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Quiz December 2013

Questions

Q1: Regarding venous thromboembolism in orthopedics which is not true?

- A) Compared to general surgery orthopedic surgery is associated with a higher risk of venous thromboembolism.
- B) Incidence of venographically documented DVT is approximately twice as high with general anesthesia as with subarachnoid blockade.
- C) The **peak incidence** of clinical DVT appears to occur 5–10 days after THA or TKA.
- D) **Therecently updated ACCP guidelines** recommend extending thromboprophylaxis to up to 28–35 days following THA or hip fracture surgery.
- E) Fatal pulmonary embolism is more common after THA than hip fracture surgery.

Q2a: What is the name of this injury?

Q2b: What is the best initial investigation?

- A) Valgus–varus stress X-rays of elbow joint.
- B) CT Scan of elbow joint.
- C) MRI of the elbow joint.
- D) CT scan of elbow joint with 3D reconstruction minus the distal humerus.

Q2c: What is the sequence of structures damaged in such injury?

- A) Medial collateral ligament, radial head, coronoid process, lateral collateral ligament.
- B) Radial head, coronoid process, Medial collateral ligament, lateral collateral ligament.
- C) Coronoid process, lateral collateral ligament Medial collateral ligament, radial head.
- D) Lateral collateral ligament, radial head, coronoid process, medial collateral ligament.
- E) Olecranon process, radial head, coronoid process, lateral collateral ligament.

Q2d: What are the basic principles of treating such an injury?

- A) Repairing medial collateral ligament of elbow is of utmost importance followed by others.
- B) Tenuous fixation/flimsy fixation of bone fragment has no role.
- C) Sequence of repair of soft tissue or bony injury should start from coronoid process, radial head, lateral collateral ligament, medial collateral ligament.
- D) Medial collateral ligament rarely needs to be repaired.
- E) (1) & (3).
- F) (1) & (4).
- G) (2), (3) & (4).
- H) (2) & (3).

Q2e: When should the radial head be replaced instead of fixed in such injuries?

- A) More than 3 articular fragments.
- B) Loss of fragments.
- C) Impaction/deformation of radial head fragments or metaphyseal comminution.
- D) All of the above.

Q2f: What should be the main consideration while doing radial head prosthesis?

- A) Overstuffing should be avoided.
- B) The elbow joint should be tight.
- C) The proximal articular surface of the radial head should protrude >1–2 mm from the lateral edge of the coronoid process.

- D) The proximal articular surface of the radial head should not protrude from the lateral edge of the coronoid process.
- E) (1) & (3).
- F) (1) & (4).
- G) (2) & (3).
- H) (1) & (3).

Q3: A middle aged man met to an RTA and brought to the hospital with C/O of severe back ache and lower limb weakness. Neurological examination revealed incomplete neurological involvement, and a palpable tender gap at DL Junction. CT scan showed D12/L1 fracture dislocation. MRI was suggestive of posterior ligaments disruption. Which of the following is true for this patient?

- A) TLICS score is 8, and he should be managed conservatively.
- B) TLICS score is 9, and he should be managed conservatively.
- C) TLICS score is 8, and he should be managed surgically.
- D) TLICS score is 9, and he should be managed surgically.

Q4: Which of the following is false regarding suprascapular nerve entrapment?

- A) Patient complains of deep, aching, diffuse pain and weakness of external rotation and abduction with overhead activities.
- B) Most commonly compression occurs at suprascapular notch.
- C) Supraspinatus muscle is involved in compression at spinoglenoid notch.
- D) Painless atrophy is more common with compression of nerve at the spinoglenoid notch.

Q5: A young football player collides with other while chasing the ball and sustains an inward thrust at right knee. On examination lateral joint line is tender and knee tap is positive. Posterior drawer and Lachman test is negative. Rotation is symmetrical in both at 90 flexed knee, but exaggerated external rotation at 30 flexed knee on right side. On the basis of this clinical finding which surgical treatment will be appropriate...

- A) ACL reconstruction.
- B) PCL reconstruction.
- C) Posterolateral corner (PLC) Reconstruction.
- D) ACL + PLC reconstruction.
- E) PCL + PLC reconstruction.

Answers

1:E

The formation of DVT is multifactorial as described by Virchow¹ in 1856. Virchow's triad—hypercoagulability,

endothelial injury, and venous stasis—establishes the basis of understanding the pathogenesis of DVT. Hypercoagulability occurs in orthopedics secondary to an activation of clotting factors with a decrease in antithrombin III levels and changes in platelet activity.² Surgery on bone also releases thromboplastins that activate the clotting cascade. Direct endothelial injury to bone marrow vessels occurs *per se* as a result of fractures and from their treatment manoeuvres; and also consequent to intraoperative mechanical factors in other orthopedic operative procedures. Venous stasis in orthopedic surgery occurs with postoperative immobilization, edema, and with the use of a tourniquet during lower-extremity surgery. So, **Compared to general surgery** orthopedic surgery is associated with a higher risk of venous thromboembolism.

The effects of epidural anesthesia have been shown to be beneficial as thromboembolic disease prophylaxis in patients undergoing joint arthroplasty (TJA). The exact mechanism action is controversial, but is likely the result of a sympathetomy effect,³ which increases lower extremity blood flow and decreases venous stasis. Inhibition of platelet and leukocyte adhesion and stimulation of endothelial fibrinolysis during epidural anesthesia have been proposed, but is unclear. The additional hypotension caused by epidural anesthesia reduces blood loss and secondary vasoconstriction. A retrospective review⁴ of patients who underwent THA and TKA found an in-hospital fatal PE rate of 0.12% with general anesthesia compared with 0.02% with epidural anesthesia. Other studies have shown a 40%–50% reduction of overall DVT with regional anesthesia compared with general anesthesia, irrespective of the type of anticoagulant prophylaxis used. Recent evidence has suggested that a combination of continuous epidural anesthesia and postoperative epidural analgesia along with warfarin is more effective for the prevention of DVT than either modality used alone.

Evidence suggests that a systemic diathesis for clotting is activated during THA and TKA; bilateral venograms have revealed a 10%–15% prevalence of DVT in the uninvolved limb following either procedure. Specifically, it has been shown that activation of the clotting cascade occurs during instrumentation of the medullary canal³ during TJA. Activation of the clotting cascade intraoperatively in joint replacement surgery combined with venous stasis secondary to extreme hip positioning in THA or tourniquet use in TKA also contribute to the increased risk of intraoperative thrombosis.

Patients with THA had venographically proven total DVT of 42–57% and Proximal DVT of 18–36%. Patients with TKA had venographically proven total DVT of 41–85% and Proximal DVT of 5–22%. In a 1994 study of 349 patients with multiple injuries and an Injury Severity Score greater than 9, venographic examination showed the following rates of DVT of lower extremity trauma as 66%, pelvic fracture 61%, tibial shaft fracture 77% and femoral shaft fracture 80%. In the multiply injured patients studied, femoral or tibial shaft fracture was associated with a relative risk of DVT nearly 5 times that of the overall group. Pelvic thrombi, which are frequently associated with pelvic fractures, are of particular concern because the risk of embolization is as high as 50% in this patient population.⁶

DVT after fracture about the hip has been reported to occur in 30%–60% of patients. Research indicates a significantly increased risk of thrombosis if surgery for a hip fracture is

delayed for 48 h or longer. In addition, fatal PE has been reported to be more common in hip-fracture patients than in patients who have undergone elective arthroplasty.⁷ Yet no specific consensus or guidelines exist regarding thromboembolic prophylaxis in patients with fractures of the pelvis, spine, or long bones of the extremities.

There has also been controversy as to whether routine chemical prophylaxis against thromboembolic disease is warranted at all, given the low overall rate (approximately 0.5%) of symptomatic or fatal PE following joint arthroplasty without prophylaxis. Multiple studies, however, have reported a threefold-to-fivefold reduction in the prevalence of fatal PE, which has created a consensus to support routine anticoagulation therapy as prophylaxis against VTED in patients undergoing THA or TKA. The current recommendation for prophylaxis in total joint arthroplasty patients is a minimum of 10 days, with extended prophylaxis up to 28–35 days following total hip arthroplasty. Prophylaxis with low-molecular-weight heparins for approximately 4 weeks following hip arthroplasty has resulted in clinically significant reductions in the incidence of venographically confirmed deep vein thrombosis. Currently, no data support extended thromboprophylaxis beyond 10 days following total knee arthroplasty.

The American Academy of Orthopaedic Surgeons Guideline on preventing venous thromboembolic disease in patients undergoing elective hip and knee arthroplasty includes 10 recommendations and 4 additional subcategorized recommendations. One of the 10 recommendations is graded as strong, three as moderate, one as weak, and one as inconclusive. Four recommendations are based on consensus. Some of the important ones are:

1. Recommendation against routine postoperative duplex ultrasonography screening of patients who undergo elective hip or knee arthroplasty.

Recommendation grade: Strong.

4. We suggest that patients discontinue antiplatelet agents (eg, aspirin, clopidogrel) before undergoing elective hip or knee arthroplasty.

Recommendation grade: Moderate.

5. We suggest the use of pharmacologic agents and/or mechanical compressive devices for the prevention of venous thromboembolism in patients undergoing elective hip or knee arthroplasty, and who are not at elevated risk beyond that of the surgery itself for venous thromboembolism or bleeding.

Recommendation grade: Moderate.

Current evidence is unclear about which prophylactic strategy (or strategies) is/are optimal or suboptimal. Therefore, we are unable to recommend for or against specific prophylactics in these patients.

Recommendation grade: Inconclusive

In the absence of reliable evidence about how long to employ these prophylactic strategies, it is the opinion of this work group that patients and physicians discuss the duration of prophylaxis.

Recommendation grade: Consensus.

6. Patients undergoing elective hip or knee arthroplasty, and who have also had a previous venous

thromboembolism, receive pharmacologic prophylaxis and mechanical compressive devices.

Recommendation grade: Consensus

7. Patients undergoing elective hip or knee arthroplasty, and who also have a known bleeding disorder (eg, hemophilia) and/or active liver disease, use mechanical compressive devices for preventing venous thromboembolism.

Recommendation grade: Consensus.

8. In the absence of reliable evidence, it is the opinion of this work group that patients undergo early mobilization following elective hip and knee arthroplasty.

Recommendation grade: Consensus

9. We suggest the use of neuraxial (such as intrathecal, epidural, and spinal) anesthesia for patients undergoing elective hip or knee arthroplasty to help limit blood loss, even though evidence suggests that neuraxial anesthesia does not affect the occurrence of venous thromboembolic disease.

Recommendation grade: Moderate.

10. Current evidence does not provide clear guidance about whether inferior vena cava filters prevent pulmonary embolism in patients undergoing elective hip and knee arthroplasty who also have a contraindication to chemoprophylaxis and/or known residual venous thromboembolic disease. Therefore, we are unable to recommend for or against the use of such filters.

Recommendation grade: Inconclusive.^{8,9}

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American College of Chest Physicians Evidence-based Clinical Practice Guidelines, Ninth Edition. 2012 compliment the afore written AAOS guidelines for Prevention of Venous Thromboembolism in Orthopaedic Surgery.

2.1.1 In patients undergoing THA or TKA we recommend use of one of the following for a minimum of 10 to 14 days rather than no anti-thrombotic prophylaxis: Low Molecular Weight Heparin (LMWH), fondaparinux, apixaban, dabigatran, rivaroxaban, Low Dose Unfractionated Heparin (LDUH), adjusted-dose Vitamin K Antagonist (VKA), aspirin (all grade 1B), or an Intermittent Pneumatic Compression Device (IPCD) (grade 1C).

2.2 For patients undergoing major orthopedic surgery (THA, TKA, HFS) and receiving LMWH as thromboprophylaxis, we recommend starting either 12 h or more preoperatively or 12 h or more postoperatively rather than within 4 h or less preoperatively or 4 h or less postoperatively (grade 1B).

2.3.1 In patients undergoing THA or TKA, irrespective of the concomitant use of an IPCD or length of treatment, we suggest the use of LMWH in preference to the other agents we have recommended as alternatives: fondaparinux, apixaban, dabigatran, rivaroxaban, LDUH (all grade 2B), adjusted-dose VKA, or aspirin (all grade 2C).

2.4 For patients undergoing major orthopedic surgery, we suggest extending thromboprophylaxis in the outpatient period for up to 35 days from the day of surgery rather than for only 10–14 days (grade 2B).

AT THE PRESENT TIME – LMWH, warfarin, fondaparinux, and rivaroxaban are acceptable agents for both total hip and knee arthroplasty patients. Mechanical devices alone can be used for total knee arthroplasty patients. Therefore, the combination of aspirin and a mechanical device is acceptable for total knee arthroplasty patients. If this combination is selected for a total hip arthroplasty patient, one would still have to write in the chart that this regimen has been selected because of concerns regarding bleeding. These 2011 AAOS & 2012 ACCP guidelines will impact the Surgical Care Improvement Project (SCIP) measures to come in 2014, which are based on the ACCP guidelines, because aspirin was not recommended earlier by the ACCP for prophylaxis in total joint arthroplasty patients.

Lieberman JR. American College of Chest Physicians evidence-based guidelines for venous thromboembolic prophylaxis: the guideline wars are over. *J Am Acad Orthop Surg.* 2012 Jun;20(6):333–335. <http://dx.doi.org/10.5435/JAAOS-20-06-333>. PubMed PMID:22661562.

'So sequence of therapy for patient with TJA: LMWH in preference to the other agents as: fondaparinux, apixaban, dabigatran, rivaroxaban, LDUH, adjusted-dose VKA, or aspirin started 12 hrs or more pre or postoperatively with or without compression device for atleast 10–14 days preferably 35 days. Early mobilization of patient to be started after surgery.'

2:TERRIBLE TRIAD OF ELBOW – Radial head fracture, coronoid process fracture, Posterior dislocation of elbow.

2b: D

2c: D
2d: G
2e: D
2f: E

In elbow instability the stabilizing structures usually fail from lateral to medial. From a surgical perspective, preparation is key to success. All components of the injury need to be addressed in a stepwise fashion.^{1,2} All fixation options should be available for use because many of the decisions are made intraoperatively. The lateral and medial aspects of the elbow should be easily accessible during surgery. This can be performed by a posterior-based incision, raising flaps laterally and medially as necessary, or by 2 separate lateral and medial incisions, if necessary. The LCL is far more important than the MCL, the trochlear notch (coronoid and olecranon), radial head, and LCL are repaired or reconstructed, the MCL rarely needs to be repaired. One should start with lateral approach first to determine whether the radial head is fixable. If the radial head is not fixable, perform the radial neck osteotomy and prepare the radial canal for an arthroplasty. Subsequently evaluate the coronoid to determine whether it is fixable from the lateral approach. If it is, work from the inside out. If not, a medial approach should be performed. The coronoid should then be fixed. If the coronoid is too small for plate or screw fixation, perform a lasso technique by passing sutures around the coronoid fragment into the anterior capsule and tying them down through bone tunnels into the olecranon.³ An anterior cruciate ligament guide to assure accuracy in tunnel placement is helpful. Once the coronoid is addressed, fix or replace the radial head. Subsequently, the lateral collateral ligament is repaired through the use of suture anchors or bone tunnels. It is better to incorporate the extensor mass in the lateral collateral ligament repair to

facilitate a more robust repair. After these 3 components are fixed, test the elbow stability. If the elbow is stable, that all needs to be done. If the elbow is still unstable, then perform a medial collateral ligament repair. Again reevaluate elbow stability, and if the elbow is stable, then closure is performed. If the elbow is still unstable, then apply a static external fixator. The postoperative rehabilitation protocol for this complex injury must balance elbow stability and early mobilization. Because immobilization of the elbow more than 4 weeks leads to consistently poor outcomes,⁴ immobilize this patient for no more than 5–7 days. At first follow-up examination, place patient in a hinged elbow brace and allow range of motion from full flexion to 30° of extension in full pronation, full supination, or neutral forearm rotation depending on ligament reconstruction with physical therapy. In addition, allow full supination and pronation with the elbow flexed to 90°. Prescribe indomethacin for 4 weeks for prophylaxis against heterotopic ossification.

3:D

Explanation – Thoracolumbar Spine Trauma Classification, Alpesh A. Patel, MD and Alexander R. Vaccaro, MD, PhD (*J Am Acad Orthop Surg* February 2010 vol. 18 no. 2 63–71).

Thoracolumbar spine trauma is among the most common musculoskeletal injuries worldwide, Thoracolumbar spine trauma is among the most common musculoskeletal injuries worldwide. However, there is little consensus on the adequate management of spine injury, in part because there is no widely accepted classification system. Several systems have been developed based on injury anatomy or inferred mechanisms of action, but they have demonstrated poor reliability, have yielded little prognostic information, and have not been widely used. The Thoracolumbar Injury Classification and Severity Score (TLICS) was developed to address these limitations. The TLICS defines injury based on three clinical characteristics: injury morphology, integrity of the posterior ligamentous complex, and neurologic status of the patient. The severity score offers prognostic information and is helpful in medical decision making. Initial application of the TLICS has shown good to excellent reliability and validity. Additional evaluation of the TLICS is needed to prospectively define its clinical utility and identify potential limitations.

4:C

Explanation – Suprascapular neuropathy.

Romeo et al, 1999–Dec Romeo AA, Rotenberg DD, Bach BR Jr. *J Am Acad Orthop Surg*. 1999 Nov–Dec; 7(6):358–67.

Suprascapular neuropathy is an uncommon cause of shoulder pain and weakness and therefore may be overlooked as an etiologic factor. The suprascapular nerve is vulnerable to compression at the suprascapular notch as well as at the spinoglenoid notch. Other causes of suprascapular neuropathy include traction injury at the level of the transverse scapular ligament or the spinoglenoid ligament and direct trauma to the nerve. Sports involving overhead motion, such as tennis, swimming, and weight lifting, may result in traction injury to the suprascapular nerve, leading to dysfunction. The diagnosis of suprascapular neuropathy is based on clinical

findings and abnormal electrodiagnostic test results, after the exclusion of other causes of shoulder pain and weakness. Magnetic resonance imaging may provide an anatomic demonstration of nerve entrapment and muscle atrophy. With this modality, ganglion cysts are recognized with increasing frequency as a source of external compression of the suprascapular nerve. Without evidence of a discrete lesion compressing the nerve, nonoperative treatment should include physical therapy and avoidance of precipitating activities. When nonoperative treatment fails to alleviate symptoms or when a discrete lesion such as a ganglion cyst is present, surgical decompression is warranted. Decompression gives reliable pain relief, but recovery of shoulder function and restoration of atrophied muscle tissue may be incomplete.

5:C

Explanation – Acute and Chronic Management of Posterolateral Corner Injuries of the Knee. Eric T. Ricchetti, MD; Brian J. Sennett, MD; G. Russell Huffman, MD, MPH. *Orthopedics*, May 2008 – Volume 31 Issue 5.

Isolated injury to the PLC of the knee is rare. More commonly seen is injury to the PLC combined with other ligamentous and bony knee injuries, such as ACL and PCL tears and tibial plateau fractures. Prompt recognition and treatment of PLC injuries is important as failure to do so can compromise the success of PLC repair or reconstruction, as well as the success of associated ACL or PCL reconstructions. Clinical management of the PLC is dictated by the severity of injury and timing of diagnosis. A general treatment algorithm can be followed based on grade of injury, but individualized treatment is necessary for each patient and must be based on an understanding of the biomechanics of the injury and of surgical principles.

Conflicts of interest

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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