



Injectable medications in eye care

Brad Sutton, OD, FAAO
Clinical Professor
IU School of Optometry
brsutton@indiana.edu

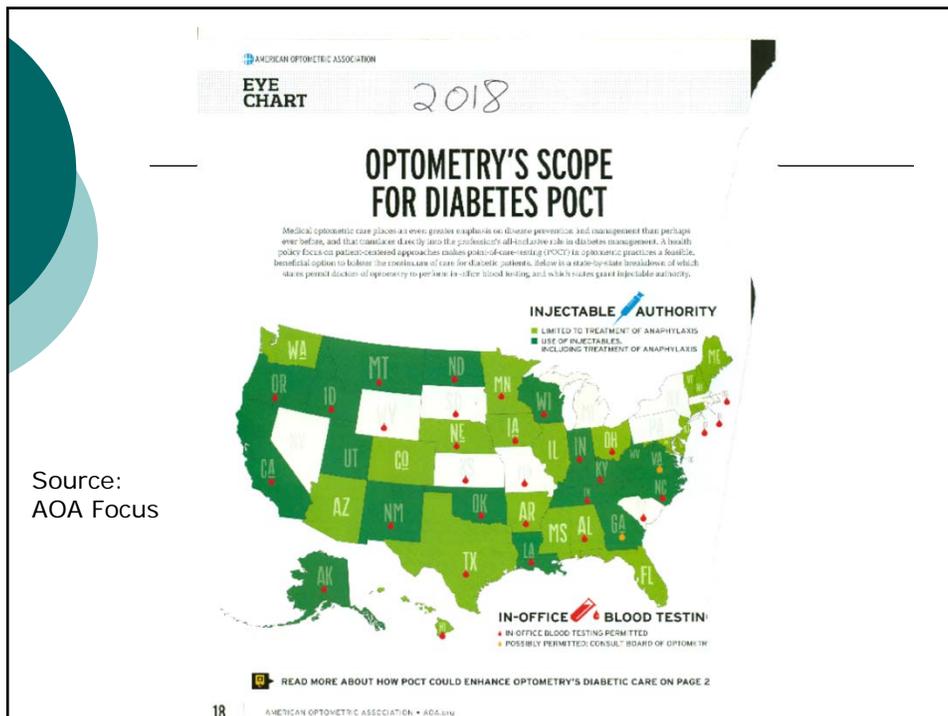


Financial disclosures

- No financial disclosures

Injections by OD's

- Allowed in 38 states
- 20 of those allow for counteraction of anaphylaxis only
- 18 allow for varying degrees of diagnostic and therapeutic use



Source:
AOA Focus

Types of injections

- Subcutaneous
- Intramuscular
- Intravenous
- Periocular
- Intraocular

- Always ask about allergies!



NBEO

- Injections were a permanent NBEO Part III station, now back to stand-alone optional starting in 2018
- Sterile technique / preparation
- IM
- IV
- Model arms only

Sterile draw technique

- Gloves
- Alcohol swab cleaning of vial top
- Always inject an amount of air in to vial first that is equal to amount of desired fluid removal: Vacuum sealed
- After draw, remove any air from syringe before use

Sharps

- All needles disposed of in a sharps container: are now usually clear to allow for viewing contents



One hand scoop technique

- Needle used only for the drawing up of a fluid can be capped using the “one hand scoop technique”



Re-capping needles

- Needles that have been used on people are never re-capped before discarding them
- High risk of “stick” with contamination



Syringe basics

- 1ml (TB)
- 3ML
- 5ML
- Larger (less common except for blood draws)



Needle gauges

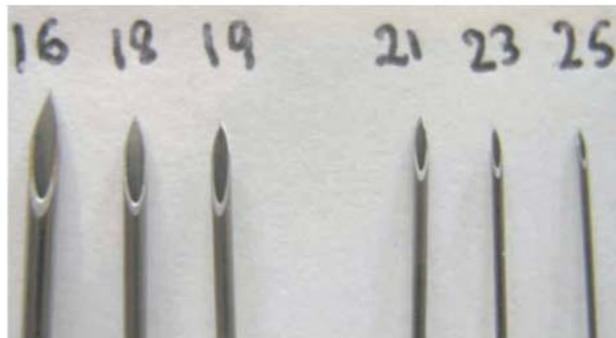


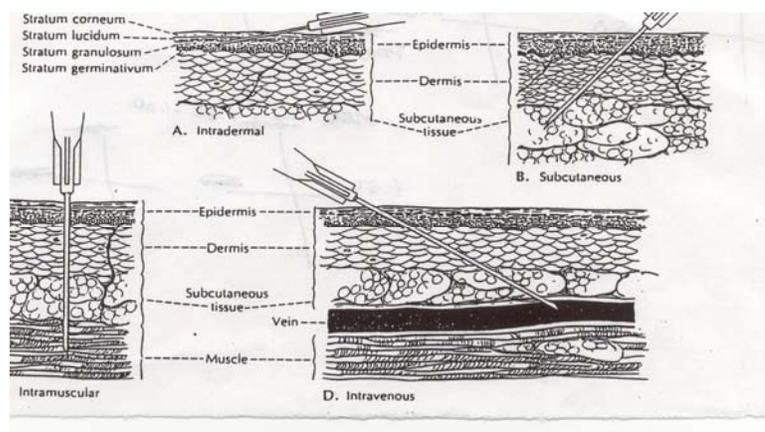
Figure 1. 16-gauge to 25-gauge micropuncture needles.
©2009 TSE Publishing, Inc.

Needle basics

- Bevel (angled slice)
- Gauge: larger number = smaller needle
- 19, 23, 25, 27, 30
- May have second # indicating length (inches): 27 ½ G



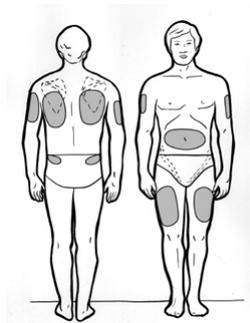
Injection sites



Subcutaneous

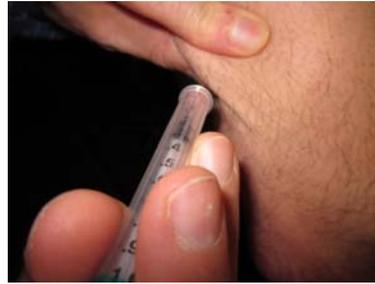
- Deposits medication below the skin
- Can use any site that is not over a bony structure and is free of large blood vessels and nerves
- Typical sites include the thigh, back of the arm, and abdomen
- CPT code 96372

Subcutaneous sites



Subcutaneous technique

- Clean site
- Pinch skin
- Insert needle at 90- degree angle (but tangential for chalazion / eyelid anesthetic / TB type)
- Inject medication
- Release skin



Subcutaneous technique





Subcutaneous

- Medication absorbed more slowly when injected in this manner than with intramuscular or intravenous injections
- Requires small, thin needles which are short
- Used with insulin, anesthetics, PPD testing, copaxone
- Good for small doses of non-irritating solutions. Bad for larger volumes and irritating solutions

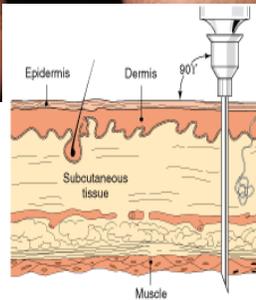
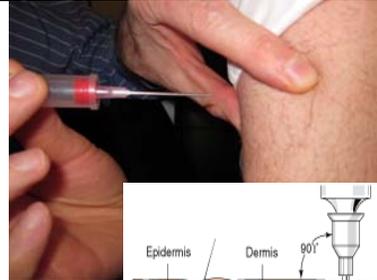


Intramuscular

- Deposits medication into muscular tissue free of major vessels and nerves
- Typically given in the deltoid or gluteus muscles (outer buttocks)
- Much more rapid onset of action than SQ route due to the greater blood supply of the tissue
- Good for concentrated or oily substance
- Requires thick, long needles (epipen and obesity?)
- Epipen costly, Teva generic .15 or .3 mg
- CPT code 96372

Intramuscular technique

- Clean site
- Pull skin taught
- Insert needle at 90-degree angle
- Inject medication



Smith et al., 2000, p. 387

Intravenous

- Utilized in eye care for IVFA, ICG angiography, and laser assisted macular surgery (visudyne, etc.)
- Very rapid onset of action
- Greater chance of early onset allergic response
- Remember.....once a medication is injected by any means it can not be retrieved!

IV injections: tools



- Must first fill 3 or 5 CC syringe with fluorescein using large needle
- Then discard that needle and attach butterfly tubing: the shorter the better!

IV Injections: technique

- Place tourniquet on upper arm (downstream from injection site)
- Locate vein in antecubital space (preferred) or back of hand (if you must)
- With bevel up, inject butterfly needle (23 – 25 gauge) into vein at an angle of around 30 degrees

IV technique



Photo above: Duncan, J



No good!



IV Injections

- When blood seen, draw back slightly on syringe to get blood flow in to tubing (saline vs. 10% dye vs. empty tubing*)
- Remove tourniquet and inject 3-5 cc of dye depending upon %

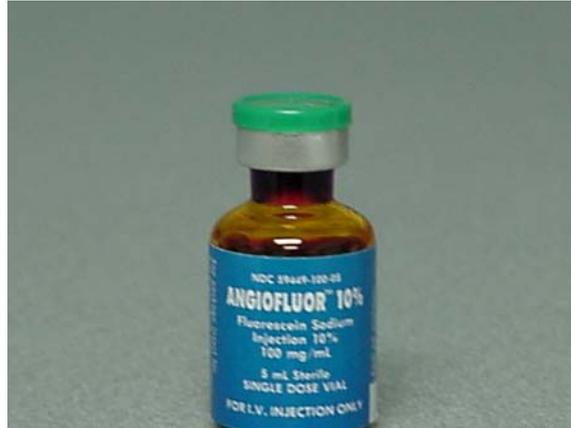


10% dye vs 25% dye

- Less nausea / vomiting with 10% (100mg/ml)
- Have to use more 10%: 5ml vs. 3ml of 25%
- Can see blood better with 10%



Fluorescein Dye



Periocular injections

- Intralesional
- Subconjunctival
- Subtenons
- Peribulbar/local anesthetic blocks
- Specialty uses- botulinum toxin
- Intraocular (intravitreal, intracameral)





Intralesional injections

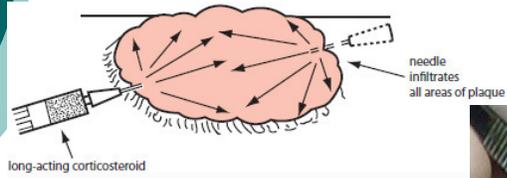
- Utilized in the treatment of chalazia and less frequently pyogenic granulomas. Form of subdermal/SQ injection
- Inject steroids into the lesion to hasten resolution
- Typically, will use kenalog 10 or 40 mg/ml (triamcinolone)



Intralesional injection

- Utilize a 1 cc (TB) syringe with a 27 or 30-gauge needle
- Bevel up
- Inject approximately .2 cc of steroid (usually kenalog) into lesion
- Can do skin side or palpebral side; skin side more comfortable. Can't really pinch skin
- Lesion may be too hard, may have to go near it instead of in it
- Really no significant subcutaneous space on the eyelid, so intradermal

Intralesional injection



Source: John Murtagh: *John Murtagh's Practice Tips*, 7e:
www.murtagh.mhmedical.com
Copyright © McGraw-Hill Education. All rights reserved.



Intralesional injection





Intralesional injections

- Contraindications/adverse reactions include allergic responses and skin depigmentation with kenalog (infrequent-personal experience)
- Follow up in two weeks.....some lesions will require a second injection
- Billable procedure with its own CPT code 11900



Subconjunctival injections

- Utilized to deliver high dose of long-acting steroid or antibiotic to the anterior segment
- Main uses include steroid delivery in cases of recalcitrant inflammation or CME
- Can give antibiotic injection for severe corneal ulcers or in endophthalmitis cases



Subconjunctival injections

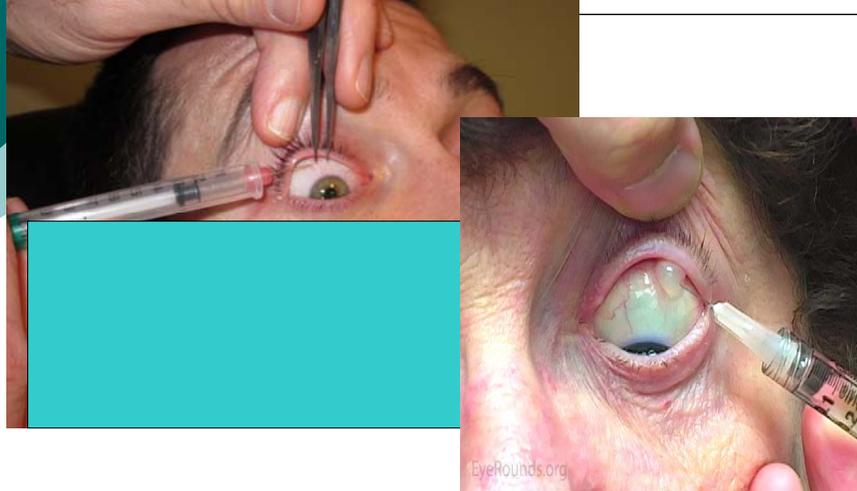
- Adverse reactions include allergic response and increased IOP with steroids
- IOP elevation can be difficult to control because med can not be “discontinued” like with topical steroids
- Can occur weeks to months after the injection
- Can occur with long history of not pressure responding to topical steroids
- Dexamethasone or Durezol trial?



Subconjunctival injections

- Perform on bulbar conjunctiva under upper lid or lower lid (hides any subconj. heme)
- Use forceps to tent conjunctiva and create potential space
- Insert small gauge needle (27 or 30) on a 1 cc syringe bevel up into space, release conjunctiva, and inject .1-.2 cc of medication to form a bullous
- CPT code 68200

Subconjunctival injection



Subtenons injections

- Similar to subconjunctival in uses and indications
- Only difference in procedure is that the needle penetrates Tenon's capsule
- Indications include pars planitis or other forms of intermediate uveitis and CME
- In the majority of cases this technique holds little advantage over a more simple subconjunctival injection
- Some glaucoma meds in trials to be delivered this way

Subtenons injection

- Utilizing small needle (27 or 30 gauge), insert needle into lower fornix where bulbar and palpebral conjunctiva meet
- Move needle laterally and observe globe to ensure no movement
- Inject approximately .2 cc
- CPT code 67515

Intravitreal injections

- Generally not performed by OD's (but nurses in England, Norway)
- Kenalog, Lucentis, Avastin, Eylea, Jetrea
- Many uses
- Small risk of endophthalmitis, RD, IOP increase



Anesthetic application

- Done to prepare for surgical procedures such as lid lesion removal, chalazion excision, etc.
- Often give block that numbs the entire lid



Specialty uses-Botulinum

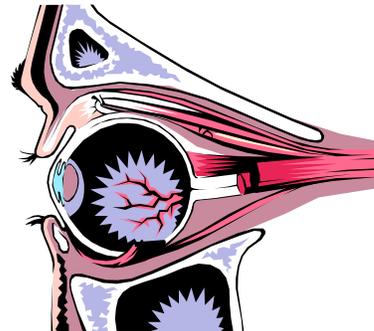
- Botulinum toxin is derived from the organism that is responsible for botulism
- It is a very powerful neurotoxin and its use results in paralysis of muscles
- It is utilized in the management of blepharospasm and strabismus
- Also used by plastic surgeons and dermatologists to temporarily remove wrinkles

Botulinum

- In blepharospasm cases, it is injected SQ at several locations to paralyze affected muscles and eliminate or decrease the spasm
- Has to be repeated every few months
- Complications include ptosis and exposure problems secondary to incomplete lid closure

Botulinum

- In strabismus, the injection is directed into the muscle to be weakened (the overacting muscle)





Pharmacokinetics

- Absorption dependent upon several factors.....
- 1) route of administration
- 2) concentration of medication
- 3) solution / suspension (sol. Is more rapidly absorbed and shorter acting)



Steroids

- One of the most common medications delivered via injection when it comes to eye care
- Uses include chalazia, recalcitrant iritis, CME, pars planitis, and others



Injectable steroids

- Three main injectable steroids
- 1) Dexamethasone
- 2) Kenalog (Triamcinolone)
- 3) Depo-medrol (methylprednisolone)



Dexamethasone

- Dexamethasone 4.0 or 2.0 mg/ml
- Water soluble and very short acting
- Clear solution, not milky suspension like kenalog
- Duration of action is often too short to be utilized effectively with uveitis or long-standing chalazia

Kenalog

- Triamcinolone 10 or 40 mg/ml
- Suspension: slow absorption and moderately long acting
- Great choice for chalazia, sub-conjunctival / sub-tenons treatment of uveitis (usually 40 mg/ml)
- Watch for IOP increase and PSC!

10 mg/ml Kenalog





Depo-medrol

- Depo (long acting) version of methylprednisone
- Very slowly absorbed and very long acting
- Duration of action is often too long to be practical (increased IOP, etc)



Anesthetics

- Utilized to prep for lid lesion removal, etc.
- Injected intradermally at the site (not really any subcutaneous space on the eyelid)
- Marcaine .25% and Lidocaine (Xylocaine) .5%, 1.0%, or 2% solutions with or without 1:100,000 epinephrine
- Epi decreases bleeding and loss of effect through systemic absorption (thus approximately doubling the duration of action)



Anesthetics

- Can have allergic response, but Marcaine and lidocaine are amides, not esters like novacaine or tetracaine. No cross allergy
- Other side effects include ptosis if injected into Mueller's muscle
- Use .5 to 1cc (ml) of medication
- Inject while withdrawing needle to spread coverage



Anesthetics

- Injection stings! Acidic
- Mix with sodium bicarbonate to significantly decrease the stinging



Anesthetics: Lidocaine

- Fast acting, about one minute or less
- Duration of 30-60 minutes without epinephrine
- Most commonly used for eyelid anesthesia



Anesthetics: Bupivacaine (Marcaine)

- Onset about 5 minutes
- Duration up to 2 hours
- Less commonly used

Anesthetics



Botulinum toxin

- Purified neurotoxin complex made from Botulinum toxin type A (Clostridium Botulinum) : Botox
- Comes in 100-unit vials, powder that is reconstituted with saline
- Used for blepharospasm, strabismus, cosmesis
- Side effects include ptosis, exposure
- Must be used within a few hours

brsutton@indiana.edu

