

TEARS

Tears are a normal body fluid that flow continuously to lubricate the cornea (the clear “watch crystal” covering the front surface of the eye). The purpose of tears is the lubrication and cleaning of the front surface of the eye, the cornea and the conjunctiva. The volume of tears is usually low, but tears increase when the eye is irritated by a foreign body, infection of the eye or the eyelid, or many chemicals (onion oil vapors, smoke, air pollution, dust, etc.) or during an emotional episode.

The tear film over the surface of the eye is comprised of three layers:

- 1 a mucous layer against the surface of the cornea and the conjunctiva (the transparent layer with blood vessels that covers the white of the eye and the inner lining of the eyelids) that serves as a coating or spreading factor;
- 2 a watery layer with salts and other nutrients to moisten the corneal and conjunctival cells
- 3 an oil layer on top or on the outer surface of the water layer, which prevents the water from evaporating. This tear layer is critically important to keep the cornea clear and healthy.

Changing either the total volume of tears or reducing one or more of the three major components may alter drastically the function of the tear film and may lead to drying, scarring and loss of the transparency of the cornea, thus permanently impairing vision.

“Dry eye” or “dry eye syndrome” is a group of disorders of the tear film associated with reduced tear production (“tear deficiency”) or excessive tear evaporation that yields symptoms of eye irritation, discomfort, sandiness or grittiness and may cause damage to the ocular surface. With the EDs the amount or the volume of tears may be either normal or deficient. In many EDs the oil glands on the eyelid are absent and so the oil layer of the tears is deficient. This causes a specific dry eye problem with increased tear evaporation and tear instability. When the eyes are chronically irritated or when recurring infections, crusting and matting of the eyelashes can be seen and the whites of the eyes may be red, inflamed and uncomfortable.

Dry eye has a number of causes and can be more common with age and in females. ED can cause dry eyes by affecting any of the three layers of the tear film (mucus, water or oil layer). Symptoms caused by dry eye may be worsened by some systemic medications such as diuretics (“water pills”). Environmental stresses, including low humidity (such as air conditioning both in homes and in cars) and wind, draughts and heating may worsen the ocular discomfort of people with dry eyes. Environmental irritants and allergens (pollens and dusts), although they don’t cause dry eyes, certainly may worsen the symptoms of dry eye.

While most forms of dry eye cannot be prevented, appropriate treatment may reduce symptoms and signs and moderate the possible permanent consequences. For those people whose symptoms are aggravated by medications and environmental factors, elimination of the offending drug or modification of the home or work environment may offer substantial relief. Thus the incorporation of a suitable humidification system into the home and air conditioning system or the adaptation of a small room humidifier at work may make noticeable differences in comfort.

Topically applied artificial tears are the mainstay of therapy for tear deficiency. Many tear preparations contain electrolytes and buffers aimed at normalizing tear thickness and coating effects. Non-blurring tear gels with polymers last longer than simple artificial tear solutions.

Frequent placement of artificial tears makes people with tear deficiency particularly susceptible to toxicity from the preservatives in artificial tears, particularly benzalkonium chloride. Every artificial tear preparation that is sold in a multiple-dose bottle incorporates a preservative in the solution to minimize bacterial contamination in the bottle (from touching the eyelids or the fingers and so forth). In the last decade, the marketing of preservative-free lubricants sold in small single-use dropperettes has allowed patients to use these preparations as frequently as they desire without experiencing the preservative-related toxicity on the surface of the eye. Preservative-free artificial tears should be considered for dry-eye patients who must instil them more than four times a day to relieve their symptoms. I would propose using preservative free drops in all ED patients as the ocular surface is abnormal due to the ED and a number of preparations are available preservative free in single use droppers.

For the person with severe or irreversible tear deficiency or with chronic conditions such as blepharitis (eyelid margin infections), the Ophthalmologist must educate the patient about the chronic nature of dry eye and must acquaint him with its natural history. Patient education is an important aspect of successful management of these conditions.

For people with severe tear deficiency, punctal occlusion is considered when the medical means of tear supplements is ineffective or impractical. This can be accomplished simply with "semi-permanent" silicone plugs that are placed like small a "champagne cork" into the punctal opening. Semi-permanent plugs have the advantage of being reversible if the patient develops excessive tearing; they can be pulled out. Punctal plugs decrease symptoms of ocular irritation and decrease the frequency of use of artificial tears. Occasionally, semi-permanent plugs are lost, but they can be replaced easily.

Permanent occlusion of the tear drain can also be accomplished with a heated cautery or with a laser. However, if it is ever necessary to open the drain, a major surgical adventure awaits. In general, therefore, the silicon or plastic plugs offer many more.

For people with dry eyes associated with systemic disease, such as rheumatoid arthritis, anti-inflammatory/immunosuppressive therapy may be appropriate.

For people with dry eye syndrome, the following surgical options are available when medical treatment has been inadequate or inappropriate: 1) correction of the eyelid abnormality that results from blepharitis, trichiasis (scarred or inturned lashes) or lid malposition (e.g., lagophthalmos [gapping open of the lids], entropion/ectropion [inturning/outturning lids]); and 2) enhancement or salvage of existing tears by closing the punctum (the tear drain in the corner of the eyelid) or tarsorrhaphy (a surgical closure or bridging of the upper and lower eyelids together in a severe case. Non invasive therapies such as spectacle side shields, moisture inserts and moisture chambers may be tried first, but they may be poorly tolerated because of the adverse cosmetic effects.

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