

The Final 2%

An overview of the intraoperative retinal complications of cataract surgery.

BY J. MICHAEL JUMPER, MD, AND H. RICHARD MCDONALD, MD

Cataract surgeons have many reasons to be proud. With constant refinements in technique and technology, theirs is the most successful of all surgical procedures in medicine. Most studies report an intraoperative complication rate in cataract surgery of less than 2%.¹ The reason to obsess over this final 2% is the same reason that there is a 98% “uncomplicated” rate.

The large volume of cataract surgery worldwide leads to such a rapid pace of innovation that the complications profile reported in the literature often differs from current practice. Regardless, knowing our history helps to avoid those pitfalls and to remind us that each new change or innovation in a surgical procedure may lead to an unforeseen problem. This article provides a brief overview of that final 2% in hopes of reducing that number.

COMPLICATIONS OF ANESTHETIC INJECTION

Anesthesia for cataract extraction has come full circle. Topical cocaine was replaced in the middle 20th century by retrobulbar injection anesthesia. Although the latter provides akinesia and excellent anesthesia, it risks perforation of the globe, injury to the optic nerve, damage to extraocular muscles, brainstem anesthesia, and orbital hemorrhage. Today, with a speedier procedure and greater control of the eye with phaco instruments, the trend of using topical with or without intracameral anesthesia has all but eliminated this risk.

The large-scale transition by cataract surgeons to topical anesthesia means that they now have less experience with the retrobulbar-injection anesthetic technique. We prefer peribulbar injections of anesthetic to retrobulbar injections. Our preferred intraoperative local anesthetic technique for vitreoretinal surgery is an injection into the sub-Tenon's space with a blunt cannula after a small conjunctival/Tenon's cut-down under topical anesthesia.

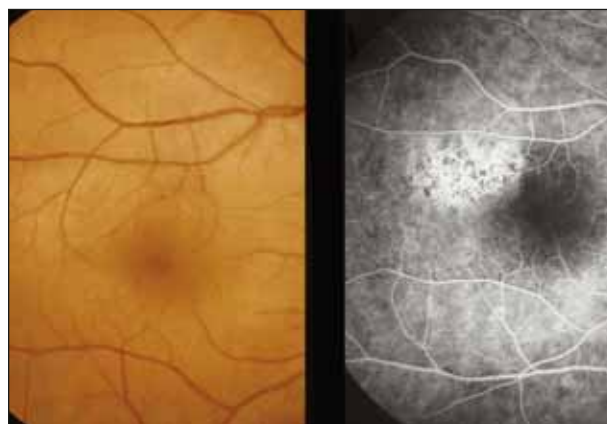


Figure 1. Microscope phototoxicity produces minimal pigmented stippling, which is only obvious with fluorescein angiography.

MICROSCOPE PHOTOTOXICITY

The first case of retinal phototoxicity undoubtedly occurred shortly after the operating microscope's first use for cataract extraction, although it was nearly 30 more years before this complication was fully recognized.² Light toxicity occurs in 3% to 7% of cataract cases. The duration of light exposure correlates with the risk of injury, although phototoxicity has even been reported in cases lasting just 11 minutes.³ The early finding of deep retinal whitening, with or without serous retinal detachment, resolves during the first 48 hours after surgery, and it is replaced by mottling of the retinal pigment epithelium during the next several weeks. These pigmentary changes may only be visible with fluorescein angiography as a window defect (Figure 1). Patients often complain of a paracentral scotoma but may be asymptomatic. Vision loss can be profound if the injury includes the foveola.

The most powerful tool in preventing phototoxicity is recognizing that every eye surgeon using any form of illumination may cause this complication. Although no

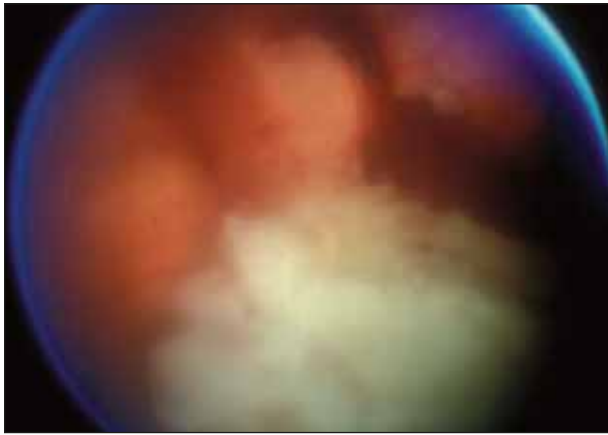


Figure 2. Cataract extraction in a patient with pseudoexfoliation left the lens nucleus and blood in the vitreous cavity.

single maneuver has proven 100% effective in avoiding light damage, limiting exposure time and intensity to that which is necessary, using some form of a light shield when possible, and properly filtering the delivered light are simple steps we should all remember.

RETAINED LENS MATERIAL

A primary cause of the final 2% complication rate for cataract surgery is the disruption of the lens capsule or zonules, which can displace lens fragments or the lens implant into the vitreous cavity (Figure 2). This complication occurs more often after phacoemulsification than other forms of cataract extraction. The early recognition of capsular rupture, the use of intracameral viscoelastic, and a careful anterior vitrectomy can prevent excessive traction on the vitreous base and the loss of lenticular fragments into the vitreous cavity. For anterior vitrectomy, we recommend a limbal entry for the vitreous cutter and a separate infusion line, both away from the cataract incision. It is best to avoid heroic maneuvers to rescue a falling lens fragment.

Larger nuclear lens fragments left in the eye are not well tolerated, and surgeons should remove them at a convenient time after the initial cataract surgery.⁴ Although even a small amount of lenticular material

can cause a severe inflammatory reaction and/or the elevation of IOP, fragments that are less than 20% of the total lens volume may be tolerated in the vitreous cavity and may be carefully observed. Pars plana vitrectomy for retained lens fragments can reduce IOP and improve patients' vision, but the outcome remains guarded because of a higher risk of cystoid macular edema, suprachoroidal hemorrhage, and retinal detachment in these individuals.⁵

Suprachoroidal Hemorrhage

Intraoperative suprachoroidal hemorrhage has become less frequent due to ophthalmologists' transition to small-incision, closed-system cataract surgery.⁶ This devastating complication is often preceded by transient hypotony and choroidal effusion. Reported risk factors include advanced age, obesity, glaucoma, high myopia, cardiovascular disease, hypertension, anticoagulation therapy, and intraoperative tachycardia.⁷ Surgeons should be aware of the signs of intraoperative suprachoroidal hemorrhage, including a sudden increase in pain, a darkening of the red reflex, a shallowing of the anterior chamber, and a forward prolapse of the posterior ocular structures.

It is imperative to close the cataract incision rapidly to prevent an expulsive choroidal hemorrhage. Subsequent management strategies are controversial. Some practitioners advocate immediate posterior-drainage sclerotomies in hopes of decreasing IOP and enabling further postoperative drainage. Secondary surgery for further drainage is reserved for those patients with apositional choroidals or macular involvement, and the procedure is timed to coincide with liquefaction of the blood, typically 7 to 14 days postoperatively.

For choroidal drainage, we isolate the rectus muscles with silk ties for better exposure. After placing infusion via the limbus with a self-retaining anterior chamber maintainer, we perform a radial scleral cut-down of 4mm in length, approximately 5mm from the limbus, in the quadrants with hemorrhage. Manipulating the sclerotomy's edges can increase flow and help clear larger clots. We use indirect



Figure 3. Retinal whitening and a cherry-red spot, which corresponds to a loss of all retinal blood flow, from gentamicin toxicity caused macular infarction.

ophthalmoscopy to verify an adequate removal of blood. The visual prognosis is guarded, especially in those cases requiring reoperation.

Aminoglycoside Retinal Toxicity

Even when properly administered at the intended dose, the intraocular injection of aminoglycoside antibiotics (gentamicin sulfate or amikacin) can lead to macular infarction.⁸ Damage is thought to be due to a localized increase in the drug's concentration in the dependent area of the retina, typically the macula (Figure 3). Despite the excellent gram-negative coverage and cost effectiveness of these drugs, we feel that they should never be used in intraocular surgery. Ceftazidime is a safer alternative for endophthalmitis care and infectious prophylaxis.

CONCLUSION

The superior outcomes of modern cataract extraction are the envy of all other ophthalmic surgeons. Constant refinement has, in most cases, made the procedure so painless and rapid that the patient forgets its invasiveness and the potential risks involved. It is our job to gently remind both the patient and ourselves that problems can and do occur. We hope that the final 2% approaches zero with time. ■

J. Michael Jumper, MD, is the retina service chief at the California Pacific Medical Center in San Francisco and is an assistant clinical professor of ophthalmology at the University of California, San Francisco. Dr. Jumper may be reached at (415) 972-4600; wcr@westcoastretina.com.



H. Richard McDonald, MD, is the retina fellowship co-director at the California Pacific Medical Center in San Francisco and is an associate clinical professor of ophthalmology at the University of California, San Francisco.



Dr. McDonald may be reached at (415) 972-4600; wcr@westcoastretina.com.

1. Masker S, Fine IH, Kidwell TP, et al. Cataract in the adult eye. *AAO Preferred Practice Patterns*. Washington, DC: American Academy of Ophthalmology; 2001.
2. McDonald HR, Irvine AR. Light-induced maculopathy from the operating microscope in extracapsular cataract extraction and intraocular lens implantation. *Ophthalmology*. 1983;90:945-951.
3. Kleinmann G, Hoffman P, Schechtman E, Pollack A. Microscope-induced retinal phototoxicity in cataract surgery of short duration. *Ophthalmology*. 2002;109:334-338.
4. Kim JE, Flynn HW Jr, Smiddy WE, et al. Retained lens fragments after phacoemulsification. *Ophthalmology*. 1994;101:1827-32.
5. Scott IU, Flynn HW Jr, Smiddy WE, et al. Clinical features and outcomes of pars plana vitrectomy in patients with retained lens fragments. *Ophthalmology*. 2003;110:1567-1572.
6. Ling R, Cole M, James C, et al. Suprachoroidal haemorrhage complicating cataract surgery in the UK: epidemiology, clinical features, management, and outcomes. *Br J Ophthalmol*. 2004;88:478-480.
7. Speaker MG, Guerriero PN, Met JA, et al. A case-control study of risk factors for intraoperative suprachoroidal expulsive hemorrhage. *Ophthalmology*. 1991;98:202-209.
8. Campochiaro PA, Lim JJ. Aminoglycoside toxicity in the treatment of endophthalmitis. The Aminoglycoside Toxicity Study Group. *Arch Ophthalmol*. 1994;112:48-53.

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