ANSWERS AND ADDITIONAL INFORMATION FOR ORTHOPAEDIC CLINICAL QUIZ

Mansor A, Albaker MZ, Ahmad TS
Department of Orthopaedic Surgery, University of Malaya, Kuala Lumpur, Malaysia

Answer 1

a) Cemented Thompson unipolar/hemiarthroplasty.
b) Stainless steel (316L).
c) Stem was fixed distally, poor proximal cement mantle collar unsupported by bone.
   Leading to cantilever and fatigue failure of metal.
d) Compressive force.
e) ETO Extended Trochanteric Osteotomy (split the femur).
   Ultrasonic cement remover/ high speed burr/ trephine extractor.

Description 1
Femoral stem fracture is an established but infrequent complication of total hip arthroplasty. The first generation of Charnley type, stainless steel femoral stems fractured in approximately 4.1% of patients, with fatigue failure attributed to insufficient stem cross sectional area and inadequate cement support. Since the 1970s, improvements in stem design and metallurgy have markedly reduced the incidence of femoral stem fracture. However, reports of femoral stem fracture have continued to surface in the orthopaedic literature, with causes ranging from corrosion at the head-neck interface to defects caused by laser etchings.

Femoral stem failure can be broadly categorised to patient-specific factors, technical issues or implant related factors. Some investigators have reported that insufficient proximal bone support may predispose femoral stems to fracture via fatigue loading, while others have suggested that distal fixation is adequate in this system. The removal of well-fixed broken femoral component and cement mantle can be extremely demanding, time consuming and potentially damaging to the host bone. Different methods have been described to extract broken femoral stem yet this remains one of the most challenging prospect to the revision hip surgeon

Reference
1. Bonnheim N, Gramling H, Ries M, Shukla S, Iliescu B, Pruitt L. Fatigue fracture of a cemented Omnifit CoCr femoral stem: implant and failure analysis. Arthroplasty Today. 2017;3(4):234-38.
2. Akrawi H, Magra M, Shetty A, Ng A. A modified technique to extract fractured femoral stem in revision total hip arthroplasty: A report of two cases. Int J Surg Case Rep. 2014;5(7):361-4.

Answer 2

a) Necrotizing Fasciitis.
b) Haemorrhagic bullae.
   Peeling of skin.
   Erythema.
   Necrotic fascia.
c) Dishwater fluid / pus.
   Fascia / muscle necrosis.
   Loss of adhesion of skin to fascia.
d) Resuscitation.
   Blood culture.
   Broad spectrum antibiotics.
   Early surgical debridement.

Description 2
Necrotizing fasciitis is a severe, rare, potentially lethal soft tissue infection that develops in the extremities, the abdominal wall, or the scrotum and perineum. The infection which is polymicrobial in most of the cases progresses rapidly and septic shock may ensue; hence, the mortality rate is high. Prognosis is poorer in the presence of co-morbidities, such as diabetes mellitus, immunosuppression, chronic alcohol disease, chronic renal failure, and liver cirrhosis. The clinical status of the patient varies from erythema, swelling, and tenderness in the early stage, to skin ischemia with blisters and bullae in the advanced stage of infection. In its fulminant form, the patient is critically ill with signs and symptoms of severe septic shock and multiple organ dysfunction. The clinical condition is the most important clue for diagnosis. Computerised tomography or ultrasonography can be helpful, but definitive diagnosis is attained by exploratory surgery at the infected site. Management of the infection begins with broad-spectrum antibiotics, but early and aggressive drainage and meticulous debridement constitute the mainstay of treatment. Postoperative management of the surgical wound is also important for the patient's survival, along with proper nutrition. The vacuum- assisted closure system has proved to be helpful in wound management, with its combined benefits of continuous cleansing of the wound and the formation of granulation tissue.

Reference
1. Misiakos EP, Bagias G, Patapis P, Sotiropoulos D, Kanavidis P, Machairas A. Current concepts in the management of necrotizing fasciitis. Front Surg. 2014;1:36. Published online 2014 Sept 29

Answer 3

a) Rarefaction of bone.
   Periosteal reaction.
   Fracture with deformity.
b) Tunneling (cloaca) at the metaphyseal – diaphyseal junction.
   Involvement of epiphysis and metaphysis (oedema).
   Fracture.
c) Gram stain.
   Gram positive cocci in clusters–Staphylococcus aureus.
d) Acute osteomyelitis.

Description 3
Acute osteomyelitis is an inflammatory disease that affects bone and synovial joints and is primarily caused by bacterial infection. It can occur alone or in combination with septic arthritis. It is more common in males and in children over 5 years old. Hips, knees, and ankles are the most frequently involved joints. The infection can occur in 3 ways, dissemination of pathogen via the blood, extension by contiguity, or penetration of the infectious agent. The first mechanism is the commonest in children. The condition should not be underestimated as it can be associated with sepsis and sequelae such as joint destruction, growth failure, and death of the patient if not correctly treated. Therefore, early diagnosis and initiation of proper treatment are essential to obtain a better outcome and avoid complications. Furthermore, emergence of bacterial strains particularly virulent and resistant to antibiotics has made the treatment of acute osteomyelitis more difficult than in the past and has led to the need to have new antibiotics available to deal with these emergencies. In spite of the on-going debate regarding the best antibiotic therapy to be administered, the mode of administration, and the duration of therapy, antibiotic therapy is still the gold standard for treating acute osteomyelitis. The antibiotic is initially chosen on an empirical basis to cover the most frequent pathogens responsible for these conditions based on the age of the child and is then driven on the basis of the antibiograms obtained from the cultural investigations performed before starting antimicrobial therapy such as blood culture or bone fragment that can be obtained via surgical intervention. Other surgical indications include drainage of pus or debridement of necrotic tissue.

Reference
1. Castellazzi L, Mantero M, Esposito S. Update on the management of pediatric acute osteomyelitis and septic arthritis. Int J Mol Sci. 2016;17(6):855.

Answer 4

a) Left groin flap.
b) Axial type of flap.
c) Superficial circumflex iliac artery.
d) 3 weeks.
e) Safe, reliable with no requirement for microsurgical skills.

Description 4
Degloving injuries are rare but alarming injuries. As the soft tissue envelope supplies blood to the distal hand, ischemia and necrosis of the denuded parts may be imminent without expedient vascularised tissue transfer. In view of that, groin flaps provide reliable, ample tissue, are easy to harvest, exhibit minimal donor-site morbidity and present an inconspicuous scar. Its disadvantages include edema of the hand and the flap is usually bulky and requires revision. There is also patient discomfort, stiffness and the need for revision surgery. The indications are limited depending on skill available and clinical need.

Reference
1. Al-Qattan MM, Al-Qattan AM. Defining the indications of pedicled groin and abdominal flaps in hand reconstruction in the current microsurgery era. J Hand Surg Am. 2016;41(9):917-27.

Answer 5

a) Neglected posterior dislocation of the right shoulder.
b) Reverse Hill Sach lesion (compression fracture of the anterior humeral head).
   May lead to unstable shoulder after reduction.
c) Electrocution.
   Epilepsy/convulsion.
   Trauma.
d) Open reduction (in view of the delayed management).
e) Redislocation.
   Osteonecrosis.
   Stiffness and functional incapacity.
   Degenerative glenohumeral disease.

Description 5

Posterior dislocation of the shoulder is a rare injury that constitutes less than 5% of all shoulder dislocations. The diagnosis can be missed on the initial presentation in about 60-80% of the cases on initial examination. This can delay the proper management of such injuries leading to complications that include chronic pain, stiffness and functional instability. Failure to identify the injury clinically as well as inadequate imaging and late patient presentation are all factors that can contribute to this delay. The following are more liable for posterior dislocation of the shoulder; direct blows to the humeral head, high energy injuries, seizures, electrocution, and even drug dependency or hypoglycaemic attacks. Clinical signs of posterior dislocation include flattening of the anterior shoulder, posterior fullness and rounding, prominence of the coracoid process and severe limitation of external rotation and elevation. Proper radiograph views are indicated and are not limited to anteroposterior, lateral scapular, axillary or Y view. Computerized tomography is required to check for associated fractures or damage to the humerus head. Magnetic resonance imaging show the extent of damage to the rotator cuff muscles. The treatment is multifactorial and it varies from benign neglect to arthroplasty depending on considerations such as the extent of a reverse Hill-Sachs lesion, the duration of the dislocation, the condition of the glenoid fossa and the patient's age, general health and functional level. Acute injuries are usually treated by closed reduction and those with reverse Hill-Sachs lesions that are less than 20% of the head size have a favourable prognosis. Those from 20 to 50% in size are unstable and require surgery to regain stability. Arthroplasty is usually the standard for lesions of sizes than 50% except for young people in whom arthroplasty should be avoided.

Reference

1. Xu W, Huang L, Guo J, Jiang D, Zhang Y, Yang H. Neglected posterior dislocation of the shoulder: A systematic literature review. J Orthop Translat. 2015;3(2):89-94.

Answer 6

a) Pavlik Harness.
b) Developmental dysplasia of the hip.
   Less than 6 months.
c) Keeping the hips in flexion (blue pointer).
   Keeping the hips in abduction (yellow pointer).
d) Avascular necrosis of femoral head.
   Missed / Persistent dislocation.
   Femoral nerve palsy.

Description 6

The Pavlik harness was first used by Arnold Pavlik in 1944 for the treatment of DDH. While the Pavlik harness prevents extension and adduction of the hip joint, it allows movements in the safe zone (the arc between the angle of adduction that would allow redislocation, and the angle of abduction that can be comfortably attained). Spontaneous movements help in the maintenance of reduction of the joint. The major advantages of the Pavlik harness are that it allows spontaneous reduction without rigid fixation, permits ultrasound observation of the reduction, allows diapers to be changed without its removal, and is inexpensive and easy to use. The harness is applied with the hips in greater than 90° of flexion, and with the adduction of the hip limited to a neutral position. The line of pull of the flexion straps must be lateral enough (e.g., along the anterior axillary line) to effect flexion in a relatively abducted rather than an adducted position. The posterior straps must not be under tension to the point of creating forceful abduction. The function of this strap is not to force the hip into abduction, but to prevent the hip joint from being dislocated by adduction. When abduction is obtained by force there is greater danger of avascular necrosis of the femoral head. A constant oblique posture is also unacceptable. A pillow should be applied under the knees to reduce the angle of abduction and maintain correct posture. Misuse of the Pavlik harness, in addition to presenting a risk of avascular necrosis, can also increase the complexity of hip deformation and may damage the femoral or other nerves.

Reference

1. Atalar H, Sayli U, Yavuz OY, Uras I, Dogruel H. Indicators of successful use of the Pavlik harness in infants with developmental dysplasia of the hip. Int Orthop (SICOT). 2007;31(2):145-50.