



INTRAVITREAL INJECTIONS TECHNIQUE & COMPLICATIONS

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INTRODUCTION

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Intravitreal injections

- ▶ A form of targeted delivery of therapeutic agents into the vitreous cavity for Intraocular treatment

INTRODUCTION

Significance

- ▶ Growing frequency: 5000 injections in the year 2000,
812000 in the year 2007
1 million in 2008,
2.3 million in 2012
- ▶ Economical weight: 2.3 billion \$ in 2013
- ▶ it is now the most common medical procedure in the United States

INTRODUCTION

Indications

Gas injection: for retinal detachment (pneumatic retinopexy)

Anti-infectious agents: Antibiotics, Antivirals and antifungals

Tissue plasminogen activator (tPA):

Steroid injections: for DME and uveitis(Triamcinolone, dexamethasone)

AntiVEGF agents: for DME and wet AMD: Pegaptanib, Bevacizumab, Ranibizumab, Aflibercept, Brolucizomab & Faricimab

Intravitreal implants: Ozurdex, Iluvin, etc



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GUIDELINES

GUIDELINES



In 2004 evolved Guidelines published in the retina Journal due to the growing body of evidence in 2014 new guidelines (also published in the RETINA journal in the same year)

Each country should have guidelines of its own for the procedure putting in consideration the economics, demographics and logistics of said country

GUIDELINES



Settings



Anesthesia



Sterilization



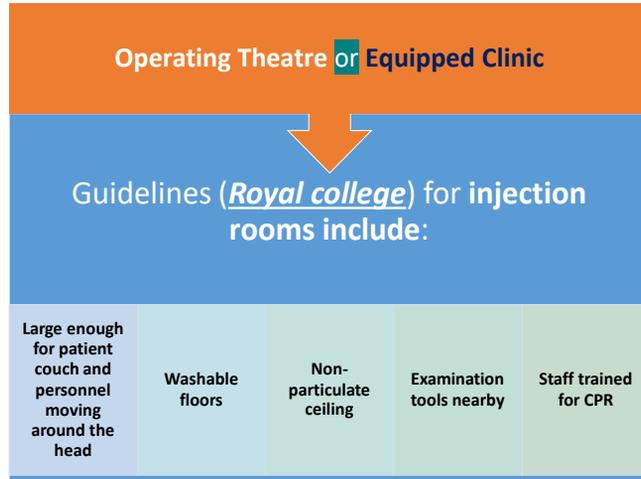
Technique of injection



Peri- & Post procedural antibiotics

GUIDELINES

SETTINGS: INJECTION IN THE CLINIC



GUIDELINES

Anesthesia

Topical anesthetic

■ Lidocaine gel 2-4%

— Subconjunctival lidocaine

■ Rarely peribulbar local anesthesia

GUIDELINES

Sterilization



Povidone iodine 10% to the lids and eyelashes



Excessive rubbing of lids and lashes ?? is not recommended as it is found to increase the expression of Meibomian glands secretions and release of bacterial flora on lashes



Povidone iodine 5% for 30 seconds to the ocular surface is the single most important factor to decrease incidence of endophthalmitis (results of studies on cataract surgery patients)



If lidocaine gel ?? was applied, another application of povidone iodine should be performed as the gel is not sterile and forms a barrier to the povidone iodine

GUIDELINES

Additional preventive measures (patient)

- ▶ Draping is **not necessary**
- ▶ **Lid speculums** are recommended to prevent contact of lids and lashes with needle. However, **manual** retraction of lids is also allowed
- ▶ Pre-injection **antibiotics** are **of no importance** and post-injection antibiotics are not necessary as it was found to increase the emergence of resistant strains

GUIDELINES

Additional preventive measures (doctor)



Hand washing/
disinfection



Sterile gloves

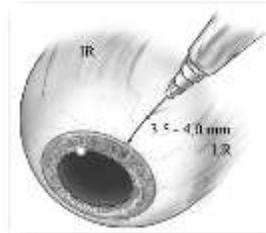


Face masks or
speechless to
avoid
droplets

GUIDELINES

Injection technique

- ▶ TIME-OUT
- ▶ Use of short **30g short (18mm or shorter)** for antiVEGFs or 27g for suspension drugs (as triamcinolone)
- ▶ Inject between vertical and horizontal rectus muscles **3-3.5mm in pseudophakics** and aphasics , **3.5-4mm in phakic**. Usually inferotemporal quadrant but choice of quadrant is according to doctor's discretion.
- ▶ **Perpendicular injection** towards the **mid vitreous** followed immediate application of pressure on injection site to avoid vitreous egress through sclera
- ▶ **Post injection** application of **povidone iodine**.
- ▶ Check form **vision and IOP**.
- ▶ Routine **paracentesis** is not recommended.



INJECTION IN THE OR

TECHNIQUE



INJECTION IN THE CLINIC

TECHNIQUE





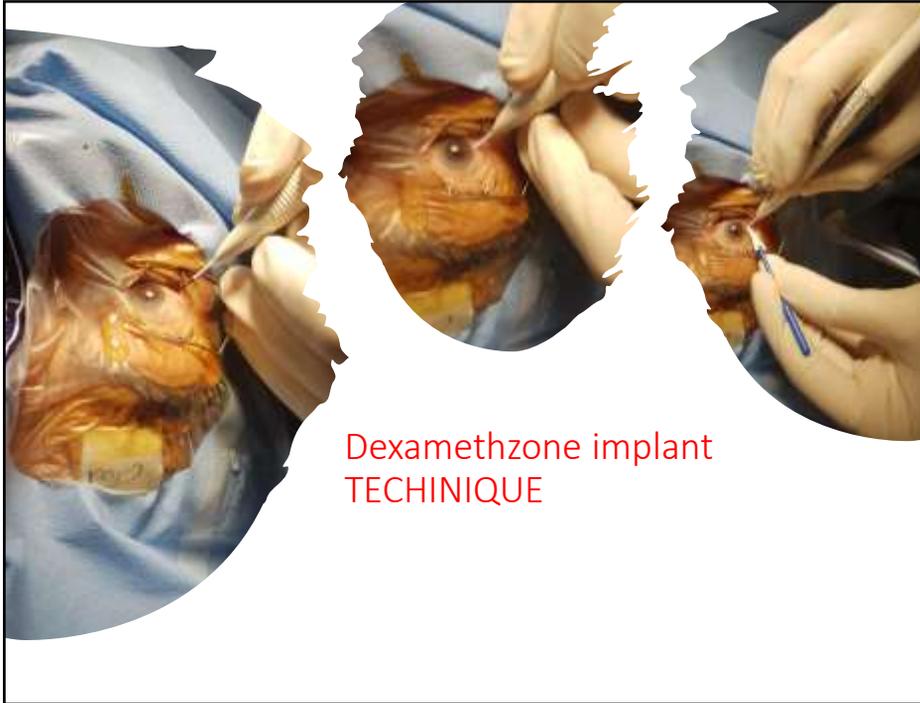


Table 3. Intravitreal Injection Procedure: An Appropriate Sequence of Events



Figure 1. Following a review of the medical history, documentation of vital signs and a signed consent, the patient's correct eye is marked as part of site verification. Using a standardized protocol as included in the 2014 guidelines, a povidone-iodine prep is performed and an optional eyelid speculum is placed.



Figure 2. The use of pre-injection topical povidone-iodine is uniformly recommended in the 2014 guidelines. Povidone-iodine should be the last drop applied to the ocular surface prior to the intravitreal injection.



Figure 3. The intravitreal injection needle is entered by way of the pars plana into the mid-vitreous cavity for injection of the intravitreal medication. Although many physicians prefer the inferior temporal quadrant, other quadrants can be considered based on anatomical issues or physician's preference.

1. Either surgical masks should be used or both the patient and providers should minimize speaking during the injection preparation and procedure.
2. Take a procedural time-out to verify patient, agent and laterality.
3. Apply liquid anesthetic drops to the ocular surface.
4. Apply povidone-iodine to the eyelashes and eyelid margins. (This is optional, most use 10% concentration.)
5. Retract the eyelids away from the intended injection site for the duration of the procedure.

6. Apply povidone-iodine (most use 5%) to the conjunctival surface, including the intended injection site, at least 30 seconds before injection.
7. If additional anesthetic is applied, reapply povidone-iodine to the intended injection site immediately before injection (again, most use 5%).
8. Insert the needle perpendicular to the sclera, 3.5 to 4 mm posterior to the limbus (3 to 5 mm in pseudophakic or aphakic eyes) between the vertical and horizontal rectus muscles.

Table 1. Guideline Areas with General Agreement Among Committee Members²⁴

- Povidone-iodine (5-10 percent) should be the last agent applied to the intended injection site before injection. If a gel anesthetic is used, povidone-iodine should be applied both before and after gel application, because retained gel may prevent povidone-iodine from contacting the conjunctival surface of the injection site.
- Topical antibiotics pre-, peri- or postinjection are unnecessary.
- No evidence supports the routine use of a sterile drape.
- Avoid contamination of the needle and injection site by the eyelashes or the eyelid margins.
- Avoid extensive massage of the eyelids either pre- or postinjection (to avoid meibomian gland expression).
- Use adequate anesthetic for a given patient (topical drops, gel and/or subconjunctival injection).
- Use sterile or nonsterile gloves as consistent with modern office practice, combined with strong agreement regarding the need for hand washing before and after patient contact.
- Either surgical masks should be used or both the patient and providers should minimize speaking during the injection preparation and procedure to limit aerosolized droplets containing oral contaminants from the patient and/or provider.
- Monitor IOP both pre- and post-injection.
- Routine anterior chamber paracentesis is not recommended.

Adapted from Avery RL, Bakri SJ, Blumenkranz MS, et al. Intravitreal injection technique and monitoring: updated guidelines of an expert panel. *Retina (suppl)*. 2014;34:S1-S188

Table 2. Guideline Areas With No Clear Consensus Among Committee Members²⁴

- Need for povidone-iodine application to the eyelids, including the eyelashes and eyelid margins. All agreed that when povidone-iodine is applied to the eyelashes and eyelid margins, eyelid scrubbing or eyelid pressure adequate to express material from the meibomian gland should be avoided.
- Use of a speculum. (Some prevent contact between the needle/injection site and the eyelashes and eyelids with manual lid retraction.)
- Need for pupillary dilation and postinjection dilated examination of the posterior segment. (Although some viewed the return of formed vision as sufficient, others routinely dilate the pupil and examine the posterior segment after injection.)
- Use of povidone-iodine flush. (Most preferred drops only and saw no benefit to allowing the povidone-iodine to dry before injection.)

Adapted from Avery RL, Bakri SJ, Blumenkranz MS, et al. Intravitreal injection technique and monitoring: updated guidelines of an expert panel. *Retina (suppl)*. 2014;34:S1-S18



COMPLICATIONS

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ORIGINAL ARTICLE Open Access

Analysis of urgent follow up visits and complications after intravitreal injections: a retrospective cohort study

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Complications of intravitreal injections: 2022

Dillon Patel¹, Samir R. Patel¹, Ram Chaudhary¹, and Sumit C. Ghosh¹

Purpose of review
 This review highlights the complications of both intravitreal injection procedures as well as different injection modalities including conventional and subconjunctival, intralaminar, subretinal, peritubular, subretrobulbar, and direct. Techniques for reducing rates of endophthalmitis will also be discussed.

Recent findings
 Intravitreal injections can cause hemorrhage, ocular surface injury, eyelid redness, and intraocular inflammation. These complications are associated with increased inflammation and ocular toxicity, leading to significant vision loss. This study can be both patient and physician as not associated with increased risk of endophthalmitis and may decrease culture positive endophthalmitis.

Summary
 Intravitreal injections continue to be one of the most commonly performed procedures by ophthalmologists. Although the procedure is generally well-tolerated, sight-threatening complications can occur including endophthalmitis, central blood vessel occlusion, and/or retinal vascular occlusion. Adverse events associated with specific modalities are outlined below. Several safety measures have been shown to reduce rates of endophthalmitis. An hour-long summary of this procedure.

Keywords
 conjunctivitis, endophthalmitis, eye pain, microbial keratitis, vitreal detachment

Patient-Reported Complications after Intravitreal Injection and Their Predictive Factors
Ophthalmology Retina • Volume 5, Number 7, July 2021

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COMPLICATIONS

Table 3 Diagnosis for Reason of Patients Seen for Urgent/Unscheduled Follow-Up Visit Within 7 Days of an Intravitreal Injection

Diagnosis at urgent follow up	Frequency	Percentage UFU	Percentage total
Blurred Vision	164	37.2	0.22
Floater/Flobers/PVD	55	12.5	0.075
Pain	42	9.5	0.057
Corneal Abasion	43	9.8	0.058
Subconjunctival Hemorrhage	37	7.5	0.045
Corneal Dryness/Foreign Body Sensation	30	6.6	0.041
Endophthalmitis	20	4.5	0.027
Vitreous Hemorrhage	18	4.1	0.025
Iris/Uveitis	11	2.5	0.015
Miscellaneous	9	2.0	0.012
Elevated ICP	7	1.6	0.010
Choroidal Neovascular Membrane	4	0.9	0.0054
Retinal Detachment/Tear	4	0.9	0.0054
Traumatic Cataract	2	0.45	0.003

COMPLICATIONS

Endophthalmitis

The rates of endophthalmitis among bevacizumab, ranibizumab, and aflibercept **do not differ significantly**.

Retinal vasculitis

Anti-VEGF medications have been associated with intraocular inflammation. Typically, these changes are mild with little to no long-term sequelae. **Brolucizumab** in a larger review of electronic health records found intraocular inflammation and/or retinal vasculitis in **2.4%** of eyes.

SUSTAINED DELIVERY IMPLANTS FOR STEROID MEDICATIONS

Intravitreal implants of dexamethasone and fluocinolone acetonide provide sustained release of steroids. However, unique adverse effects to these is **Hypotony**.

Another serious complication of **intravitreal implants is migration** into the anterior chamber which can lead to corneal edema and corneal endothelial damage.

COMPLICATIONS

FACE MASK USE

Another study of 483 622 intravitreal injections analyzed the differences in endophthalmitis rate between injections administered with physician face mask use compared to injections administered with a *no-talking policy and no face mask* and found **no difference in endophthalmitis risk between the two groups**

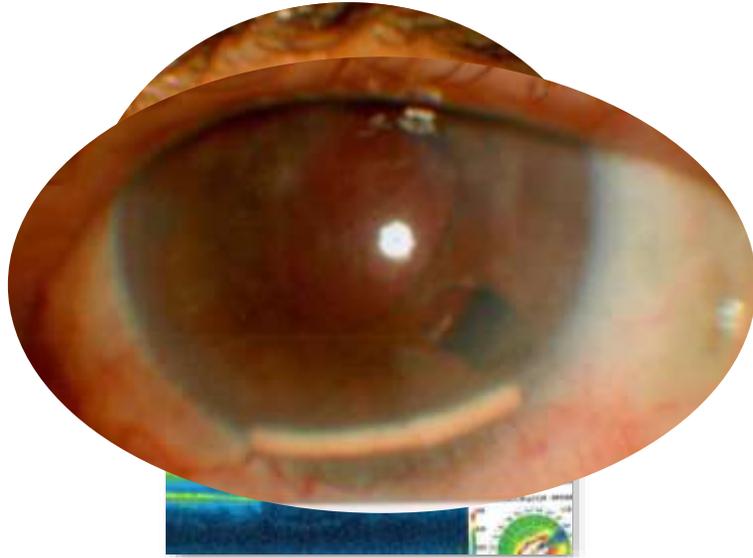
BILATERAL INJECTIONS

Same-day bilateral intravitreal injections are generally **well tolerated and safe**.

REAL WORD

- **Electricity hospital** conducted a Case serious retrospective study to evaluate Intravitreal injection complications from **2018 to 2022**.
- **4664 eyes intravitreally injected** ;
All injected in the OR upon the guidelines.
3288 of them treated by **Aflibercept**,
3225 treated by **Ranibizumab**
151 treated by **DEX implants**.
- **3 eyes (0.06 %)** complicated with **endophthalmitis** & the culture showed no organisms.
- **1 optic neuritis (0.02%)** 1 day after injection.
- **DEX implant migration issues** was reported in single 3cases

Implant Migration



CONCLUSION

- The number of intravitreal injections administered continues to grow.
- **Although intravitreal injections are generally safe and well tolerated, they can be associated with visually threatening adverse effects such as:**
 - Endophthalmitis,
 - Retinal detachment
 - Retinal vasculitis.
- **Understanding the safety profile of different classes of medications as well as applying injection technique guidelines reduce the risk of adverse effects & enables physicians to achieve better patient outcomes.**



ACKNOWLEDGMENT



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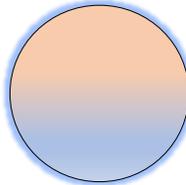
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