

**CITY UNIVERSITY  
DEPARTMENT OF OPTOMETRY & VISUAL SCIENCE  
LONDON, UK**

**MODULE -**

**MANAGEMENT OF DRY EYE -Modes of intervention**

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**The use of ocular lubricants**

Ocular lubricants may be used to give short term relief from symptoms of dry-eye. In addition they are used for prophylactic purposes to reduce the risk of epithelial desiccation and for therapeutic purposes to aid reversal of epithelial damage.

The tears are composed of three major components : the posterior mucus layer, the intermediate serous or watery component, and the anterior lipid layer. Ocular lubricants are broadly formulated to alleviate deficiencies in these three categories.

*Hypromellose (HYM)* eye drops are commonly prescribed for deficiencies in the serous content of the tears

*Polyvinyl alcohol (PVA), polyethylene glycol (PEG) and dextran (DX)* act as a wetting agent to assist even efficient and even spread of the serous layer over the epithelium in cases of a mucus layer anomaly.

*Acetylcysteine (ACST)* is used to breakdown mucus molecules and is useful when there is excess mucus accumulation (Messner & Leibowitz, 1971).

*Saline eye drops (SAL)* are used for ocular irrigation and in the presence of meibomian gland dysfunction.

*See Table 1 for list of lubricants*

**Table 1 Ocular lubricants available in the UK**

**SD= single dose; O= ointment; M = multidose; SA = sachet  
(some contain Benzylkonium Chloride - (C) soft CLs)**

<b>Proprietary name</b>	<b>Content</b>	<b>Indications for use</b>	<b>Precautions (P) /contraIndcn (C)</b>	<b>Delivery</b>
Hypotears	PVA 1%	dry eye wetting agent	(C) soft CLs	M
Ilube	ACST 5% HYM 0.35%	Dry eye with mucus abnormal production	(C) soft CLs	M
Isopto Alkaline	HYM 1%	Ocular lubrication	(C) soft CLs	M
Isopto Frin	Phenylephrine hyd. 0.12% HYM 0.5%	Relief from minor irritations	(C) soft lenses (P) narrow A/C severe diabetes, cardiovasc disease	M

Isopto Plain Lacri-lube	HYM 0.5% White soft paraffin, wool-fat	Ocular lubricant Ocular lubrication, corneal protection	(C) soft CLs (C) allergy to wool fat; contact lenses	M O
Liquifilm tears	PVA	Ocular lubrication; tear substitute	(C) soft CLs	M SD
Lubrifilm	Lanolin 10%, yellow soft paraffin 80%, liquid paraffin 10%	Ocular lubricant, corneal protection	(C) contact lenses	O
Minims Artificial tears	Hydroxyethylcell -ulose 0.44% ; SAL 0.35%	Tear deficiencies		SD
Minims saline	SAL 0.9%	Irrigation		SD
Normasol	SAL 0.9%	Irrigation		SA
SNO Tears	PVA	Lubrication	(C) soft CLs	M
Steripod blue	SAL 0.9%	Irrigation		SD
Tears Naturale	DX 0.1%; HYM 0.3%	Tear deficiencies	(C) soft CLs	MD
Viscotears	Polyacrylic acid 0.2%; liquid gel	Tear deficiencies	(C) children, CLs, pregnancy, lactation	O

## Vitamins and essential fatty acids

***Oil of Evening Primrose (Efamol) (contains linoleic and gamma linoleic acids)***

There is some **anecdotal** evidence of the efficacy of oil of evening primrose in the management of dry eye in Sjögren's syndrome (Campbell and MacEwen, 1982)

## Vitamin A

***Vit-A-Drops***

A sterile, isotonic aqueous solution containing polysorbate 80, sodium chloride, purified water with disodium edetate 0.05% and Vitamin A as antioxidants. These drops can be used concurrently with GP and soft contact lenses. The drop is presently unavailable in the UK.

Rengstorff et al (1988) evaluated 200 patients with various dry-eye and contact lens-related complications. Patients were asked to apply 2 or 3 drops of Vit-A-Drops daily for 30 days. The authors reported subjective improvements in 95% of the patients and improvements in BUT and slit lamp appearance in 48%. Chandra et al (1988) assessed the affect of Vit-A-Drops on 33 dry-eyes of different aetiology. They reported symptomatic improvement in 87.9% of cases and reversal of keratinisation in 24.2 % of cases. Westerhout (1989) describes the use of these drops on a series of 143 dry-eye problem patients who had not responded to previous therapy. He

reported that patients' symptoms were reduced in 88% of cases and increased BUT in 72% of cases. *Note that none of these studies were double-blind nor offered a control group.*

Westerhout (1991) carried out a double blind study on the use of Vitamin A drops and found a subjective improvement in symptoms in 61% of Vitamin A drop patients compared with 15% of patients using an artificial tear.

### **Increased humidity with the use of spectacles**

To increase the moisture level around the eyes, small, wet, triangular sponges from which water readily evaporates, were attached to special side panels of modified spectacles. The moisture level in the region between the spectacle lens and the cornea was monitored in 10 moderately severe dry eyes and 10 normal controls. All dry eye patients noticed symptomatic relief with the inserts and the rose bengal score and fluorescein staining improved after two weeks of use (Tsubota et al, 1984)

"Dry" panels are commercially available e.g. Eagle Vision.

### **Wet gauze eye mask during sleep**

A wet gauze eye mask (WGEM) (9 x 12 cm) wetted with tap water were placed over both eyes of patients during sleep. In 14 (63.6%) of the 22 dry eye patients who carried out the procedure, dry eye symptoms were eliminated by the WGEM all day or until the evening. Of these 7 were freed from eye drop procedure. The authors recommend the use of WGEM before resorting to punctal plugs.

**Contact lenses** (see other lecture in the series)

### **Occlusion of the puncta**

*Surgical techniques* e.g. cauterisation  
*Intracanalicular or punctum plugs*

#### **Indications for canalicular occlusion**

Chronic dry eye (particularly aqueous deficiency), in the absence of infection or other pathology in which the patient's symptoms are not adequately controlled with tear supplements. This may include contact lens patients.

#### **Contraindications**

Allergy to bovine collagen (temporary plugs)

Infective conjunctivitis

Dacryocystitis

Inflammation of the eyelid

Epiphora

#### **Other uses**

Ophthalmologists (and optometrists in the USA) have used punctal occlusion to enhance efficiency of topical ocular therapeutics (e.g. glaucoma therapy) and to prevent drainage of drugs into nasolacrimal system in susceptible patients (e.g. beta blockers).

## Types of plug

There are two broad categories of plug:-

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- (a) **collagen plugs** - these are "temporary" and dissolve over 4 to 7 days. As such they are useful for diagnostic and prognostic purposes.
- (b) **silicone plugs** - these are "permanent" in that they do not dissolve. However they can be removed if necessary.  
Two main designs: Freeman plugs (Eagle vision™)  
Herrick plugs (Lacrimedics Inc™)

## Procedure for collagen implantation

Before contemplating intrcanalicular occlusion it is assumed that:

- (a) a full eye examination and tear assessment (biomicroscopy, fluorescein and rose bengal staining, Schirmer test (et al) has been carried out. The results of these tests are important for follow-up comparisons
- (b) the patient has not obtained satisfactory symptom relief by using artificial tears, ocular lubricants or other interventions.

**Step 1** Explain the procedure to the patient

**Step 2** If both eyes are "dry" it is useful to carry out the procedure on one eye to allow a subjective (patient) and clinical comparison of its effect. Check the corneas and conjunctiva using diagnostic stain prior to inserting the plug(s). Examine the puncta of one eye using biomicroscopy.

**Step 3** Anaesthetise the region. This is most easily carried out by instilling one drop of Benoxinate hydrochloride 0.4% into the conjunctival sac and waiting for the drug to drain via the puncta.

Alternatively, a cotton-wool tipped applicator soaked in benoxinate may be held for 30 seconds against each punctum.

**Step 4** If the punctum is small it may be dilated by **gently** inserting and rotating a fine stainless steel dilator just into the punctum. This procedure may be safely carried out by pulling the lid away from the globe and instructing the patient to look to the temporal side of that eye. This will reduce any risk of accidental trauma to the cornea.

**Step 5** Grasp the collagen implant with fine forceps towards one of its ends and insert the other end into the punctum. Positioning of the punctum with the other hand by manipulating the lid will help.

**Step 5** Release the plug from the grip of the forceps the tip of which may then be used to gently push the plug down until it disappears completely.

**Step 6** Repeat the process for the other punctum. Note that occluding one punctum does not reduce tear drainage by 50% due to the pump action of the remaining duct.

**Step 7** As with other procedures such as applanation tonometry, **consider** the prophylactic use of an anti-biotic eye drop.

**Step 8** Review the patient after one week

If the patient reports resolution of symptoms (and there is clinical evidence of resolution of signs), then consider the use of "permanent" silicone plugs.

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### **Insertion of "permanent plugs"**

*(see attached manufacturer's information)*

### **Suppliers**

Freeman plugs Eagle vision™ 6263 Poplar Ave, Suite 650, Memphis, TN  
38119 USA. UK agent - Optimed Tel 01386 561845  
Herrick plugs Lacrimedics Inc™, 190 N. Arrowhead Ave, Suite B, Rialto,  
CA 92376-9908 USA. UK agent Altomed Tel 0191 5190111

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