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OCT 01, 2004

Intravitreal Kenalog Injections

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Retina/Vitreous

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Intravitreal injections of triamcinolone acetate (Kenalog) have become increasingly popular for treating a broad spectrum of retinal diseases. Risks of intravitreal Kenalog injections, such as IOP elevation, cataract and infection, must be weighed against the potential benefits.

Indications

We use intravitreal Kenalog injections to treat the following:

- pseudophakic cystoid macular edema that fails to respond to conventional therapy;[1]
- clinically significant diffuse diabetic macular edema that fails to respond to conventional laser treatment;[2]
- macular edema associated with branch retinal vein occlusion that fails to respond to laser treatment (or where laser has not been shown to be useful);[3]
- nonischemic central retinal vein occlusions associated with decreased vision with or without macular edema;[4] and
- select cases of wet AMD, often in combination with photodynamic therapy with verteporfin (Visudyne).[5,6]

The efficacy of Kenalog on vascular permeability and new vessel growth may involve multiple mechanisms, including reduced tight junction permeability and downregulation of the effects of vascular endothelial growth factor.

Injection Technique

Our technique is as follows:

1. After a full discussion of the risks, benefits and alternatives to treatment and signing of an informed consent, **pretreat the eye for injection** with fluoroquinolone antibiotic drops four times daily for three consecutive days prior to injection and then four more times (one drop every three to five minutes) on the day of injection. We routinely use a fluoroquinolone given its broad spectrum and evidence for ocular penetration.

2. While the antibiotics are being instilled, **withdraw 0.3 cc of Kenalog** (40 milligrams per milliliter) into a sterile TB syringe attached to a 27-gauge needle. We shake the Kenalog bottle first so that a defined amount is withdrawn into the syringe. Next, place a fresh 25-, 27- or 30-gauge needle on the syringe and position the syringe upside down (needle upward), which allows the Kenalog crystals to precipitate against the plunger in the lower portion of the syringe.

3. Once the Kenalog has settled, **discard the supernatant from the syringe** by slowly advancing the plunger to the 0.05 ml mark—this is about the amount of precipitated Kenalog contained in the syringe (about 12 mg total). Previous studies suggest that the preservative contained within the Kenalog solution may be toxic to the retina and that decanting the supernatant may reduce the preservative dose. By injecting just 0.05 ml, the need for an anterior chamber paracentesis to normalize the IOP following injection is reduced.

4. **Apply a drop of topical anesthetic.** Place a short sterile cotton swab soaked in 4 percent lidocaine in the cul-de-sac of the lower eyelid at the 5 o'clock position and leave it in place for five minutes. Repeat this step with a fresh cotton swab. (Note: If you press on the eye for 20 seconds with the swab as the eye is anesthetized and repeat, the eye usually will be both soft and numb.)

5. **Instill a fresh drop of topical anesthetic** and use a sterile cotton swab soaked in Betadine to apply several drops of undiluted Betadine into the lower conjunctival cul-de-sac.

6. **Rinse a sterile lid speculum** that has been presoaked in glutaraldehyde (Cydex) in nondilute Betadine and insert

7. **Inject the Kenalog through the pars plana** approximately 3.5 millimeters posterior to the limbus. This distance can be estimated by an experienced vitreoretinal surgeon but should be measured with a sterile caliper if there is uncertainty.

The tip of the TB syringe (without needle) also can be used to measure: Compression perpendicular to the sclera with the tip of the TB syringe tangential to the limbus will leave a circular mark, the back edge of which is 3.5 to 4 mm posterior to the limbus. The Kenalog is then injected through the pars plana with the needle directed toward the optic nerve.

Make a "z"-shaped puncture track by penetrating the conjunctiva first and then moving the needle slightly before penetrating the sclera. When the needle is removed, there is occasionally an efflux of clear vitreous fluid from the injection site and the creation of a small conjunctival bleb.

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8. After the injection, **perform indirect ophthalmoscopy** to confirm the location of the Kenalog within the vitreous cavity—often in the vitreous base region—and to verify perfusion of the optic nerve. Continue to check vision along with IOP until the latter is below 30 mmHg. If the central retinal artery is not pulsating or there is vision loss due to high pressure, perform an anterior chamber paracentesis.

9. **Patch the eye overnight.** Discharge the patient with specific instructions to contact the office if he or she experiences increasing blurred vision, pain or discharge. We warn patients that they may see floaters, particularly in the upper visual field for one or two weeks and may notice a subconjunctival hemorrhage.

We contact patients one day and one week after injection and ask specifically about vision, pain, discharge or any other problems.

Risks

Any intraocular injection carries the risk of vision loss from infection, retinal detachment or hemorrhage. Potential risks of intravitreal Kenalog injections include the following:

IOP rise. A number of researchers have noted Kenalog-induced increases in IOP, with the reported incidence as high as 50 percent.[7] Fortunately, when this occurs, one topical glaucoma drop alone is adequate for the management in most cases. Patients with a history of glaucoma are at higher risk due to the higher incidence of “steroid responders” in this patient population. Approximately 1 percent of patients with a pressure rise can develop intractable glaucoma requiring trabeculectomy or a glaucoma drainage device, particularly in cases of central retinal vein occlusion. We avoid injecting steroids in those patients who are already on two or more glaucoma drops.

Cataract. Cataracts may occur from direct contact with the lens either during the intravitreal injection or during an anterior chamber paracentesis performed for elevated IOP. We have not personally observed this complication, but it is possible. More commonly, progressive or new posterior subcapsular cataract is observed following Kenalog injections due to the glucocorticoid effects of the drug itself.

It is thought that multiple Kenalog injections are required for the development or progression of cataract but a single injection in susceptible patients may increase or cause cataract. Since cataract surgery may be required to rehabilitate vision, it should be kept in mind that inflammation related to the surgery may aggravate retinal edema and vasoproliferation.

Endophthalmitis. Endophthalmitis following intravitreal Kenalog injections is rare, with an incidence of 1 in 500 to 1 in 1,000. Included among these are cases of pseudoendophthalmitis or sterile endophthalmitis, which are likely the result of an inflammatory response to a preservative in the Kenalog formulation. Concentrating the Kenalog crystals and removing the supernatant may reduce the risk of an inflammatory response.

Sterile and infectious endophthalmitis can be differentiated in part by the time of onset of signs and symptoms. In the cases of sterile endophthalmitis the onset is typically one to two days following injection; in contrast, symptoms of infectious endophthalmitis typically begin four to 14 days following injection.

The steroid itself may suppress the inflammation and pain associated with cases of infectious endophthalmitis, which may complicate making the diagnosis.

Vitreous hemorrhage. We have had a few cases of vitreous hemorrhage following Kenalog injections. In each instance, the patient was on anticoagulant therapy; the most severe cases were associated with the use of clopidogrel bisulfate (Plavix). Vitrectomy was required in some cases to clear the persistent hemorrhage, which was dense enough to cause count fingers or hand motion vision.

Patients taking warfarin seem less prone to hemorrhage, although a randomized study of sufficient size would be required to assess the risk of anticoagulant therapy.

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1 Scott, I. U. et al. *Am J Ophthalmol* 2003: 136(4):737–739.

2 Jonas, J. B. et al. *Am J Ophthalmol* 2003; 121(1):57–61.

3 Chen, S. D. et al. *Br J Ophthalmol* 2004; 88(1):154–155.

4 Park, C. H. et al. *Am J Ophthalmol* 2003; 136(3):419–425.

5 Spaide, R. F. et al. *Ophthalmology* 2003; 110(8):1517–1525.

6 Jonas, J. B. et al. *Br J Ophthalmol* 2003; 87(4):462–468.

7 Jonas, J. B. et al. *Br J Ophthalmol* 2003; 87(1):24–27.

Drs. Gallemore and Boyer are with the Retina Vitreous Associates Medical Group in Los Angeles. *They acknowledge Hector Jimenez for his expert assistance with photography.*

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