

Clinical & Refractive Optometry is pleased to present this continuing education (CE) article by Dr. Ron Melton and Dr. Randall Thomas entitled **Corneal Abrasions**. In order to obtain a 1-hour Council of Optometric Practitioner Education (COPE) approved CE credit, please refer to page 196 for complete instructions.

Corneal Abrasions

Ron Melton, OD; Randall Thomas, OD

Subjective

A 78-year-old male presents after accidentally scratching his right eye with his thumbnail hours earlier. His eye now hurts very much and vision is blurred.

Objective

- VA: OD 6/24 (20/80); OS 6/12 (20/40)
- Conjunctiva: 2+ injection OD
- Cornea: OD large abrasion (5 x 7 mm) encroaching on the visual axis. Area on epithelial basement membrane dystrophy (EBMD) nasal to the abrasion in the OD (Fig. 1); also 1+ EBMD OS
- 2+ nuclear sclerotic cataracts OU

Assessment

- Large corneal abrasion OD
- EBMD OU

Plan

- In office instillation of 5% homatropine and diclofenac (Voltaren). Pressure patch over a combination of bacitracin/polymyxin B sulfate (Polysporin) ophthalmic ointment and NaCl 5% ophthalmic ointment
- Recheck day 1: with 50% improvement in the abrasion. Start polymyxin B sulfate/trimethoprim sulfate (Polytrim) 1 gt. q.i.d. alternated with diclofenac 1 gt. q.i.d. OD. Add NaCl 5% ophthalmic ointment at h.s. and educate patient of the need to continue this for 4 weeks followed by GenTeal Gel for 4 weeks to reduce the risk of recurrent corneal erosion
- Recheck the next day with 95% re-epithelialization of cornea OD. Now the EBMD is grade 2 from amplified edema as the cornea heals (Fig. 2).

Continue polymyxin B sulfate/trimethoprim sulfate 1 gt. b.i.d. OD alternated with the diclofenac 1 gt. b.i.d. OD x 2 days then discontinue. Start GenTeal q.i.d. and reinforce the use of the NaCl 5% ointment for the 4 weeks followed by GenTeal Gel for 4 weeks. Recommend a recheck in 1 month

Comments: The therapy for corneal abrasions continues to evolve. The current thought is to continue to pressure patch larger abrasions, at least initially. If patients are in enough pain, an oral analgesic such as Acetyl-para-aminophenol (APAP-acetaminophen) 300 mg + Codeine 30 mg [Tylenol #3] q. 6h. p.o. as needed x 10 tablets is prescribed.

With the smaller corneal abrasion one can use a loose fitting disposable contact lens with diclofenac q.i.d. alternated with moxifloxacin (Vigamox) until the epithelium has healed. If the patient is tolerating the injury with little discomfort in the smaller abrasions, prophylax with polymyxin B sulfate/trimethoprim sulfate q.i.d. alternated with preservative-free artificial tears. The artificial tears provide added lubrication and comfort which facilitates re-epithelialization.

This case shows the importance of observing the cornea for signs that may indicate a slower recovery time. The EBMD being present with a corneal abrasion is significant because it may take the epithelium longer to heal. Edema associated with the patching will make the EBMD more pronounced. Therefore, adding the NaCl 5% ointment under the patch helps combat the edema and minimize the EBMD influence. Also in the corneal abrasions caused by sharp objects, the risk of damage to the basement membrane and Bowman's layer is greater. This increases the risk of recurrent corneal erosion and therefore one would want to use ophthalmic lubricants such as NaCl 5% ointment or GenTeal Gel at h.s. for 8 weeks, the time required for basement membrane to heal.

General Observations

- If there is only an epithelial defect, healing is usually rapid with or without pressure patching. Risk of recurrent corneal erosions (RCE) is minimal as long as the traumatic injury did not compromise the basement membrane

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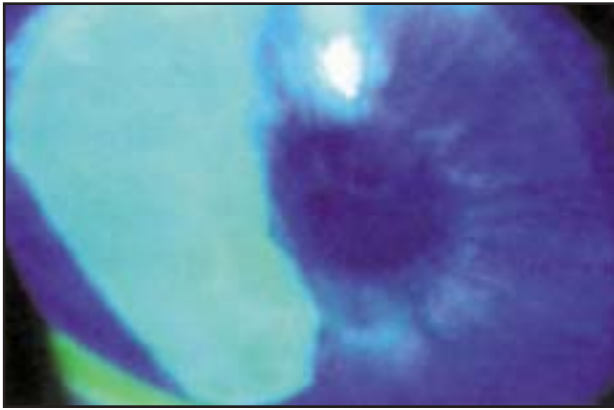


Fig. 1 While the large abrasion is obvious, note the area of negative staining in the visual axis which indicates underlying EBMD.

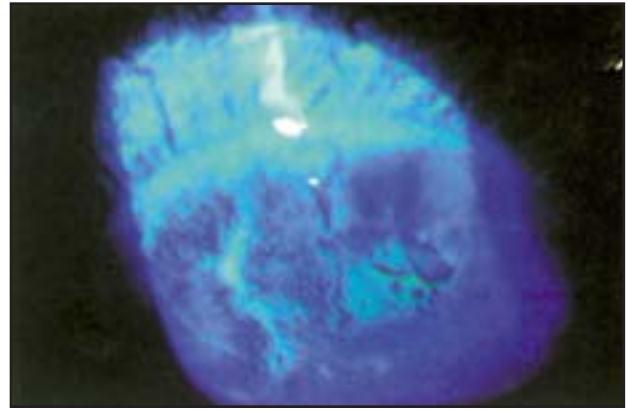


Fig. 2 After a day of pressure patching, the abrasion is resolving nicely. However, the area of EBMD is exaggerated because of the relative hypoxia under the patch. This will spontaneously resolve in a day or two.

- If the basement membrane has been traumatized (such as in fingernail, paper cuts, and other cutting type insults), the risk of RCE is sufficient to warrant hypertonic saline ointment at bedtime for six to eight weeks — the healing time required for basement membrane to regenerate
- Rule out intraocular penetration: history, tonometry, systemic lupus erythematosus (SLE) with “painting” over injury site looking for a positive Seidel’s sign, and BIO
- Cycloplege (usually with 1% cyclopentolate, 5% homatropine, or 0.25% scopolamine — depending on the severity of the abrasion)
- Pressure patch larger abrasions over a properly affixed firm patch. Patch over erythromycin or bacitracin/polymyxin B sulfate ointment. Almost always, see the patient in 24 hours for follow-up evaluation when patching
- For medium-sized abrasions, a loose fitting disposable contact lens supported with diclofenac sodium for pain and moxifloxacin (Vigamox) for antimicrobial prophylaxis is becoming more common. Small abrasions may need only frequent lubrication for a day to achieve healing
- If there is secondary iritis, try to wait until the cornea is essentially re-epithelialized prior to instituting topical corticosteroid therapy, should such therapy be indicated
- Always examine the fellow eye to look for the presence of EBMD, since this can delay re-epithelialization
- When patching for two or three days, there will be some temporary decrease in vision related to corneal edema and/or folds in Descemet’s membrane. This will simply disappear in a day or two once patching therapy has ceased

- If significant corneal edema is present at the time of presentation, it may be helpful to instill 5% NaCl ointment along with the antibiotic ointment prior to patching

Epithelial Basement Membrane Dystrophy (EBMD)

EBMD is also known as Cogan’s microcystic epithelial dystrophy and map-dot-fingerprint dystrophy.

- Most common corneal dystrophy — seen mostly in Caucasian women over 40
- Commonly missed or misdiagnosed (Pearl: negative fluorescein staining is a very helpful diagnostic slit-lamp finding)
- Membrane expression is not stationary and may come and go over a period of months
- These can cause subtle refractive changes if they are in the visual axis, a point to consider in patients complaining of subtle, usually monocular, visual problems
- Non-hereditary in nature; however, there is a tendency toward autosomal dominant transmission
- Patient is usually asymptomatic, but can present with pain, foreign body sensation and/or photophobia, if associated with a spontaneous recurrent corneal erosion. These types of erosions are commonly associated with EBMD and a history of acute pain upon awakening is a common presenting symptom
- There is poor hemidesmosomal attachment of the epithelial cells overlying abnormal basement membrane. This explains the predisposition of these tissues to recurrently erode
- Treatment is hypertonic (5%) NaCl drops every three to four hours by day and/or 5% NaCl ointment at bedtime. This may need to be continued for two to three months. If there is concurrent dry eye, use frequent lubrication as needed

- Initial patching over 5% NaCl and erythromycin ointment for a day or two may be required for advanced erosions
- In chronic, recurrent cases, a therapeutic soft bandage lens may need to be worn for two to three months to give the basal epithelium complex/basement membrane ample time to fully heal
- Another therapy for continued erosions is “anterior stromal puncture” where a microbent needle tip is used to create multiple superficial (into anterior stroma) punctate punctures in the area of defective epithelial tissues, thereby “spot-welding” these epithelial tissues to the underlying basal epithelium/basement membrane/Bowman’s layer complex. This is best accomplished for off visual axis erosions. However, it can be used in recalcitrant cases involving the central cornea. These heal neatly and clearly leaving extremely faint scars

Recurrent Corneal Erosion

Recurrent corneal erosion (RCE) can occur spontaneously secondary to EBMD, or subsequent to prior corneal trauma where the epithelial basement membrane sustained damage. This latter expression can occur days, weeks, months, or years following the original trauma.

- The most common history is one of sharp pain, either during sleep, or immediately upon awakening. The acute pain can be transient, lasting only seconds or minutes, or it may persist a few hours. It is this latter category of patients who commonly present
- Depending on the time delay and the severity of the erosion, the clinical findings can be: negative, demonstrate a pinpoint epithelial defect, a mottled-splotchy defect, or a frank erosion/abrasion
- There is a myriad of therapeutic approaches depending upon the temporal sequence (i.e., initial or recurrent event) and the severity of the clinical presentation. Such

maneuvers include artificial tear lubrication, hypertonic preparations (5% NaCl solution and/or ointment), cycloplegia, pressure patching, therapeutic/bandage soft contact lenses, debridement, anterior stromal puncture, or a combination of these

- The basement membrane is produced by the basal epithelial cells, and it generally takes about eight weeks for a defect in this membrane to be repaired. Once the integrity of this membrane has been breached, aggressive therapeutic maneuvers should be undertaken for about eight weeks
- At the second, or certainly by the third, erosive episode, the technique of anterior stromal puncture should be performed, since it has been shown to be a permanent fix in the vast majority of patients. This is accomplished with a small gauge sterile needle whose tip has been microbent so as to limit the depth of puncture to the anterior one-quarter of the cornea. Bausch & Lomb Surgical (www.blsurgical.com) also makes a commercially available needle product for this purpose. The technique of anterior stromal puncture is easily accomplished at the slit lamp following topical anesthesia and takes less than one minute to perform. There is no discomfort to the patient
- Long-term management and prevention centers around nocturnal lubrication and advising patients not to rub their eyes, especially upon awakening
- Patient education is important because of the potentially chronic nature of this condition

Disclaimer: Not every detail of every case is discussed, rather the key clinical findings are described. For example, if nothing is said about the corneal status, you should assume that the cornea is normal, etc. When vision is recorded, it should be assumed to be best corrected or pinholed. Regarding therapy, we show how we treated the particular case. Given that medicine is an art, as well as a science, therapy will — and often does — vary with each unique patient presentation depending on severity, known drug allergies, prior treatment, response to therapy, etc.



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QUESTIONNAIRE

Corneal Abrasions

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- In the case presented, the following statements are true, **EXCEPT**:
 - Patient was prescribed polymyxin B sulfate/trimethoprim sulfate (Polytrim) 1 gt. q.i.d.
 - NaCl 5% ophthalmic ointment at h.s. was prescribed
 - A 6-month recheck was scheduled
 - GenTeal Gel for 4 weeks was prescribed
- Which of the following statements at recheck day 2 is **FALSE**?
 - Polymyxin B sulfate/trimethoprim sulfate was discontinued
 - Examination revealed 95% re-epithelialization of cornea OD
 - EBMD was grade 2 from amplified edema
 - Patient was started on GenTeal q.i.d.
- All of the following statements regarding therapy are true, **EXCEPT**:
 - Pressure patches for larger abrasions, at least initially, is an acceptable plan
 - Loose-fitting disposable contact lens with diclofenac q.i.d. alternated with moxifloxacin (Vigamox) for small abrasions
 - Artificial tears are to be avoided as they tend to provide over-lubrication
 - In smaller, less painful abrasions, prophylax with polymyxin B sulfate/trimethoprim sulfate q.i.d.
- Which of the following statements describing this case is **TRUE**?
 - Observing the cornea can reveal signs indicating a slower recovery time
 - Epithelial basement membrane dystrophy (EBMD) being present is significant as it may take the epithelium longer to heal
 - Edema associated with patching will make the EBMD more pronounced
 - All of the above

5. All of the following statements are true, **EXCEPT**:
 - It is important to rule out intraocular penetration
 - With only epithelial defects, healing is usually rapid
 - Pressure patching larger abrasions over a properly affixed firm patch is acceptable
 - When patching, 48 hour follow-up evaluation is essential

6. The following are important treatment considerations, **EXCEPT**:
 - Examination of the fellow eye for the presence of EBMD is important
 - With significant corneal edema, instill 5% NaCl ointment along with antibiotic ointment prior to patching
 - Cycloplege is recommended
 - Decrease in vision following patching takes about 2 weeks to disappear

7. All of the following statements describe EBMD, **EXCEPT**:
 - Membrane expression normally remains stationary over a 12-month period
 - It is most often seen in Caucasian women over 40
 - It is non-hereditary
 - The patient is usually asymptomatic

8. Which of the following statements about EBMD is **TRUE**?
 - Pearl: negative fluorescein staining is a helpful diagnostic slit-lamp finding
 - There is a tendency toward autosomal dominant transmission
 - In chronic, recurrent cases, a therapeutic soft bandage lens may be required
 - All of the above

9. Which of the following statements about recurrent corneal erosion is **FALSE**?
 - It can occur spontaneously secondary to EBMD
 - Therapy includes artificial tear lubrication, debridement, cycloplegia, among others
 - It generally takes about 8 weeks for a basement membrane defect to be repaired
 - The patient is usually asymptomatic

10. Which of the following statements is **FALSE**?
 - Small corneal abrasions may only require frequent lubrication in order to heal
 - Larger corneal abrasions have traditionally been treated with a properly affixed firm patch over erythromycin or bacitracin/polymyxin B sulfate ointment
 - Patching for two or more days will cause a temporary decrease in vision related to corneal edema and/or folds in Descemet's membrane
 - None of the above