Nonsurgical Management of a Traumatic, Full-Thickness Corneal Laceration: A Case Report

Leslie Huang, MS; Jennifer Larson, MD

ABSTRACT

Introduction: In this report, we describe a case of a large, full-thickness traumatic cornea laceration that was managed nonsurgically.

Case Presentation: A 22-year-old male presented with a red, painful right eye 4 days after a work-related injury. He was found to have a 6.5 mm full-thickness corneal laceration. The wound was Seidel negative, so the decision was made to manage the laceration nonsurgically. The patient did not develop endophthalmitis or wound complications, and his corrected visual acuity recovered to 20/25.

Discussion: Full-thickness cornea lacerations and lacerations larger than 3 mm routinely necessitate surgical intervention in a sterile environment, while medical management is typically reserved for partial-thickness or small, self-sealing lacerations. Surgical repair of lacerations can lead to resultant astigmatic problems, even when performed in ideal conditions and, therefore, should be avoided when possible. Through careful examination and close follow-up, our patient with a large full-thickness laceration was successfully treated nonsurgically and able to avoid associated complications.

Conclusions: This report expands the literature of the appropriate management of cornea lacerations.

INTRODUCTION

Corneal lacerations represent an important sequela of ocular trauma that can cause significant ocular morbidity. Eliciting a detailed history regarding the nature of the injury and performing a thorough examination are crucial in determining the best course of management. All lacerations require prompt treatment to minimize risk of infection and permanent visual disability, with the ultimate goal of restoring meaningful vision.[1]

Specific management of a corneal laceration is dependent on many different factors, notably the extent of the injury and the risk of complications. For example, larger lacerations are more likely to require surgical repair, whereas smaller or partial-thickness lacerations may be treated with conservative medical management.[2] Additionally, the mechanism of injury may prompt further evaluation; traumas that involve possible fragments necessitate radiologic imaging to rule out the presence of intraocular foreign bodies.[3] Developing a cohesive treatment plan for corneal lacerations is complex and requires careful evaluation of the injury to determine the risks and benefits of medical versus surgical management.

Here, we present a case of nonsurgical management of a large, traumatic, full-thickness corneal laceration in a young male patient.

CASE PRESENTATION

A 22-year-old male patient was referred for ophthalmological evaluation after sustaining a traumatic corneal laceration. He presented with right eye pain, redness, and tearing 4 days after a work-related injury. He reported possible metal hitting his right eye underneath protective safety glasses, with no noticeable bloody drainage or loss of fluid. Despite prompt irrigation and use of artificial tears, his symptoms continued without improvement, so he sought ophthalmological care.

At initial presentation, a full ocular examination was per-

Author Affiliations: Department of Ophthalmology and Visual Sciences, University of Wisconsin School of Medicine and Public Health, Madison, Wisconsin (Huang, Larson).

Corresponding Author: Jennifer Larson, MD, Department of Ophthalmology and Visual Sciences, University of Wisconsin School of Medicine and Public Health, 2880 University Ave, Madison, WI 53705; phone 608.263.7171; email jciske@wisc.edu; ORCID ID 0000-0001-5205-1529

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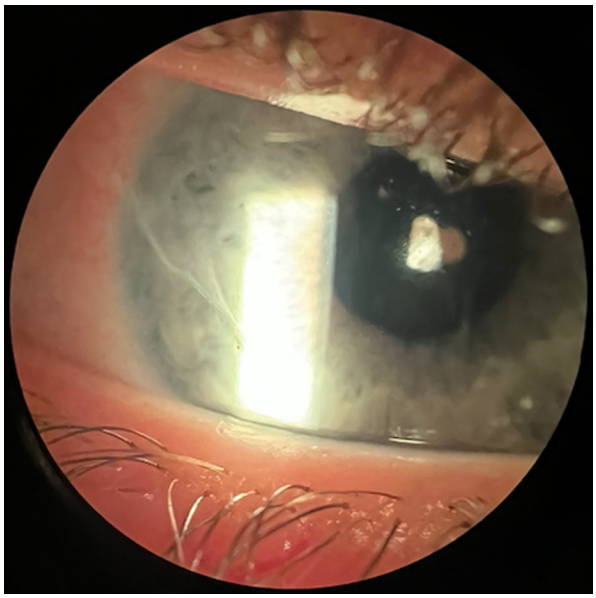
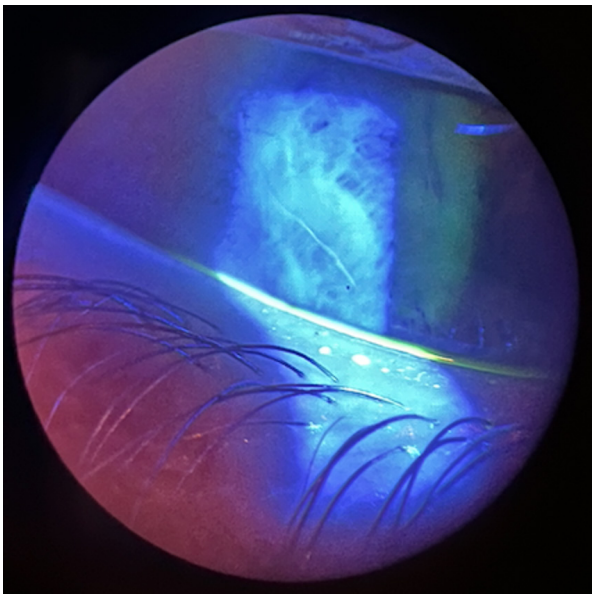
Figure 1. Slit Lamp Photograph of the Right Eye Taken During Initial Ophthalmic Evaluation Four Days After Eye Injury



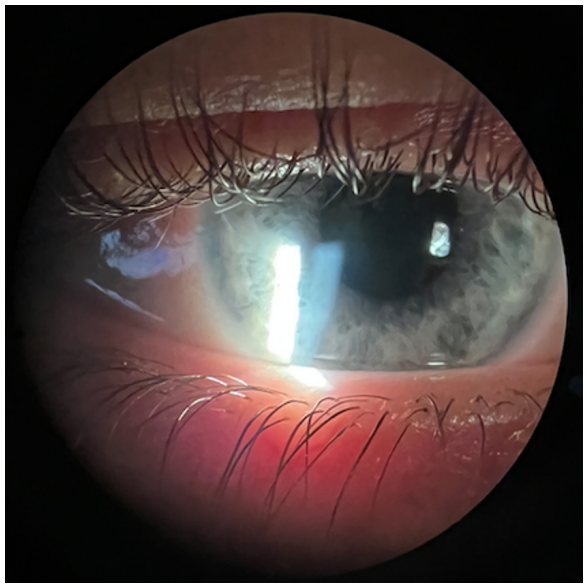
A 6.5 mm diagonal corneal, full-thickness laceration is noted (black arrow). Subtle corresponding Descemet's fold are also seen.

Figure 2. Fluorescein Staining of the Right Eye



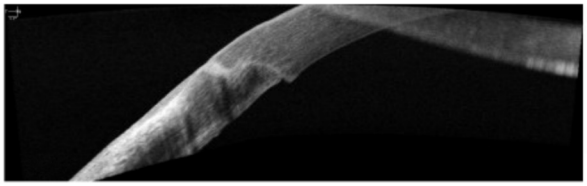
The cornea laceration was Seidel negative and remained so even when pressure was applied to the globe.

Figure 3. Slit Lamp Photograph of the Right Eye



The anterior chamber is deep and well formed. No hyphema or hypopyon is seen.

Figure 4. Anterior Segment and Cornea Optical Coherence Tomography of the Right Eye



A full-thickness laceration is demonstrated.

formed. Best corrected visual acuity was 20/30 in the right eye and 20/40 in the left eye. The right pupil was noted to be smaller than the left but reacted appropriately without an afferent pupillary defect. Anterior segment examination revealed a 6.5 mm diagonal, well-approximated corneal-limbal laceration with corresponding Descemet's fold (Figure 1). The wound was Seidel negative (Figure 2), even with pressure applied to the globe. The anterior chamber was formed with trace anterior chamber cells (Figure 3). The remainder of the anterior and posterior segment examination was unremarkable. Anterior segment and cornea optical coherence tomography confirmed the laceration was full thickness (Figure 4). Intraocular pressure was not measured to avoid unnecessary manipulation of the globe. A maxillofacial computed tomography scan revealed no intraocular or intraorbital foreign body. The patient received tetanus prophylaxis and prophylactic intravenous antibiotics (moxifloxacin).

After the initial evaluation, the patient's eye was covered with a rigid Fox eye shield, and he was given strict orders of bed rest and prescribed topical steroid (prednisolone) and topical antibiotic (moxifloxacin) eye drops. Prophylactic oral antibiotics were not prescribed as they are not used routinely for open globe injuries.

The patient returned for follow-up 1 day and 1 week after the initial ophthalmologic exam, and he reported adhering to the medication regimen and activity restrictions with improving photophobia and eye discomfort. At the 6-week follow-up appoint-

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ment, best corrected visual acuity improved to 20/25-2 in the right eye, and he recovered without further ocular co morbidity, endophthalmitis, or wound complications.

DISCUSSION

Corneal lacerations are most commonly managed with surgical repair, however there are some limited circumstances where these injuries may be managed medically. Many patients with eye trauma present to primary care, urgent care, or the emergency department and not the eye clinic, so it is imperative for these clinicians to be comfortable with the initial workup and management of ocular trauma—including corneal lacerations—and to initiate emergent consultation with an ophthalmologist when an open globe injury is suspected.

Further, the majority of ocular traumas presenting to the emergency department involve corneal injury, including full-thickness corneal lacerations due to traumatic foreign bodies.[4] Clinical course and visual outcomes vary widely depending on the mechanism of injury, the extent of the injury, and the time to treatment. A rapid and thorough evaluation of the injury is needed to determine whether the best course of action is medical or surgical intervention.

A patient presenting with ocular trauma should first be evaluated for other traumatic injuries. Clinicians must complete a primary and secondary trauma survey unless the injury is limited to the eye. When the patient is deemed medically stable, it is then important to evaluate the extent of the ocular injury. Broadly, ocular trauma can be characterized as open globe or closed globe. Open globe injuries (OGI) are full-thickness lacerations and penetrating or perforating injuries to the eye.[5] History should focus on the mechanism and timing of injury, as these circumstances can raise suspicion for an open globe and risk for endophthalmitis. If possible, visual acuity assessment, pupillary responses, and external examination should be completed prior to ophthalmologic consultation. Clinicians should avoid placing direct pressure on the eye due to the concern for extrusion of ocular contents and worsening the extent of the injury; therefore, intraocular pressure should not be measured.[6] Any leakage or extrusion of intraocular contents is diagnostic of OGI. To aid in the visualization of aqueous humor loss, a Seidel test may be performed by placing fluorescein on the ocular surface and looking for a stream of leaking fluid under cobalt blue lighting.[5] Other suggestive signs of OGI include a shallow anterior chamber, peaked pupil (as a result of iris tissue being pulled toward the wound by a strand of vitreous tissue), 8-ball hyphema (complete filling of the anterior chamber with blood), 360-degree subconjunctival hemorrhage, and irregular scleral or corneal contour. Finally, it is important to perform a complete examination of the uninjured eye as well. If an OGI is suspected or detected, the eye should be covered with a rigid Fox shield, and ophthalmologic consultation should be requested immediately.

The goals of traumatic corneal injury repair are to maintain a watertight globe, prevent hypotony, restore anatomy, and prevent infection.[7] For partial-thickness or small corneal lacerations, the options for medical management are well-established. Patching and therapeutic soft contact lenses can provide structural support by acting as mechanical splints and preventing leakage in pinpoint lacerations or very small perforations.[8] Tissue adhesives, such as cyanoacrylate, also may be used to approximate irregular wound edges and additionally provide the advantage of allowing immediate closure of a wound that can be done in the outpatient setting.[2]

In our case, the size of the laceration was larger than those typically managed conservatively; full-thickness cornea lacerations and lacerations larger than 3 mm routinely necessitate surgical intervention and are most often managed through surgical repair in a sterile environment.[8] The conventional method of repair is utilizing 10-0 nylon interrupted sutures to restore the original anatomy and create watertight wound closure.[9] However, there are advantages to nonsurgical management of corneal lacerations, such as avoiding the risks associated with general anesthesia and avoiding surgically induced irregular astigmatism from the corneal sutures. A significant cause of visual disability in patients with corneal lacerations is the development of high astigmatism due to irregularity in the corneal surface.[1] Even with careful surgical techniques and perfect approximation of wound edges, there is still a risk of visually significant surgically induced irregular astigmatism postoperatively.[10] Furthermore, self-sealing lacerations have been found to confer higher risks of intraocular foreign bodies, endophthalmitis, and other complications that should lead to prompt evaluation for surgical management. Watanachai et al reported a study with 591 OGI patients in which a higher distribution of endophthalmitis and delayed presentation to the hospital were observed in patients with self-sealing wounds compared to patients requiring primary wound repair (P values < 0.001).[11] The self-sealing nature of our patient's laceration, combined with the delayed presentation and size of the wound, made this an unusual case of medical management of a traumatic corneal laceration.

We reported here a case of a large traumatic, full-thickness corneal laceration that was managed nonsurgically. The patient presented 4 days following the initial injury. Full ophthalmological examination revealed a self-sealing, full-thickness, peripheral laceration with no iris or vitreous prolapse and no evidence of infection, despite the passage of 4 days since the initial injury. We speculate that healing may have occurred in the time between injury and initial presentation—especially given the peripheral location of the laceration. The increased thickness of the peripheral cornea, as well as the involvement of the limbus—a critical reservoir for corneal epithelial stem cells, likely accelerated wound healing and helped prevent OGI complications.[12]

This case was reported to show that with careful evaluation

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and conservative management, we were able to avoid surgery and associated complications and, importantly, achieve good visual acuity. Surgical care remains the standard of care for open globe injuries, however, conservative management was appropriate here because of the lack of intraocular foreign body and self-sealing nature of the wound. Reviewing return precautions (asking the patient to return immediately for worsening eye pain, redness, or decrease in vision) was also important for safely managing this wound conservatively.

CONCLUSIONS

Developing an optimal treatment plan for corneal lacerations is dependent on a thorough and rapid examination to evaluate the extent of the injury. Although the standard of care is to surgically repair full-thickness corneal lacerations, there are advantages to avoiding surgery, and select lacerations may be appropriate for nonsurgical management as this case demonstrates.

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