ANSWERS AND ADDITIONAL INFORMATION FOR ORTHOPAEDIC CLINICAL QUIZ

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Answer 1

a) Bilateral genu varus with the right knee in flexion and the left knee in hyperextension.
b) Bilateral Charcot arthropathy of the knee.
c) Diabetes mellitus.
   Syphilis infection.
   Spinal stenosis.
d) External bracing/orthosis.
   Fusion surgery for the more unstable knee.

Description 1
Charcot arthropathy of the knee leads to severe deformity due to progressive destruction and collapse of the weight-bearing surfaces of joints due to repeated microtrauma to an insensate joint. Diseases such as diabetes mellitus, neurosyphilis and spinal canal stenosis may lead to this condition. Options for treatment for Charcot arthropathy of the knee are arthrodesis or knee arthroplasty in severe deformities. Risk of nonunion is very high in Charcot arthropathy and also early implant failure in arthroplasty.

Reference:
1. Drennan DB, Fahey JJ, Maylahn DJ. Important factors in achieving arthrodesis of the Charcot knee. *J Bone Joint Surg Am.* 1971; 53(6): 1180-93.
2. Tibbo ME, Chalmers BP, Berry DJ, Pagnano MW, Lewallen DG, Abdel MP. Primary total knee arthroplasty in patients with neuropathic (charcot) arthropathy: contemporary results. *J Arthroplasty.* 2018;33(9): 2815-20.

Answer 2

a) Fall with wrist in hyperextension.
   Pronation.
   Radial inclination and a twisting force.
b) Radial styloid fracture.
   Ulnar styloid fracture.
   Dorsal subluxation of the radiocarpal joint.
c) The steps are:
   Closed manipulative reduction.
   Immobilize with a splint.
   Wait for soft tissue swelling to reduce.
   Open reduction utilizing both dorsal and volar approaches.
d) Osteoarthritis of the wrist.

Description 2
Radiocarpal fracture-dislocations are complex wrist injuries associated with cortical rim fractures of the distal radius, the radial styloid and the ulnar styloid. The mechanism of injury is complex and thought to be a combination of hyperextension, pronation and radial inclination. Dorsal dislocations are more common than volar. Treatment involves stabilisation of the fractured bone fragments and repair of the radiocarpal ligaments with the need of an external fixator to stabilise the wrist. The risk of development of osteoarthritis is very high in this type of injuries.

Reference:
1. Dumontier C, Meyer zu Reckendorf G, Sautet A, Lenoble E, Saffar P, Allieu Y. Radiocarpal dislocations: classification and proposal for treatment. A review of twenty-seven cases. *J Bone Joint Surg Am.* 2001;83(2): 212-8.
2. Spiry C, Bacle G, Marteau E, Charruau B, Laulan J. Radiocarpal dislocations and fracture-dislocations: Injury types and long-term outcomes. *Orthop Traumatol Surg Res.* 2018;104(2): 261-6.
3. Ilyas AM, Mudgal CS. Radiocarpal fracture-dislocations. *J Am Acad Orthop Surg.*2008;16(11): 647-55.

Answer 3

a) Subluxation of total hip arthroplasty.
   Loosening of both components.
   Old malunited right femur fracture.
b) Right total hip arthroplasty implant failure secondary to loosening.
c) Septic loosening.
   Aseptic loosening.
d) The steps are:
   Rule out infection.
   Revision of hip arthroplasty.

Description 3
Total hip replacement is a reliable treatment option for end-stage hip osteoarthritis. Outcome of hip replacements at 10- and 15-year follow-ups is satisfactory. Wear, loosening, dislocation, instability and infection are common causes for revision in patients with hip arthroplasty. Aseptic cup loosening or osteolysis has been shown to be a common mechanism of failure.

Reference:
1. Park YS, Moon YW, Lee KH, Lim SJ. Revision hip arthroplasty in patients with a previous total hip replacement for osteonecrosis of the femoral head. *Orthopedics.* 2014; 37(12): e1058-62.
2. Karachalios T, Komnos G, Koutalos A. Total hip arthroplasty: Survival and modes of failure. *EFORT Open Rev.* 2018; 3(5): 232-9.

Answer 4

a) Non-union of the medial and lateral malleolus with varus ankle deformity.
b) Lag screw principle.
c) Unstable fixation with no interfragmentary compression.
d) Options are:
   Apical screw followed by compression screw.
   Antiglide plate.

Description 4
Vertical fractures of the medial malleolus occur in supination-adduction loading of the talus into the articular surface of the medial malleolus. Fixation of this pattern of fracture is not amenable to the usual screw fixation directed from the tip of the medial malleolus obliquely upwards to the tibia. Antiglide plating is a good option for stabilisation of vertical medial malleolus fractures. Two 4.0 mm partially threaded cancellous screws inserted perpendicular to the fracture line is also an acceptable fixation technique.

Reference:
1. Rockwood CA, Green DP, Bucholz RW. Rockwood and Green's Fractures in Adults. 7th ed. Wolters Kluwer Health/Lippincott Williams & Wilkins, Philadelphia, PA. 2010
2. Toolan BC, Koval KJ, Kummer FJ, Sanders R, Zuckerman JD. Vertical shear fractures of the medial malleolus: a biomechanical study of five internal fixation techniques. *Foot Ankle Int.* 1994; 15(9): 483-9.
3. Wegner AM, Wolinsky PR, Robbins MA, Garcia TC, Maitra S, Amanatullah DF. Antiglide plating of vertical medial malleolus fractures provides stiffer initial fixation than bicortical or unicortical screw fixation. *Clin Biomech (Bristol, Avon)*. 2016; 31: 29-32.

Answer 5

a) Torticollis.
b) Grissel syndrome, Juvenile RA, Congenital sternomastoid torticollis, rotatory atlanto-axial subluxation, traumatic odontoid fracture.
c) Os odonteoideum/ fracture of dens/ hypoplasia of odontoid/subluxation of C1/C2.
d) Traction, bracing, surgical (C1/C2 fusion).

Description 5
The word torticollis is derived from a Latin root that means twisted neck. Causes of torticollis may be congenital muscular torticollis and non-muscular causes such as tumours in the posterior fossa or cervical spine, syringomyelia, Arnold-Chiari malformations, Klippel-Feil syndrome and rotatory instability. Mainstay of treatment is usually physical therapy and refractory cases may require surgery. Congenital muscular torticollis is a significant risk factor in acquiring later neurodevelopmental disorders.

Reference:
1. Do TT. Congenital muscular torticollis: current concepts and review of treatment. *Curr Opin Pediatr.* 2006; 18(1): 26-9.
2. Schertz M, Zuk L, Green D. Long-term neurodevelopmental follow-up of children with congenital muscular torticollis. *J Child Neurol.* 2013; 28(10): 1215-21.

Answer 6

1. Knee Ankle Foot Orthoses (KAFO).
2. Good cognitive function, good upper limbs and trunk muscle power, hip flexors/extensors at least grade MRC 3, hip flexors/ extensors, plantigrade foot.
3. Poliomyelitis, myelomeningocele, spinal cord injury.
4. Contracture of lower limb, severe lower limb spasticity.

Description 6
Lower limb orthoses can be utilised to normalise the walking pattern of children with cerebral palsy improving the position of joints to reduce pathological reflex or spasticity. A variety of othoses are available with different designs and materials to fit into different presentations of cerebral palsy.

Reference:
1. Aboutorabi A, Arazpour M, Ahmadi Bani M, Saeedi H, Head JS. Efficacy of ankle foot orthoses types on walking in children with cerebral palsy: A systematic review. *Ann Phys Rehabil Med.* 2017; 60(6): 393-402.
2. Morris CH, Newdick H, Johnson A. Variations in the orthotic management of cerebral palsy. *Child Care Health Dev.* 2002; 28(2): 139-47.