CASE 1: BARBARA

Part 1

History
Barbara Kay is a 27 year-old female Caucasian who presents with moderate to severe pain in the left eye. The onset of Barbara's symptoms began the night prior (12 hours) as she was retiring for the evening. At that time, she was aware of mild discomfort and a transient foreign body sensation. Barbara was tired from a day of mountain biking and hiking and retired without removing her contact lenses. Upon awakening, her pain was immediately apparent and she had difficulty opening her eye sufficiently to remove her hydrogel lens.

Questions
What has happened to Barbara? Come up with several possibilities and discuss which is the most likely.
Is her problem related to the contact lens?
What can a contact lens do to the normal physiology of the eye?
What does the symptom of pain tell us?

To start thinking about what contact lenses could do to the eye, consider that there are number of different types of contact lenses. You might want to think about how the different types could affect the eye in different ways:

- Hydrogel (soft) lenses, these are thin and flexible and wrap closely over the cornea
- Rigid gas permeable (RGP) lenses - they are like hard plastic, and don't sit right against the cornea; i.e. tears can swish around under them.
- Some hydrogel and some RGP lenses can be worn overnight (extended wear), others are for daily wear

There are differences in the amount of oxygen that can get through different materials. Remember to consider the effects of any contact lens care solutions as well.

Essential topics to cover
Basic anatomy and physiology of the cornea and sclera
- physiology includes biophysical and biochemical aspects

References:
Your books, other books in the library (in particular check out books on reserve), journal articles, and internet websites. Examples (in no particular order) include:

1. Fatt and Weissman: Physiology of the Eye: An Introduction to the Vegetative Functions.
2. Adler’s Physiology of the Eye.
5. Forrester: The Eye.
10. Catania: Primary Care of the Anterior Segment
12. Silbert: Anterior Segment Complications of Contact Lens Wear
CASE 1: Part 2

Barbara wears hydrogel contact lenses for the correction of her myopia. They are daily disposable lenses that she keeps for 3-4 weeks “due to cost”. Barbara reports that she is currently soaks her lenses in a commercially available solution for “sensitive eyes” when she takes her lenses out, but she cannot recall its name. She has no glasses.

Examination Findings:
Barbara's entrance distance acuities were O.D. (with her hydrogel contact lens) 20/25 and O.S. (without contact lens) 20/400. With a pinhole her vision in the left eye improved to 20/80.

Upon presentation the bulbar and palpebral conjunctiva were characterized by a grade 4 hyperemia. Although Barbara reports a purulent discharge upon awakening, she is more noticeably epiphoric with only a trace of discharge. There is an opaque lesion in the cornea located in the inferior temporal quadrant. Surrounding the lesion is a translucent region containing discrete white cellular particulate. The inferior anterior chamber has a hypopyon.

Essential topics to cover
Cell and molecular biology of the cornea:
• cell biology of the epithelium and endothelium, particularly transport and barrier functions
• biochemistry of the stroma and how it contributes to transparency
The effect of contact lens wear on normal physiology
Corneal defenses against infection
How contact lenses might interfere with defenses
Normal wound healing in the cornea and the consequences of wounding
Factors that determine whether there will be scarring after a wound

Questions
Anatomy and Physiology
Can contact lens wear effect the eyelids and blinking patterns?
How does contact lens wear affect the tear film?
How does contact lens wear affect the cornea (and conjunctiva?)
  • The glycocalyx (structure and function)
  • The epithelium (structure and function)
  • The stroma (structure and function)
  • The endothelium (structure and function)
Clinical
Why is her vision reduced in the right eye?
Why does the left eye vision improve with a pinhole?
Why is there a purulent discharge?
What does the opaque lesion consist of?
What does the translucent area around the lesion consist of?
Why is there a hypopyon? What do you think is the causative agent?

References
Fleiszig and Evans: Contact lens infections: can they ever be eradicated? In CLAO Journal, 2003. (on reserve in folder: VS206C No. 2)
Fleiszig, McNamara, and Evans: The tear film and defense against infection. In Lacrimal Gland, Tear Film, and Dry Eye Syndromes 3, 2002. Edited by D. Sullivan, et al. (on reserve in folder: VS206C No. 4)
CASE 1: Part 3

A culture was taken of Barbara’s left eye. Barbara was started on fortified tobramycin, 15 mg/ml, and fortified cefazolin (Ancef®), 50 mg/ml, on an alternate around the clock q. 1/2 hr O.S. schedule. Barbara was prescribed .25% scopolamine qid O.S. The eye was not patched. Barbara was also prescribed oral ketorolac (Toradol®), two 10 mg tabs initially, then one tablet every six hours with food. Follow up was scheduled for 24 hours.

Follow up (24 hours):
Barbara reported that the oral analgesia had reduced her discomfort to a tolerable level.

Visual acuity with each eye remained unchanged. Physical examination of the lesion with the slit lamp revealed the lesion had increased in size slightly. The anterior chamber reaction and hypopyon remained unchanged.

The current treatment was continued (fortified antibiotics, cycloplegia, and oral analgesia) and the patient scheduled for the next day. The patient was advised to remain compliant. Culture and sensitivity results were not yet available.

Follow up (day 2):
The culture results were available and revealed Streptococcus pneumoniae as the causative agent. Sensitivity suggested that the fluoroquinolone moxifloxacin HCl (Vigamox®) was the most appropriate antibiotic. Barbara was switched to .5% Vigamox® q. 1/2 hr O.S. for 3 hours, and q1h thereafter.

Follow up (day 5):
The lesion was diminishing in size and density. The anterior chamber reaction was also resolving. Dosages were reduced to Vigamox® q2h and .25% scopolamine bid. Toradol® was discontinued.

Follow up (day 8):
The lesion has further diminished in size and density. Anterior chamber is quiet. Scopolamine was discontinued and Vigamox® dosage reduced to qid.

Follow up (day 14):
Quiet anterior segment with a 2.5 mm round corneal scar that bordered on fixation. The visual acuity had improved to 20/30- in that eye.

Questions
Why was there a scar after the eye healed?
What is the difference between the opaque lesion of an active infection and an opaque scar at a cellular/molecular level?
Do all infections that involve an opaque lesion lead to permanent scaring?
Make a list of factors that could lead to corneal edema and then explain how.
Make a list of factors that can cause loss of transparency of the cornea and explain how.
Why do some things cause stromal edema and others epithelial edema? Which is worse for vision?
What is responsible for cloudy vision during corneal edema?
How does contact lens wear cause edema?