A Case Report on Corneal Abrasion

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Abstract:

Corneal abrasion is a defect of the corneal surface that results from an injury. Slit-lamp examination is an important aspect of assessing the presence, extent and depth of the corneal epithelial defect in patients who present with symptoms suggestive of a corneal abrasion. In most cases, recurrent corneal erosions may occur weeks to months after the corneal abrasion heals due to an alteration in the corneal epithelium basement membrane during healing.

An 18-year-old female presents to the office with a red painful left eye of sudden onset. Examination findings revealed a large area of corneal epithelial defect which stained positively with fluorescein; thus, suggestive of a corneal abrasion. The management involved the use of Vigamox 0.5% ophthalmic solution, Nevanac 0.1% ophthalmic suspension, Bacitracin ophthalmic ointment, Scopolamine 0.25% ophthalmic solution and a silicone hydrogel bandage contact lens.

The prognosis of corneal abrasion is good; however, a corneal ulcer may develop if the condition is under-treated or left untreated.

Initial Presentation:

An 18-year-old African American female presented to the office complaining of a “very red” watery left eye accompanied by foreign body sensation. Patient reports blurry vision, with photophobia, tearing, burning, and stabbing pain in the left eye. She stated that the associated pain felt to be confined to the area around her iris and pupil. She used visine to help with the redness. Patient reported that her current condition was present upon waking. She has no

recollection of injuring her left eye or any foreign substance entering into or around the eye and denied any eye rubbing of any kind. When asked to grade level of pain, burning and photophobia on a 1-10 scale, she rated both burning and photophobia as 8s and pain as a level 10. The patient reported no flashes, floaters, or double vision. She denies wearing spectacle or contact lens correction. Her systemic and ocular history was unremarkable. The only reported medication was birth control pills.

Diagnostic Data:

Visual acuities at distance were 20/20 OD (right eye) and 20/200 OS (left eye) upon presentation; there was no improvement with pinhole O.S. Extraocular motility testing was unremarkable in all positions of gaze. Her pupils were equal, round, and reactive to light with no afferent pupillary defect. Slit lamp examination was unremarkable O.D., while it revealed grade 2+ bulbar conjunctiva injection, moderate corneal edema and epithelial defect O.S. Upon instillation of sodium fluorescein, it was noted that a corneal abrasion was present across approximately 80% of the cornea OS (figure 1). The anterior chamber was deep and quiet OS.

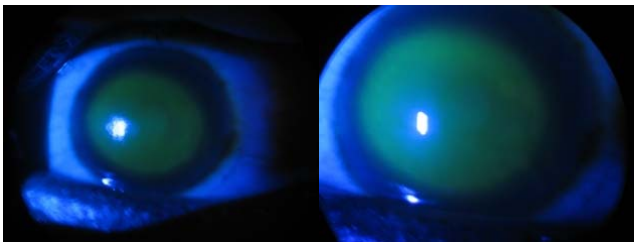

Figure 1. Large area of abraded cornea that stains positively with fluorescein O.S.

Diagnosis:

Based upon the history and clinical evidence, the patient was diagnosed with a corneal abrasion OS of unknown cause.

Treatment and Follow up Care:

Further questioning of the patient did not lead to a possible cause of the abrasion. The patient only revealed that she awoke with the previously discussed symptoms. Initial treatments in the office included one drop of Vigamox (moxifloxacin hydrochloride) 0.5% ophthalmic solution every 5 minutes for a period of 30 minutes, one drop of scopolamine 0.25%, and 0.5-inch ribbon of bacitracin ophthalmic ointment O.S. only. A bandage contact lens was placed on her eye and the patient was given instructions on how to administer the topical pharmaceutical agents. Her instructions were as follows: Administer one drop of Vigamox 0.5% ophthalmic solution every 30 minutes for 4 hours followed by one drop every hour for the remainder of the day. Along with the Vigamox 0.5% ophthalmic solution, the patient was instructed to use one drop of Refresh Liquigel every hour as supportive therapy. Anterior segment photos were taken and the patient was asked to return the next day for follow-up care.

A few hours later on the same day, the patient returned reporting severe pain O.S. despite recent therapy and bandage contact lens placement. She stated that instead of Refresh Liquigel, the pharmacist had given her Teargen artificial tears containing 1.4% polyvinyl alcohol. The bandage contact lens was removed. One drop of Vigamox 0.5% ophthalmic solution, one drop of Nevanac 0.1% ophthalmic suspension, and hypertonic sodium chloride 5 % ophthalmic ointment was administered O.S. The bandage lens was replaced and a call

placed to the pharmacy with the name of the artificial tears to be dispensed. The patient was again asked to return one day later for follow-up care, but now with Nevanac 0.1% ophthalmic suspension q.i.d. and hypertonic sodium chloride 5 % ophthalmic ointment b.i.d. O.S. added to her therapeutic regimen. She was provided with written instructions of the treatment protocol. She was advised to keep the hypertonic sodium chloride solution refrigerated to avoid ocular irritation or stinging upon instillation.

First Follow-up Care Visit

At the first follow-up visit one day later, the patient reported no improvement of pain O.S. despite excellent compliance with the treatment protocol; however her symptoms weren't any worse than they were on her initial presentation. Slit lamp examination revealed healthy anterior segments O.D. with similar findings to the initial visit O.S. However, the positive fluorescein staining was smaller in diameter with a clear central zone (figure 2). The assessment was that our patient was responding to the treatment regimen. Anterior segment photos were taken and the patient's bandage contact lens was replaced. The patient was educated to continue using Vigamox 0.5% ophthalmic solution one drop every hour OS along with the use of artificial tears every hour, Nevanac 0.1% ophthalmic suspension q.i.d. OS, and hypertonic sodium chloride 5 % ophthalmic ointment b.i.d. OS. The patient was asked to return the next day for follow-up care.

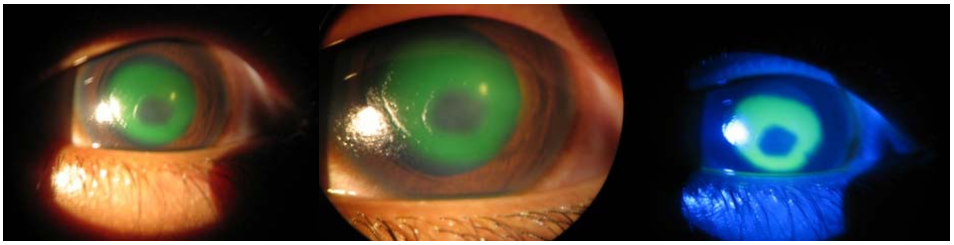

Figure 2. Large ring-like area of epithelial defect O.S.

Second Follow-up Care Visit

One day later, two days after the initial presentation, the patient reported improvement, except for persistent photophobia (patient was pharmacologically dilated previously). The patient reported compliance with treatment protocol. When asked to grade level of pain, burning and photophobia on a 1-10 scale; she rated burning as a level 5, photophobia as 8, and pain as a level 6. Slit lamp examination revealed healthy anterior segments O.D.; however, it revealed bulbar conjunctival injection, corneal edema, and cornea epithelial defect, with lid edema added to the findings OS. Also, the diameter of the fluorescein staining was now half the size of its initial presentation (figure 3). The assessment now was that our patient was exhibiting clinically significant improvement and response to the treatment regimen. Patient was instructed to discontinue the use of Nevanac 0.1% ophthalmic suspension, but to continue using Vigamox 0.5% ophthalmic solution one drop every hour OS along with the use of artificial tears every hour, and hypertonic sodium chloride 5 % ophthalmic ointment b.i.d. OS. Anterior segment photos were taken and a fresh bandage contact lens was placed on OS. The patient was asked to return the next day for follow-up care in 48 hours.

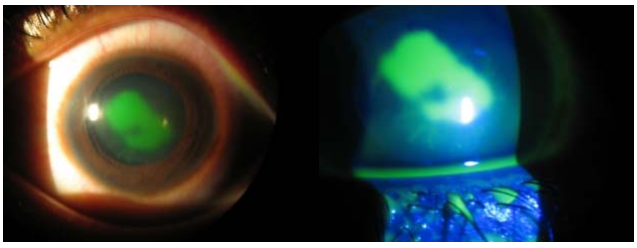

Figure 3. Central corneal epithelial defect O.S.

Third Follow-up Care Visit

Day 3 of follow-up care, four days after initial presentation, and the patient presents reporting a considerable improvement in the symptoms. Persistent photophobia was reported corresponding to her dilated pupil from instillation of scopolamine 0.25% during initial treatment. The patient reported compliance with treatment protocol. When asked to grade level of pain, burning and photophobia on a 1-10 scale; she rated burning as a level 3-4, photophobia as 8s and pain as a level 6. Visual acuity was now 20/20 O.D. and 20/200 with pinhole improvement to 20/80 O.S. Slit lamp examination was unremarkable O.D. Lid and corneal edema persisted O.S., but the bulbar injection and cornea epithelial defect noted on initial presentation had resolved (figure 4). The patient no long required a bandage contact lens, but was instructed to continue the use of Vigamox 0.5% ophthalmic solution q.i.d. and hypertonic sodium chloride 5 % ophthalmic ointment b.i.d .OS. Anterior segment photos were taken and the patient advised to return to clinic in 4 days for follow-up care.

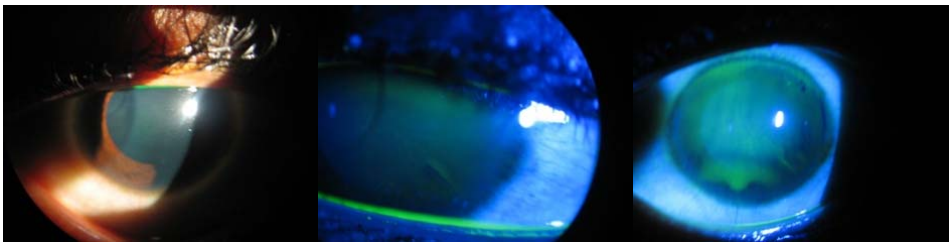

Figure 4. Resolved corneal abrasion with residual drug-induced pupil mydriasis O.S.

Fourth Follow-up Care Visit

Day 4 of follow-up care, 9 days following initial presentation; the patient no longer had reports of pain or photophobia. The patient reported compliance with treatment protocol. Visual acuity was now 20/20 O.D. and 20/80-1 O.S. with pinhole correction 20/50-1 O.S. Slit

lamp examination revealed healthy anterior segments O.D. with mild corneal edema O.S. No signs of lid edema, bulbar injection, or cornea epithelial defect that stained positively with fluorescein were noted in the left eye at this visit (figure 5). The patient was then instructed to discontinue the use of Vigamox 0.5% ophthalmic solution q.i.d. after two days. Patient was instructed to continue using hypertonic sodium chloride 5 % ophthalmic ointment b.i.d .O.S. to reduce risk of recurrent corneal erosion, as well as decrease the residual corneal edema. Anterior segment photos were taken and the patient advised to return to the office for follow-up care in 1 month. The patient was then lost to follow-up care.

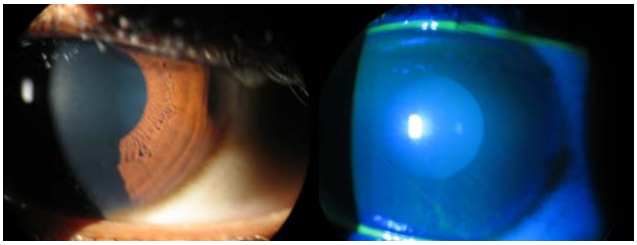

Figure 5. Complete resolution of corneal epithelial defect O.S.

Discussion:

Corneal abrasions are one of the most common ocular complaints seen in practice today. It is a disorder of the corneal epithelium or grazing of the corneal surface that may occur from foreign bodies, contact lenses, chemicals, fingernails, hair brushes, tree branches and many other forms of ocular irritants.[1] There are two types seen in general practice: superficial (those not involving the Bowman membrane) and deep (those that penetrate Bowman's membrane but do not penetrate Decemet's membrane. [1]

Corneal epithelium consists of five to seven layers of cells and rests on a basement membrane that adjacent overlies the Bowman's layer. The corneal epithelium is constantly replaced by basal epithelial cell mitosis or by stem cells within the limbus. [2] During the re-epithelization process, the corneal epithelial cells become flattened, as they spread, and migrate across the defect until the defected area is covered. [2] Cell proliferations, which are independent of cell migration, begin approximately 24 hours after injury. [2] Stem cells from the limbus also respond by proliferating to give rise to daughter cells that migrate to heal the corneal defect and proliferate to replenish the wounded area. [2]

Nevanac (nepafenac ophthalmic suspension) 0.1% is a topical nonsteroidal anti-inflammatory (NSAID) and analgesic prodrug for ophthalmic use.[3] It can penetrate the cornea and is readily converted by hydrolases to amfenac, which inhibits the synthesis of prostaglandins; thus it is indicated for the treatment of pain and inflammation. [3] Instillation of scopolamine (isopto Hyoscine ophthalmic) blocks the responses of the sphincter muscle of the iris and ciliary muscles of the ciliary body to cholinergic stimulation, producing mydriasis and cycloplegia. [1] Therefore, it can provide considerable relief for patients with marked photophobia and pain by alleviating any ciliary muscle spasms. Vigamox (moxifloxacin HCL ophthalmic solution) 0.5% is a fourth generation fluoroquinolone, which acts to inhibit the action of topoisomerase II (DNA gyrase) and topoisomerase IV.[4] These enzymes are essential for bacterial DNA reproduction. [4] It is effective against both gram-positive and gram-negative organisms, therefore making vigamox an excellent choice for providing prophylaxis against secondary infection in corneal abrasions.

Our patient had a large corneal abrasion of unknown etiology. The most important aspects of treatment and management in superficial corneal abrasions are the prevention of infection, the control of edema and pain for the patients, as well as re-reepitheliazation of the cornea. The management involved the use of vigamox, hypertonic sodium chloride, nevanac,

scopolamine, and a bandage silicone hydrogel contact lens. The bandage contact lenses were placed on the eye to provide comfort and pain relief, as well as enhance corneal epithelial regeneration and proper healing to prevent the blink action of the eyelid from disrupting the re-epithelization process. [5,6] Disruption of the re-epithelization process may result in focal areas of poor epithelial adherence. [7] Thus it provides protection, promotes healing, and reduces pain. The osmotic action of the hypertonic sodium chloride will drain fluid from the epithelium aimed at keeping the superficial cornea dehydrated; thereby promoting adherence of basal epithelial cells to the underlying basement membrane, as well as reducing corneal edema. [8] Scopolamine and topical NSAID were used as an ocular analgesic or 'ocular aspirin' for pain management. We administered one drop of scopolamine 0.25% ophthalmic solution to the left eye with the aim of minimizing any potential for the development of secondary or 'traumatic' iridocyclitis. Topical NSAIDs are good analgesics that have been shown to reduce the ocular pain associated with traumatic corneal abrasion. [9] Once re-epithelization was complete, we discontinued bandage contact lenses and recommended the long-term use of hypertonic sodium chloride with the objective of ensuring and/or promoting proper corneal epithelial adherence to the basement membrane. [10]

With our patient, follow-up care continued and within 9 days post-abrasion, vision and comfort was greatly improved, with pain, burning and photophobia resolved. On the 11th day Vigamox was discontinued, as corneal staining was no longer present. The patient was instructed to continue using hypertonic sodium chloride 5 % ophthalmic ointment b.i.d .O.S. to reduce risk of recurrent corneal erosion and aid in the resolution of corneal edema.

Conclusion:

There are many approaches to treating corneal disruptions. Corneal abrasions respond to management with cycloplegia, placement of a bandage contact lens, topical NSAIDs, prophylactic antibiotics, topical lubrication or hypertonic saline. The approach taken for each case depends on the history and etiology of the abrasion, as well as the extent and depth of the corneal epithelium defect. With our patient, the only information she provided was history of an acute onset of unknown cause. With that in mind, the treatment plan for this patient consisted of a regimen designed solely for the purpose of re-epithelization of the cornea and to prevent the development of microbial keratitis.

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