INJECTABLE MEDICATIONS IN PRIMARY CARE OPTOMETRY
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I. BASICS
   A. Indications
   B. Needles
      • Hypodermic
      • Intravenous
   C. Syringes
   D. Needle Safety
   E. Instrumentation
   F. Medications
   G. Type of Injections
      • Intradermal
         - least used
         - TB skin test, allergy tests
         - 30-45 minutes
      • Subcutaneous
         - insulin, epinephrine, narcotics
         - 30 minutes
      • Intramuscular
         - for larger volumes
         - quicker absorption (10-15 minutes)
         - less irritation
      • Intravenous
         - largest volume
         - quickest route

II. LOCAL INFILTRATIVE INJECTION (SUBCUTANEOUS EYELID INJECTION)
   A. Purpose: to deliver local anesthesia prior to various procedures
      • cyst removal or drainage
      • incision and curettage of chalazion
      • sutures
      • papilloma removal
      • punctoplasty (laser or thermal cautery)
      • argon laser treatment of trichiasis
   B. Medication
      • lidocaine 1 or 2% (± 1:100,000 epinephrine)
   C. Contraindications
      • known hypersensitivity to amide anesthetics
      • sites with active infection, bony prominences, large nerves
   D. Equipment
      • 27-30 gauge needle with 1 cc syringe, ½"
E. Technique

• obtain written, informed consent
• wash hands and don gloves
• clean area first with alcohol or betadine swab allowing skin to dry
• if utilizing a Jaeger plate, instill one drop of 0.5% proparacaine then insert plate
• position bevel up
• pull skin taut and insert needle using a gentle stabbing motion with the angle at about 15 degrees relative to skin surface
• pull out stopper of syringe to ensure no intravascular penetration
• inject approximately 0.2 – 0.3 cc
  - simultaneously depress plunger and begin slowly withdrawing needle while moving it side to side (infiltrative)
• if injection follows a line instead of diffuse filling – stop!
  - may have hit a small vessel
  - can cause cardiac arrhythmia
  - watch patient for 5-10 minutes checking heart rate, if ok, restick, and inject
• two to three sites may be needed to provide adequate anesthesia
• apply moderate pressure with gauze to allow diffusion of the local anesthesia
• place the used needle and syringe in a puncture-resistance container (do NOT recap)
• after waiting for 5 minutes, use tissue forceps to gently determine area of anesthesia

III. INTRALESIONAL INJECTIONS

A. Indications

• Chalazion management
• Strawberry nevus (capillary hemangioma)

B. Contraindications

• Known hypersensitivity
• Caution with darkly pigmented patients
• Rule out sebaceous cell carcinoma

C. Potential Complications

• skin depigmentation
• bruising
• ptosis
• subcutaneous abscess
• CRAO

D. Evaluating Chalazion

• How big?
• How long has it been present?
• Anterior or posterior to the tarsal plate?

E. Equipment
• 25-27 gauge needle with 1 cc syringe, ½”
• chalazion clamp or Jaeger plate
• gauze

F. Medication
• triamcinolone acetonide suspension 10 or 40 mg/mL (Kenalog™-10 or Kenalog™-40)
• dexamethasone

G. Technique and Comments
• Obtain written informed consent
• Wash hands and don gloves
• 25-27 gauge, ½” needle with 1 cc syringe
• Instill topical 0.5% proparacaine OU
• Clean area with alcohol
• Recommend chalazion clamp for support, isolation, protection and comfort
  - Alternatively, a Jaeger plate may be used
• Place clamp on securely
• Position bevel up
• If using clamp, insert needle straight ahead at apex of lesion
• If not using clamp, insert at approximately at 45 degree angle
• Push hard – you will feel it give as you enter the lesion
• Push in until you have gone full thickness
• Aspirate to ensure no intravascular penetration
• Inject as much as possible (usually 0.1 – 0.3 cc)
  - back needle out a little and inject some more
  - repeat this process until completely out of lesion
• May repeat process at a different angle
• May also place steroid around lesion, but this may cause blanching of pigment. If this occurs, skin usually returns to normal in a few months.
• Apply firm pressure to the lid area with a gauze pad for a few minutes.
• Recommend patient continue digital massage at home
• Procedure works well on small to medium size chalazion (< 6mm in size)
• Follow up in 3-4 weeks - may need to repeat injection

IV. SUBCONJUNCTIVAL INJECTIONS
A. Indications
• Post Trabeculectomy
• Failing Trabeculectomy
• Refractory Uveitis
• Corneal Ulcers
• Bacterial endophthalmitis

B. Medications
• 5-Fluorouracil
• Mitomycin C
• Steroids
• Antibiotics

C. Contraindications
• Known hypersensitivity
• Corneal epithelial defects (for 5-FU or MMC)
• Infectious etiology (for steroids)

D. Complications
• subconjunctival hemorrhage
• increased IOP (steroid injection)
• globe penetration
• discomfort

E. Equipment
• 27-30 gauge needle with 1 cc syringe; ½"
• tissue forceps
• cotton swabs
• lid speculum (optional)

F. Techniques and Comments
• obtain informed written consent
• wash hands and don gloves
• instill 2 drops of topical anesthetic
• +/- one drop of prophylactic antibiotic
• swab area to be injected with pledget of anesthetic
• direct the patient’s gaze away from the injection site
  - 4 or 8 o’clock
  - superotemporal between the SR and LR muscles
• the conjunctiva may be lifted (i.e. “tented”) with a pair of tissue forceps
• retract the upper lid with your non-dominant hand (use speculum if patient is uncooperative)
• hold the syringe by the flange of the barrel between your index and middle fingers
• position the needle and syringe tangential to the globe so that the needle bevel is facing toward the globe
• direct the needle posteriorly, at the equator or beyond
• use a gentle stabbing motion to introduce the needle into the subconjunctival space
• aspirate ensuring no intravascular penetration
• inject the desired amount of solution (0.5 – 1.0 cc) until a bleb is formed
• withdraw the needle and ask the patient to close the eyes
• apply pressure with a gauze pad for a few minutes – this will help the medication diffuse through the subconjunctival space
• a subconjunctival hemorrhage may occur
V. SUB-TENON’S INJECTION

A. Indications
- Cystoid macular edema (CME)
- Pars planitis
- Severe Uveitis
- Administration of medication in certain cases
- In most cases, sub-Tenon’s injections do not offer a significant advantage over subconjunctival injections

B. Contraindications
- Hypersensitivity
- Steroid responder
- Lesions of unknown etiology

C. Complications
- Inadvertent globe penetration

D. Equipment
- 27-30 gauge needle with 1 cc syringe; ½"
- Cotton swabs

E. Medication
- Triamcinolone acetonide suspension 10 or 40 mg/mL (Kenalog™-10 or Kenalog™-40)

F. Site Selection
- Anterior sub-Tenon’s
- Posterior sub-Tenon’s
- Skin
  - Inferior orbital rim
  - Superior orbital rim

G. Technique
- Obtain informed written consent
- Wash hands and don gloves
- Instill 2 drops of topical anesthetic
- Instill one drop of prophylactic antibiotic
- Apply pledget of anesthetic to injection site (inferior-temporal)
- Direct the patient’s gaze away from the injection site (up and in)
- With the bevel toward the globe, stick needle into conjunctiva next to globe avoiding vessels (at 7-8 o’clock)
- Continue to insert the needle by rotating the syringe downward and following the curvature of the globe (continue until needle all the way in)
- Always move the needle tip back and forth to ensure that you are not penetrating the sclera (if you feel resistance – stop – pull out and try again)
- Aspirate to ensure no intravascular penetration
- Inject at moderate rate
- Remove needle and with patient’s eyes closed apply moderate pressure to area
- Patient will feel fullness behind the eye for a day or two
VI. INTRAMUSCULAR (I.M.)

A. Indications
- Used for irritating medications
  - few sensory nerves within muscle tissue (less painful)
- Larger volume (up to 5 mL for single injection)
- Faster absorption (compared to subcutaneous)
- Ophthalmic indications
  - pre- or post-fluorescein angiography
  - acute angle closure glaucoma
  - management of allergic reactions (Type I and IV)

B. Equipment
- 2-5 cc syringe
- 20-23 gauge 1", 1", 2"

C. Site Selection (avoid injury to tissue, nerves, and vessels)
- deltoid
  - not good for pediatrics
  - 2-3 finger-widths below acromion process
- dorsogluteal
  - antibiotics
  - slowest and deepest IM
- ventrogluteal
- rectus femoris (anterior thigh)
  - emergency situations
- vastus lateralis (slightly to the anterior outer portion of thigh)
  - children

D. Techniques
- Obtain informed written consent
- Wash hands and don gloves
- Cleanse site and allow to dry
- Compress skin between fingers to lift the muscle
- Pierce tissue quickly at 45 to 90 degree angle
- Release the tissue
- Aspirate for blood (if blood is present, remove needle).
- Inject medication slowly
- Remove needle and apply pressure at the site of injection
- Apply self-adhesive bandage over the injection site
E. Miscellaneous

- **Air Lock Technique**
  - ensures all of the dose is administered
  - 0.2 cc of air is left in the syringe
  - syringe is inverted, forcing the air to move up
  - the injection is given with the entire contents of the syringe deposited in the tissue

- **Z-track**
  - prevents medication from being released into the subcutaneous
tissue
- useful for irritating drugs
- can be used in elderly patients with decreased muscle mass
- technique:
  - drag the skin to one side
  - insert needle at 90 degrees
  - after injection is given remove needle and release the skin
  - do not apply pressure over the site of injection

VII. INTRAVENOUS (I.V.)
A. Indications
  - to deliver large volumes
  - medications that can only be given I.V.
  - medical emergencies
  - Ophthalmic Applications
    - intravenous fluorescein angiography
    - acute angle closure glaucoma - mannitol
    - anaphylaxis - epinephrine (1:10,000)
    - tension test (to rule out Myasthenia gravis)
B. Contraindications
  - hypersensitivity
  - mastectomy (on that side; for FA)
  - renal disease (FA)
C. Complications
  - phlebitis
  - infection at injection site
  - FA: discolored urine, discolored skin, allergic reactions
D. Equipment
  - 25-27 gauge butterfly needle
  - 5-10 cc syringe, ½” – 1”
  - 5 cc 10% sodium fluorescein (or 2 cc of 25%)
  - gauze
  - band-aid
E. Site Selection
  - dorsum of the hands, forearm, inner aspect of the elbow
  - large veins
  - start with most distal site if difficulty expected
  - ask patient for the best site then explore!
  - to enhance venous dilation:
    - open and close fist
    - tap skin overlying vein
    - stroke the arm below the selected site
F. Technique
  - Obtain informed written consent
• Select site
• Wash hands and don gloves
• Scrub site in a circular motion and allow to dry
• Apply tourniquet 2 to 6 inches above site selected
  - if locating a vein has taken more than a brief moment, release the
tourniquet and reapply after cleaning area
  - have patient clench and unclench fist
• Remove cover from needle maintaining sterility

• Grasp arm distal to site with nondominant hand and place thumb about
  1 inch below site
• Pull skin to stabilize vein
• Hold need at 15-45 degree angle and insert with bevel facing up
• When vein is entered and return blood is observed, decrease the needle
  angle and advance needle to stabilize it in the vein
• Remove tourniquet
• Tape butterfly in place
• Give the injection slowly, apply pressure, and remove the needle (watch
  that extravasation does not occur)
• Apply adhesive bandage over the injection site
• Observe patient for 30-45 minutes following fluorescein angiography

VIII. PHLEBOTOMY
  A. Vacutainer system