Multiple studies over the past 25 years have found that adequate initial pupil dilation as well as maintenance of dilation during surgery are necessary for safe and efficient cataract surgery. A metaanalysis evaluated 40 studies of intraoperative miosis from 1982 to 2014. It found numerous complications associated with inadequate initial mydriasis or intraoperative miosis during cataract surgeries, such as an increased incidence of posterior capsule tear, vitreous loss, and zonular fiber breaks. In addition, there is also an increased risk for possible iris damage and iris chafing if the pupil is not adequately dilated during cataract surgery. There is also an increased risk for retained lens cortical material if the pupil is inadequately dilated during surgery. Finally, complications such as corneal edema and cystoid macular edema can occur secondary to intraoperative miosis.

There are multiple different ways of obtaining adequate pupil dilation before cataract surgery, including the use of topical mydriatic drops such as tropicamide, cyclopentolate, and phenylephrine hydrochloride. In addition, topical nonsteroidal antiinflammatory drops (NSAIDs) have also been shown to prevent intraoperative miosis or constriction of the pupil during cataract surgery. An ASCRS Cataract Clinical Committee white paper reviewed multiple different strategies in the management of the pupil in intraoperative floppy-iris syndrome (IFIS). Medications, including epinephrine compounds, can also be used during cataract surgery itself to help prevent intraoperative miosis. More recently, phenylephrine was found to help maintain mydriasis during cataract surgery when used intracameral or in the irrigating solution during cataract surgery. Phenylephrine preferentially stimulates \( \alpha \)-adrenergic receptors to decrease the propensity for intraocular miosis. Studies performed outside the United States found intracameral phenylephrine 1.5% mixture to be highly effective in maintaining pupil dilation during cataract surgery, especially in patients with IFIS.

A new medication has been developed that contains a mixture of the \( \alpha_1 \)-adrenergic receptor agonist phenylephrine as well as the NSAID ketorolac, which is a relatively nonselective cyclooxygenase-1/cyclooxygenase-2 inhibitor. This medication has been called OMS302, or Omidria, and it is now available for use in the U.S. as an additive to the balanced salt solution used for irrigation during cataract surgery. This formulation is not only preservative-free, but also bisulfite-free. An additional advantage to the use of this medication is that not only does it maintain pupil mydriasis, it also has the ability to decrease postoperative pain in cataract patients.

In this issue of the journal, Donnenfeld and coauthors (pages 597–605) present the results of a randomized double-masked control study evaluating the components in the OMS302 compound, both individually and together, as well as comparisons to a balanced salt solution vehicle as a control. Videos were taken during cataract surgery, and the pupil diameter was measured at 1-minute intervals by video capture. In addition, the study evaluated postoperative ocular pain for up to 12 hours after cataract surgery. The results showed that the OMS302 compound was significantly better than the vehicle and the individual ketorolac in maintaining mydriasis during cataract surgery. Significantly fewer patients treated with the combination medication had intraoperative pupil diameters smaller than 6.0 mm compared with those treated with the vehicle as well as the individual components of ketorolac and phenylephrine. In addition, fewer patients who were administered phenylephrine alone or ketorolac alone had constricted pupils during surgery than patients given the vehicle. The combination of these 2 medications had a greater or more than additive effect relative to each in preventing intraoperative miosis.

This study also evaluated postoperative pain and found that the combination of the 2 medications significantly reduced postoperative pain compared with the phenylephrine-treated patients and vehicle-treated patients.

One of the exclusion criteria in this study was a history of \( \alpha_1 \)-adrenergic antagonist preoperatively. Although the OMS302 compound was found to provide excellent mydriasis during cataract surgery and to help prevent intraoperative miosis, the potential area of further research is to see whether this compound is helpful in the prophylaxis of IFIS patients who have been on \( \alpha_1 \)-adrenergic medications for prostate disease. In Europe, intracameral phenylephrine 1.5% has been found to be...
highly effective for prophylaxis in these IFIS patients. It will be important to see whether the combination of phenylephrine and ketorolac compound added to the balanced salt solution during cataract surgery is also able to maintain miosis in these difficult surgical patients. This could help decrease the need for intraoperative devices to maintain pupil dilation during cataract surgery, such as iris hooks or various ring-shaped devices, in this group of patients.

Medications that can safely maintain mydriasis during cataract surgery have the potential to reduce intraoperative complications by better maintaining an adequate pupil diameter during cataract surgery. A well-dilated pupil during cataract surgery can decrease the incidence of posterior capsule tears as well as vitreous loss, zonular fiber disruption, and remnant lens material. This can help provide better outcomes after cataract surgery and could be especially important in the era of premium intraocular lenses and more demanding patients and cataract surgeons.

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REFERENCES

OTHER CITED MATERIAL