

**Review Article**

# Intravitreal Injections of Steroids

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**Abstract:** Intravitreal injection of steroid was first introduced to prevent inflammatory reaction following retinal detachment surgery. Since then it has been used for different conditions with inflammatory processes at the back of the eye. However, the side effects of steroids in general made their use limited, especially with the last few years' introduction of anti-endothelial vascular growth factor injection.

**Keywords:** Steroids, Intravitreal, Anti-endothelial, Growth Factor, Uveitis, Cystoid, Macular, Edema

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## 1. Introduction

Intravitreal injections of Triamcinolone acetonide (TA) were first used by Machemer to prevent proliferative vitreoretinopathy (PVR) after retinal detachment surgery [1]. Visual loss in proliferative vitreoretinopathy is a result of a combination of photoreceptor degeneration and apoptosis, neural remodeling, and epi- and subretinal pathology. Photoreceptor regeneration is prevented by inflammatory processes resulting in subretinal gliosis. To prevent gliosis, help the photoreceptors to regenerate and hence eyesight remains preserved [2]. Subretinal gliosis as well as epiretinal membranes lead to the development of Cystoid Macular edema, another reason for visual loss in PVR.

Since the very early start, steroids have been used in different conditions. Cystoid macular edema (CME) was one of the early uses of steroids both intravitreally and by sub-Tenon's injection [3]. CME can develop secondary to a few other ocular conditions such as diabetic retinopathy, Central and Branch retinal vein occlusion, radiation retinopathy, uveitis, retinitis pigmentosa and post-cataract surgery [4, 5].

## 2. Discussion

### 1) Steroids injected intravitreally:

Triamcinolone is the most common steroid to be injected intravitreally [6]. The long-acting effect of the medicine gives it priority over shorter-acting steroids such as dexamethasone [7]. Triamcinolone comes in a suspension form which can

linger in the visual axis, impairing vision. The longer-term effect has its known side effects on eye pressure as well as cataract formation. Both are related to steroids in general [8].

### 2) Technique of Intravitreal injection:

Intravitreal injection is a procedure that is normally dreaded by patients once it is suggested as a treatment. The idea of a needle going into someone's eye is beyond belief for many people. Therefore, it is absolutely necessary to make this procedure as pain-free as possible. The other important point here is to inject intravitreally with minimal risk of spreading infection. Injection when infection is suspected should be prohibited at all costs. There is no need to increase the risk of an elective procedure which won't affect the course of treatment significantly if delayed by a few days until infection subsides.

Topical anesthesia can provide complete analgesia if administered properly. The patient will be given topical proxymetacaine or tetracaine at least three drops with about a minute between each. The last drop will be mixed with povidone iodine 5%. This will be a good test for the anesthesia. If the last drop still stings, this means more anesthetic drops are still needed.

Once the three drops are completed, the eye is prepped in the fashion preferable to the surgeon. As a must, the area around the eye should be cleaned with Povidone Iodine 10%. A speculum is inserted to keep the eyelid open so the patient won't worry about this. I find it helpful to give injections with the eye covered by a drape with a hole in the middle over the eye to be injected. The drape has the benefit of covering the other eye. Although most patients would prefer shutting both eyes

throughout the procedure, there will be a few who prefer to sneak a peak at what every one in the room is doing to their eyes. Some patients, especially those with claustrophobia would find that drape even for the few seconds of the injection, completely unpleasant. In those patients I tend to cut a hole in the drape for the other eye to be open and for them to be able to get the feeling of an open space around them.

After prepping, draping and speculum insertion, the site for injection is chosen. Injections can be given anywhere in the eye as long as you are giving it within the 3.5-4 mm distance from the limbus depending whether the eye is pseudophakic or phakic respectively. However, there are areas that are more favorable than others. Giving the injections in the horizontal meridian is normally more painful even with the most intense topical anesthesia. The horizontal meridian is when the long posterior ciliary nerve run their course to enter the sclera. Injections in the right eye can be given in the superior or inferior temporal quadrants for the right handed surgeon and superior or inferior nasal quadrants for left handed surgeons. Injections in the left eye would follow the same principle. Superior or inferior temporal quadrant for the left handed surgeon and superior or inferior nasal quadrant for the right handed surgeons. Inferior quadrants I more referable in my experience as they are location inferior to the macula. Should a retinal tear happen during the procedure, it is less likely to cause macula off retinal detachment if the tear is inferior than superior to the macular specially for the right handed surgeons. Another benefit of injection in the inferior quadrant is when injection Triamcinolone suspension which tend to obstruct vision if it is suspended in the middle of the vitreous gel in front of the macula right in the visual axis. With experience Both hands can be trained to give injections in either side.

Once the site of injection is decided, a cotton tipped bud is soaked with tetracaine eye drops and pressed gently on the conjunctiva where the injection is likely to go. This bud should be left on the conjunctiva for about thirty seconds. Distance from the sclera is then measure and injection is done as indicated. The needle should be directed to the optic disc and should be pushed all the way into the eye. Some surgeons specially trainees find it intimidating having to insert the needle all the way in. However knowing the length the needle used and the length of the globe should eliminate such fear. Should the surgeon be not comfortable inserting the needle all the way in visual inspection of the tip of the needle is recommended prior to injecting any fluid into the eye.

Following injection visual inspection of the optic nerve head is recommended. Normally with other intravitreal injections vision testing by hand movement or counting fingers can suffice. However with steroid injections specially triamcinolone and the larger done of 0.1 ml it is recommended to inspect the optic nerve head visually before concluding the injection. Should the optic nerve venous pulsations remain, anterior chamber paracentesis would be recommended.

It is now a common consensus among injectors not to give any antibiotic before or after intravitreal injections. There is no need either to cover the eye after the injection. Patients should be warned not to rub their eye in the first 15 minutes

after injections as the eye is normally heavily anesthetized after this procedure and rubbing can cause a corneal abrasion that can be a nuisance for a few days after a simple procedure.

### 3. Conclusion

Intravitreal injection of steroid used to be a common practice in many eye conditions specially those involving subretinal gliosis. The immediate and long term side effects of steroid intravitreal injection have made them less favorable to many eye surgeons lately. The introduction of Anti-endothelial vascular endothelial growth factor medicine has made it safer to use those medicines over steroids. However steroids are becoming more reserved for non-responsive cases [9, 10].

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