

Approaching Eyes With Intraoperative Floppy Iris Syndrome

By David F. Chang, MD



Four years after intraoperative floppy iris syndrome (IFIS) was first described,¹ there is still no clear preference among ophthalmologists for the surgical management of these cases, according to a survey conducted last year by the ASCRS Cataract Clinical Committee.² In fact, when asked to name their preferred single method for IFIS, the most common response (33%) was “always employ multiple strategies” (Figure 1).

One reason for the diversity of opinions and approaches is the variable range of IFIS severity. A prospective multicenter study of cataract surgery in 167 consecutive eyes of patients on tamsulosin rated IFIS as mild (billowing only), moderate (billowing and intraoperative miosis), or severe (billowing, miosis, and iris prolapse).³ Using this classification, 10% of the tamsulosin cases had no IFIS, 17% had mild IFIS, 30% had moderate IFIS, and 43% had severe IFIS. In general, I anticipate severe IFIS when the patient is taking tamsulosin and the pupil dilates poorly preoperatively. Another warning sign is billowing of the iris immediately upon the instillation of intracameral lidocaine. In contrast, if the pupil dilates well preoperatively, I expect mild-to-moderate IFIS, but I am still prepared for iris

prolapse. Patients taking nonselective alpha-1 antagonists or who have stopped their alpha blockers for several months are most likely to display mild-to-moderate IFIS.⁴

Considering the variable severity of IFIS, it makes sense that certain strategies, such as pharmacologic approaches, may work well in some eyes but poorly in others.^{2,4} Clearly, it is to surgeons' advantage to be familiar with several different strategies from which they may select according to the situation or that they may use in combination to achieve complementary benefits. Intracameral alpha agonists, such as epinephrine, illustrate this point well. In some eyes, injecting epinephrine results in signifi-

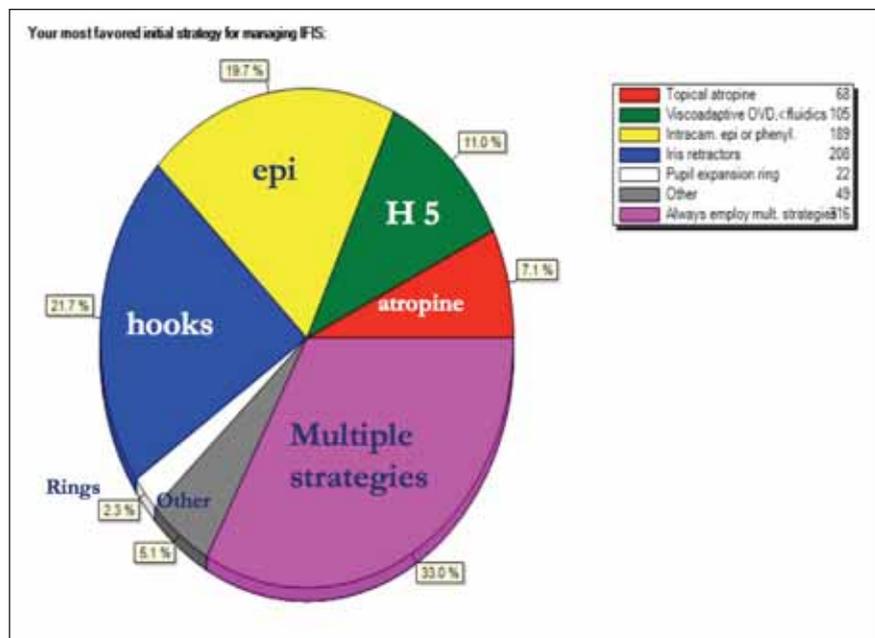


Figure 1. Responses to the 2008 poll of the ASCRS membership in which ophthalmologists were asked to name their preferred initial strategy for IFIS.

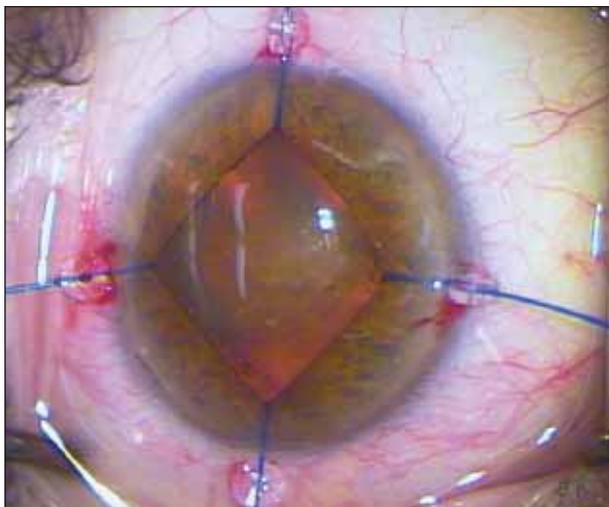


Figure 2. The surgeon places reusable 4-0 polypropylene iris retractors in a square configuration in the eye of a patient on tamsulosin therapy. At the bottom, the temporal iris retractor is within a separate paracentesis track just behind the clear corneal incision.

cant mydriasis and rigidity of the iris, whereas it has little effect on pupillary size or billowing or prolapse of the iris in other eyes.

STRATEGIES

Using intracameral epinephrine is both safe and inexpensive, and if the pupil dilates moderately well, I routinely inject this agent prior to initiating the capsulorhexis. It may take a minute before the pupil slowly dilates, but even if it does not, the alpha agonist will often increase tone in the iris dilator muscle, thereby reducing billowing and the tendency for prolapse or further miosis. A 1:4000 epinephrine solution is made by adding 0.2 mL of commercially available 1:1000 epinephrine to 0.6 mL of plain balanced salt solution in a 3-mL disposable syringe. The late Joel Shugar, MD, determined that this dilution raised the acidic pH of the stock epinephrine solution to physiologic levels, and I have used this formulation more than 200 times without evidence of endothelial toxicity.⁵ American Regent, Inc. (Shirley, NY), and Cura Pharmaceutical Co., Inc. (Eatontown, NJ), produce a bisulfite-free epinephrine solution.

If mydriasis remains borderline adequate after the injection of epinephrine, Healon5 (Abbott Medical Optics Inc., Santa Ana, CA) can then be used to mechanically expand the pupil further.⁶ Viscomydriasis facilitates the capsulorhexis and combines with the epinephrine-induced iris rigidity to block iris prolapse. Keeping the aspiration vacuum and flow rate to a mini-

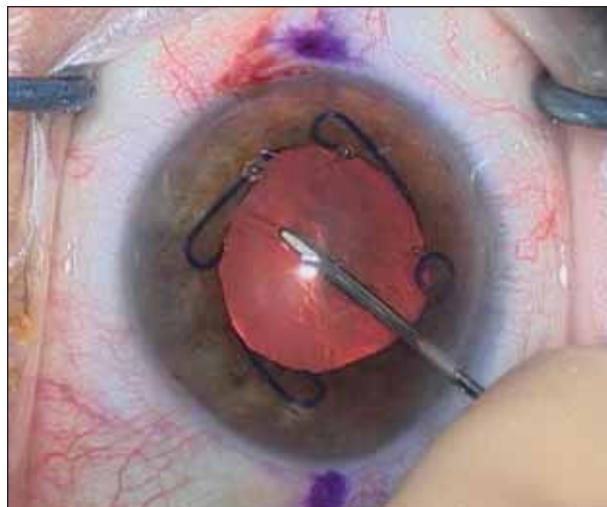


Figure 3. The Malyugin ring does not impede the access of the irrigating cystotome.

mum prolongs the presence of Healon5 in the anterior chamber, as does the strategy from Wendell Scott, MD, of adding a dispersive ophthalmic viscosurgical device over the lens to displace the Healon5 peripherally and delay its aspiration.

When the pupil dilates poorly preoperatively (eg, 3 to 5 mm in diameter), I have found it easiest to proceed directly to mechanical devices, which are more difficult to insert following the creation of the capsulorhexis. Both iris retractors and the Malyugin ring (MicroSurgical Technology, Redmond, WA) provide 100% assurance that the pupil will be adequately large and will not constrict during surgery. These devices also allow surgeons to use their routine ophthalmic viscosurgical device, phaco technique, and fluidic parameters. For example, I would rather not give up the higher vacuum and flow parameters that I prefer for dense nuclei. This guarantee of adequate pupillary diameter and control is helpful in the presence of other risk factors such as pseudoexfoliation, weak zonules, brunescient nuclei, or a poor red reflex. Other issues to consider are the individual surgeon's level of confidence with small pupils or with functionally one-eyed patients.

Iris retractors should be placed in a diamond configuration, as described by Oetting and Omphroy⁷ (Figure 2). The subincisional retractor occupies a separate paracentesis tract that is located just posterior to the temporal clear corneal incision. Because it pulls the iris down and behind the phaco tip, this configuration provides excellent access to subincisional cortex and avoids tenting the iris up in front of the phaco tip, as occurs with a square configuration of retractors. The nasal iris retractor also provides excellent visualization for the chopper's place-

ment. My preference is to use 4–0 polypropylene iris retractors (available from Katena Products, Inc. [Denville, NJ], and FCI Ophthalmics, Inc. [Marshfield Hills, MA]), because they are stiffer and easier to manipulate than 6–0 nylon retractors. The increased girth and sturdiness of 4–0 polypropylene iris retractors also make them autoclavable and reusable. Finally, the IFIS pupil is not fibrotic and typically can be maximally stretched with retractors without tearing the sphincter muscle. Iris retractors therefore provide the best surgical exposure of any method for managing IFIS.

The disposable 5–0 polypropylene Malyugin ring is my pupillary expansion ring of choice, and most surgeons will find it easier and faster to insert and remove than iris retractors⁸ (Figure 3). Because the iris drapes over the sides of the device, it creates a round pupil with a 6- or 7-mm diameter, depending on which of the ring's two sizes is used. The tip of the disposable injector goes through a 2.5-mm incision and is used both to place and remove the ring. Compared with bulkier plastic pupillary expansion rings, the thin profile of the Malyugin ring reduces the risk of accidental corneal or incisional trauma, and it does not impede instruments' access to the lens. There is no need for multiple paracentesis sites, which is advantageous in the presence of a bleb or pterygium, and the problem of iris hooks pushed against the lid speculum with a tight palpebral fissure is avoided. Finally, the smooth coils are very gentle on the pupillary margin, which minimizes depigmentation and damage to the sphincter. Because it is disposable, the Malyugin ring is more costly to use than reusable iris retractors.

CONCLUSION

Some combination of intracameral epinephrine, Healon5, and iris expansion devices enables me to handle the entire spectrum of IFIS severity. Knowing this, I neither stop the patient's systemic alpha blockers nor employ topical atropine preoperatively. In this way, these patients receive the same simple preoperative instructions as everyone else undergoing routine cataract surgery.

David F. Chang, MD, is a clinical professor at the University of California, San Francisco. He acknowledged no financial interest in the products mentioned herein, and he stated that his consulting fees from Abbott Medical Optics Inc., and Alcon Laboratories, Inc., are donated to the Himalayan Cataract Project. Dr. Chang may be reached at (650) 948-9123; dceye@earthlink.net.

1. Chang DF, Campbell JR. Intraoperative floppy iris syndrome associated with tamsulosin (Flomax). J Cataract Refract Surg. 2005;31:664-673.

2. Chang DF, Braga-Mele R, Mamalis N, et al. Clinical experience with intraoperative floppy-iris syndrome. Results of the 2008 ASCRS member survey. J Cataract Refract Surg. 2008;34:1201-1209.
3. Chang DF, Osher RH, Wang L, Koch DD. Prospective multicenter evaluation of cataract surgery in patients taking tamsulosin (Flomax). Ophthalmology. 2007;114(5):957-964.
4. Chang DF, Braga-Mele R, Mamalis N, et al; ASCRS Cataract Clinical Committee. ASCRS White Paper: clinical review of intraoperative floppy-iris syndrome. J Cataract Refract Surg. 2008;34(12):2153-2162.
5. Shugar JK. Intracameral epinephrine for prophylaxis of IFIS [letter]. J Cataract Refract Surg. 2006;32:1074-1075.
6. Arshinoff SA. Modified SST-USST for tamsulosin-associated intraocular floppy iris syndrome. J Cataract Refract Surg. 2006;32:559-561.
7. Oetting TA, Omphroy LC. Modified technique using flexible iris retractors in clear corneal surgery. J Cataract Refract Surg. 2002;28:596-598.
8. Chang DF. Use of Malyugin pupil expansion device for intraoperative floppy iris syndrome: results in 30 consecutive cases. J Cataract Refract Surg. 2008;34:835-841.

By Alan S. Crandall, MD



Since its first description by Chang and Campbell,¹ much has been learned regarding the mechanism and management of intraoperative floppy iris syndrome (IFIS), which can negatively affect the outcome of cataract surgery. Initially associated with the use of tamsulosin (Flomax; Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT) in male patients, the syndrome has been observed in women using the drug as well, and other pharmaceutical and homeopathic agents have been implicated. Because stopping the drugs is not effective in preventing IFIS, it is important to query patients about their previous use of these medications. Once aware of the potential for problems, surgeons have a number of effective options for their prevention.

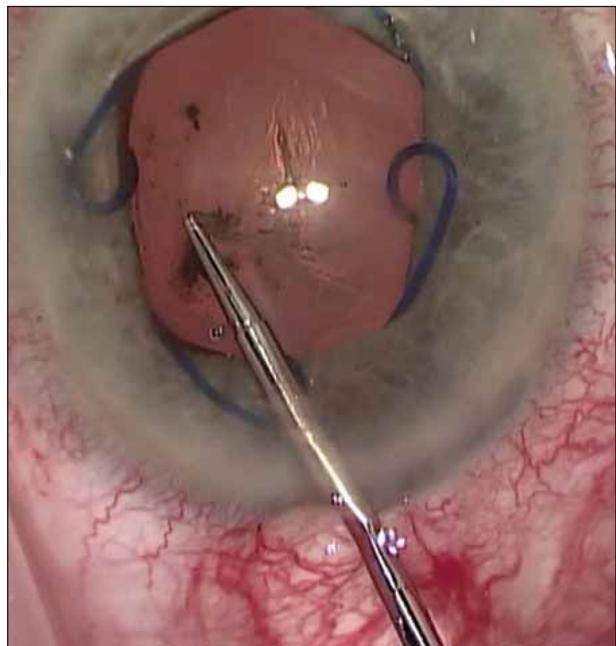


Figure 1. The Malyugin ring in place.



Figure 2. The Akahoshi Prechopper.

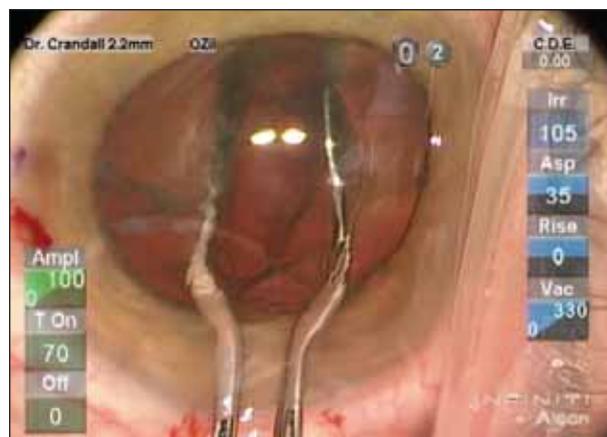


Figure 3. The quadrants performed.

OPTIONS

One strategy is to use intracameral lidocaine with epinephrine. I routinely use this mixture to dilate the pupil for cataract surgery and have found that it works well in eyes with IFIS (see *Dr. Crandall's Lidocaine/Epinephrine Formula*). In most cases, combining an ophthalmic viscosurgical device (OVD)—either DisCoVisc (Alcon Laboratories, Inc., Fort Worth, TX) or Healon5 (Abbott Medical Optics Inc., Santa Ana, CA)—with low flow and vacuum settings allows for uneventful surgeries. These OVDs represent a new generation of adaptive viscoelastic materials. Because they can be primarily dispersive in a setting of low flow and vacuum (< 25 cm/min and < 300 mm Hg) but cohesive with a higher flow rate, removing these OVDs at the conclusion of surgery is easy. They can thus help stabilize the anterior chamber and keep the iris from moving into the phaco port, especially in eyes with large pupils. Lowering the bottle during the procedure also decreases the risk for iris-related problems.

When the pupil does not dilate well, surgeons may employ a variety of devices to enlarge it, but it is important to avoid stretching the pupil, which will exacerbate

the floppy iris. I recently began using the Malyugin ring (MicroSurgical Technology, Redmond, WA) exclusively in these cases. The ring is available in two sizes to produce either a 6.0-mm or a 7.5-mm pupil. I like this device, because it is easily placed without further incisions and it has eight points of support to help stabilize the anterior chamber (Figure 1). The ring's removal at the end of the case is easy.

Another helpful adjunct in these cases is a prechopping phaco technique. I use a variety of prechoppers but prefer an Akahoshi type that has been designed for 2.2-mm incisions (ASICO LLC, Westmont, IL). I use a prechopping phaco technique in most of my routine cases but find it invaluable in IFIS cases. Because flow is a major cause of trouble in these eyes, dividing the nucleus into quadrants prior to introducing the phaco handpiece reduces the amount of balanced salt solution used and facilitates the surgery (Figures 2 and 3).

CONCLUSION

If unanticipated, IFIS can cause significant problems during cataract surgery. Originally associated with the use of tamsulosin, other potential agents may introduce similar surgical issues. Ophthalmologists must be careful in their preoperative assessment of patients and, whenever possible, disseminate information about the syndrome and its management to their colleagues.

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1. Chang DF, Campbell JR. Intraoperative floppy iris syndrome associated with tamsulosin. *J Cataract Refract Surg.* 2005;31(4):664-673.

DR. CRANDALL'S LIDOCAINE/EPINEPHRINE FORMULA

Preservative-free lidocaine 1% 30 mL

Epinephrine 1:1000 mL amps (1 mL)

1. Withdraw 0.3 mL lidocaine 1% from vial and discard.
2. Add 0.3 mL epinephrine to vial.
3. Label as expiring in 24 hours.

By Roger F. Steinert, MD



My approach to intraoperative floppy iris syndrome (IFIS) begins at the time of the preoperative examination. Although hard data are lacking regarding the statistical impact of possible risk factors, clinical experience

points to limited pupillary dilation and lightly colored irides (blue and green) as having a tendency for intraoperative miosis and structural instability that increases the risk of iris prolapse. I also believe that the available evidence indicates that the duration of a patient's use of tamsulosin or similar drugs is not predictive of the severity of IFIS and that the discontinuation of these drugs before cataract surgery does not alter the operative behavior of the iris.

MY STRATEGY

My standard operative approach begins with the incision. To discourage iris prolapse, the incision should be sufficiently long to gain distance from the iris root. In general, the length of the incision, measured in clear cornea, should equal its width.

My second standard measure is the use of Healon5 (Abbott Medical Optics Inc., Santa Ana, CA). The concentration of Healon5 is higher than that of any other commercially available ophthalmic viscosurgical device (OVD). I inject Healon5 in the angle over 360°, which requires injecting the OVD through both the main incision and a sideport paracentesis. This placement stabilizes the iris and typically creates a modest amount of viscomydriasis (about 1 mm). In order to encourage the retention of Healon5 in the angle, I then fill the remainder of the anterior chamber with a dispersive OVD of low molecular weight (either Healon D [Abbott Medical Optics Inc.] or Viscoat [Alcon Laboratories, Inc., Fort Worth, TX]). The order in which I inject the OVDs is the inverse of the classic concept of a soft shell. Because the dispersive OVD resists aspiration in bulk, it forms a buffer that improves the retention of the Healon5 in the angle. The other key maneuver in retaining the Healon5 is to reduce the flow and vacuum settings used during phacoemulsification. If the iris begins to constrict or billow as the case progresses, I will reinject the Healon5 and dispersive OVD.

In the past, as measures to counteract intraoperative miosis, I had patients begin using topical atropine 1% drops several days preoperatively and administered unpreserved epinephrine 1:1000 diluted in balanced salt solution to 1:5000 for intracameral injection. I was never particularly impressed by the efficacy of atropine, and the intracameral epinephrine, although definitely

“Iris retraction hooks are an effective alternative to the Malyugin ring, but I find them unnecessarily cumbersome to insert and remove.”

effective, generally has a transient benefit.

I therefore now rely on the Malyugin ring (Micro-Surgical Technology, Redmond, WA) to manage inadequate initial pupillary dilation, intraoperative miosis, or unacceptable intraoperative billowing of the iris. The ring was initially manufactured with a 6-mm diameter; a second version with a 7-mm diameter is now available. In my opinion, the Malyugin ring has the lowest profile—and is therefore the least intrusive on surgical technique—of any of the available pupillary expansion devices. The ring has a clever insertion device that is also used for removal. Iris retraction hooks are an effective alternative to the Malyugin ring, but I find them unnecessarily cumbersome to insert and remove, with multiple incisions to create and later seal. Moreover, excessive dilation with iris hooks may rupture the sphincter muscle and lead to permanent and possibly symptomatic mydriasis.

CONCLUSION

For me, the key components in managing IFIS are the incision's construction, the routine use of Healon5, and the insertion of a Malyugin ring when needed. ■

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