The Eye: What You Don’t Know Can Hurt Your Patient

Steven Gayer, MD, MBA,* and Richard C. Prielipp, MD, MBA, FCCM†

Ophthalmic surgery accounts for a large percentage of all surgical procedures performed. Each year there are 50,000 corneal transplants and 25,000 operations for retinal detachment in the United States, but these numbers are dwarfed by lens surgery as cataracts affect nearly 25 million Americans >40 years of age, and nearly half the population has significant lens opacity by age 75. Thus, >3 million cataract operations are performed annually in the United States and >20 million worldwide.

For most of the 20th century, anesthesia personnel sedated and monitored patients while ophthalmologists performed regional eye blocks. The natural evolution of this arrangement makes historical sense as ophthalmologists were pioneering eye anesthesia techniques long before the formal introduction of anesthesiology as a medical subspecialty. In 1884, Karl Koller was the first to use cocaine as a topical anesthetic for the eye, while Knapp reported using a needle and syringe to inject cocaine around the eye, and Turnbull described the first sub-Tenon’s block later that same year. More than 50 years transpired before Walter Atkinson’s classic description of the retrolubar block was published in 1936. Ophthalmologists established a tradition of teaching their trainees anesthesia specific for the eye.

By contrast, most anesthesiology programs provided minimal instruction in this area. A survey of anesthesiology teaching programs from the early 1990s revealed that nearly 80% of residency programs provided neither exposure to ophthalmic surgery accounts for a large percentage of all surgical procedures performed. Each year there are 50,000 corneal transplants and 25,000 operations for retinal detachment in the United States, but these numbers are dwarfed by lens surgery as cataracts affect nearly 25 million Americans >40 years of age, and nearly half the population has significant lens opacity by age 75. Thus, >3 million cataract operations are performed annually in the United States and >20 million worldwide.

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By contrast, most anesthesiology programs provided minimal instruction in this area. A survey of anesthesiology teaching programs from the early 1990s revealed that nearly 80% of residency programs provided neither exposure to eye cases nor any formal training in ophthalmic anesthesia. Two publications from that time described multiple cases of patients rendered blind, or nearly so, after eye blocks by anesthesia personnel who lacked formal instruction or actual experience performing ocular anesthesia blocks. In the past few decades, ophthalmic surgery has migrated from hospitals to ambulatory surgery centers and, more recently, to specialty eye care facilities. Meanwhile, anesthesiology residency programs have remained primarily hospital-based. It is feasible that there may be even less instruction in ophthalmic anesthesia techniques today compared to 30 years ago. It is of little surprise that a 1999 survey of senior anesthesiology residents reported that the median number of eye blocks performed during residency was 0 and that 90% were not confident performing eye blocks, perhaps reflecting why ophthalmic anesthesia block misadventures such as globe perforation or puncture continue to be reported in the American Society of Anesthesiologists closed-claims analysis and other studies.

But expectations and current practice are changing this algorithm. In this issue of the Journal, Roberto et al report that nearly 75% of ophthalmologist respondents who use eye blocks now rely on anesthesiologists to administer them. Anesthesiologist-administered conduction anesthesia in a preoperative area allows immediate availability of the next patient as soon as the previous patient’s procedure is finished and the room is readied. The flow of patients through each operating room is significantly expedited because the attending anesthesiologist can perform the ophthalmic block significantly further in advance than the operating surgeon. This team approach has several potential benefits, including reduction of “production pressure” on the surgeon and allowing the anesthesiologist to use anesthetic techniques that have longer latency of onset but fewer potential untoward sequelae. Assessment of the quality of the anesthetic and topping off as necessary are also tenable, minimizing potential interruption of the steady throughput of patients. Clearly, ophthalmologists, as well as administrators and surgical center shareholders, find benefits in anesthesiologist-administered ophthalmic conduction anesthesia as a means for providing high-quality operating anesthesia and akinesia, minimal turnover times, and maximizing the number of surgical procedures per room per hour.

Ironically, despite an ever-increasing volume of eye surgery cases, both anesthesiology and ophthalmology residents may face fewer opportunities to acquire ophthalmic anesthesia experience today than in previous decades. As mentioned, eye surgery is increasingly uncommon in hospital settings where anesthesia residents garner most of their training. The transition to topical anesthetics for many cataract operations reduces the overall number of patients for both anesthesiologists and ophthalmologists in training to block. Anesthesiologist-rendered conduction anesthesia at the larger academic ophthalmic institutes with ophthalmology training programs may also lessen opportunity for ophthalmology residents to gain informed experience.

At the same time, new developments in the niche subspecialty area of ophthalmic regional anesthesia warrant attention. For example, as with other areas in regional anesthesia, there may be a role for ultrasound-guided ophthalmic anesthesia. Additionally, the maxim that regional anesthesia is
Table. Human Factors Contributing to Anesthesia Mishaps

<table>
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<tr>
<th>Normalization of deviance</th>
<th>Faulty or absent policies and procedures</th>
<th>Production pressure</th>
<th>Poor communication</th>
<th>Inadequate anesthesia provider experience</th>
<th>Inadequate familiarity with OR equipment, surgical procedure, or specific anesthetic technique</th>
<th>Provider fatigue and stress</th>
<th>Emergency operations</th>
<th>Lack of skilled assistance or appropriate supervision</th>
<th>Afferent overload (excess stimuli, noise, or distractions)</th>
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Modified from Table 2.16

Abbreviation: OR, operating room.

Contraindicated for open globe injuries has been debunked.14 Ultimately, patients’ visual outcomes and perioperative health may be optimized if both anesthesiologist and ophthalmologist are adept at ophthalmic regional anesthesia.

Obviously, procedural hazards do exist. “Perforating ocular injuries caused by anesthesia personnel” by Grizzard et al 8 was published nearly 30 years ago. At that time, the authors identified insufficient training as a root cause of the problem and concluded, “Anesthesia personnel should be well trained before attempting ocular anesthesia.” In this issue of the Journal, Roberto et al 11 report that Massachusetts’ Serious Reportable Events Involving Cataract Surgery attributes insufficient anesthesia provider training as fully causative for the 5 cases of vision loss due to nerve block for the period of 2011–2015. The same person, a locum tenens-contracted physician, performed all of these cases in a single day. The authors emphasize that, “Anesthesiologists who perform eye blocks should have adequate and documented training, both didactic and hands-on, on proper technique, management of complications, and identification of high-risk eyes and patients.” Kelly and Farrell’s article,15 also in this issue of the Journal, reminds us of the importance of knowing ocular physiology, as well as anatomy and block techniques.

Opportunities for postresidency hands-on training do exist. The American Society of Anesthesiologists and the World Congress of Anesthesiology conduct regular workshops using ex-vivo porcine and human orbits. Subspecialty groups, such as the Ophthalmic Anesthesia Society, the British Ophthalmic Anaesthesia Society, and the Ophthalmologic Forum of the Indian Society of Anesthesiologists, offer training and lectures. Academic anesthesiologists from the major university-affiliated eye institutes can provide didactic and hands-on teaching as well.

Finally, in the past few decades, we have seen increasing emphasis on operating room speed, efficiency, cost cutting, and economic productivity. However, unbridled pursuit of efficiency may have unintended consequences such as the emergence of subtle but serious errors. We have previously described how providers and administrators may (un)knowingly accept significant deviation from optimal patient care pathways: a process termed “the normalization of deviance.”16 When deviations are first detected, the safety implications are readily recognized; however, faulty analyses, oversight, or frank neglect may lead to the conclusion that the system is robust enough to tolerate these deviations. Even more ominous is when decision makers simply view the events as “acceptable” risks. Over time this process establishes a precedent for accepting safety violations as minor deviations that can be tolerated or managed.16 Without immediate major consequences, the fallacy that some errors are acceptable is reinforced and the deviations become “normalized” and continue unabated until disaster strikes. The Table illustrates several additional human factors that may contribute to anesthetic errors.

In summary, ultimately education and vigilance remain key to patient safety. Vision is arguably our most precious sense. When dealing with the eye, what you do not know may hurt your patient.

DISCLOSURES

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REFERENCES


