

# ANSWERS AND ADDITIONAL INFORMATION FOR ORTHOPAEDIC CLINICAL QUIZ

Aizah N, Mansor A, Ahmad TS

Department of Orthopaedic Surgery, University of Malaya, Kuala Lumpur, Malaysia

## Answer 1

- Degenerative changes of the right hip with reduced joint space, and osteophytosis. Fusion of the sacroiliac joints. Ankylosis of the lumbar spine (bamboo spine appearance).
- Ankylosing spondylitis.
- Pre-operatively - difficult intubation due to cervical rigidity, difficult ventilation due to restrictive lung disease, failure of spinal anaesthesia due to ossification of posterior spinal ligaments, risk of spine fracture during positioning after induction. Intra-operatively - flexion and external rotation contractures of the hip causing difficulty in exposure of femoral neck and acetabulum. Pelvic obliquity causing difficulty in positioning of acetabular component, osteoporosis increasing the risk of over-reaming the acetabular component.
- Anterior hip dislocation. Proximal femoral fracture. Aseptic loosening.

## Description 1

Hip involvement in ankylosing spondylitis is not uncommon and a large number of patients have involvement bilaterally. The combination of a stiff spine and hip causes severe disability in patients, largely reducing their quality of life. Total hip replacement is necessary in patients who failed conservative management but is associated with risks of surgery and complications. Anterior hip dislocation occurs because patients have hyperextended hips and extended pelvis to compensate for thoracic kyphosis and loss of lumbar lordosis. During surgery, the cup is at risk of being inserted with an exaggerated anteversion, increasing the risk of anterior hip dislocations.

## Reference:

- Guan M, Wang J, Zhao L, Xiao J, Li Z, Shi Z. Management of hip involvement in ankylosing spondylitis. *Clin Rheumatol*. 2013; 32(8): 1115–20.
- Tang WM, Chiu KY. Primary total hip arthroplasty in patients with ankylosing spondylitis. *J Arthroplasty*. 2000;15(1): 52–8.

## Answer 2

- Heterotopic ossification of right hip causing bony ankylosis of the right hip.
- Neurogenic: traumatic brain injury, spinal cord injury, stroke, brain tumours. Traumatic: fracture, arthroplasty, muscular trauma, joint dislocation, burns.
- NSAIDs: Indomethacin 75mg OD for 2-3 weeks. External beam radiation after total joint arthroplasty – 700 – 800 centigray 24 hours pre-operatively or within 72 hours post-operatively.
- Mobilisation with ROM exercises in early stages. Surgical resection once heterotopic ossification has fully matured.

## Description 2

Heterotopic ossification (HO) is defined as the presence of lamellar bone at locations where bone normally does not exist. It is a frequent complication following central nervous system disorders such as brain or spinal cord injuries, tumours, or encephalitis, multiple injuries, hip surgery, and burns. The pathophysiology of the disease is poorly understood. Three-phase bone scintigraphy is the most sensitive imaging modality for early detection of HO (as early as 2-4 weeks) and can be used to assess the maturity of HO. Definitive treatment is by surgical resection once the HO has fully matured.

## Reference:

- Aubut JA, Mehta S, Cullen N, Teasell RW, ERABI Group, SCIRE Research Team. A comparison of heterotopic ossification treatment within the traumatic brain and spinal cord injured population: An evidence based systematic review. *NeuroRehabilitation*. 2011; 28(2): 151–60.
- Vanden-Bossche L, Vanderstraeten G. Heterotopic ossification: a review. *J Rehabil Med*. 2005; 37(3): 129-36.
- Sun E, Hanyu-Deutmeyer AA. Heterotopic Ossification. StatPearls Treasure Island (FL): StatPearls Publishing; 2018 Oct 1.

## Answer 3

- Talar neck fracture with subtalar dislocation Hawkins type II.
- Dual-incision (medial and lateral) open approach with direct fracture visualisation and reduction. Fixation with two headless screws or can utilise small fragment plates if fracture comminuted (usually over medial side).
- Avascular necrosis of talar body. Subtalar joint arthritis (malunion / non-union).
- Subchondral lucency best seen on Mortise view at 6-8 weeks. Good prognostic factor – indicates intact vascularity with resorption of subchondral bone.

## Description 3

An uncommon and potentially devastating injury due to the high risk of osteonecrosis of the talar body. Hawkins original classic work described a rate of 0%, 42% and 86% for types I, II, and III, respectively. Current rates have mildly reduced with a more aggressive dual-incision open reduction and fixation treatment for all fractures. Another common complication, subtalar joint arthritis may necessitate subtalar joint arthrodesis in symptomatic patients.

## Reference:

- Dodd A, Lefavre KA. Outcomes of talar neck fractures: a systematic review and meta-analysis. *J Orthop Trauma*. 2015; 29(5): 210–5.
- Whitaker C, Turvey B, Illic EM. Current concepts in talar neck fracture management. *Curr Rev Musculoskelet Med*. 2018; 11(3): 456–74.
- Hawkins LG. Fractures of the neck of the talus. *J Bone Joint Surg Am*. 1970; 52: 991–1002.

## Answer 4

- Vertically positioned talus with midfoot and forefoot dislocated dorsally. The line along the long axis of the talus passes below the first metatarsal-cuneiform axis. Tibiotalar angle is almost parallel.
- Congenital vertical talus.
- Neuromuscular and genetic disorders such as arthrogyrosis, myelomeningocele.
- Within the age of one month, the Dobbs method of serial manipulation and casting the feet (the reverse of Ponseti method forces) is used to stretch the dorsal and lateral contracted tissues, followed by pinning of the talonavicular joint and percutaneous Achilles tenotomy. At the age of roughly one year, surgical correction with soft tissue releases and K-wiring, is performed.

## Description 4

Congenital vertical talus is a rare flatfoot deformity that is characterized by a fixed dorsal dislocation of the navicular on the talus with associated Achilles tendon and dorsolateral soft-tissue contractures, as well as a variant with calcaneocuboid joint subluxation or dislocation. In contrast to its sibling condition the oblique talus, the talonavicular joint does not reduce with forced plantarflexion of the foot. Traditionally, this condition was managed with extensive soft tissue release with acute correction of the deformity with resultant stiffness and poor outcome. Current evidence has moved towards a more promising minimally invasive method of serial casting followed by minimal surgery, not unlike the Ponseti method for congenital talipes equinovarus.

## Reference:

- Yang JS, Dobbs MB. Treatment of congenital vertical talus: comparison of minimally invasive and extensive soft-tissue release procedures at minimum five-year follow-up. *J Bone Joint Surg Am*. 2015; 97(16): 1354-65.
- McKie JJ, Radomislji T. Congenital vertical talus: a review. *Clin Podiatr Med Surg*. 2010; 27(1): 145–56.

## Answer 5

- Posterior leaf spring ankle foot orthosis.
- Mild foot drop secondary to common peroneal nerve palsy or stroke.
- Mediolateral ankle instability. Rigid equinus. Moderate to severe plantarflexion weakness. Moderate to severe spasticity.
- Prevents foot slap at heel strike. Assists toe clearance during the swing phase.
- High temperature thermoplastics.

## Description 5

The posterior leaf spring ankle foot orthosis is a flexible orthosis designed to assist in dorsiflexion and to correct foot drop during the swing phase of gait. The trim around the ankle is thin and present only posteriorly, providing no ankle stability during stance phase. It is suitable for use in patients with isolated motor weakness of ankle dorsiflexors with a supple ankle joint and no hip, knee, or ankle plantarflexion weakness.

## Reference:

- Ounpuu S, Bell KJ, Davis RB 3rd, DeLuca PA. An evaluation of the posterior leaf spring: orthosis using joint kinematics and kinetics. *J Pediatr Orthop*. 1996; 16(3): 378–84.
- Cikajlo I, Osrečki K, Burger H. The effects of different types of ankle-foot orthoses on postural responses in individuals with walking impairments. *Int J Rehabil Res*. 2016; 39(4): 313–9.

**Answer 6**

- a) Dynamic dorsal wrist hand orthosis (outrigger splint).
- b) Radial nerve palsy.  
Extensor tendon injury.
- c) Active finger and wrist flexion with passive finger and wrist extension.
- d) Prevents overstretching of denervated muscles or injured tendons.  
Preserves joint mobility and prevents contractures.  
Assists weak movements and substitutes for absent movements during the period of recovery.
- e) Fixed finger contractures, patients who cannot comply to rehab regimes.

**Description 6**

The dynamic dorsal wrist hand orthosis, or more commonly known as the outrigger splint provides a quick means for positioning the hand and assisting wrist and metacarpophalangeal (MCP) extension. The orthosis is made of low-temperature thermoplastics heated to the appropriate temperature and formed directly on the patient. It is typically used for patients with radial nerve injury while awaiting recovery of the nerve function.

**Reference:**

1. Alsancak S. Splint satisfaction in the treatment of traumatic radial nerve injuries. *Prosthet Orthot Int.* 2003;27(2): 39–45.