

Techniques for Managing a Small Pupil During Cataract Surgery

These strategies take into account the possible underlying pathophysiology in eyes that dilate poorly.

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A well-dilated pupil with a sharp red reflex enhances the ease of cataract surgery and decreases the likelihood of complications. Unfortunately, many cataractous eyes have concurrent pathology that limits pupillary dilation. Miotic therapy, glycogen deposition from diabetes, pseudoexfoliation (Figure 1), synechial scar formation from prior trauma or inflammation (Figure 2), the use of systemic α -antagonist therapy for hypertrophy of the prostate, or other issues may cause a pupil to dilate poorly. No single approach will address each of these issues. The surgeon's plan to eyes with a small pupil, therefore, requires flexibility and resourcefulness. The underlying pathophysiology should be taken into consideration when strategizing the surgical plan.

PHARMACOLOGIC AGENTS

Fortunately, many eyes with small pupils respond to pharmacologic techniques. Intracameral lidocaine, epinephrine in balanced salt solution (BSS; Alcon Laboratories, Inc.), and intracameral solutions such as Shugarcaine (4% unpreserved lidocaine diluted 1:3 with BSS Plus [Alcon Laboratories, Inc.]) are all tools at the cataract surgeon's disposal.¹⁻³ (To make epinephrine for intracameral use, we use 1:1,000 epinephrine and mix 0.1 mL epinephrine with 0.9 mL BSS, then use 0.1 mL of that mixture intracamerally for a total of 1:10,000.) In dia-

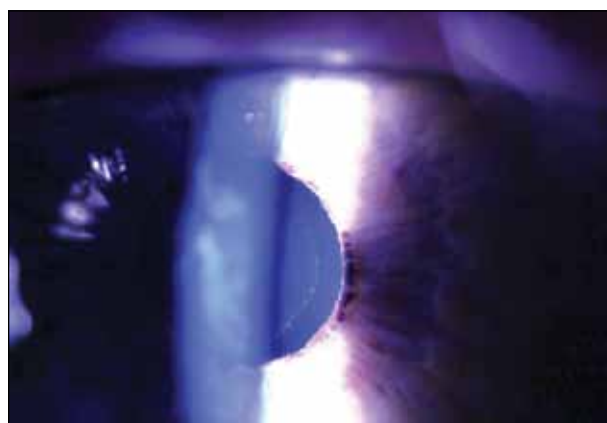


Figure 1. Pseudoexfoliative material on the anterior capsule.

betic or pseudoexfoliative eyes, these agents may be just what the doctor ordered. Viscomydriasis with a viscodispersive agent of heavy molecular weight such as Healon GV or Healon5 (both from Abbott Medical Optics Inc.) can also be helpful in breaking mild to moderate synechial closures. Viscomydriasis alone should be used with caution, however, as the limited duration of this effect will likely not last throughout phacoemulsification if other pupil-related pathologies exist. In an eye on miotic therapy, the miotic agent should be discontinued preoperatively if IOP control will not be compromised.

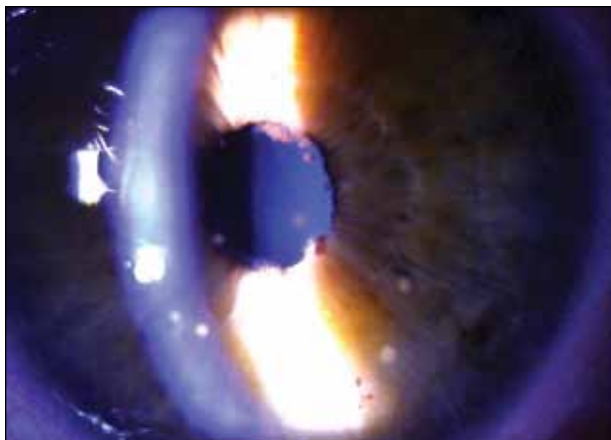


Figure 2. A uveitic eye with peripheral anterior synechiae on the pupillary border in the setting of mutton fat keratoprecipitates and iris nodules.

INCISIONAL AND STRETCHING STRATEGIES

When a more aggressive approach is required to open an obstinate pupil, incisional or stretching strategies may be helpful. A keyhole iridectomy is usually only needed in an especially fibrotic pupil.⁴ Multiple tiny, equally spaced sphincterectomies created with small-caliber intraocular scissors can be helpful in a variety of scenarios, especially in cases of sphincter hypertrophy as seen in eyes on long-term miotic therapy.⁴ With this technique, care should be taken to avoid extending the sphincter incisions into the iris stroma to reduce the risk of permanent mydriasis. Our video on Eyetube.net demonstrates how to perform incisional sphincterectomies in a pseudoexfoliative eye that failed to achieve adequate dilation with intracameral epinephrine. As shown in the video, small, minimally invasive iris incisions facilitate safe cataract surgery without causing permanent mydriasis.

Bimanually stretching the pupil to 8 mm in two to three axes opposed 180° from each other with two iris hooks or two notched instruments such as Kuglen hooks can break synechiae, enhance moderate diabetic dilation, or open a pharmacologically small pupil.⁴ With all of these techniques, less is more. It is important to minimize the trauma to the iris to reduce the risk of inflammation, bleeding, and chronic mydriasis.

METHODS OF IRIS RETENTION

In cases of intraoperative floppy iris syndrome, iris retention is the technique of choice to avoid perioperative miosis. Iris hooks or expansion devices such as the Graether Pupil Expanding System (EagleVision), Beehler Pupil Dilator (Moria SA), and Malyugin Ring (MicroSurgical Technology)

can open the pupil and be used alone or in combination with one another.^{5,6} Iris hooks are typically placed 60° apart near the phacoemulsification wound and 90° apart distal to the wound to minimize inadvertent iris trauma.⁵ The placement of an additional subincisional hook under the main wound keeps the iris away from the phaco tip. Because the amount of tension on the iris tissue can be up-titrated gently with hooks, these devices are particularly useful in cases of iris fibrosis such as iridocorneal endothelial syndrome or in eyes at high risk for intraoperative bleeding (eg, neovascularization or systemic anticoagulation). We prefer the Malyugin Ring, which comes in two sizes. We use the 6.25-mm ring to engage a miotic pupil and the 7-mm ring when a pupil that dilates relatively well but in which there is concern for the iris to be floppy or for intraoperative miosis.

CONCLUSION

Successful surgical outcomes have been achieved with both mechanical iris dilation and iris retention devices.^{7,8} The retention devices add to overall surgical cost and generally require more time in the OR than a mechanical pupillary stretch.⁷ Pupillary stretch is more traumatic to the iris and also possibly to the corneal endothelium, but this does not appear to detract from the surgical outcome.^{7,8} ■

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