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Cornea Specialists Do Not Recommend Routine Usage of Topical Anesthetics for Corneal Abrasions



To the Editor:

As cornea specialists, we have noted an increasing number of patients with corneal abrasions who are being discharged from emergency departments (EDs) with topical anesthetics. This trend is concerning.

The corneal epithelium is the most densely innervated structure in the body, with an average number of terminal nerve endings greater than 600/mm².¹ Scratches on its surface, known as corneal abrasions, can be excruciatingly painful and even temporarily debilitating. Corneal abrasions often cause patients to seek emergency medical care.² To provide patients comfort during the diagnostic evaluation of these corneal injuries, emergency physicians and ophthalmologists often use topical anesthetic drops. However, recurrent use of these drops can delay wound healing, increase the risk of accidental trauma to the eye, promote infection, and even result in corneal perforation.

Even though a scratched cornea is painful, the sensation of pain is a functional evolutionary response. Pain is a required signal for corneal healing. Corneal sensation from the V1 branch of the trigeminal nerve triggers the blink reflex and tear production, which promotes lubrication and upregulates growth factor production.³ Stimulation of corneal nerves

initiates a healing cascade, which includes nerve growth factor, substance P, insulin-like growth factor 1, glial-cell-derived neurotrophic factor, and neurotrophins 3, 4, and 5, which are all involved in maintaining the corneal epithelium. All these important factors in wound healing are downregulated in the absence of corneal sensation.⁴

Neurotrophic, or anesthetized, eyes have delayed healing and are prone to complications of nonhealing epithelial corneal defects such as secondary infections and corneal melts (Figure 1). In the cornea clinic, some of the most difficult cases to treat are diseases that diminish or destroy corneal sensation, such as keratitis and ulcers from herpes zoster and herpes simplex virus type 1. The amount of corneal hypoesthesia is directly related to disease duration and the number of recurrences.⁵ Not uncommonly, these conditions cause corneal melt, perforation, and permanent blindness.⁶ In a worldwide survey of blindness, out of 285 million people who have poor vision, 2.85 million are visually impaired because of corneal opacities that are frequently related to corneal nerve dysfunction.⁷

The emergency medicine literature has published retrospective studies claiming the use of topical anesthesia is “safe and rated highly effective” for controlling pain.⁸⁻¹¹ In the largest retrospective study, which was published in *Annals*,¹¹ follow-up was short (24 hours) and the authors reported no difference in pain scores and “no serious complications or uncommon adverse events” between the groups who received topical tetracaine hydrochloride 1% drops and those who did not. However, after additional follow-up, the authors did report adverse effects. Of the 141 patients who received a diagnosis of a “nonsimple corneal abrasion,” 2 patients eventually received a diagnosis of recurrent corneal erosions with significant decrease in vision, 2 patients had completely misdiagnosed disease and had severe anterior uveitis and episcleritis, and 1 patient with herpetic keratitis, a neurotrophic condition, was inappropriately prescribed tetracaine, with poor healing and a resultant visually significant corneal scar.

Often cited as the impetus and justification for the practice of prescribing topical anesthetic are 2 small studies investigating its use after photorefractive keratectomy surgery.^{11,12} One such study clearly stated that it used anesthetic “in relation to defined wounds induced by specific surgical techniques” (ie, laser-created, geometric corneal injuries performed under surgically sterile conditions).¹² In contrast, corneal abrasions caused by foreign body trauma are not only nonsterile but also frequently dirty and are at higher risk for infection; it is therefore not appropriate to generalize these results for corneal abrasions.

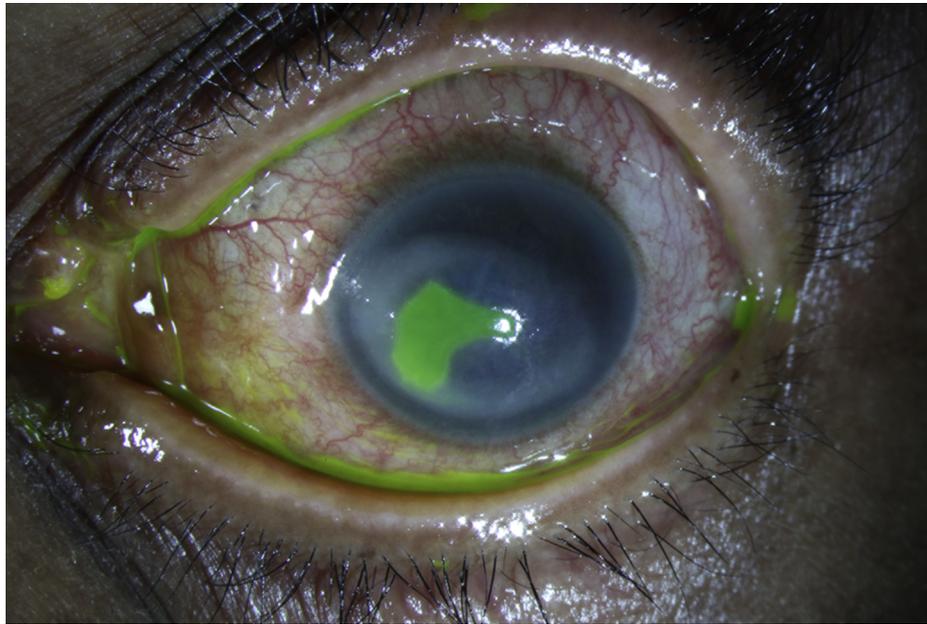


Figure 1. A 60-year-old woman presented to the emergency department with a corneal abrasion. She was sent home with a bottle of proparacaine for analgesia and presented to us several weeks later with a corneal ulcer and persistent epithelial defect from frequent proparacaine use. Her bottle of proparacaine was confiscated. However, despite the most advanced therapies for her persistent neurotrophic corneal epithelial defect, her central cornea was severely scarred. Her visual acuity in this eye is 20/400 and she will require corneal transplantation for visual rehabilitation.

With the increased weight of patient satisfaction and instinctive duty to control pain in the ED setting, we understand the appeal of topical anesthetic for temporary relief of eye pain. However, we are concerned because the potential for abuse of topical anesthesia is very high.

Because the presence of the drop delays healing, when the anesthetic effect wears off, the abrasion is still present, and the patient very much desires pain control with the use of additional drops. One institution demonstrated that 12.5% of anesthetic abuse cases began from a corneal abrasion and

Q1 – Patients who present to the Emergency Department with an acute cornea abrasion should be discharged with a topical anesthetic drop such as tetracaine.

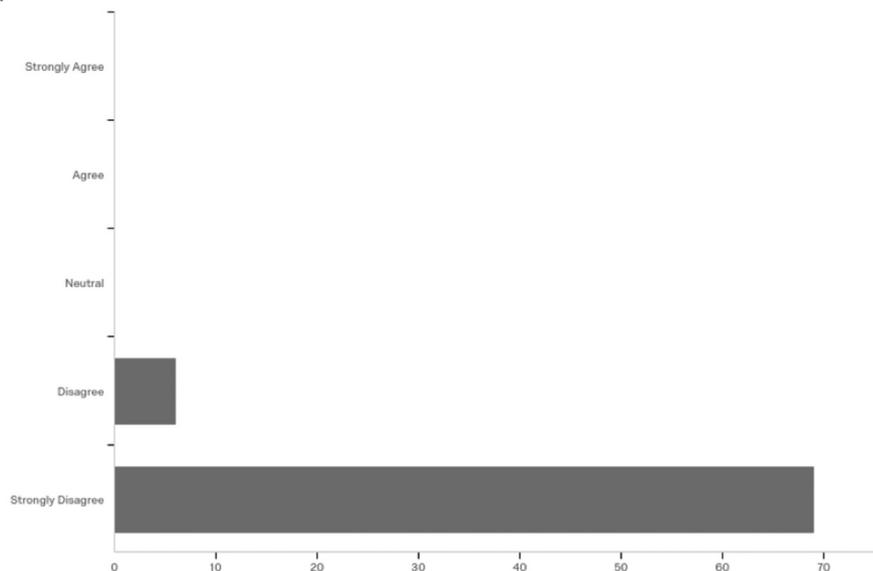


Figure 2. Distribution of anonymous survey responses from cornea-trained ophthalmologists.

Q2 - Patients who present to the Emergency Department with an acute cornea abrasion could be discharged with a 24-hour supply of a topical anesthetic such as tetracaine.

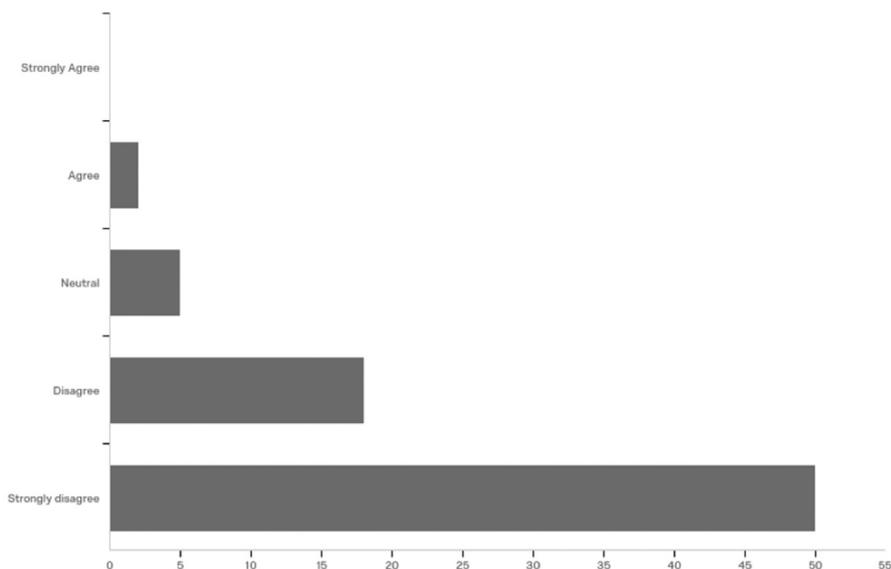


Figure 3. Distribution of survey responses.

11 of 12 of the eyes that involved topical anesthetic abuse developed an infiltrate or scar, which often leads to permanent visual impairment.¹³ It is also the presence of discomfort that encourages appropriate follow-up care with an eye care professional. Similarly, the masking of pain can falsely reassure a patient that the injury has improved.

Often when there is a difference in clinical practice or clinical equipoise, there is an opportunity for a clinical trial. However, it is our hypothesis that within the ophthalmology community, there is not equipoise with respect to our practice of not prescribing topical anesthetics after traumatic corneal abrasions. To test this, we designed and distributed a

Q3 - It is acceptable for Ophthalmologists, not Emergency Medicine Doctors, to prescribe topical anesthetic drops for the treatment of acute cornea abrasions.

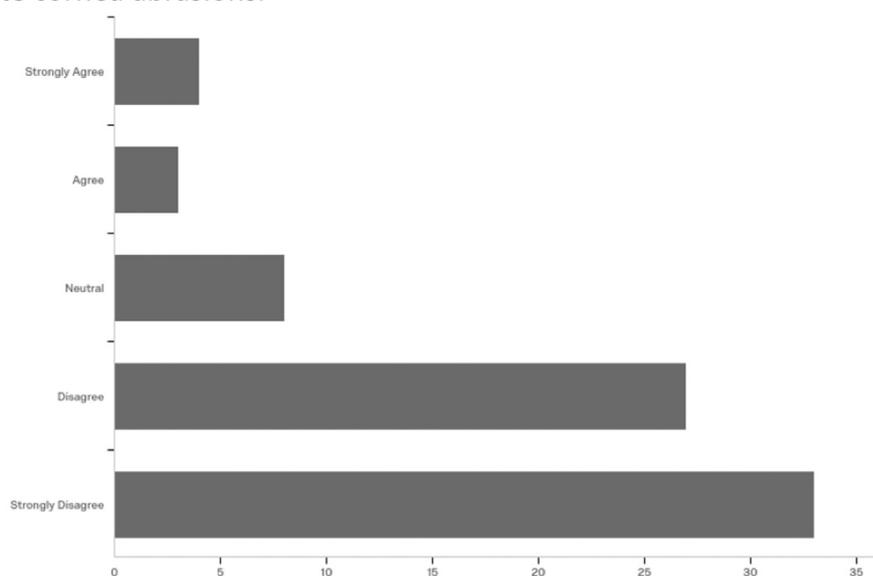


Figure 4. Survey responses.

3-question survey to a community of international corneal specialists. This study was exempt by the University of California–San Francisco institutional review board.

Seventy-five cornea-trained ophthalmologists anonymously rated 3 different statements gauging preferences in regard to the use of topical anesthetics for corneal abrasions from 1 (strongly agree) to 5 (strongly disagree), according to a standard Likert scale (Figures 2 to 4). For the statement “Patients who present to the ED with an acute corneal abrasion should be discharged with a topical anesthetic drop such as tetracaine,” 100% of all corneal specialists either disagreed or strongly disagreed with this statement. For the statement “Patients who present to the ED with an acute corneal abrasion could be discharged with a 24-hour supply of topical anesthetic such as tetracaine,” 89% of cornea specialists gave a score of 4 (disagree) or 5 (strongly disagree). For the statement “It is acceptable for ophthalmologists, not emergency physicians, to prescribe topical anesthetic drops for the treatment of acute corneal abrasions,” 80% of providers gave a score of 4 or 5 (disagree or strongly disagree), whereas only 9.3% gave a score of 1 or 2 (agree or strongly agree).

In conclusion, the recent practice pattern for emergency medicine practitioners to discharge patients with full bottles of topical anesthetic drops is perplexing to us. To our knowledge, there are no studies that support the use of topical anesthetic drops for corneal abrasions because there is no demonstrated benefit, with potential for visual impairment. As we demonstrate here, the majority of cornea-trained ophthalmologists would not dispense topical anesthetics for a traumatic corneal abrasion themselves and strongly disagree that this should or could be a practice pattern in either the ED or clinical setting.

As an ophthalmic community, we discourage treating corneal abrasion with topical anesthesia. We continue to encourage the use of antibiotic drops, ointments, or both to prevent infection; long-acting oral nonsteroidal anti-inflammatory drugs for pain control as needed; and lubrication to promote healing in routine corneal abrasions. We discourage patching because it can promote infection. Any patient with vision changes, persistent discomfort, or contact lens–related corneal abrasions should be urgently evaluated by an ophthalmologist within 24 to 48 hours from discharge.

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