Dry eyes

Eye series 3

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During her regular check-up a 68 year old woman patient mentions, as an aside, that the recent hot weather has left her eyes with a 'dry, gritty feeling'. The feeling is more noticeable toward the end of the day and on further questioning has gradually become more prominent over the past few years.

Question 1

Describe the components of the tear film and their respective function.

Question 2

What are the factors that contribute to dry eyes?

Question 3

What clinical signs may suggest dry eyes?

Question 4

What follow up investigations should be conducted?

Question 5

What are the treatment options?

Answers

Answer 1

The tear film is composed of three separate layers, each with a specific function (Figure 1). The outer layer is an oily or lipid layer that primarily serves to reduce evaporation of the remaining tear film. The oils are released from the meibomian glands located on the eyelid margins. The middle or aqueous layer provides moisture as well as supplying oxygen and nutrients to the cornea. Comprised almost entirely of water, the aqueous layer is produced by the lacrimal gland located under the upper eyelid. This middle layer also carries antibodies and other immune defence agents to guard against infection. The innermost layer is the mucous (or mucin) layer. Produced by goblet cells, its main purpose is to allow the tear film to adhere to the surface and spread evenly.

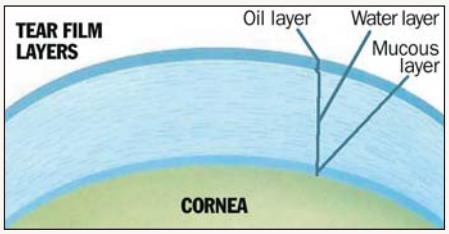

Figure 1. Tear film layers

Answer 2

Dry eyes generally result from a deficiency or compromise to the quality or quantity of the above three layers. Factors that may influence this include:

- age
- medication
- inflammation of the eyelids or skin
- systemic disease
- localised irritation or irregularities of the ocular surface, and
- previous eye surgery.

Almost 75% of the population over 65 years of age will experience dry eye symptoms. As we age decreased production of the aqueous occurs, similarly the body produces less oil as we grow older. More pronounced in women, this oil deficiency allows the tear film to evaporate more quickly leading to further irritation.

Many medications can impair lacrimal gland function leading to dry eyes. These include antibiotics, antihistamines, diuretics, oral contraceptives and antianxiety medications.

Blepharitis is an inflammation of the oil glands of the eyelids (Figure 2). As the oil glands become blocked the essential oils

are reduced allowing the tear film to evaporate more quickly. Common signs are redness of the sclera and lids and crusting of the eyelashes. In blepharitis the symptoms are generally worse in the morning and improve over the day.

Figure 2. Blepharitis

Collagen vascular disorders such as rheumatoid arthritis, lupus and Sjogren's syndrome have a high association with dry eyes. These inflammatory disorders lead to a destruction of the lacrimal gland and therefore decreased production of the tear film. Surgery and radiation may also cause damage to these glands. Thyroid changes are also associated with dry eyes.

Figure 3. Band keratopathy

Localised irritation or irregularities will cause a disruption to the proper action of the tear film. Pterygium growth, corneal scarring and various lid anomalies such as band keratopathy can upset the environment of the eye and lead to symptoms of dry eyes. Band keratopathy (Figure 3) occurs as a result of inadequate blink. The resulting irritation will leave the patient requiring constant lubrication to alleviate symptoms.

Contact lenses can produce irritation through the rubbing action on the cornea. Some contact lens brands will also absorb a large amount of the tear film further aggravating symptoms.

Corneal or refractive surgery can lead to short to midterm decrease in the sensitivity of the corneal nerves. As a result, tearing will be reduced until nerve function returns.

Answer 3

More often than not patients with dry eyes syndrome will be more symptomatic than their respective clinical signs. Unless inflammation is present the eye will be mostly white and relatively quiet. If the ocular surface is damaged, the continuous irritation can lead to excess tearing in some patients. As this also may be due to abnormalities of the lacrimal drainage system an ophthalmologist should always be consulted.

Answer 4

Further tests to measure the amount of tears produced (Schirmer's tear test) and assess the quality of the tear film (tear film break up time) will provide further evidence to the presence of dry eyes. Results show a decrease in tear production compared to the average person. When the quality of the tear film is compromised the tear film will look patchy and break up quickly after the patient has blinked. Staining with dye (Flouroscein or Rose Bengal) can exaggerate any defects under microscopic examination and will help determine the origin of the condition.

Answer 5

The patient needs to be educated that dry eye conditions cannot usually be completely cured. Therapy aims to provide relief of the symptoms and reduce any discomfort. A problem with the eyelids, eg. meibomian gland dysfunction (MGD), blepharitis or other lid disease lends itself to a therapeutic solution, ie. rapid tear break up because the oily layer is not of high enough quality to stabilise the tear film. The underlying cause should be treated. MGD should be treated with minocycline tablets. Blepharitis may be treated with a combination of antibiotic or steroid drops. Lid scrubs to remove any excess crusting will also help. Inverted or untoward eyelashes, if present, should be removed.

With an aqueous deficiency, ie. low tear production from the lacrimal gland the first step is introducing artificial tears. Depending on the severity, nonpreservative tears may be prescribed from an hourly to an 'as necessary' basis. A lubricating ointment at night will provide further relief from symptoms if the condition is severe. The patient should be warned that when using ointment the eyes will be sticky upon waking. Ointment may also cause a slight, temporary blur to the vision. If a patient does not find relief from drops, or does not adhere to treatment, more permanent procedures may be necessary. Occlusion of the punctum (by small collagen or silicon plugs) will stop the flow of tears away from the surface and form a reservoir to aid lubrication. If successful this option can be made more permanent by cauterisation of the punctum.

Nonsurgical options such as increased hydration through drinking more water and wrap-around sunglasses to avoid excessive wind or UV damage should be suggested. Humidifiers at home during unusually hot weather may also provide some external relief.

Further reading

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