



Intravitreal Injection Techniques

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Abstract

Povidone iodine is a commonly used antiseptic solution in ophthalmology for preoperative disinfection and treatment of ocular infections. Symptoms of corneal toxicity include pain, redness, tearing, photophobia, and blurred vision. Diagnosis of corneal toxicity is made by examining the eye under cobalt blue light after fluorescein staining. Treatment for corneal toxicity involves discontinuing the use of povidone iodine and providing supportive care such as lubricating eye drops and antibiotics if there is an associated infection. Prevention of corneal toxicity involves using povidone iodine according to recommended guidelines and avoiding prolonged or excessive use.

Keywords: Povidone Iodine; Ophthalmology; Eye; Endophthalmitis

Intravitreal Injection techniques

Administering intravitreal injections is a quick and simple process, but it must be done accurately to prevent any unwanted complications that could result in visual impairment.

Preparing your patient

Prior to the injection, there are both in-office and pre-injection preparations that need to be made. During the in-office examination, any inflammation on the ocular surface, such as conjunctivitis or blepharitis, should be ruled out. Patients should also be advised not to discontinue their anticoagulant medication. Pre-injection preparation involves educating the patient on remaining still and avoiding sudden movements of the eye or head during the procedure.

Preparing the eye

Before injecting the eye, a nurse applies a topical anesthetic like proparacaine or lidocaine through injection. Then, the nurse disinfects the conjunctiva with a 5% povidone iodine eye drop. To prevent subconjunctival hemorrhage, the author suggests using brimonidine eye drops to bleach the conjunctiva. The nurse can

also use a 10% povidone iodine eyelid drape until the physician is ready to administer the injection.

Preparing the physician

The physician and their assistant should wear masks and the physician should prepare as if for surgery, including wearing sterile gloves. The physician should also clean their eyelids with 10% povidone iodine three times and wait a few minutes. The author wears a sterile gown and gloves, and all instruments are sterilized with an autoclave.

Post injection complications

The use of intravitreal injections has greatly improved the treatment of diabetic macular edema and retinopathy, with many clinical trials proving their safety and effectiveness. Despite this, these injections can result in severe complications that may lead to vision loss or serious systemic events. It is crucial to take measures to prevent these complications and handle them appropriately to avoid any negative impact on health.

Subconjunctival hemorrhage

A subconjunctival hemorrhage is a common complication that can occur after an injection, where the conjunctival vessels are ac-

cidentally pierced. This is more likely to occur in patients who are taking anticoagulants, but it is not a serious complication. However, it may cause frustration in some patients.

Prevention

To prevent this complication, care should be taken to avoid piercing the conjunctival vessels during injection. Another way to prevent it is to use Brimonidine eye drops before injection, which will constrict the conjunctival vessels.

Treatment

There is no need for treatment for a subconjunctival hemorrhage, and the patient should not be advised to stop taking anticoagulants. Observation is sufficient.

Corneal abrasion

Corneal abrasion is a painful complication that occurs when the corneal epithelium is scratched by instruments such as a lid speculum. Symptoms include painful eyes and sometimes swollen eyelids. The condition can be diagnosed using cobalt blue light after fluorescein staining.

Prevention

To prevent corneal abrasion, care should be taken to avoid scratching the corneal epithelium during instrumentation.

Treatment

Treatment involves covering the affected eye with a patch for 24 hours, and the epithelium usually heals without causing any corneal scarring.

Conjunctivitis

Conjunctivitis is an irritating complication that causes pink eye, a feeling of grittiness, and discharge. It is usually caused by a secondary infection from eye drops used during or after an injection, particularly if the drops touch the eyelashes.

Prevention

To prevent conjunctivitis, fresh eye drops should be used during injections and unnecessary eye drops should be avoided after injections.

Treatment

Conjunctivitis is treated with topical antibiotics such as moxifloxacin q.i.d.

Corneal toxicity

Corneal toxicity is a chemical trauma caused by excessive use of topical povidone iodine, resulting in symptoms similar to corneal abrasion, such as blurred vision and punctate corneal erosions. It is diagnosed using cobalt blue light after fluorescein staining.

Prevention

To prevent corneal toxicity, excessive use of povidone iodine eye drops should be avoided, and the concentration of povidone iodine should be no more than 5%. Povidone iodine should also be promptly irrigated from the conjunctival sac after injection.

Treatment

Corneal toxicity can be treated with topical preservative-free lubricants.

Povidone iodine allergy

Some individuals may develop an allergic reaction to povidone iodine, which causes itchiness, swollen eyelids, and conjunctival chemosis.

Treatment

If an allergic reaction occurs during injection, povidone iodine should be cleaned from the skin and irrigated from the conjunctival sac. Subconjunctival injection of dexamethasone will reduce symptoms, along with systemic antihistamines.

Post injection elevated intraocular pressure and cataract formation

Elevated intraocular pressure (IOP) can cause damage to the optic disc if it is prolonged and not managed properly, and cataract formation is usually a complication associated with intravitreal steroids [1] more than anti-VEGF intravitreal injection. If it happens with anti-VEGF, the reason is usually the contraction of the fibrovascular membrane at the angle. Elevated IOP can be asymptomatic or can cause halos around light, painful eyes, reduced vision, and corneal edema.

Prevention

To prevent elevated IOP, careful inspection of the fibrovascular membrane at the angle and elevated IOP in patients with severe peripheral retinal ischemia or rubeosis iridis is necessary when planning to use anti-VEGF. When using steroids, patients should

not have a history of glaucoma. A steroid provocation test can be done to determine whether steroids will elevate IOP or not. It is noteworthy that the dexamethasone implant has a more predictable IOP elevation post-injection than other agents.

Treatment

Elevated intraocular pressure (IOP) can be treated with topical antihypertensive eye drops in mild to moderate cases, while more severe cases may require surgical intervention such as trabeculectomy or implantation of an Ahmed valve. Cataract formation can be managed by phacoemulsification and IOL implantation [2].

Hyphema

Although, it is a rare complication but can cause reduced vision and sometimes pain due to increased IOP, the main reason of developing hyphema is inadvertently injecting through ciliary body.

Prevention

Hyphema, although rare, can cause reduced vision and sometimes pain due to increased IOP. It is best prevented by using calipers to measure 3.5 mm from the limbus in aphakic or pseudophakic eyes or 4 mm in phakic eyes when injecting.

Treatment

Treatment for hyphema involves topical steroids and cycloplegia in mild to moderate cases and antihypertensive eye drops if IOP is increased. In severe, recalcitrant cases with high IOP and corneal staining, an anterior chamber wash is necessary.

Posterior capsular rupture

Posterior capsular rupture can occur during intravitreal injection if the needle is directed toward the lens instead of the center of the eye. This complication can lead to cataract formation and reduced vision. Patients who have been treated with intravitreal injections are more prone to posterior capsular rupture during cataract surgery than other patients [3].

Prevention

To prevent posterior capsular rupture, it is best to use calipers to measure 4.0 mm from the limbus in phakic eyes and direct the needle toward the center of the eye when injecting.

Treatment

Cataract removal with 3-piece IOL implantation is the preferred treatment for cataracts, but surgeons should be careful when operating on eyes with a history of intravitreal injections.

IRITIS

Iritis is an uncommon complication that presents with mild to no ocular pain and mild to moderate transient reduced vision. It is caused by poor storage of vials containing medication, exposure to high temperatures, counterfeit vials, or injecting patients with a history of uveitis [4].

Prevention

To prevent iritis, vials should be stored at temperatures between 4-8 C and obtained from trusted sources. Active uveitis patients should not be injected. Iritis can be treated with topical steroids and cycloplegia, with a good prognosis and no ocular damage.

Treatment

Endophthalmitis is an uncommon complication that can cause permanent damage.

Endophthalmitis

It usually presents with moderate to severe ocular pain, visual loss, congested conjunctiva, fibrin, hypopyon, vitritis, and retinal hemorrhages. Vitreous tap and B-scan are the best ways to diagnose endophthalmitis [4].

Endophthalmitis is caused by injecting under non-sterilized environments or contaminated patches.

Prevention

Preventing endophthalmitis starts with injecting under sterilized hoods, such as a sterilized room, and properly draping the eyelids and conjunctiva with povidone iodine. Patients and personnel should not speak during injection and should wear masks and sterile gloves after hand washing. A sterile speculum should be used to isolate the eyelashes, and sterilized equipment, such as calipers, should be used. Sterile needles and syringes should be used, and the stopper (vial rubber) should be disinfected before withdrawing medication. Obtaining vials from trusted sources can help avoid contaminated patches. Patients with blepharitis, conjunctivitis, or paraocular infections should not be injected.

Treatment

In cases of visual acuity counting fingers or better and absence of retinal detachment, prompt injection of 2 mg of vancomycin, 2 mg ceftazidime, and dexamethasone intravitreal is necessary after doing a vitreous tap and sending it for culturing to identify the offending organism [5]. If this treatment fails or visual acuity

is less than counting fingers or the case is associated with retinal detachment, pars plana vitrectomy with intravitreal antibiotics injection and sending vitreous samples for culturing is necessary. After identifying the offending organism, a sensitized antibiotic should be used in case of treatment failure. It is crucial to identify the source of infection by thoroughly obtaining swabs and culturing everything used during injection, such as instruments, needles, and medication, with the aim of eliminating the source of infection.

Retinal detachment

Retinal detachment causes painless visual loss, which can present either rhegmatogenous or tractional. The former is usually caused by the physician injecting far from the limbus behind the ora serrata or missing an existing tear, hole, or small retinal detachment in the periphery during pre-injection examination. Tractional retinal detachment is caused by the contraction of the fibrovascular membrane due to the rapid regression of neovascularization from anti-VEGF injection.

Prevention

Preventing rhegmatogenous retinal detachment involves carefully examining the retinal periphery before injecting and using calipers to measure 3.5 mm from the limbus in aphakic or pseudophakic eyes or 4mm in phakic eyes while injecting. Tractional retinal detachment can be prevented by avoiding patients with tractional retinal detachment threatening the macula before injection. However, AntiVEGF can be administered before planned vitrectomy for tractional retinal detachment to reduce intraoperative complications.

Treatment

Pars plana vitrectomy with gas tamponade or silicon oil is the treatment for retinal detachment.

Ethical Approval

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