

# Intravitreal Injection Procedure Instructional Outline

Anh-Danh T. Phan, M.D.  
Indiana University School of Medicine  
Department of Ophthalmology

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Anh-Danh T. Phan, M.D.  
Assistant Professor of Ophthalmology  
Retina and Vitreous Service  
Indiana University School of Medicine  
Department of Ophthalmology / Glick Eye Institute  
Indianapolis, IN  
Email: anphan@iupui.edu

**Background Statement:** Intravitreal injection is the most common procedure in ophthalmology, yet carries associated risks. Mastery of the procedure particularly during residency training is critical to address the staggering patient treatment needs.

**Objectives:** To transfer, along with accompanying instructional video, useful knowledge and skills for performing the intravitreal injection during ophthalmology training, enabling residents to understand: (1) the precautions before, during, and after the procedure, including risk of endophthalmitis; (2) the technique performed at a major university medical center; and (3) a method to standardize the procedure across multiple clinical settings. Residents are encouraged to gather instructional input from their supervising retinal specialists during training to develop their own procedural approach most comfortable, while observing the underlying principles and concepts outlined herein.

## **Conflict of Interest**

The author has no propriety interest in either the outline or its subject matter.

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## Outline

- Standard of care shift to intravitreal medications over laser therapy in retinal diseases.
  - o Evidence-based medicine, in place of focal and PRP for diabetic retinopathy, PDT for exudative age-related macular degeneration, and grid laser for CME in retinal vein occlusion.
  - o ACGME requirement in ophthalmology training of intravitreal injections and no more focal laser.
- Growing patient demographics:
  - o Prevalence of retinal diseases increases with age, coupled with rising census in U.S. and worldwide:
    - Five-fold increase in DM population in U.S. by 2050.
    - Two-fold increase in AMD population in U.S. by 2050.
  - o Creates staggering patient treatment need in the near future, especially in light of limited number of practicing ophthalmologists and graduating residents.
  - o Necessitates participation of comprehensive ophthalmologists to help address treatment need, particularly in non-metropolitan/rural areas with reduced access to healthcare.
    - Far greater number of non-physician eye care providers than ophthalmologists in U.S., particularly in poor-access regions.
- Residency training in intravitreal medications injection at Indiana University:
  - o Majority of our Residents enter comprehensive ophthalmology throughout Indiana and U.S. following training.
  - o Reading requirements beforehand:
    - An update on the intravitreal injection procedure. Using recent ‘guidelines’ and best practices to optimize outcomes (Scott and Flynn, 2015).
    - Intravitreal injection technique and monitoring: updated guidelines of an expert panel (Avery et al, 2014).
  - o Instructional video training provided beforehand: Required log of viewings.
    - *Video accompanies this outline.*
    - Visual demonstration of procedure is understandable learning format for trainees in the age of YouTube<sup>®</sup>.
    - Allows standardization of procedure across multiple hospitals/clinics.
    - Immediately accessible throughout residency training.
  - o Practicum recommended before first procedure (i.e., on pig eyes).
- Before procedure recommendations:
  - o Requires accurate interpretation of OCT and FA/OCT angiography for selection of treatment algorithm and appropriation.
  - o Seek exclusionary risk factors:
    - For anti-VEGF medications: Recent arterial thromboembolic event (ATE).
    - Uncontrolled elevated BP.
    - Uncontrolled elevated IOP.
    - External eyelid infection.
    - Intraocular inflammation.
  - o Mark surgical eye.
  - o “Time-Out”: Verify correct patient, treatment eye, drug and dosage.
  - o Bilateral intravitreal injections require separate sterile supply sets.
    - We do not perform bilateral aflibercept (Eylea<sup>®</sup>) on the same day.
  - o Requires sterile ophthalmic anesthetic adequate for individual patient.

- We use tetracaine 0.5% gel (Tetravisc<sup>®</sup>).
    - Discard multi-use containers at the end of day.
  - Check vision, IOP, V/S and dilate.
    - Allows immediate DFE afterwards if necessary [*Correction to video*].
  - Signed written informed consent.
    - Includes risks of: infection, bleeding, eye discomfort, cataract (progression), increased eye pressure, retinal tear/detachment, worsening of eye condition, loss of vision/eye, cardiovascular event.
  - Peri-operative topical antibiotics no longer recommended.
- Bacterial endophthalmitis: Caused by
  - Patient's conjunctival/eyelid flora: coagulase-negative Staphylococcus species (65%).
  - Patient's/Provider's droplet transmission: Streptococcus species (31%).
- Addressing risk factors to bacterial endophthalmitis:
  - Before procedure:
    - Reduce droplet transmission by patient/provider before and during procedure:
      - Minimize speech.
      - Ask patient to breathe through nose.
      - Wear surgical mask (including for patient with heavy breathing/coughing).
    - Wash hands.
    - Wear gloves for universal precautions (sterile or non-sterile).
    - Reduce ocular surface flora:
      - Remove overhanging/infringing objects (hair, hat, etc.) [*Correction to video*].
      - Sterile povidone-iodine 5-10% prep solution, to eye and eyelids:
        - Last agent applied before injection.
        - If use gel anesthetic, use povidone-iodine before and after its application.
        - Paint surface, do not extensively massage eyelids to avoid meibomian gland expression.
        - At least 30 seconds exposure time before injection.
  - During procedure:
    - Reduce ocular surface flora:
      - Avoid contamination of needle by eyelashes/eyelids.
        - We use sterile eyelid speculum (with solid blades).
          - Do not touch blades.
      - Avoid glove contact with hub of needle.
  - After procedure:
    - Wash hands.
    - Post-procedure instructions, for 4 days: Avoid eye rubbing, only touch eye with a clean tissue, no water/matter into eye, after taking a shower use a clean towel to gently dry before opening eye.
    - Post-procedure warnings: Call immediately/go to ER with signs/symptoms of decreased vision, eye pain, increased sensitivity to light, worsening redness of eye, increased number of floaters or flashes of light, any concerns about eye.
- During procedure recommendations:

- Patient should be at ease (reduces risk of sudden movement).
- Avoid povidone-iodine application directly onto cornea (causes painful epithelial erosion).
- For anti-VEGF medications in a vial:
  - Clean rubber stopper with sterile isopropyl 70% alcohol prep pad. We also apply povidone-iodine onto rubber stopper beforehand.
  - Tip vial a few times before withdrawing medication. Do not shake vial (medication is fragile).
  - Carefully exchange sterile withdrawing (filter) needle for injecting 30-gauge needle.
    - Withdraw more medication than needed into TB syringe due to need to expel dead-air space in injecting needle before usage.
      - Withdraw all of aflibercept (Eylea<sup>®</sup>) from vial since provided just enough for usage.
    - Injecting needle is 27-gauge for steroid medications.
- Remove air bubbles from injection TB syringe through tapping.
- Needle should enter at pars plana between horizontal and vertical rectus muscles.
  - Avoid nearby blebs/inflamed/vascular sites.
  - Avoid horizontal meridian (long posterior ciliary nerves).
  - We mark injection site with another sterile TB syringe tip placed at edge of limbus:
    - Lightly indents sclera to indicate 3.5 mm posterior to limbus (posterior border of outer ring of indentation).
  - Bevel of needle oriented anteriorly.
- Aim needle toward ONH (to avoid injury to crystalline lens).
- We apply light pressure to site of injection with sterile cotton tip applicator as withdraw needle to avoid medication egress.
- After procedure recommendations:
  - We rinse eye of povidone-iodine with sterile BSS to minimize irritation.
    - Do not extensively massage eyelids to avoid meibomian gland expression.
  - Check vision, IOP.
  - Anterior chamber paracentesis typically not performed, even with 0.1 mL medication injection.
  - Typical signs/symptoms to expect immediately afterwards and for the first 24-36 hours: floaters (dark spots/lines), irritation/feeling that something is in the eye, redness/area of hemorrhage at site of injection or elsewhere.

## References

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