

Preventing Intraocular Infections after Intravitreal Injections: Injection Technique

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Abstract

Intravitreal injections (IVIs) are the mainstay of current retinal medical therapy and are used to treat common retinal conditions like age-related macular degeneration and macular edema. Advantages of IVIs are their ability to maximize intraocular levels of medications and to avoid the toxicities associated with systemic treatment. They can be used to deliver anti-microbials, anti-inflammatory agents, anticancer agents, intraocular air, surgical gases, anti-vascular endothelial growth factor agents, and other pharmaceuticals.

Serious adverse effects of IVIs include endophthalmitis, retinal detachment, ocular hypertension, and cataract formation. However, there is no consensus on the ideal protocol for administering IVIs. The rate of endophthalmitis after IVIs has been reported to be 0.2%. Here, recommended steps are suggested to aid in the prevention of intraocular infection after IVIs.

Before the Injection

As with any procedure, reducing the introduction of microbial agents through the wound is an important step in minimizing post-procedure infection [1-10]. Thus, it is important to minimize the bacterial load on the eyelids and conjunctiva by treating active blepharitis prior to attempting any IVIs [11].

While reduction in microbials on the ocular surface reduces the risk of infection, there is no data that convincingly supports the use of antibiotics prior to injection. Research studies that did not use pre-injection antibiotics demonstrated a low rate of endophthalmitis [12]. Additionally, pre-injection antibiotics can increase antibiotic resistance and should be avoided.

Povidone-iodine (PI), on the other hand, has evidence which supports its use on the eye prior to IVIs [13,14]. Either 5% or 10% PI can be used to sterilize the ocular surface, however concentrations below 5% have been shown to be less effective at preventing intraocular infections [15]. It is recommended that PI be used on the ocular surface prior to any IVI unless there is a severe contact allergy. If a true allergy exists, 0.05% chlorhexidine can be substituted.

Anesthesia for the injection can be accomplished via several methods. Topical drops, viscous gels, subconjunctival lidocaine, and cotton tip applicators soaked in anesthetic can be used prior to injection. One should consider applying PI prior to viscous anesthetics as there is a potential for gels to block the exposure of bacteria to PI if the anesthetic is applied before PI [16].

It is possible that oral flora may contribute to endophthalmitis [17]. Thus, it is not unreasonable for the treating physician to wear a surgical mask during the injection procedure [18].

A sterile drape is not necessary, but a sterile eyelid speculum is recommended [19]. It exposes the ocular surface for antisepsis and can help prevent contact between the needle tip and any bacteria on the eyelids and eyelashes. Furthermore, a bladed speculum design can help to keep the eyelashes out of the way.

Injection Technique

One's hands should be washed with soap immediately before the procedure. Gloves may be worn, but they do not need to be sterile gloves. Some retinal specialists choose not to wear gloves at all. The

only requirement is to make sure that the tip of the needle only touches the site of injection on the ocular surface.

The most common needle used for IVIs in clinical trials and clinical practice is 30 gauge, [6] though some choose to use 27 gauge needles (especially for particulate medications like triamcinolone acetonide). The same needle should not be used to draw up the medication and perform the IVI as it will become blunt after drawing up the medication and may become contaminated from the first puncture. Most vitreoretinal specialists use a $\frac{1}{2}$ to $\frac{5}{8}$ inch needle. Some insert the needle part of the way into the eye and others bury the hub. There is no consensus as to which method is superior.

In order to avoid damage to the lens or the retina, the IVI should be performed 3.5 mm posterior to the limbus in aphakic or pseudophakic patients and 4 mm from the limbus in phakic patients, with the tip of the needle directed toward the geographic center of the globe. The inferotemporal quadrant of the eye is recommended for IVIs to avoid introducing the medication into the visual axis [20] (some medications like aflibercept and triamcinolone acetonide cause a perceptible floater to be seen by the patient). There is also a tendency in some patients to look up or squeeze the eyelids during the injection, activating the Bell's reflex, [21] thus making an inferior injection location ideal. Once the needle is positioned in the eye, the medication should be injected in a steady slow to moderate fashion and then the needle removed in a single motion. A sterile cotton tip applicator may be used to tamponade the site to prevent vitreous reflux and theoretically prevent a tract for bacterial entry into the eye [22]. To minimize pressure rise, it is recommended that an anterior chamber paracentesis be performed if more than 0.1 mL is injected into the eye.

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Post-Procedure Care

There is no data that convincingly supports the use of antibiotics after injection [23]. Post-injection antibiotics can increase antibiotic resistance and should be avoided. If the eye is irritated and requires lubrication, sterile artificial tears can be used.

Patients should be instructed to call immediately if they notice a red eye, eye pain, decreased vision or light sensitivity. They should not rub their eye or expose it to possible sources of bacterial contamination, like hot tubs and swimming pools.

Conclusion

The above recommendations describe what is commonly used in today's retinal practice to minimize the potential for infectious complications after IVIs. When performed thoughtfully and correctly, IVIs are a low risk procedure with great effectiveness for treating significant diseases of the eye.

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