

ANSWERS AND ADDITIONAL INFORMATION FOR ORTHOPAEDIC CLINICAL QUIZ

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Answer 1

- Tendon weaver/ Tendon passer/ Tendon braider
- Curved distally- easy to manipulate and weave tendons
Sharp distal tip- to penetrate/ weave tendon with minimal damage
Sharp tooth at 1 distal limb- to grasp tendon well during weaving
- Tendon transfer
Tendon grafting
Tendon reconstruction
(Tendon repair is not an acceptable answer as different techniques are used for the procedure)
- Pulvertaft Weave technique
Side-to-side Weave technique

Description 1

In an acute tendon rupture, primary end-to-end suturing is possible. Various suturing techniques can be used like modified Kessler, Lahey, Adelaide, and Becker Sutures for Flexor Tendon Repair. *J Hand Surg Am.* 2015 Sep; 40(9):1812-7. Epub 2015 Jul 23.

In cases where, tendon grafting is impossible; ruptured tendon at musculotendinous junction or denervated muscles, tendon transfers are a better option. In tendon grafting and transfer, there is discrepancy between the tendon sizes. Thus, Pulvertaft or Side-to-side weave techniques are used. In addition, these techniques have better strength and stiffness which enable patients to start early mobilization and rehabilitation.

References:

- Jordan MC, Schmitt V, Jansen H, Meffert RH, Hoelscher-Doht S. Biomechanical Analysis of the Modified Kessler, Lahey, Adelaide, and Becker Sutures for Flexor Tendon Repair. *J Hand Surg Am.* 2015 Sep; 40(9):1812-7. Epub 2015 Jul 23.
- Brown SH, Hentzen ER, Kwan A, Ward SR, Fridén J, Lieber RL. Mechanical strength of the side-to-side versus Pulvertaft weave tendon repair. *J Hand Surg Am.* 2010; 35(4): 540-545.

Answer 2

- Prominent tibia at amputated stump
Sagging of soft tissue/ Shape of stump is not ideal for prosthetic fitting
Scar directly below the prominent tibia/ adhered to tibia
Adequate residual limb length
- Pain on pressure/ touch at prominent tibia
Hypersensitivity at scar or prominent tibia
Lead to ulceration
Unable to wear prosthesis- surface area not suitable for prosthetic fitting
- Myoplasty- suturing the fascia of the sectioned agonistic and antagonistic muscles to each other
Myodesis- anchoring the remaining muscles through drill holes at the cut end of bone
Osteomyoplasty- creating a bone bridge between tibia and fibula followed by myoplasty

Description 2

Amputation is a rehabilitative procedure where good surgical techniques can guarantee an excellent outcome in terms of function and patient satisfaction. The standard technique used in transtibial amputation is long posterior flap technique or also known as Burgess Technique. The aim of amputation is to obtain primary healing without infection and appropriate stump for prosthetic fitting. The stump must be well-padded, cylindrical shape and tolerant to stresses and weight-bearing. This can be achieved with muscle stabilization over beveled anterior tibia.

References:

- Taylor BC, Poka A. Osteomyoplastic transtibial amputation: technique and tips. *J Orthop Surg Res.* 2011; 6:13.
- Smith DG, Ferguson JR. Transtibial amputations. *Clin Orthop Relat Res.* 1999; 361: 108-115.

Answer 3

- Thermoplastic splint (TPS) at dorsum of hand with Velcro extending volarly/ Outrigger splint
Spring coils attached at proximal TPS (wrist level) with glue
Long curved wires for each finger and thumb extending over dorsum of the hand
Ulnarly curved distal end wires to suspend all proximal phalanges
- For passive extension of all fingers and thumb by the wires
Allow active flexion of all fingers and thumb

- Posterior Interosseous Nerve (PIN) palsy
(Radial nerve palsy is not acceptable as the splint did not include wrist joint)
- Paediatrics/ psychiatric patients who can't follow instructions for physiotherapy
Ulcers/ burns/ wounds at hand
Contractures/ stiffness/ non-supple joints

Description 3

Posterior interosseous nerve (PIN) palsy causes finger and thumb drop deformity. Radial wrist extension is possible as extensor carpi radialis longus muscle is supplied by a more proximal branch of radial nerve just before it bifurcates into superficial radial nerve and PIN. A dynamic splint application during the recovery period is necessary to maintain supple joints and to stretch the denervated muscles. Recovery either spontaneous or post-surgery can be lengthy. A PIN splint applied between wrist and metacarpophalangeal joints and enables mobilization of both joints. Active wrist motion preserves the tenodesis action which allows grasp-release pattern of normal hand function.

References:

- Colditz JC: Splinting for radial nerve palsy, *J Hand Ther* 1: 18, 1987.
- McKee P, Nguyen C: Customized dynamic splinting: orthoses that promote optimal function and recovery after radial nerve injury: a case report. *J Hand Ther.* 2007; 20(1): 73-87.

Answer 4

- Lytic lesion at distal phalanx seen, measuring about 30% or 1/3 of the whole distal phalanx
Intralesional calcifications which has 'popcorn' appearance
About 40% of the cortex is eroded
Pathological fracture at shaft of distal phalanx
Distal interphalangeal joint is not involved
Soft tissue shadow is seen
- Cyst was lined by stratified squamous epithelium
Cyst contained laminated keratin flakes and foreign body-type multinucleated giant cells
Surrounding stroma was inflamed with presence of chronic inflammatory cells
- Intraosseous epidermoid inclusion cyst
- Curettement and cementation as it is a benign lesion, cementation for structural stability
(Bone graft is not an acceptable answer as history of frequent infections were present)
Amputation as there is history of infections, huge lytic lesion with pathological fracture (unstable)

Description 4

Intraosseous epidermoid inclusion cyst is a rare benign lesion which usually found at skull or distal phalanges. Many studies suggest that the pathophysiology of this condition is either direct implantation of epidermal fragments into bone during trauma or misplacement of epithelial cells into bone during embryogenesis. It is challenging to diagnose this condition from radiographical imaging alone as it mimics other benign conditions like enchondroma, gouty tophus, giant cell tumor and cystic tumours as well as malignant tumours and chronic infections. Biopsy is crucial to obtain definitive diagnosis and treat accordingly. Complete marginal excision has good outcome with low recurrence rate.

References:

- Lincosky CJ, Bush DC: Epidermoid cysts in the Hand. *Journal of Hand Surgery: European* 2009; 34(6): 792-6.
- Wang BY, Eisler J, Springfield D, Klein MJ. Intraosseous epidermoid inclusion cyst in a great toe. A case report and review of the literature. *Arch Pathol Lab Med* 2003; 127: e298-300.

Answer 5

- Spiral or long oblique fracture of right 4th metacarpal
Oblique fracture of right 5th metacarpal
Shortening of both 4th and 5th metacarpals
Possible rotational deformity of both metacarpals
- Spiral or long oblique fracture
- Fracture length is twice the diameter of the bone
- Minimum 2 screws in different direction following a helical disposition
(3 screws more stable)

- Lag screw principle is to achieve interfragmentary compression
 - Oblique fracture
 - Fracture length is less than twice the diameter of the bone
 - 1 lag screw fixed to achieve interfragmentary compression
 - Neutralization plate inserted to prevent sliding during axial load
- c) Early mobilization
(Splint or immobilization are not acceptable as the fixations are stable)

Description 5

Metacarpal shaft fractures as a result of trauma; caused by excessive axial loading, torsional or direct force. Undisplaced fractures can be treated conservatively. However, surgery should be considered in severe angular deformities, rotational deformities, shortenings and pseudoclavings. The choices of fixation depend on the configuration of fractures and surgeon preference. Options are wiring, interfragmentary screw fixation, intramedullary pinning, plate fixation and external fixations. Stable fixations can allow early mobilization and rehabilitation.

References:

1. Henry MH. Fractures of the proximal phalanx and metacarpals in the hand: preferred methods of stabilization. *J Am Acad Orthop Surg.* 2008, 16: 586-95.
2. Diaz-Garcia R, Waljee JF. Current management of metacarpal fractures. *Hand Clin* 2013; 29(4): 507-18.

Answer 6

- a) Flexed right knee
Tip-toeing of left foot
Atrophic left lower limb
- b) Chronic dislocation of left hip joint secondary to developmental hip dysplasia (DDH)
- c) Right hip
 - Reduced lateral centre-edge angle / increased Tonnis angle
 - Features of osteoarthritis (reduced joint space / superior acetabular osteophytes / subchondral cyst)

Left hip

- Dysplastic/ Dislocated femoral head (Crowe IV)/ Shallow acetabulum
- d) Achieving a painless stable hip – right total hip arthroplasty (THR)
- Assessment of native dysplastic acetabulum (avoid overreaming to avoid blow-out)
 - Coverage of acetabular cup – optimize bone contact with acetabular cup to increase stability/ improve osseointegration for cementless cup
 - Identification of true hip centre – avoid high hip centre
 - Achieving adequate femoral version – consider using modular implants
 - Equalizing limb length
 - Improves gait, less risk of overloading adjacent joints
 - A standing long limb axis radiographs (with blocks) can assist in determining the limb length discrepancy.
 - Consider shortening subtrochanteric osteotomy with THR

Description 6

Developmental dysplasia of the hip (DDH) is the most common cause of secondary osteoarthritis of the hip. In neglected or advanced disease, the acetabulum and head of femur are hypoplastic and distorted. Superior migration or dislocation of head of femur is frequently seen. Soft tissues around the hip joint particularly the muscles, sciatic and femoral nerve and profunda femoris artery are shortened. Thus, total hip replacement (THR) in DDH requires complex reconstruction. The outcome is less reliable compared to THR in primary degenerative osteoarthritis.

References:

1. Learmonth ID, Young C, Rorabeck C. The operation of the century: total hip replacement. *Lancet.* 2007; 370: 1508-19.
2. Iida H, Matsusue Y, Kawanabe K, Okumura H, Yamamuro T, Nakamura T (2000) Cemented total hip arthroplasty with acetabular bone graft for developmental dysplasia. Long-term results and survivorship analysis. *J Bone Joint Surg Br* 82: 176-84
3. Papachristou G, Hatzigrigoris P, Panousis K, Plessas S, Sourlas J, Levidiotis C, Chronopoulos E. Total hip arthroplasty for developmental hip dysplasia. *Int Orthop.* 2006; 30: 21-5. doi: 10.1007/s00264-005-0027-1.