Section 1. Multiple Choice Questions for Wide Awake Surgery (from Dr Donald Lalonde)

1. A 30 year old carpenter suffers a finger fracture that you treat with closed K wire fixation with a WALANT bupivacaine block on a Monday morning. He wakes up Monday night with pain in his finger, but it is still numb. He goes to the emergency department because he is worried about this. Which of the following is the most appropriate explanation of this problem for you to give to the emergency department physician who calls you for advice?

a) he most likely just has perceived pain, not real pain
b) numbness to pain wears off 15 hours, to touch at 30 hours with bupivacaine
c) most likely perceived numbness, because the feeling of touch should return with pain
d) the pain is likely caused by injury to the nerve fascicles during the nerve block

Right answer b) numbness to pain wears off 15 hours, to touch at 30 hours

Discussion There is level 1 evidence in humans that numbness to touch lasts twice as long (30 hours) as numbness to pain (15 hours) with digital blocks. Patients who get bupivacaine or ropivacaine blocks should be warned that numbness to touch will last much longer than numbness to pain. Some patients will burn their fingers in hot water "trying to get feeling back" with the prolonged numbness to touch with bupivacaine or ropivacaine.

References

Calder K, Chung B, O'Brien C, Lalonde DH. Bupivacaine digital blocks: how long is the pain relief and temperature elevation? Plast Reconstr Surg. 2013;131(5):1098-1104.

2. An emergentologists in the emergency room is about to give lidocaine slowly intravenously to manage pain in a 70 kg 30 year old man with multiple extremity trauma. 70 kg man with acute severe pain in the emergency department. What is the accepted highest total dose that he can give safely?

a) 5 mg
b) 50 mg
c) 100 mg
d) 150 mg

Right answer c) 100 mg

Discussion: Emergentologists inject lidocaine in 100 mg slow intravenous boluses to treat various pain conditions (Tanen). Anesthesiologists inject 1 mg/kg of lidocaine intravenously for pain control in postoperative patients (Barreveld). This is why small amounts of lidocaine possibly injected intravenously with WALANT antegrade injection of lidocaine in a slowly advancing are not likely to be harmful to patients.

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Barreveld A, Witte J, Chahal H, Durieux ME, Strichartz G. Preventive analgesia by local anesthetics: the reduction of postoperative pain by peripheral nerve blocks and intravenous drugs. *Anesth Analg*. 2013;116(5):1141-1161.

3. Which of the following statements best describes the true incidence of anaphylaxis to lidocaine in the world literature?

a) extremely rare if it actually does exist
b) common enough that all patients who say they are allergic should never get lidocaine
c) positive skin testing of lidocaine allergy clearly means anaphylaxis is likely
d) 1.0 % of the world's population

Answer a) extremely rare if it actually does exist

Discussion

A PubMed search for lidocaine anaphylaxis for the last 20 years reveals an average of one case report per year. Nine such of these reports are referenced below for the reader to study (ref 1-9). The reader will see that most have incomplete details or confounding variables such as other medications or medical problems. These reports are extremely rare when you consider the billions of lidocaine doses administered in dental offices in the world in six and a half decades since the introduction of lidocaine in 1948. If life threatening anaphylaxis to lidocaine actually does exist, it is likely to be extremely rare (Specjalski). Although there are many reports of lidocaine "skin test allergy" in patients, many patients who test positive can be safely given lidocaine (ref 11).

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11) Corbo MD, Weber E, DeKoven J. Lidocaine Allergy: Do Positive Patch Results Restrict Future Use? *Dermatitis*. Mar-Apr 2016;27(2):68-71. doi:10.1097/der.0000000000000171

4. Which of the following time periods is closest to the half life of epinephrine in plasma?

a) 15 seconds
b) 1.7 minutes
c) 3.4 minutes
d) 7.0 minutes

Answer b) 1.7 minutes

Discussion Catecho-o-methyl transferase and monoamine oxidase rapidly break down epinephrine in plasma (Kopin) so that its half-life inside blood vessels is only 1.7 minutes (Rosen). However, extravascular epinephrine degradation is slower. The molecules must first get into blood vessels by diffusion into the lymphatics and then up the forearm and into veins to get degraded. You can frequently see white peri lymphatic arteriolar vasoconstriction tracks in the forearm (see image below) when you inject epinephrine into the hand. It takes time for that epinephrine to work its way into the vascular system. That is why the adrenaline rush feeling can last for up to 20 to 30 minutes after an injection of local anesthetic (Greene).

At least 3% of patients can feel an epinephrine ″rush,″ ″jitter, ″ ″shakiness, ″ ″nervousness″ or a feeling ″like you have had too much coffee″

Forewarned is forearmed. We warn all of our patients that they may get this rushy feeling after we inject them. We tell them that this is not an allergy; it is a normal reaction to the epinephrine we have injected with the lidocaine, and the sensation will go away in 20 to 30 minutes.

References

1) Kopin IJ. Monoamine oxidase and catecholamine metabolism. J Neural Transm 41:57, 1994.
2) Rosen SG, Linares OA, Sanfield J, Zech LA, Lizzio VP, Halter JB. Epinephrine kinetics in humans: radiotracer methodology. J Clin Endocrinol Metab 69:753, 1989.
3) Greene BHC, Lalonde DH, Seal SKF. Incidence of the "Adrenaline Rush" and Vasovagal Response with Local Anesthetic Injection. Plast Reconstr Surg Glob Open. 2021 Jun

5. Which of the following is the generally accepted maximum dosage of extravascular subcutaneous epinephrine in milligrams that you can safely inject with lidocaine in a 71 kg patient?

a) 0.025 mg
b) 0.05 mg
c) 0.25 mg
d) 0.5 mg

Correct Answer d) 0.5 mg

Discussion If you use the generally accepted dosage of 7mg per kg of lidocaine with epinephrine, that would be 50 ml of 1% lidocaine with 1:100,000 epinephrine in a 71kg patient. That would contain 500 mg of lidocaine and 0.5 mg of epinephrine. One ml of 1:1,000 pure epinephrine contains 1mg of epinephrine. One half of that is 0.5 ml which contains 0.5 mg of epinephrine. EpiPen® auto injectors are designed to deliver a single dose (0.3 ml) of 0.3 mg adrenaline when activated.

It is still generally accepted that we should use 7mg per kg of lidocaine with epinephrine. That is the number that was determined in 1948 when lidocaine first became available. Since then, multiple studies have shown that we can safely use much higher doses than that However much higher doses of 20 to 35mg/kg have been reported in patients undergoing liposuction and facelift procedures with measured safe blood levels of lidocaine (Klein, Ramon Burke)

Low dose epinephrine is actually cardiac muscle protective when injected directly into coronary arteries (Jafari, Tantawy)

References

Klein JA, Jeske DR. Estimated Maximal Safe Dosages of Tumescent Lidocaine. Anesth Analg. May 2016;122(5):1350-9. doi:10.1213/ane.0000000000001119

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Tantawy M, Selim G, Saad M, Tamara M, Mosaad S. Outcomes with intracoronary versus intravenous epinephrine in cardiac arrest. Eur Heart J Qual Care Clin Outcomes. 2023 Feb 15:qcad013. doi: 10.1093/ehjqcco/qcad013. Epub ahead of print. PMID: 36792065.

6. You have run out of premixed lidocaine with epinephrine. All you have available is 1% lidocaine without epinephrine. You would like to make 1% lidocaine with 1:100,000 epinephrine. How much volume of a one milliliter vial of 1:1,000 epinephrine should you add to 10 ml of 1% lidocaine to get make a solution of 1% lidocaine with 1:100,000 epinephrine?

a) 0.001 ml
b) 0.01 ml
c) 0.1 ml
b) 1.0 ml

Correct answer c) 0.1 ml

Discussion You should add 0.1 ml of a one milliliter vial of 1:1,000 epinephrine to 10 ml of 1% lidocaine to get make a solution of 1% lidocaine with 1:100,000 epinephrine.

It is still generally accepted that we should use 7mg per kg of lidocaine with epinephrine. That is the number that was determined in 1948 when lidocaine first became available. Since then, multiple studies have shown that we can safely use much higher doses than that However much higher doses of 20 to 35mg/kg have been reported in patients undergoing liposuction and facelift procedures with measured safe blood levels of lidocaine (Klein, Ramon Burke)

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7. You inject 20 ml of 1% lidocaine with 1:100,000 epinephrine in a 65 year old man's hand and finger to perform Dupuytren's surgery. When you check on him fifteen minutes later, he tells you that he feels "shaky" and that he feels his heart racing. After examining him, you reassure him that this is a normal reaction to adrenaline. Your medical student wants to know how this can happen as a delayed reaction because he has read that the intravascular half life of epinephrine is 1.7 minutes. Which of the following is your best explanation to the student?

a) he was likely misinformed by what he read on the internet
b) this patient's symptoms are not likely being caused by epinephrine
c) this patient is lacking the enzymes that normally degrade the epinephrine
d) it takes time for the adrenaline to get into the blood to be broken down

Correct answer d) it takes time for the adrenaline to get into the blood to be broken down

Discussion Catecho-o-methyl transferase and monoamine oxidase rapidly break down epinephrine in plasma (Kopin) so that its half-life inside blood vessels is only 1.7 minutes (Rosen). However, extravascular epinephrine degradation is slower. The molecules must first get into blood vessels by diffusion into the lymphatics and then up the forearm and into veins to get degraded. You can frequently see white peri lymphatic arteriolar vasoconstriction tracks in the forearm (see image below) when you inject epinephrine into the hand. It takes time for that epinephrine to work its way into the vascular system. That is why the adrenaline rush feeling can last for up to 30 minutes or more after an injection of local anesthetic (Greene).

At least 3% of patients can feel an epinephrine ″rush,″ ″jitter, ″ ″shakiness, ″ ″nervousness″ or a feeling ″like you have had too much coffee″ Forewarned is forearmed. We warn all of our patients that they may get this rushy feeling after we inject them. We tell them that this is not an allergy; it is a normal reaction to the epinephrine we have injected with the lidocaine, and the sensation will go away in 20 to 30 minutes.

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Section 2. Multiple Choice Questions for Flexor Tendon Surgery (from Dr Donald Lalonde)

1. A 30-year-old carpenter suffers a glass laceration of his index flexor tendons and digital nerves in zone 2. Which of the following describes the most appropriate post operative movement regime to produce the best total outcome of movement and sensation?

A. Immobilization for 4 weeks followed by protected movement
B. Up to half a fist of true active movement beginning at 4 days post op
C. Full fist place and hold regime starting at 4 days post op
D. Kleinert active extension rubber band flexion 4 days post op

Correct answer: B

Discussion: Casting for 3 to 4 weeks has been the accepted protocol after primary repair of digital nerve lacerations. In contrast, combined digital nerve and flexor tendon repairs are rehabilitated with immediate postsurgical range of motion. A retrospective cohort study (2005) by Yu showed that the outcome of sensation after digital nerve repair was the same in patients who had isolated digital nerve injuries and were immobilized for 3 weeks vs. those who had concomitant flexor tendon repairs and were immobilized only 4 days **(**Level III Evidence**)** (1).
They concluded that their data challenge the long-held belief that digital nerve repairs should be completely immobilized after surgery.

Early protected movement beginning after the risk of internal bleeding is reduced but before collagen formation begins in earnest (2-4 days post op) will produce better movement outcomes.

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6.Higgins A, Lalonde DH. Flexor Tendon Repair Postoperative Rehabilitation: The Saint John Protocol. Plast Reconstr Surg Glob Open. 2016 Nov 23;4(11):e1134. eCollection 2016 Nov.

2. You are discussing with a medical student the ideal length of suture purchase you would like to obtain as you repair a zone 5 flexor tendon with her. Which of the following suture purchase lengths has been shown to be optimal in experimental studies?

A 5mm
B 10mm
C 15mm
D 20mm

Correct answer: B

Discussion: There is experimental evidence by Cao that longer core suture purchase length (1cm) is superior to shorter purchase length (0.4cm) (1). Tang has shown that the optimal suture purchase length for a core tendon suture is 0.7-1.0 cm (2). There is no high level clinical evidence to support this.

References:

1. Cao Y, Zhu B, Xie RG, et al. Influence of core suture purchase length on strength of four-strand tendon repairs J Hand Surg Am. 2006;31:107-112.
2. Tang JB, Zhang Y, Cao Y, et al. Core suture purchase affects strength of tendon repairs. J Hand Surg Am. 2005;30:1262-1266.

For more information on the evidence discussed above, please refer to the MOC paper: Lalonde D. An evidence-based approach to flexor tendon laceration repair. *Plast. Reconst. Surg.* 2011;127:885-890.

3. You are have been asked to repair a zone 2 flexor tendon injury in an obese patient with multiple comorbidities including a history of DVT, pulmonary embolism, diabetes and renal impairment. Which of the following forms of anesthesia for this tendon repair is most likely to result in the lowest complication rate for this patient?

A Bier block with sedation
B General anesthesia
C Ultrasound guided axillary block
D Local lidocaine and epinephrine

Correct answer: D

Discussion: Both Bier blocks and axillary blocks run a risk of the requirement to convert to general anesthesia. Clearly, general anesthesia in this case has a significant risk of complications. In addition, the use of the tourniquet in the obese patient is not always reliable either for Bier blocks or for hemostasis. The use of pure lidocaine and epinephrine (wide awake approach) for hemostasis and anesthesia totally negates all the problems associated with sedation and general anesthesia **(Level IV Evidence)** (1, 2).

References:

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For more information on the evidence discussed above, please refer to the MOC paper: Lalonde D. An evidence-based approach to flexor tendon laceration repair. *Plast. Reconst. Surg.* 2011;127:885-890.

4. You are repairing a Zone 2 flexor tendon with a sharp laceration in the center of the A2 pulley. Which of the following is the best way to manage the pulley during the repair?

A. leave the pulley intact, fish out the tendon ends, repair and drop back into the pulley
B. vent the entire A2 pulley
C. vent as much pulley as you need to allow the slightly bulky multistrand repair to glide freely from unvented pulley in full fist flexion testing to unvented pulley in full extension testing
D. vent less than 1cm of pulley, make a slim repair, and hope that the repair will fit in the pulley after the patient is healed

The correct answer is c) vent as much pulley as you need to allow the slightly bulky multistrand repair to glide freely from unvented pulley in full fist flexion testing to unvented pulley in full extension testing.

Discussion

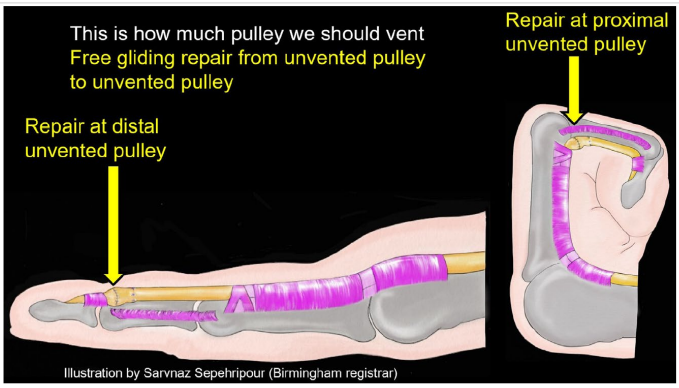

Fig. 1. Full fist active flexion and extension at WALANT surgery determines how much pulley we need to vent. The slightly bulky repair needs to glide freely from distal unvented pulley to proximal unvented pulley with active patient flexion and extension during the surgery. (*Courtesy of* Sarvnaz Sepehripour, MD, Birmingham, England.)

Moriya has shown that the entire A2 pulley can be vented without clinically significant bowstringing. The main thing is to vent only as much as you need to in order to see unimpeded repair gliding from unvented pulley to unvented pulley in the wide awake patient see video
https://www.mediafire.com/file_premium/x08ubcp2mu5a93w/A1_%252B_proximal_half_A2_pulley_vented_no_clinically_significant_bowstringing.mp4/file

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Section 2. Multiple Choice Questions for Finger Fractures (from Dr Donald Lalonde)

1. A 60 year old woman fractures her small finger proximal phalanx on a big dog leash. You insert two crossed K wires under local anesthesia and demonstrate fracture stability with your fixation in a full range of flexion and extension during the surgery. Which of the following post operative mobilization regimens is most likely to generate the least amount of stiffness in this finger?

a) 4 weeks of immobilization, K wire removal and aggressive hand therapy
b) 4 days of elevation followed by early protected pain guided movement
c) 6 weeks of immobilization with K wire removal at 4 weeks
d) 2 weeks of immobilization, K wire removal, 1 more week of immobilization

Correct answer: b) 4 days of elevation followed by early protected pain guided movement

Discussion: To avoid stiffness, early protected movement with pain guided therapy is just as important in K wired fingers as it is in flexor tendon repairs. Patients are not likely to lose their fixation or get K wire infections if they don't do what hurts and are off pain killers. 3-5 days of elevation and immobilization give time for the swelling to come down and for patients to get off pain killers to start early protected movement with a hand therapist. Seeing a full range of flexion and extension of the finger with stable fracture fixation under fluoroscopy during WALANT K wire insertion gives the surgeon the confidence to start early protected movement before collagen formation gets underway seriously at 3 days after injury.

References
1) Lalonde D, Ayhan E, Ahmad AA, Koehler S. Important updates of finger fractures, entrapment neuropathies and wide-awake surgery of the upper extremity. J Hand Surg Eur Vol. 2022 Jan;47(1):24-30.
2) Gregory S, Lalonde DH, Fung Leung LT. Minimally invasive finger fracture management: wide-awake closed reduction, K-wire fixation, and early protected movement. Hand Clin. 2014 Feb;30(1):7-15.

3) Lalonde DH. Pain guided healing: Something we should all know about. Plast Reconstr Surg. Glob Open: 2022; (4) 25;10(4):4192e.
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2. You are going to start early protected movement 4 days after K wiring a proximal phalanx spiral shaft fracture in a 30 year old accountant. Which of the following is the best advice that you can give him about pain management while he is exercising?

a. get off all pain killers if possible and don't do what hurts while exercising
b. take pain medicine 30 minutes before exercise
c. move the finger up to half a fist even if it hurts
d. take scheduled pain medicine till 7 days after surgery

Correct answer a. get off all pain killers if possible and don't do what hurts while exercising

Discussion: To avoid stiffness, early protected movement with pain guided therapy is just as important in K wired fingers as it is in flexor tendon repairs. Patients are not likely to lose their fixation or get K wire infections if they don't do what hurts and are off pain killers. 3-5 days of elevation and immobilization give time for the swelling to come down and for patients to get off pain killers to start early protected movement with a hand therapist. Seeing a full range of flexion and extension of the finger with stable fracture fixation under fluoroscopy during WALANT K wire insertion gives the surgeon the confidence to start early protected movement before collagen formation gets underway seriously at 3 days after injury.

References

1) Lalonde DH. Pain guided healing: Something we should all know about. Plast Reconstr Surg. Glob Open: 2022; (4) 25;10(4):4192e.
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3) Gregory S, Lalonde DH, Fung Leung LT. Minimally invasive finger fracture management: wide-awake closed reduction, K-wire fixation, and early protected movement. Hand Clin. 2014 Feb;30(1):7-15.

3. You are going to K wire a proximal phalanx fracture without having to cut the skin in an injured finger with intact skin. Which of the following is the most appropriate location and level of sterility with which to perform your procedure to keep your infection rate and resource utilization optimal?

a) the main operating room (theater) with full sterility
b) the main operating room (theater) with field sterility
c) a minor procedure room with full main operating room sterility
d) a minor procedure room with field sterility

Correct answer: d) a minor procedure room with field sterility

Discussion

The evidence shows that there is no significant difference in infection rates between the main operating room full sterility K wire insertion and minor procedure room field sterility infection. The resources for all the unnecessary draping and extra nursing generated by the main operating room are not evidence based.

Figure 1 field sterility for K wire insertion has the same infection rate as main OR full sterility

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Section 2. Multiple Choice Questions for Basal Joint Arthritis (from Dr Donald Lalonde)

1. Which of the following two ligaments are considered the main stabilizers of the thumb carpometacarpal joint?

A The deep anterior oblique and the posterior oblique.
B The superficial anterior oblique and deep anterior oblique.
C The dorsoradial and deep anterior oblique.
D The ulnar collateral and dorsoradial.

The correct answer is c. The dorsoradial ligament and deep anterior oblique ligament

Discussion: Bettinger et al identified 16 ligaments contributing to the stability of the thumb CMC joint with the dorsoradial and deep anterior oblique ligaments being of primary importance. 37 hands from fresh frozen cadavers were used in the dissection. Radiographs were obtained prior to confirm the absence of advanced basal joint OA. The authors also noted the deep anterior oblique ligament may also function as a pivot for the first metacarpal during palmar abduction and allow rotation (pronation). Although the remaining ligaments are all stabilizers of the thumb CMC joint their role appears secondary, many act as tension bands preventing instability from cantilever bending forces on the trapezium [1]. Eaton and Littler prior to more advanced anatomic studies identified the anterior oblique (beak) ligament as the primary stabilizer of the basal thumb joint. The ligamentous attachment is on the palmar beak of the ulnar thumb metacarpal. The ligament lies intracapsular and originates from the palmar aspect of the trapezium [2].

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2. Which of the following non surgical treatments has been shown to provide the most benefit of pain relief in patients with advanced thumb carpometacarpal osteoarthritis?

A Intra-articular steroid
B Oral Hylan
C Heat application
D Splint application

The correct answer is a. Intra-articular steroid

Discussion: Conceptually steroids work by diminishing inflammation within the joint and surrounding tissues. The majority of supportive evidence comes from rheumatologic literature. One prospective case series of 25 patients presenting to a community rheumatology clinic with thumb CMC OA were injected with 0.25 ml of methylprednisolone acetate and followed for one year. A significant improvement in the visual analog scale for pain was noted at one month but not at 3,6, or 12. Five of the 25 patients were still pain free at 12 months post-injection.

Only 2 minor side effects were reported [3]. Another prospective review of 41 patients underwent fluoroscopically guided corticosteroid injection by one plastic surgeon. 76% of patients reported pain relieved for an average duration of four weeks [4].

Hylan (Synvisc) is an elastoviscous high molecular weight fluid containing hylan A and hylan B polymers produced from chicken combs. Hylans are derivatives of hyaluronan (sodium hyaluronate). Hyaluronan is a long-chain polymer containing repeating disaccharide units of Na-glucuronate-N-acetylglucosamine. These agents are administered by intraarticular injection and not given orally. Although patients report excellent relief of symptoms from heat application there is no good scientific evidence of its benefit. Splint application is also an excellent adjunctive conservative measure for thumb CMC OA. The literature, however, supports its use in early Stage I disease combined with corticosteroid injection [5].

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3. The xray below most closely demonstrates which of the 4 Eaton stages of thumb carpometacarpal osteoarthritis?

A Stage I
B Stage II
C Stage III
D Stage IV

The correct answer is c. Stage III

Discussion: The original radiographic classification of thumb CMC OA by Eaton is still widely used today [2]. Stage III disease refers to narrowing of the thumb CMC joint with significant sclerosis, subchondral cysts, and debris or osteophytes >2mm in diameter. This xray demonstrates classic joint collapse and dorsal-radial migration of the base of the MC. Sclerosis is evident along the distal trapezial border and small cystic changes are noted in the MC base. A large osteophyte in excess of 2mm is present at the radial joint corner which separates this from Stage II disease. The scapho-trapezial joint appears preserved which delineates this further from Stage IV disease. Combination views including a Bett's/Gedda's view (postero-anterior in pronation and flexion) may also increase reliability of staging [6].

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4. The differential diagnosis of pain at the base of the thumb includes several common hand conditions. Which of the following coexisting diagnoses has been demonstrated in up to 43% of patients with thumb CMC OA?

a. De Quervain's Tenosynovitis
b. Carpal Tunnel Syndrome
c. Trigger Finger
d. Volar Wrist Ganglion

The correct answer is b. Carpal Tunnel Syndrome

Discussion: The physical exam should be a comprehensive motor and sensory exam with evaluation of all joints. Several co-existing conditions may be present and a complete evaluation will identify them. Evaluation for carpal tunnel syndrome should be routine as it has been shown to be present in up to 43% of patients with first CMC disease [7]. The authors reviewed 246 patients who had surgery of the thumb basal joint. 39% of those had chart documentation of CTS. An additional 11 patients were contacted and described symptoms which were confirmed by nerve conduction studies. Prevalence was higher in worker's compensation and diabetes cases.

De Quervain's tenosynovitis, triggering of digits, and other local pathologies such as ganglions can also be co-existent; however their actual prevalence has not been reported. Careful clinical examination for these entities will distinguish them from thumb CMC OA [8].

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5. A 55 year old female presents with worsening pain at the base of her thumb for 1 year duration. She has not previously sought care for her condition. Her X-ray reveals Eaton Stage III carpometacarpal osteoarthritis. Which of the following treatment options would be considered the most appropriate initial management?

a. Weilby Suspension Arthroplasty.
b. anti-inflammatories, a splint, and heat.
c. Sinvisc injection.
d. Trapezial resection and palmaris longus interposition.

The correct answer is b.

Discussion: Although post-mortem and radiographic studies demonstrate OA at the thumb CMC joint in a large percentage of the population, the incidence of symptomatic disease is much lower. Furthermore, radiographic staging does not seem to correlate with symptomatology [9-11]. Patients with minimal joint space narrowing may have disabling pain. Similarly, it is not uncommon to have pantrapezial destruction on X-ray found incidentally in asymptomatic patients. Thus, initial conservative care is fairly universally recommended [12, 13]. Berggren et al randomized 33 patients awaiting thumb CMC joint surgery to receive therapy, splints and other devices for a 7 month period. 70% of patients declined surgical intervention following because of improvement in symptoms.

Answer “a” and “d” represent surgical options. Although both are considered reliable surgeries, they would not be considered a first line of treatment for a patient initially presenting with thumb CMC symptoms, regardless of staging, who has not considered conservative management. Sinvisc has been reported fairly extensively in the orthopedic literature for injection of large joints. Reports on small joint use in the hand thus far have been limited to small pilot studies. Evidence for its use is not as strong as corticosteroid injection. It may be beneficial but commencing care with splinting, heat and anti-inflammatories tends to be a more comprehensive and common-place approach.

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6. A 50 year old male presents with a 3 year history of significant pain at the first CMC joint. His xray reveals Eaton Stage II OA. He has been utilizing a night splint, heat therapy, and has received 2 prior corticosteroid injections relieving symptoms for approximately 2-3 months duration. Which of the following treatments is the most appropriate next step in his care?

a. Cast immobilization for 6 weeks.
b. Placement of an Artelon spacer.
c. A third corticosteroid injection.
d. A thumb CMC arthrodesis.

The correct answer is d.

Discussion: The patient in question seems to have failed conservative care of his symptomatic thumb CMC disease. Cast immobilization would not correct underlying pathology as has not been reported as a successful treatment modality. Failure to improve symptoms beyond 2-3 months with repeated prior steroid injections does not warrant repeated attempts at them. Several soft tissue interposition surgeries have demonstrated good outcome reports. However, Artelon (polyurethane) has demonstrated foreign body reaction and wear debris and would not be considered a reliable surgical option in a high demand male thumb [14-17].

Thumb CMC arthrodesis has been advocated for high demand, younger or male patients [18, 19] and would be a reasonable surgical option in this patient. This procedure is limited to clinical stages in which the STT joint is not involved which would be the situation here with Stage II OA. Pain relief is thought to be routine [20] and outcomes have been considered comparable to ligament reconstruction [21, 22].

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7. A 60 year old female undergoes open debridement of the thumb CMC joint involving the distal portion of the trapezium and surrounding osteophytes through a volar approach. Ligament reconstruction is then performed with the FCR tendon. The patient is immobilized for 5 weeks post-operatively and then commences therapy. Four weeks into her therapy, she returns complaining of pain in the dorsoradial wrist. What is the most likely explanation for her pain and failure of care?

a. Collapse or proximal migration of the thumb MC.
b. Post-operative wound infection.
c. Complex regional pain syndrome.
d. Unrecognized Stage IV disease

The correct answer is d.

Discussion: The majority of popularized surgical options for the treatment of thumb CMC OA demonstrate reliable outcomes. In fact, several systematic reviews have failed to illustrate superior outcomes of particular techniques. This patient was treated with trapezial debridement at the CMC joint but without trapeziectomy. Therefore, proximal migration of the MC is a less likely complication [23, 24]. This would be a much delayed presentation for a post-operative wound infection and would be accompanied likely by other symptomatology such as swelling, drainage or fever. Similarly, complex regional pain syndrome, although possible within this time frame, usually presents at 6-12 weeks with diffuse edema and often sympathetic/vascular type findings.

A CMC debridement and ligament reconstruction is a valuable option for care of early stage disease (I-III) [25-27]. However, there is no documentation of the disease stage in the patient in question. One of the main considerations for failure of these reliable techniques is simply inappropriate use of the surgical procedure. Critical to patient evaluation and ultimately treatment is identifying the presence of OA involvement of the “basal joint” representative of the five pan-trapezial articulations. Failure to address this both clinically and radiographically can lead to incorrect surgical management [28, 29].

References:

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8. Which of the following interposition materials has led to the development of foreign body reaction and wear debris?

a. Pyrocarbon hemiarthroplasty
b. Acellular dermal allograft
c. Artelon (polyurethane)
d. Autogenous costochondral cartilage

The correct answer is c.

Discussion: In an effort to reduce donor site morbidity and complications cited with used of tendon grafts [30], surgical alternatives for interposition materials have been sought. Artelon (polyurethane) has demonstrated foreign body reaction and wear debris and would not be considered a reliable surgical option in a high demand male thumb [14-17].

Recently, preliminary results of pyrocarbon hemiarthroplasty have been reported. Although the results did show some evidence of complications related to subluxations no reports of implant wear debris have been reported [31]. The use of Acellular Dermal Allograft was reported in 100 thumbs. Outcomes were similar to other surgical series and no evidence of soft tissue adverse reactivity was reported [32]. Trumble et al utilized allograft costochondral interposition graft after hemiresection of the trapezium and FCR ligament reconstruction [33]. They demonstrated only one patient with a fractured allograft following a trauma but again no evidence of foreign body reaction.

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9. Which of the following surgical techniques have been associated with persistent hardware pain and progression of OA changes at adjacent joints?

a. Thumb CMC arthrodesis
b. Weilby Suspension Arthroplasty
c. Trapeziectomy with K wire placement
d. Ligament reconstruction with interference screw

The correct answer is a.

Discussion: Reasonable outcomes have been reported following thumb CMC arthrodesis and it remains an option in the management of Stage I-III disease [18, 19]. However, pain from hardware can be problematic [34]. Furthermore, loss of motion and abnormal wear at adjacent joints has been reported [35, 36].

Weilby suspension arthroplasty does not routinely involve the use of hardware. The other two noted surgical options do utilize hardware. K wires tend to be used for short term post-operatively to maintain the trapezial-scaphoid interval during healing [37-39]but are removed prior to therapy. Utilizing the FCR tendon passed through a drill hole in the base of the MC from volar to dorsal and securing it with an interference screw has showed promising results. Excellent clinical outcomes with no revisions and no hardware complications were noted [40].

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