CLINICAL FOCUS **THERAPY UPDATE** 0

A GP guide to treating dry eye disease

The surge in digital devices has resulted in increasing prevalence of this condition, including among younger populations.

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By Dr Alison Chiu |

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Dry eye disease is common, with prevalence estimated between 4.6% and 46%.[1,2]

The condition, also known as keratoconjunctivitis sicca, is more common in women.[1]

The incidence of dry eye increases with age.[2] However, the surge in digital device use specifically has resulted in increasing cases of dry eye, including among younger populations.

Many patients are asymptomatic. Treatment may prove difficult in such patients as it can require significant effort and persistence on the their part.

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Asymptomatic dry eye warrants aggressive treatment particularly in patients undergoing eye surgery, such as cataract and refractive surgery.

Untreated dry eye is associated with decreased patient satisfaction and accuracy of surgical outcomes, prolonged recovery, and increased risk of complications during recovery.[3]

Symptomatic dry eye disease, when severe, can be debilitating and have significant impact on quality of life.[4]

Related reading: *A GP guide to the impact of digital screens on young eyes*

Pathogenesis

Dry eye disease is predominantly an inflammatory disorder.

The presumed pathogenesis includes increased osmolarity of the tear film, and inflammation of ocular surfaces and lacrimal glands.[5]

Specifically, T cell-mediated inflammation leads to release of chemokines, which are pro-inflammatory cytokines that damage the ocular tissues.[6,7]

The components of the tear film are a watery layer containing proteins and electrolytes, produced by the lacrimal gland, lipid layer produced by the meibomian glands, and a mucin layer produced by conjunctival goblet cells.

Clinically, dry eye disease is classified into two sub-types, which guide management principles: aqueous deficiency with decreased tear secretion, and evaporative disease with increased tear evaporation.[8]

Clinical features

Symptoms of dry eye can include the eyes feeling dry, gritty, watery, painful, stinging and sensitive to light.

Vision can be blurred, of poor quality and may fluctuate.

Itchiness is usually a feature of allergic conjunctivitis, which can exist independently or in conjunction with dry eye.

Gauging symptoms of dry eye is important for the GP, as there is limited scope for patient examination.

There are a variety of validated questionnaires.

The author utilises the Ocular Surface Disease Index (OSDI - see Online resources) for all patients with symptoms or who are considering surgery such as laser vision correction, lens replacement or cataract surgery.

This tool gathers baseline data on symptoms and severity, and can be utilised to monitor progression of symptoms with treatment.

Systemic associations

Dry eye predominantly occurs in the absence of systemic disease.

However, there are a number of potential systemic associations that warrant consideration in patients with suggestive historical or clinical features.

Autoimmune disorders associated with dry eye include primary Sjogren's syndrome, secondary Sjogren's syndrome (associated with rheumatoid arthritis, SLE, scleroderma, polymyositis and dermatomyositis, and primary biliary cirrhosis), graft versus host disease, and immune reactions after radiotherapy to the head and neck.

Infiltrative processes, such as lymphoma, amyloidosis, haemochromatosis and sarcoidosis, can be associated with dry eye, as can infectious processes such as trachoma and HIV related disease.

Dry eye may also be a manifestation of neuropathic dysfunction such as multiple sclerosis, Bell's palsy, Parkinson's and Alzheimer's disease, or endocrine conditions such as menopause and androgen deficiency.

Contributing medications

Medications can also contribute to dry eye. The most common categories are listed in box 1.

Box 1. Medications commonly associated with dry eye

- Antihypertensives (eg, beta blockers, diuretics)
- Antihistamines and decongestants
- Anticholinergics
- Antidepressants (eg, setraline, paroxetine, tricyclics)
- Antipsychotics (eg, phenothiazines)
- HRT
- Gastrointestinal medications (eg, proton pump inhibitors and H2 receptor antagonists)
- Acne medications (eg, isotretinoin)
- Chemotherapy agents (eg, cyclophosphamide)

Environmental factors

These are often overlooked as contributors to dry eye symptoms. Heating and air-conditioning dehumidify the air.

Placing bowls of water in the room can help ease symptoms. Airplane travel is an especially dehumidified environment.

Activities that reduce blink rate — such as close, concentrated work and screen use — contribute to increased dry eye signs and symptoms.

Awareness of the need to consistently maintain adequate blink rate can be useful.

Inadequate oral hydration and alcohol consumption can also have an adverse impact on dry eye symptoms.

Ocular factors

Specific ocular factors that can contribute to dry eye include contact lens use, frequent use of preserved eye drops, and eyelid malpositions.

Contact lenses interfere with the normal composition of the tear film.[9]

> **Preservatives in eye drops, including artificial tear solutions marketed to alleviate dry eye symptoms, can worsen symptoms.**

Advise patients with moderate to severe dry eye or using artificial tear lubricating drops to use preservative free formulations where possible.

This applies not only to lubricating drops, gels and ointments, but also to preparations used to treat allergic conjunctivitis and glaucoma.

In addition, topical steroid and bacteriostatic antibiotics are also available in minim forms for preservative sensitivity or allergy.

Eyelid abnormalities, most commonly ectropion, disrupt the normal flow of the tear film and often occur concurrently with significant meibomian gland dysfunction, at least of the lower lid.

Eyeliner use along the eyelid margin where the meibomian gland orifices lie, can cause blockage of the glands and should be avoided.

Examination findings in primary care

Examining for signs of dry eye requires magnification, usually achieved using a slit lamp biomicroscope, which is not typically available in general practices.

A useful preliminary assessment tool in primary care is whether pain disappears with installation of local anaesthetic.

In the absence of other eye pathology, pain that disappears with local installation indicates ocular surface disease, which includes dry eye.

This finding also excludes intraocular causes of eye pain such as iritis and rare causes of ocular pain such as neurotrophic pain.

This simple technique can be especially useful when the symptoms are longstanding.

Management

Treatment of dry eye is tailored to the individual and determined by the severity of disease, taking both symptoms and signs into account.

Dry eye disease is a chronic condition and requires long-term treatment.

Patient education regarding the condition, prognosis and treatment is important, to increase adherence.

Discuss modification of environmental contributors, and identify and modify or eliminate offending systemic and topical medications.

In addition, treatments for mild disease generally include as their mainstay the use of preservative free artificial tears three to four times a day regularly, and additionally as needed.

Administering lubricating preservative free gels and ointments at night can be helpful for symptoms that are present on waking.

These formulations are more viscous and last longer, lubricating the eye during sleep.

Ointments offer the most intensive lubrication and are particularly thick.

These warrant application just before sleep, as vision will be blurred.

Advise patients to administer about 1.0-1.5 cm to the inferior fornix.

Treatments targeted to the meibomian glands aim to address deficiencies in the tear film's lipid layer.

Around 20-30 meibomian glands lie in a vertical direction in the upper and the lower eyelids, with their opening along the eyelid rim behind the lash line.

Oral supplementation with fish oil and/or flaxseed oil is recommended.

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- *How to Treat — Eyelid and lacrimal disorders*

The two main components of interest are eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), both of which have anti-inflammatory effects.

Flaxseed oil contains alpha-linolenic acid (ALA), which is converted to EPA and DHA, at rates of 8-21% and 0-9%, respectively.[10,11]

Therefore fish-based omega 3s (which contain both EPA and DHA) are preferable over plant-based formulations in improving the quality of oil produced by the meibomian glands.

Hot compress and massage to the eyelids, performed at home, is designed to increase the quantity of oil getting onto the surface of the eye, and should be performed daily.

The author prescribes 30 seconds of hot compress and one minute of massage in a vertical direction, towards the lashes, downwards over the top eyelid and upwards over the bottom eyelid.

If these measures are inadequate, tear conservation with punctal occlusion — using either temporary or permanent punctal plugs — can be used for predominantly aqueous tear deficiency.

Because of the inflammatory nature of dry eye disease, punctal occlusion is used in conjunction with anti-inflammatory eye drops such as a weak topical steroid (for example, fluorometholone, one drop tds).

This ensures that the tear film, which is retained for longer thanks to punctal occlusion, is of good quality, and the inflammatory components are dampened.

The finding of punctate epitheliopathy on examination signals a significant inflammatory component to the tear film and warrants treatment with topical fluorometholone.

Moisture chamber spectacles/goggles can also be considered, but have low patient uptake.

If there are features of anterior blepharitis — dandruff-like changes of the eyelids — either macroscopically or on slit lamp examination, treatment to address demodex infestations are utilised.

These may include eyelid scrubs with bicarbonate soda, mild shampoo, or tea-tree lid wipes.

In targeting the inflammatory cascade, prescription antibiotics, such as doxycycline or azithromycin, can be of benefit.

These exert their effects by inhibiting TGF-1-induced MMP-9 production.[12]

Doxycycline requires a longer duration of treatment, and has greater systemic side effects, notably gastroesophageal ulceration and photosensitivity.

It is also a contraindication for intense-pulsed light (IPL) therapy, discussed below.

When these measures are inadequate, the treatment algorithm progresses to office-based treatments

and more specialised eye drops.

Office-based treatments are targeted to meibomian gland dysfunction, and simulate home lid hot compress and massage, with greater efficiency and effectivity.

These involve the doctor or other clinician (for example, an optometrist) performing meibomian gland expression using specifically designed devices.

IPL therapy is a promising treatment that targets meibomian gland dysfunction and abnormal vasculature carrying inflammatory cytokines at the eyelid margin in ocular rosacea.[13]

Treatments consist of monthly treatments for the initial three months, then individualised treatment and maintenance regimens.

Long-term use of corticosteroids, including topical formulations, is associated with a number of complications including increased intraocular pressure and cataract. Therefore steroids are used for short-term treatment only, and require close monitoring.

Patients who are dependent on topical steroids or more potent oral steroids (such as dexamethasone or prednisolone acetate) should be transitioned to a steroid sparing agent, such as cyclosporin-A 0.05%.

This is a topical non-glucocorticoid immunomodulatory drug, that works via a reduction of inflammatory cells and cytokines on the ocular surface.[14]

This treatment is TGA approved under the Special Access Scheme.

The disadvantage of topical cyclosporin is that it has a long onset of action and causes a temporary stinging sensation when administered.

Read more:

- *Case Report — Chronic eye irritation associated with a serious sleep disorder*
- *Case Report — Beware the warning signs of 'typical' viral conjunctivitis*

Lifitegrast, a topical lymphocyte function-associated antigen intercellular adhesion molecule 1 (LFA-1/ICAM-1) antagonist was approved by the TGA in January 2019 and holds promise for patients in increasing the armamentarium of available treatment modalities.

It targets the binding that facilitates T- cell proliferation/activation and cytokine release, which in turn recruits more T cells.[15] PBS listing is expected in 2020.

Autologous serum and plasma-rich growth factor eye drops are formulated from the patient's own blood, and have the same osmolarity and pH of tears.

The biochemical and nutritional components of these drops mimic natural tears more closely than artificial tears.

They are expensive, however, costing around $1200 for a three-month supply.

In comparison, the Australian Blood Bank will supply 12 months of fully subsidised autologous serum drops.

However plasma-rich growth factor drops are advantageous in that they are associated with higher levels of growth factor, and lower leukocyte concentrations than autologous serum.[16]

With both formulations the logistics of use can be a barrier to some patients. Both are stored frozen, and defrosted 24 hours before use, needing to be discarded if unused.

While therapy is associated with symptom relief, long-term outcomes after the cessation of autologous drops are uncertain and more studies are needed.[17]

Conclusion

Dry eye disease is increasingly common, and treatment of mild disease is fairly straightforward.

Do not overlook environmental and other contributory factors, as addressing these can have a positive impact on treatment outcomes.

There is also a great deal that can be done beyond the basic foundation treatments for dry eye, for those patients with debilitating and severe symptoms.

Resource:

- **Ocular Surface Disease Index**

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References: