

Vitreectomy Without Intravenous Anesthesia



Taking a cue from our anterior segment colleagues.

BY ERICA PODESTO, BA, AND MURTAZA ADAM, MD

Pars plana vitrectomy (PPV) is typically performed with the assistance of an anesthesiologist either with monitored anesthesia care (MAC) or general anesthesia (GA), combined with a local ocular block. Numerous factors, including the patient's medical history, comorbidities, anxiety, dementia, medication or illicit drug history, along with surgical complexity, expected case time, and language barriers, can all influence the anesthesia modality selected for a particular case. For all cases supported by an anesthesiologist, patients are required to fast for at least 8 hours before surgery, and intravenous (IV) line placement is mandatory. With local block administration and anesthesiologist support, PPV with this approach has a proven track record of patient comfort and safety.

While vitreoretinal surgeons have been performing cases with the same anesthesia approach for decades, our anterior segment colleagues have been rapidly evolving their approaches to anesthesia for cataract surgeries. Recent studies involving cataract surgery with topical anesthesia and oral sedation without an anesthesiologist have reported excellent outcomes with reduced costs, low intraoperative complication rates, and increased patient satisfaction.¹⁻³

Aside from the benefits of not requiring IV line placement or fasting preoperatively, additional financial costs related to the care provided by an anesthesiologist are deferred with this technique. These significant cost reductions are of greatest benefit for patients with high deductible insurance plans and those without insurance. Insurers have not ignored these financial benefits. Indeed, Anthem Blue Cross in California proposed a policy that limited ophthalmic anesthesia coverage to local and topical regional anesthesia, specifically stating that it would not cover MAC sedation,

asserting that MAC was not medically necessary in most circumstances.^{4,5} Despite the subsequent retraction of this policy by Anthem, many anterior segment surgeons across the country choose to perform their surgeries without intravenous sedation because the benefits to both patients and payers are significant.

Can we retina surgeons learn from our anterior segment colleagues when it comes to anesthesia approaches for PPV? Although vitreoretinal cases likely cannot achieve the efficiency and comfort of a 5-minute cataract surgery with topical anesthesia, we believe that PPV can be safely and comfortably performed without IV anesthesia for a significant proportion of patients. In this article we share our rationale and methodology for, and our initial experience with, a technique to perform PPV without IV sedation.

AT A GLANCE

- ▶ Although cataract surgery anesthesia techniques have evolved in recent decades, anesthesia for vitreoretinal surgery has remained mostly static.
- ▶ With appropriate patient and case selection, PPV without IV anesthesia has the potential to reduce costs, improve patient satisfaction, decrease OR turnover time, and increase the feasibility of in-office PPV.
- ▶ The authors describe a technique for sub-Tenon block without anesthesiology support that has to date been employed successfully in a mix of vitreoretinal surgeries.

A SUB-TENON BLOCK CAN BE SAFELY AND COMFORTABLY ADMINISTERED TO A CONSCIOUS PATIENT WITHOUT THE USE OF PROPOFOL. AFTER I GAINED SIGNIFICANT EXPERIENCE WITH THIS MINIMALIST ANESTHETIC TECHNIQUE, THE TRANSITION TO PERFORMING PPV WITHOUT IV SEDATION WAS RELATIVELY SEAMLESS.

WHY SHIFT THE PARADIGM?

In the United States, PPV is most commonly performed with MAC anesthesia and an intraconal or retrobulbar block to achieve local akinesia and anesthesia, requiring sharp needle penetration through the orbital septum.⁶ Other local anesthesia options exist, however, including periorbital block, sub-Tenon block, and subconjunctival anesthesia. For most surgeons performing a local block, regardless of method, the block is immediately preceded by the administration of IV propofol provided by an anesthesiologist to sedate the patient.⁷

Although propofol and other IV sedatives such as fentanyl and midazolam are standard of care for anesthesiologists providing support for PPV, these drugs introduce risks such as hypotension, apneic spells and sudden movement upon their resolution, cardiovascular compromise, respiratory depression, metabolic acidosis, acute kidney injury, and nausea.⁸ Additional complications related to retrobulbar and peribulbar techniques include retrobulbar hemorrhage, orbital perforation, injection of the perioptic meningeal space causing respiratory suppression, optic nerve damage, lid hematoma, vascular retinal occlusion, and diplopia secondary to myotoxicity.⁹ Block effectiveness with these techniques can also be variable, and supplemental IV anesthesia may be needed intraoperatively, increasing the risk of additional complications.

Aside from the risks listed above, patients who are more heavily sedated at the beginning of a case do not easily follow instructions and can suddenly awaken with confusion. This can lead to unexpected and rapid movement of hands and head. When one is peeling a membrane off the macula, this can be a scary experience.

With these issues in mind, I (M.A.) began performing sub-Tenon blocks with minimal IV anesthesia, typically with midazolam and occasionally fentanyl. There has been an increase in the use of sub-Tenon compared to retrobulbar and periorbital techniques in vitreoretinal surgery in the past few years, presumably because of the improved safety profile and equivalent efficacy compared to traditional peribulbar and retrobulbar anesthesia.¹⁰ Furthermore, a sub-Tenon block can

be safely and comfortably administered to a conscious patient without the use of propofol. After I gained significant experience with this minimalist anesthetic technique, the transition to performing PPV without IV sedation was relatively seamless.

The first time I performed PPV without IV sedation was in 2018 for a patient who was undergoing urgent retinal detachment (RD) repair. He was frustrated to learn that he would need to find a ride home after surgery because of the delayed effects of IV sedation. After some discussion, I offered to perform the surgery without sedation with a sub-Tenon block. The patient agreed, as he would then be able to drive himself home postoperatively. He had a comfortable experience during surgery and the case was performed without issue. After this experience, I began offering PPV without anesthesiologist support for patients without insurance, those out of network or with or high-deductible plans, those with difficult IV access, and patients wary of fasting for surgical cases booked in the afternoon.

Oral sedatives have a higher safety profile compared with IV sedatives because they require lower dosages to achieve sedation. Thus, they are safer to use in patients with high anesthesia risk.

Furthermore, surgical costs for anesthesia management with IV sedation and MAC are relatively more expensive.¹¹ The surgeon and patient should evaluate the risks and benefits of each option to select the most appropriate option for the individual patient.

TECHNIQUE AND CASE SELECTION

For most patients, the technique involves using a sub-Tenon block with oral or no sedation and performing vitrectomy without the support of an anesthesiologist. For those receiving oral sedation, I borrowed the method of a cataract surgeon colleague and administered 0.125 to 0.25 mg of triazolam 30 minutes before the surgery, based on body mass index. Intraoperative vital signs including heart rate, blood pressure, oxygen, and respiratory rate were monitored by the circulating OR nurse.

Before block administration, the operative eye receives proparacaine drops for topical anesthesia and is then

prepped and draped with standard sterile technique using 5% povidone-iodine. After a lid speculum is placed with the patient still conscious, a small conjunctival incision is made in the inferonasal quadrant with Wescott scissors. A 19-gauge blunt sub-Tenon cannula is then gently inserted into the sub-Tenon space via this conjunctival incision, and approximately 5 to 6 mL of the anesthetic containing a 1:1 mixture of lidocaine and bupivacaine is administered.

When the anesthetic is injected slowly over a period of approximately 20 to 30 seconds, patient comfort is maintained. This is truly the most critical portion of the technique. If the block is administered too quickly, patient discomfort can be significant. If needed, additional sub-Tenon block can be administered subsequently via the previously created inferonasal conjunctival incision.

Ideally, surgical cases with this technique should not last more than 60 minutes. The technique should also be avoided in patients with significant anxiety and claustrophobia, patients requiring scleral buckle placement, and complex cases in which operative time is difficult to predict. Other exclusions are patients who have experienced delirium after anesthesia with benzodiazepines and those with illicit drug or heavy alcohol use.

OUTCOMES

Since September of 2018, I have performed 21 PPVs using this method. Patients who opted for this method had insurance issues (uninsured or out of network; $n = 11$), preferred IV-free sedation ($n = 6$), were unable to fast ($n = 1$), had difficult IV access ($n = 1$), or were considered high anesthesia risk ($n = 2$). Indications for surgery included macular hole, dislocated or mispositioned IOL, aphakia, vitreous hemorrhage, RD (both rhegmatogenous and diabetic tractional detachment), retained lens fragments following cataract surgery, and retained silicone oil tamponade. Most cases ($n = 14$) were performed with oral sedation, and the others ($n = 7$) were performed with no sedation.

Intraoperative complications, need to cease surgery mid-operation, or conversion to intravenous sedation were not encountered. One patient required additional supplemental sub-Tenon block intraoperatively.

With a mean follow-up time of 76 ± 86 days (range 1–345 days), mean visual acuity significantly improved, from a mean preoperative VA of 1.15 ± 0.74 LogMAR to a mean 0.59 ± 0.52 logMAR ($P = .023$) postoperatively. Postoperative complications included recurrent RD ($n = 1$), cystoid macular edema ($n = 1$), vitreous hemorrhage ($n = 2$), corneal edema ($n = 1$), postoperative glaucoma ($n = 1$), and postoperative cataract ($n = 1$).

Overall, we found that patients were satisfied with their surgical experience and visual outcomes. This assertion is supported by the fact that the same method of anesthesia was requested by four patients who underwent reoperation either

on the same eye or the fellow eye. We also found that patients were grateful that they could eat and drink until the time of their surgery and that IV placement was not required.

LOOKING AHEAD

Taking a cue from our anterior segment colleagues, I have found that PPV can be safely and effectively performed without the support of an anesthesiologist. We plan to continue collecting data and have begun offering IV-free PPV to patients more routinely, regardless of insurance status. We are also designing an unmasked randomized prospective trial to compare oral to IV sedation for patients undergoing PPV. We expect this study to supplement the ongoing masked randomized clinical study at Boston University that is comparing oral triazolam to IV midazolam in a variety of ocular surgeries, including vitreoretinal surgery.¹²

With appropriate patient and case selection, PPV without IV anesthesia has clear potential to reduce costs, improve patient satisfaction, decrease OR turnover time, and increase the feasibility of in-office PPV. With time, we expect this technique to be adopted by more vitreoretinal specialists looking for better ways to care for their surgical patients. ■

1. Peeler CE, Villani CM, Fiorello MG, Lee HJ, Subramanian ML. Patient satisfaction with oral versus intravenous sedation for cataract surgery. *Am J Ophthalmol*. 2019;126(9):1212–1218.
2. Rocha G, Turner C. Safety of cataract surgery under topical anesthesia with oral sedation without anesthetic monitoring. *Can J Ophthalmol*. 2007;42(2):288–294.
3. Chen M, Hill GM, Patrianakos TD, Ku ES, Chen ML. Oral diazepam versus intravenous midazolam for conscious sedation during cataract surgery performed using topical anesthesia. *J Cataract Refract Surg*. 2013;41(2):415–421.
4. Masterson L. Anthem to limit anesthesiologists in latest cost-saving move. *HealthCareDive*. February 21, 2018. <https://www.healthcarediver.com/news/anthem-to-limit-anesthesiologists-in-latest-cost-saving-move/517428/#:~:text=In%20its%20latest%20cost%20saving,monitor%20anesthesia%20during%20cataract%20surgery>. Accessed September 30, 2020.
5. Tertel Z. Insurance provider under fire for changing coverage of monitored anesthesia. March 13, 2018. <https://www.opthalmologymanagement.com/issues/2018/march-2018/insurance-provider-under-fire-for-changing-coverage>. Accessed September 30, 2020.
6. Sridhar J. Current trends in vitreoretinal anesthesia. Paper presented at: American Society of Retina Specialists Annual Meeting; July 26–30, 2019; Chicago, IL.
7. Vann MA, Ogunnaike BO, Joshi GP. Sedation and anesthesia care for ophthalmologic surgery during local/regional anesthesia. *Anesthesiology*. 2007;107(3):502–508.
8. Katz J, Feldman MA, Bass EB, et al; Study of medical testing for cataract surgery study team. Adverse intraoperative medical events and their association with anesthesia management strategies in cataract surgery. *Ophthalmology*. 2001;108(10):1721–1726.
9. Anker R, Kaur N. Regional anesthesia for ophthalmic surgery. *BJA Education*. 2017;17(7):221–227.
10. Guise P. Sub-Tenon's anesthesia: an update. *Local Reg Anesth*. 2012;5:35–46.
11. Reeves SW, Friedman DS, Fleisher LA, Lubomski LH, Schein OD, Bass EB. A decision analysis of anesthesia management for cataract surgery. *Am J Ophthalmol*. 2001;132(4):528–536.
12. Oral Versus Intravenous Sedation for Ocular Procedures. *ClinicalTrials.gov* Identifier: NCT03246724. <https://clinicaltrials.gov/ct2/show/NCT03246724>. Accessed September 30, 2020.

MURTAZA ADAM, MD

- Physician, Colorado Retina Associates, Denver
- madam@retinacolorado.com
- Financial disclosure: Consultant (Allergan/AbbVie, EyePoint Pharmaceuticals, Genentech, Novartis, Regeneron)

ERICA PODESTO, BA

- OMS-III, Rocky Vista University, Parker, Colorado
- erica.romo@rvu.edu
- Financial disclosure: None