorption of the distal phalanges i.e. Morningstar appearance, bony proliferation including shaft and periarticular peri-ostitis, spur formation and spondylitis. Radiological changes in psoriatic arthritis are often asymmetric and oligoarticular, most commonly involving the carpus, MCP, PIP, and DIP joints.

4. What is the natural history of this condition?
   Psoriatic arthritis is a pleomorphic disease that can affect any joint and has a variable course and prognosis. It was initially considered to be less severe than rheumatoid arthritis. However, up to 20% of patients having a severe, debilitating form of degenerative arthritis. Patients with psoriatic arthritis experience intermittent symptomatic flares, with variable lengths of intervening remission. The natural history of the disease varies by subtype of clinical and radiologicalpresentation.
   Risk factors for severe, progressive destructive disease include female gender, polyarticular disease at presentation, younger

age at symptom onset, and acute onset of arthritis. The mortality rate of patients is higher than that of the general population. The disease leads to significant functional disability and a reduced quality of life. At time of diagnosis almost a third of patients are bedridden or have limited their activities of daily living to self-care. Progression of clinical damage is seen in the majority of patients, and only small percentages achieve complete, prolonged remission without therapeutic intervention.[13]

Children's Orthopaedics

Here is a pelvic radiograph of a six-year-old child with a dislocated right hip (Fig. 4).

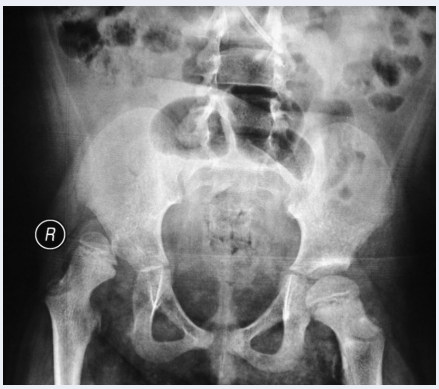

Fig. 4

1. How would you manage the condition?

The radiograph shows a right-sided high hip dislocation. There is delayed ossification of the femoral head and an increased acetabular index. These findings are consistent with developmental dysplasia of the hip. I would take a thorough history from the parents and the child and perform a full clinical examination. I would enquire about treatment to date, current symptoms and co-morbidities. I would fully explain the condition and the future prognosis.

The child has a myelomeningocele. The spinal abnormality, ventriculo-peritoneal shunt and bowel stasis are obvious. There is little acetabular dysplasia, indicating the dislocation is related to muscle weakness. The child is a non-walker and the position of the hip with regard to sitting and propped standing is good. The child should be managed non-operatively.

Here is the chest radiograph of a nine-year-old child (Fig. 5).

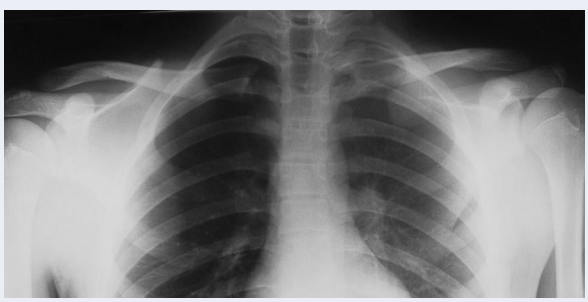

Fig. 5

2. What is the diagnosis and how would you address the problem?

The diagnosis is a Sprengel deformity on the right. Management depends on cosmetic and functional disability. In this case the condition is not severe and there is no associated Klippel- Feil anomaly. If the appearance is a problem, it could be addressed by excision of the upper angle of the scapula with division of any vertebral connection.

In more severe cases a vertical scapular osteotomy can be helpful. It is debatable whether more extensive procedures are overall better as scarring can be a major cosmetic disability and function may not be significantly improved.[3,4]

Basic Science

1. How would you differentiate osteoporosis from osteomalacia?

Both osteoporosis and osteomalacia may present with bone fractures. Typically, osteoporosis is painless and insidious until a fracture develops. It is commoner with advancing age. Characteristically, osteomalacia is a painful bone disorder at onset, which can present at any age.

Osteomalacia patients may report a history of renal failure, anticonvulsant use, or malabsorption. Osteoporosis typically presents with a normal serum calcium, phosphorus, alkaline phosphatase, vitamin D, and PTH. In contrast, osteomalacia is characterised by hypophosphataemia, hypocalcaemia, increased alkaline phosphatase levels, low levels of vitamin D metabolites, and secondary hyperparathyroidism. Urinary calcium levels may be normal in osteoporosis but are often low in osteomalacia. Both conditions appear as low bone mass on radiographs and DEXA scan. However, specific radiological findings unique to osteomalacia include Looser pseudofractures. On x-ray, the coarseness of the trabeculae in osteomalacia may differentiate the two diagnoses.[14]

2. What advice would you give a patient in terms of prevention of osteoporosis?

In both osteoporosis and osteomalacia bone mass may be decreased, but in osteoporosis mineralisation is normal, whereas it is deficient in osteomalacia.

Prevention of osteoporosis includes reduction of risk factors. Important messages would be to avoid smoking, excess alcohol and drug abuse. A healthy balanced diet and encouraging some load-bearing exercise is also important. Prevention of falls in at-risk patients may also minimise osteoporotic fragility fractures.

3. Is having a national screening programme for osteoporosis worthwhile? Why?

Osteoporosis is an important condition that causes more than 200 000 fractures each year at a cost to the NHS of more than £940m. It would therefore seem that a national screening programme would be of benefit. However, according to the Wilson-Jugner criteria,[15] screening the entire population would not be worthwhile. This is because there is not really an early stage of osteoporosis that would require treatment to prevent a late stage. The use of bone density assessment in selected individual patients is however important in reducing the prevalence of osteoporosis, prevention and therefore reduction of fragility fractures. Those who would benefit from screening would be women with a premature menopause; people on steroids for an extended period; women who have suffered hip fractures and elderly people with a stoop or loss of height.

4. How would you treat an established case of osteoporosis?

Treating osteoporosis includes advising patients to stop smoking, excess alcohol and to ensure that they have a healthy balanced diet with moderate load-bearing exercise. Options for preventing bone loss include calcium and Vitamin D supplementation, oestrogen therapy (HRT), bisphosphonates (inhibits osteoclasts), calcitonin and selective oestrogen receptor modulators (e.g. raloxifene). Stimulation of bone formation could include sodium fluoride (stimulate osteoblasts), recombinant PTH and strontium. The specific combination of therapies would vary from patient to patient.

5. What are the complications/side-effects of therapy with bisphosphonates?

Oral bisphosphonates are associated with gastric irritation and oesophageal ulceration. It is recommended that they are taken after food and that the patient should remain upright for 30 to 60 minutes after taking the medication. Osteonecrosis of the jaw is a complication associated with intravenous bisphosphonates and is commoner in patients having dental surgery involving the jaw. There have been reports of patients having severe muscle, joint, and/or bone pain after taking bisphosphonate medications. This complication may arise days, months, or even years after starting bisphosphonate therapy. Atypical femoral fractures have been reported in patients receiving long-term bisphosphonates and any significant thigh pain should be investigated in these patients. In the USA, the FDA has commented on an association between a higher prevalence of atrial fibrillation in patients taking bisphosphonates.

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