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Adverse events in cataract surgery: The least invasive form of anesthesia is best

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We appreciate the opportunity to respond to questions raised by Rabinowitz and colleagues¹ about our recent manuscript, which outlined recommendations to prevent patient harm during cataract surgery.² In particular, the authors raised questions about our recommendation to use the least invasive form of anesthesia that is appropriate for the patient. While our article described five globe perforations by one provider, our recommendations were based not only on those five cases as suggested by Rabinowitz and colleagues,¹ but also on a review of the literature, malpractice claims, clinical registries, incident reporting systems from other states, interviews with frontline staff, online surveys of cataract surgeons and administrators in facilities that perform cataract surgery, and the collective expertise of our multidisciplinary expert panel.² Perioperative complications may be due to the anesthetic or surgery itself, and sudden changes in practice may have unintended consequences. For this reason, we recommended in our paper that the choice of anesthesia be made considering not only the risk profile of the anesthetic, but also surgeon and patient preferences, patient factors and comorbidities, as well as case-specific factors.² For example, if the surgeon prefers operating under block anesthesia, or if akinesia of the eye is critical to the case, then block anesthesia may be preferable to topical anesthesia. However, if there are no external factors or preferences that would lead to a particular

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anesthesia choice, the available data support our recommendation to use the least invasive form of anesthesia.^{3–6}

We would like to flag two recurring assumptions that we believe can be obstacles to improvements to patient safety. First is the assumption that the reported complication rates represent the full extent of patient harm. We know that complications and errors are vastly underreported,^{7,8} even with state-mandated incident reporting systems.⁷ Therefore, Rabinowitz and colleagues' assertion that an estimated 14,639 cases of needle-based blocks had no perforations¹ is speculation. The second assumption is that quality and safety are consistently high across providers, or "due to our expertise and experience, our own outcomes are nearly flawless and our peers must be doing just as well". For example, Rabinowitz and colleagues quoted from our personal email exchange that "we don't know the experience level of the provider who had 5 perforations in one day."¹ This quote is problematic when taken without permission in isolation, out of the context of our broader personal email discussion. The email explained that experience is not the only important factor to consider. Complications, including globe perforation, can occur even with the most experienced clinicians, and there are additional important contributing factors to consider, such as adequate orientation at a new site in the case of locum tenens or contracted staff.² Cataract surgery is a safe, high-volume procedure, with many highly experienced clinicians, including at the centers where the reported complications occurred. In fact, when we interviewed front-line healthcare workers at these centers, they were overwhelmingly shocked that these types of complications could occur at their centers. Each of these assumptions contributes to the misconception that current practice is already as good as it gets, which can be an obstacle to improvement.

Rabinowitz and colleagues referenced an open-access online article by Mehta and colleagues, who reported that posterior capsular rupture was higher in the topical anesthesia group than the peribulbar group.¹ The article was in a pay-to-publish journal that is not indexed by PubMed, and the authors' statistical tests were not described. We caution drawing any generalizable conclusions from this study as it was a small study of a single surgeon in India, with a surprisingly high complication rate in both the topical and peribulbar anesthesia groups – 66.9% of patients enrolled in the study experienced a complication from cataract surgery. The study's results directly contradict the larger, more robust studies in the mainstream scientific literature, all of which demonstrate that outcomes with topical anesthesia are the same or better than with peribulbar anesthesia.^{3–6}

While it may seem logical that the rates of surgical complications leading to postoperative vision loss would be lower with block anesthesia than topical anesthesia due to the inability of topical anesthesia to provide akinesia of the eye, the literature does not support this assumption. In fact, the literature shows no significant difference^{3,4,6} or improved visual outcomes⁵ in cataract operations performed with topical anesthesia instead of blocks. A 2012 meta-analysis by Zhao and colleagues compared outcomes between topical anesthesia and retrobulbar/peribulbar blocks using data from 15 randomized control trials, and found that blocks had higher anesthesia-related complication rates, and no difference in surgery-related complication rates or intraoperative difficulty as assessed by the surgeons.³ Another recent study of 21,000 office-based cataract surgery operations using topical anesthesia

demonstrated no vision-threatening complications.⁹ Topical anesthesia has also been associated with fewer intraoperative systemic adverse events such as hemodynamic swings requiring intervention.¹⁰

Topical anesthesia is the most common anesthesia technique used for cataract surgery in the U.S. today, following its progressive increased use over the last two decades, with 8% of cataract surgeons using it in 1995, 51% in 2000, 61% in 2003, and 77.6% in 2012.^{11,12} Despite the increased use of topical anesthesia in recent years, the 2015 Royal College of Ophthalmologists National Ophthalmology Database study of cataract surgery reported that visual outcomes have remained stable, and the rate of posterior capsule rupture, vitreous loss or both has not increased over the past decade.¹³

Rabinowitz and colleagues cited a 2012 report from the UK that states that the sensory block from topical anesthesia may not be adequate.¹⁴ However, additional research demonstrated that despite higher intraoperative pain scores with topical anesthesia, patients who underwent bilateral cataract surgery with topical anesthesia in one eye and block in the other eye significantly preferred topical anesthesia due to fear of pain during block injection.³ Even in cases where sedation was administered during the block, patients' fear of pain during the block was perceived as worse than their intraoperative pain with topical anesthesia.³ Moreover, tachycardia and hypertension occur more frequently in patients with eye blocks than with topical anesthesia.^{3,10,15} In fact, the same UK report that raised the issue of adequate sensory block with topical anesthesia also stated that "use of sub-Tenon's, topical, topical-intracameral and sub-conjunctival anaesthesia should lower the risk of some life-threatening adverse events associated with [sharp-needle injection techniques]."¹⁴ So even though intraoperative pain scores may be higher with topical anesthesia, it is well tolerated and preoperative block injection remains the aspect of cataract surgery that is most feared by patients.³

Though these results support the assertion that topical anesthesia is at least as safe as blocks, the overall incidence of sight threatening complications is low. A large prospective study is the next step in further demonstrating the safety of topical anesthesia. We disagree with Rabinowitz that this would best be achieved with single surgeons operating under both conditions.¹ While it may be more efficient, a study with subjects acting as their own controls would actually confound the results as individual surgeons may be more proficient operating under their preferred anesthesia technique. Fewer confounders would exist if differences in outcome were assessed among well-practiced surgeons using their preferred anesthesia technique. Nevertheless, based on the existing evidence, we continue to recommend use of the least invasive form of anesthesia that is appropriate for the patient, surgeon, anesthesiologist and case. Oftentimes, surgeons may request a specific anesthesia technique for cataract surgery based upon a number of factors. For that reason, we also suggested in our paper that if the anesthesia provider feels a different technique may be indicated, he or she should speak with the surgeon preoperatively.²

We thank Rabinowitz and colleagues for their questions and agree that the choice of anesthesia should be made considering not only the risk profile of the anesthetic, but also surgeon and patient preferences, patient factors and comorbidities, as well as case-specific

factors, as described in our paper.² In cases where there are no external factors or preferences that would lead to a particular anesthesia choice, we recommend that the least invasive form of anesthesia be used.

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