

# Sedation Considerations

An overview of anesthesia options for patients with concomitant cataract and glaucoma.

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The goal of anesthesia in cataract surgery is to provide patients with optimal comfort while creating an environment that is safe to maximize the potential for a successful outcome. Intraoperative sedation, typically administered as monitored anesthesia care, decreases anxiety, increases comfort while the patient holds still during the procedure, and produces some amnesia surrounding uncomfortable events such as nerve blockade. Patients who have cataracts and glaucoma are often elderly with numerous health conditions that are associated with an increased risk of intraoperative adverse events. Care regarding choice of sedation level as well as the vigilant monitoring of patients' blood pressure, oxygen saturation, and heart rate is critical to avoid adverse events during surgery.

## CONSIDERATIONS FOR GLAUCOMA PATIENTS

An elevated IOP in glaucoma patients can increase the risk of central retinal artery occlusion if a prolonged episode of perioperative hypotension were to occur. A high preoperative IOP in elderly, frail patients can increase the risk of suprachoroidal hemorrhage with the drop in IOP that occurs during surgery. Patients are often uncertain if they should continue using glaucoma drops in the perioperative period. To minimize risks of serious complications and to optimize IOP control, it is important to emphasize that patients are to continue using glaucoma medications on the day of surgery.

Anesthetic agents that could promote venous congestion, significantly affect the size of the pupil, or interact with topical glaucoma medications are typically avoided. Although of theoretical risk, agents known to have some mydriatic or miotic effect reach the eye in very low concentrations and do not contribute to the pupil's size in appreciable amounts. Sedatives paired with analgesics provide an excellent combination for ophthalmic surgery. Benzodiazepines provide anxiolysis and amnesia and reduce IOP, making them a good choice for sedation. Propofol has

frequently been used during regional eye blocks and may also reduce IOP. Opioids, most commonly fentanyl, are used for analgesia. These agents reduce pain from surgical manipulation and relieve discomfort from lying in one position when other musculoskeletal or joint conditions exist.<sup>1</sup> A list of frequently used agents and their characteristics are listed in the table.

## REGIONAL ANESTHESIA

Traditionally, a regional nerve block via retrobulbar or peribulbar injection has been used for a variety of different ophthalmic procedures, including cataract surgery. Provided that sufficient conscious sedation is achieved during the injection, when compared with topical anesthesia, patients report adequate pain control during surgical manipulation and less postoperative discomfort with nerve blockade.<sup>2</sup> Regional anesthesia also provides the additional benefit of akinesia, diminished eyelid movement, less discomfort associated with a lid speculum or microscope light, and the patient's general decreased awareness of the procedure.

Regional nerve blockade, however, does carry additional risks. Bruising is common, particularly in patients on blood thinners such as aspirin. An injection near the rectus muscles can stimulate the oculocardiac reflex or cause postoperative muscle weakness with diplopia. More rare, but much more serious complications include retrobulbar hemorrhage, globe penetration, and central nervous system depression. Injection near the optic nerve sheath can lead to nerve damage or compromise central retinal vessels. Particularly in patients with glaucoma, increased orbital pressure and decreased blood flow are a concern and could worsen already compromised nerve function.

Huber and Remky demonstrated a significant reduction in flow velocities of orbital vessels measured by color Doppler imaging in cataract surgery patients undergoing retrobulbar injection.<sup>3</sup> Use of a Honan or external compression device following peribulbar injection has been shown to slightly decrease IOP, but it appears to make no

**TABLE. GENERAL PROPERTIES AND EFFECTS OF SOME MEDICATIONS COMMONLY USED DURING OPHTHALMIC SURGERY**

| Agent        | Class                        | Typical Dose | Route  | Half-life | Desired Effect                | Common Side Effects                           |
|--------------|------------------------------|--------------|--------|-----------|-------------------------------|-----------------------------------------------|
| Propofol     | General anesthetic, sedative | 0.25-1 mg/kg | IV     | 2-4 min*  | Induction, sedation           | Hypotension, injection pain, muscle movements |
| Fentanyl     | Analgesic, opioid, sedative  | 50-100 µg    | IV, IM | 3.7 hr    | Analgesia, sedation           | Somnolence, nausea, confusion, hypotension    |
| Remifentanyl | Analgesic, opioid            | 0.5-1 µg/kg  | IV     | 3-10 min  | Analgesia, anesthesia adjunct | Hypotension, nausea, confusion, pruritus      |
| Diazepam     | Benzodiazepine, sedative     | 2-10 mg      | PO     | 30-60 hr  | Anxiolysis, sedation          | Fatigue, confusion, amnesia, ataxia           |
| Midazolam    | Benzodiazepine, sedative     | 1-2 mg       | IV     | 2.5 hr    | Anxiolysis, sedation          | Nausea, hypotension, amnesia, confusion       |

\*More than 70% of elimination occurs during the distribution phase with a typical half-life of the clinical effect in the 2-4-minute range. True half-life via excretion in the urine is 3 to 12 hours.

Abbreviations: IV, intravenous; IM, intramuscular; PO, orally.

significant difference in anesthetic effectiveness.<sup>4</sup> Pressure elevations tend to be greater and more variable in glaucoma patients in general, and most studies that evaluate the effect of these devices on IOP exclude glaucoma patients. Some studies have shown a small elevation in IOP, whereas others reported significant and variable spikes following an injection.<sup>5,6</sup> The risk of even a short period of relative ischemia contributing to further nerve damage with a Honan balloon likely outweighs the transient IOP-lowering benefits and is thus best avoided in patients with glaucoma.

## TOPICAL ANESTHESIA

Although peribulbar block is still used for cataract surgery in some patients, topical anesthesia has grown in popularity as the method of choice for minimizing risks related to a regional nerve block. Topical treatment anesthetizes the cornea, conjunctiva, and anterior sclera. For the purpose of comparison to combined phaco-trabeculectomy, patients who will require iris manipulation, scleral cautery, or flap creation will often have discomfort if under topical anesthesia alone.<sup>7</sup> Preservative-free intracameral lidocaine 1% is often used to supplement topical anesthesia. When injected through a paracentesis, this agent has been shown to decrease patients' discomfort during tissue manipulation and increase cooperation during surgery.<sup>8</sup> This technique helps to improve iris and ciliary body anesthesia, although patients typically remain comfortable during routine small-incision phacoemulsification even with topical anesthesia alone. Topical anesthesia does not provide ocular akinesia and can be very short acting, making patients' selection crucial to maintain a safe environment for surgery. It should typically be avoided in young patients or when nystagmus, a strong blink reflex, or poor fixation is present. Regional anesthesia may also be a safer choice when approaching challenging cataract cases. Conditions that can prolong

surgical times such as dense cataracts, small pupils, posterior synechiae, or weak zonules may be more safely approached with a regional nerve block. Prior trauma, inflammation, or pseudoexfoliation is found more frequently in patients with glaucoma, which can make cataract surgery somewhat less routine in this patient population.

## CONCLUSION

Cataract surgery can have IOP-lowering effects, improve quality of life, and help to increase the reliability of routine testing used to monitor glaucoma patients. Careful pre-operative assessment, an appropriate sedation level, and adequate intraoperative anesthesia can help to minimize the risk of sight-threatening complications while providing a comfortable and safe environment for this low-risk procedure. ■

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