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Ocular surface disorders

EDITORIAL

Assessment and diagnosis: a rational approach

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Examining the ocular surface. CAMBODIA

Sophiavid Choum, World Sight Day Photo Competition www.flickr.com/photos/iapb

The ocular surface is critical to the health of the eye and essential for good visual functioning. It is a complex, integrated system involving the cornea, conjunctiva, tear film, lacrimal gland, nasolacrimal system and the eyelids (incorporating the meibomian glands and lashes). The normal physiological function of the ocular surface depends on the interaction of these different components. Working together, they maintain a clear optical surface, keep the eye from drying out, and protect it from trauma and infection. Changes in the structure and function of any of the ocular surface components can disrupt its delicate balance and lead to pathology.

Ocular surface diseases have a relatively limited set of symptoms and signs, and a systematic approach to assessing and diagnosing these conditions is therefore necessary.

History

Because patients with ocular surface problems present with a limited range of symptoms and signs, taking a detailed history is very important. Ask patients whether they have experienced, or are experiencing, any of the following:

- **Reduced vision** (mild blurring can occur if the tear film is disturbed; a more severe visual disturbance suggests corneal or other disease)
- **Redness**
- **Irritation or gritty sensation** (suggests epithelial disturbance)
- **Itching** (suggests allergy)
- **Pain** (sharp pain suggests a corneal problem or foreign body; a duller ache may suggest uveal or scleral inflammation)
- **Purulent discharge**
- **Watering**, whether from lacrimation (increased tear production) or epiphora (decreased tear drainage)

It is important to take a careful note of when and how the problem developed. You need to ask if there has been a history of trauma or a foreign body. In some settings, contact lens use is common and you need to ask about this. If patients do use contact lenses, ask how they clean and use them.

Examination

Your examination of the ocular surface needs to be systematic. A stepwise approach helps to ensure that important things are not missed.

- **Vision.** Start by assessing the uncorrected, pinhole and best corrected visual acuity.
- **Eyelids.** Examine the lid position and closure and check for entropion (when the eyelid turns in on itself), trichiasis (lashes touching the eye) and lagophthalmos (a gap between

Continues overleaf ➤

ABOUT THIS ISSUE

Many diseases can affect the ocular surface. Their frequency and severity varies from region to region, often depending on the local climate. Ocular surface diseases can affect both eyesight and quality of life, and – in severe cases – cause blindness. Because they have a limited number of symptoms and signs, and can appear very similar in presentation, patients can be misdiagnosed and hence poorly managed. In this issue, we offer a systematic approach to assessing and diagnosing common ocular surface diseases and look in detail at general management principles, including how to control inflammation. Other articles discuss ocular allergy, pterygium and squamous cell carcinoma. In the middle of the issue we also have a poster with useful information about common ocular surface conditions and their primary management. — ***Elmien Wolvaardt Ellison (Editor)***

In this issue

the upper and lower lid when the eyes are closed). Examine the lid margin and meibomian gland openings for abnormal positions, inflammation and plugging with secretions. Try to express the meibomian glands, using gentle pressure.

- **Tears.** Assess the quality of the tear film by looking for discharge or debris and the tear meniscus height (to give an idea of quantity). Check the tear break-up time by instilling a drop of fluorescein and timing how long it takes for the tear film to disperse. A tear break-up time of less than 10 seconds is abnormal. Finally, perform Schirmer's test by placing a testing strip in the inferior conjunctival fornix and asking the patient to close their eyes for five minutes. A normal result is >15 mm. Less than this suggests insufficient tear production, to varying degrees: mild is 9–14 mm, moderate is 4–8 mm and severe is <4 mm.
- **Bulbar conjunctiva and sclera.** Assess inflammation, scarring, haemorrhages and abnormal swellings such as pinguecula, pterygium or possible malignancies.
- **Tarsal conjunctiva.** Evert the upper and lower lids. Look for scarring, foreign body defects, inflammatory membranes, papillae and follicles.
- **Corneal epithelium.** Using a torch, look for foreign bodies, infiltrates, oedema and deposits. Is the light reflected off the eye's surface shiny (healthy), or rough and/or dull? Also test for corneal sensation, which may be reduced due to infection with herpes simplex or zoster.
- **Corneal stroma.** Look for stromal opacities. Assess the size, location, pattern and depth. Opacities may be scars or active inflammatory infiltrates. Look for blood vessels: active vessels have blood flowing, inactive have a clear, grey outline without blood.
- **Corneal endothelium.** Look for any guttata, Descemet folds and the presence and type of any deposits (blood, keratic precipitates or pigment).

Diagnosis

Problems affecting the ocular surface broadly divide into non-infectious and infectious conditions. They present with a limited range of symptoms. The pattern of symptoms can often help to differentiate between conditions. In Table 1 we outline the typical symptom pattern for some of the commoner conditions. For example, if the person mainly complains of itching, then allergic conjunctivitis needs to be considered as a possible cause.

The symptoms of these different conditions can overlap. Therefore, a careful examination is critical to reaching an accurate diagnosis. Although not exhaustive, there is a list of common and important ocular surface conditions on pages 50–51, detailing their presenting features and some example photographs.

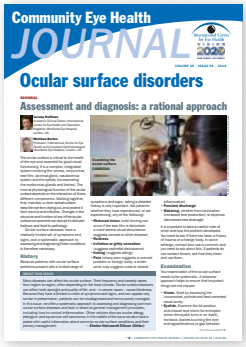

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Table 1: Symptom and signs of common conditions Key: Absent Possible Present, moderate Present, severe

Condition / Symptoms/ signs	Bacterial conjunctivitis	Viral conjunctivitis	Allergic conjunctivitis	Microbial keratitis	Dry eye	Blepharitis	Rosacea	Mucous membrane pemphigoid	Stephens-Johnson Syndrome
Visual impairment									
Red									
Pain									
Itchy									
Irritation or gritty sensation									
Watery discharge									
Purulent discharge									

Understanding the ocular surface

Jeremy Hoffman and **Matthew Burton**

The ocular surface consists of the cornea, conjunctiva, tear film, lacrimal gland, nasolacrimal system and the eyelids (incorporating the meibomian glands and lashes), each of which is described in detail below. Figure 1 shows the anatomy of the upper eyelid and anterior segment of the eye in cross-section.

Cornea

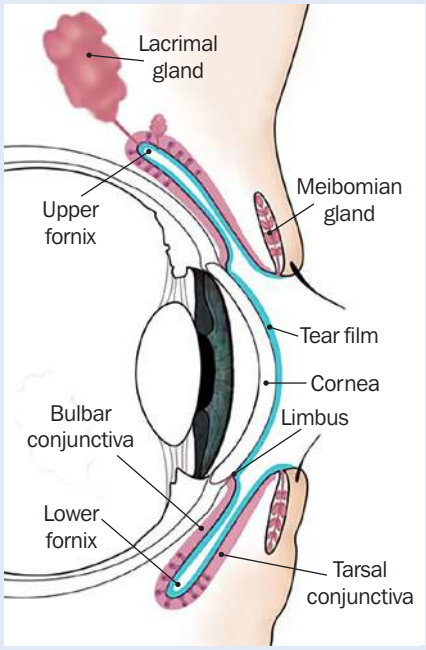
The cornea is the most powerful refracting component of the eye. Together with the lens, it focuses light on the retina. The central 4 mm zone is critical for good vision. The cornea is made up of five layers: epithelium, Bowman's layer, stroma, Descemet's membrane and endothelium. The normal cornea does not have blood vessels; it gains oxygen and nutrients through diffusion from the aqueous, from limbal blood vessels and from the atmosphere. The cornea is very sensitive; there is dense innervation by fine nerve fibres from the trigeminal nerve. Normal corneal sensation is essential for a healthy intact epithelial surface, tear function and protection through the blink reflex.

If damaged, the corneal epithelium can regenerate, so simple abrasion injuries can heal without scarring. However, if the stem cells that repopulate the corneal epithelial surface are damaged, for example by a chemical injury, the resulting epithelium is abnormal and clarity is lost. Corneal clarity also depends on there being a highly ordered arrangement of collagen fibres within the stroma. These deeper layers are unable to regenerate well and often heal with scarring. In addition, the cornea needs to be maintained in a relatively dehydrated state by the action of the endothelial cell layer. If this is not functioning well, the cornea becomes oedematous and opaque.

Conjunctiva

The conjunctiva is composed of an epithelial layer overlaying a loose connective tissue (stroma). It covers the eye from the edge of the cornea (limbus) to the fornices and the inside surface of the eyelids. It contains specialised goblet cells that produce the mucus layer of the tear film. In the stromal layer of the conjunctiva, there are immune system cells that defend against infection. Sometimes lymphoid cells are recruited and gather together to form visible follicles, particularly on the tarsal conjunctival surface. Papillae, which form in the tarsal conjunctiva, are dome-like swellings with inflammatory cells, oedema and a dilated blood vessel. Conjunctival scarring develops in some chronic inflammatory ocular surface conditions, with shortened fornices, symblepharon (adhesions between the eye lid and globe) and distortion of the eyelids.

Figure 1: Anatomy of the upper eyelid and anterior segment of the eye in cross-section



Peter Mallen www.schepens.harvard.edu

Tear film

The tear film is made up of three layers. The outer lipid layer (produced by the meibomian glands) reduces evaporation of the middle aqueous layer (produced by the lacrimal gland), with the inner mucin layer (produced by goblet cells) helping to stabilise the aqueous layer on the corneal epithelium. A good tear film helps to maintain a well-hydrated, healthy corneal epithelium and a clear optical surface, and it protects against infection.

Lacrimal gland

The lacrimal gland sits in the supero-lateral region of the orbit. Fine ducts open into the upper fornix, delivering lacrimal fluid to the ocular surface. Secretion of tear fluid is controlled by the parasympathetic nervous system. Problems with the gland itself, obstruction of the ducts (by scarring) and neurological problems can all result in reduced aqueous tear production.

Nasolacrimal system

The nasolacrimal system drains tear fluid from the surface of the eye. Fluid is collected through the punctae and passes along the canaliculi into the lacrimal sac. From the sac, the fluid passes down the nasolacrimal duct and drains into the nasal cavity. Obstruction at any point along the system can result in a watery eye (epiphora) and predispose the eye to infection.

Eyelids

Eyelids protect the eyes by covering them. They are formed of several layers: skin, the orbicularis muscle, the tarsal plate (including the meibomian glands), and the conjunctiva.

Managing ocular surface disease: a common-sense approach

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Many diseases can cause ocular surface disorders. The poster on pages 50–51 provides an overview of the most common diseases, and other articles in this issue focus on the management of individual diseases. In this article, the authors offer a systematic strategy for the **overall** management of ocular surface diseases.

When managing patients with an ocular surface condition, identifying the underlying disease is valuable (see pages 41–43 for guidance on assessment and diagnosis). However, diagnosis can sometimes be difficult or even impossible, as complex interactions exist between the different components of the ocular surface. A wide range of conditions can therefore result in similar functional effects at the ocular surface. These functional effects manifest as clinical signs common to several diseases, and include chronic punctate keratopathy, filamentary keratopathy, recurrent corneal erosion, bacterial conjunctivitis, culture-negative conjunctivitis, cicatrising (scarring) conjunctivitis, persistent epithelial defect, infectious keratitis, corneal melt and ocular surface failure (Figures 1A–G).

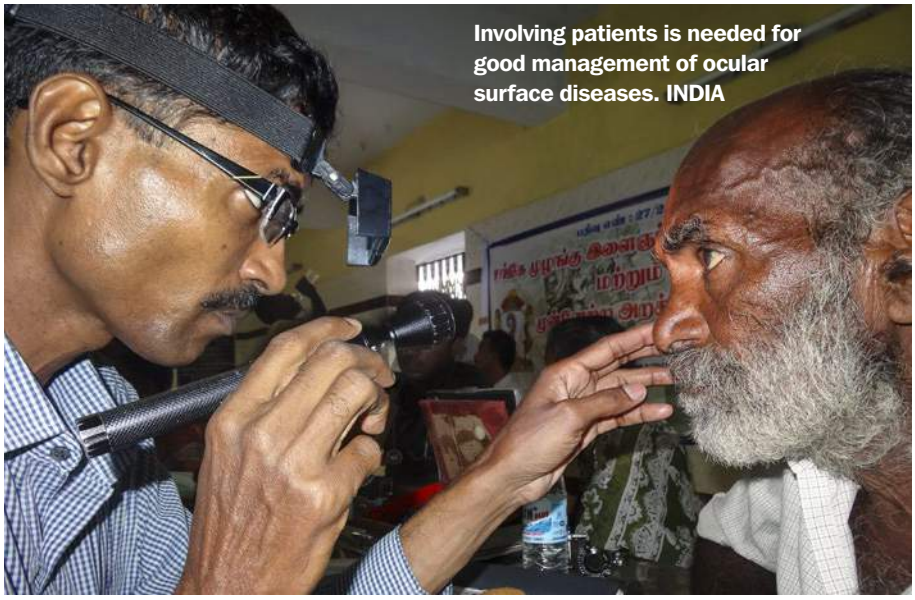
Fortunately, in the absence of a definite diagnosis, ocular surface diseases can usually still be managed effectively, provided the choice of approach and therapy is based on the functional effects observed and their severity. It is therefore important to have a systematic approach to the identification of functional effects and their severity (see Figure 2). Many of these functional effects are susceptible to a range of therapies, as discussed below.

Note: Ocular surface disorders often affect both eyes asymmetrically. Where patients present with unilateral disease, neoplasia – e.g. ocular surface squamous neoplasia (Figure 1H) – must be excluded.

Management

1 Eliminate exacerbating factors

Eliminating exacerbating factors (if present) should be considered in all patients with ocular surface disease.



Involving patients is needed for good management of ocular surface diseases. INDIA

T Murugesan, World Sight Day Photo Competition www.flickr.com/photos/iapb

Ocular surface irritants have a negative effect on the recovery of the ocular surface.[1] A common example is the use of glaucoma drops on a continuous basis. Unnecessary topical medications should be discontinued or systemic alternatives sought. If drops are needed, preservative-free formulations should be used where possible, especially if more than six drops are required daily. It may also be advisable to avoid using make-up and cosmetics on the eyelids and around the eye. Removal of exacerbating factors is particularly important in certain ocular surface diseases, such as allergic eye disease and Stevens-Johnson Syndrome.

Blepharitis is common and should be controlled to reduce its effects on tear film quality and the ocular surface.[2] Lid hygiene (lid cleaning) removes crusts, debris and bacteria load on the lid margins in anterior blepharitis. Warm compresses and lid massage mechanically unblocks meibomian glands in posterior lid margin disease. One- to three-month courses of tetracycline class agents, such as doxycycline 100 mg once a day, are often helpful in controlling blepharitis in adults. ***Note:*** *doxycycline should* ***not*** *be given to children.* In children, or in adults where doxycycline is not tolerated, macrolides, such as erythromycin 250 mg twice a day, can be used. They are thought to improve meibomian gland dysfunction by altering their metabolism and secretion. Newer therapies, such as topical azithromycin 1.5% twice a day for 3 days, repeated weekly for 4–8 weeks, are also available.

Diseases of the eyelid and its adnexae (e.g. trichiasis, entropion) must be promptly addressed. Where appropriate, eyelid surgery should be considered.

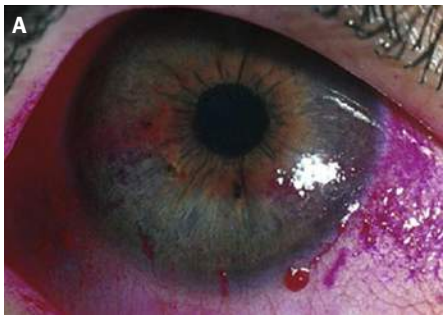
2 Support ocular lubrication

An overlying physiological tear fluid is essential for a healthy ocular surface.[3] Supporting the tear film should be considered in all cases of ocular surface disease, especially if the eye is dry. Lubricants not only serve as tear substitutes, they also help to dilute ocular surface irritants and reduce the shearing forces of the eyelids on the corneal epithelium. Many ocular lubricants are available. Some examples include hyaluronate, carmellose, hypromellose, polyvinyl alcohol, and paraffin. Lubricants with lipids or osmoprotectants (e.g. glycerine and L-Carnitine) are also available. Excess mucous can be treated with N-acetylcysteine drops.

Preservative-free lubricants are preferable for treating patients with ocular surface disease. Excessive use of drops with preservatives that are not diluted by normal tear flow can cause intolerance or ocular surface toxicity and impede ocular surface healing.

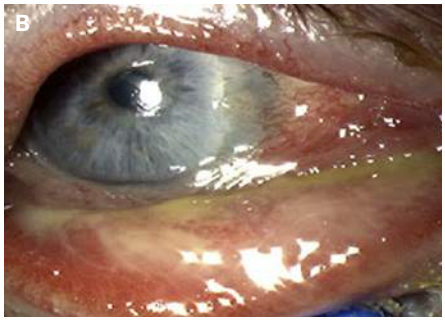
In aqueous-deficient dry eyes, punctal occlusion can prevent tear drainage and prolong the effects of tear substitutes. Punctal occlusion may exacerbate symptoms of blepharitis, so this must be treated beforehand. Permanent occlusion can be achieved by using punctal cautery. Parasympathomimetics such as oral pilocarpine can also be useful if tolerated. In more severe disease, autologous serum is beneficial, but this is expensive and not always readily available.

Figure 1. Functional effects (clinical signs) of ocular surface disorders



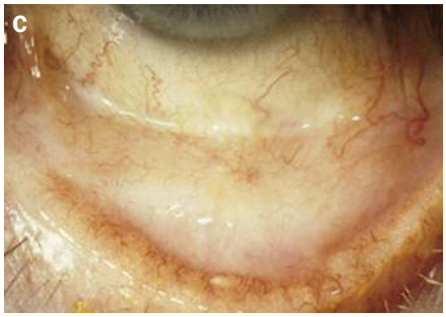
John KG Dart

Chronic punctate keratopathy with associated filaments (Rose Bengal stain)



John KG Dart

Bacterial conjunctivitis



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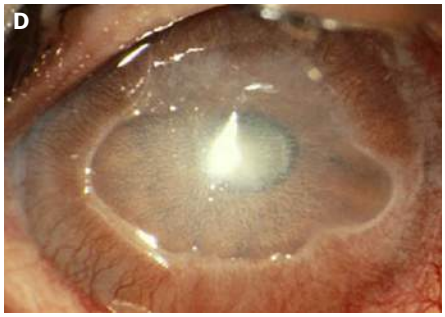
Cicatrising conjunctival changes (subepithelial fibrosis of the tarsal conjunctiva and forniceal shortening)

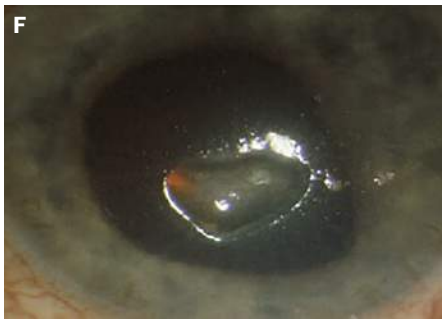


John KG Dart

Large persistent epithelial defect in a vascularised cornea

John KG Dart

Microbial keratitis caused by *Candida species*



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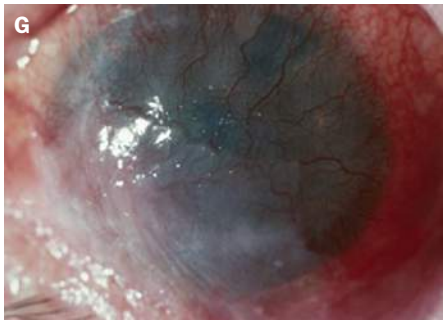
Central corneal melt



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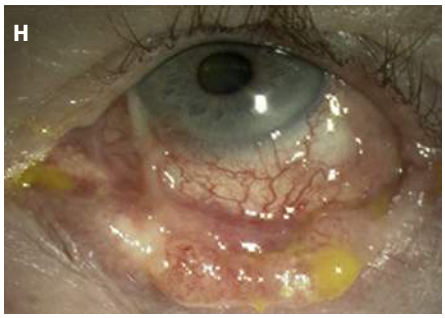
Ocular surface failure (conjunctivalisation, opacification and vascularisation of the cornea)



John KG Dart

Ocular surface squamous neoplasia

Figure 2. Ophthalmological assessment of a patient with ocular surface disease

Assess facial and periocular skin, eyelids, and conjunctival inflammation in normal light (preferably daylight)

↓

Perform a slit lamp examination without eyelid manipulation to assess the lid margins and position, eyelashes, punctae, tear meniscus, and tear film quality

↓

Instil unpreserved dilute fluorescein into the tear meniscus (e.g. using a fluorescein strip wet with unpreserved saline)

↓

Wait 1 minute and assess tear film break-up time over 10 seconds. Look for focal areas of irregularity and break-up

↓

Assess for the presence of punctate stain on the cornea and conjunctiva, including the superior limbus

↓

Assess the bulbar conjunctiva (for scarring, keratinisation, symblephara), fornices, limbus, and cornea (for focal abnormal wetting, filaments, thinning, infiltrates, keratinisation, scarring and vascularisation)

↓

Evert the lids and assess the tarsal conjunctiva with white light and blue light for infiltrate, papillae, and follicles

↓

Perform Schirmer's test for 5 minutes without anaesthesia. Test corneal sensation with cotton-tipped bud or Cochet and Bonnet anaesthesiometer

↓

Press on lids and examine meibomian gland secretion

↓

Instil lignocaine and fluorescein and use Lissamine Green (+/- Rose Bengal)* if no surface stain is found with fluorescein

*Rose Bengal is no longer available in some countries.

3 Consider therapeutic contact lenses

Therapeutic contact lenses (TCL) can be useful in severe dry eye diseases and persistent epithelial defects. Proposed mechanisms of action include modification of lid-tear-ocular surface interactions, retention of fibrin matrix on the surface of an injured cornea, and retention of tears under rigid lenses. In aqueous tear deficiency, hydrogel TCL should be avoided as the risk of infection is high. In very dry eyes, soft or silicone hydrogel TCL do not work well as they tighten up and reduce oxygen transmission. Rigid gas-permeable scleral TCL cover the cornea and most of the conjunctiva. This can prevent excessive tear evaporation and protects the ocular surface from abnormal lids.

4 Control ocular surface inflammation

An inflammatory component is seen in almost every form of ocular surface condition. Some clinical features of ocular surface inflammation include pain, conjunctival injection (redness), dilatation of conjunctival blood vessels, limbitis, conjunctival swelling (chemosis), redness

Continues overleaf ➤

and swelling of the eyelids (Figure 3).

Ocular surface inflammation is treatable. The choice of steroids depends on the severity of inflammation. In conditions where there is mild ocular surface inflammation, weak topical steroids (e.g. fluorometholone, or prednisolone 0.5% preservative free) can be used on an 'as required' basis or as short tapering courses. In severe inflammation (e.g. acute vernal keratoconjunctivitis), more potent topical steroids (e.g. dexamethasone 0.1%, or prednisolone 1%) are required. The frequency of drop administration is titrated according to disease severity. In cases where prolonged steroid use is anticipated, lenticular status, intraocular pressure, and assessment of the optic nerve head must be regularly documented to monitor for side effects such as cataract and glaucoma.

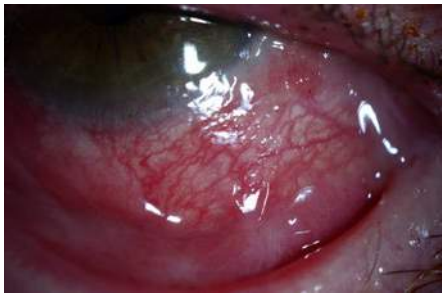
Topical ciclosporin A (various preparations) has been shown to be effective in several ocular surface disorders without the adverse effects of steroids. However, ciclosporin is often poorly tolerated during disease exacerbations and its full efficacy is only achieved several weeks from the initial dose. Ciclosporin has been shown to be better tolerated if introduced following a few weeks of treatment with topical steroids.[4]

Treatment of allergic eye disease (including acute, seasonal and perennial allergic conjunctivitis, vernal keratoconjunctivitis, and atopic keratoconjunctivitis) includes mast cell stabilisers (e.g. nedocromil, lodoxamide), antihistamines (e.g. emedastine, loratidine, chlorphenamine), or combined mast cell stabilisers/antihistamine (e.g. olopatadine).

In severe ocular surface inflammation (e.g. corneal melts, mucous membrane pemphigoid), rapid immunosuppression is required to prevent visual loss.[5] In these situations, immunosuppressive doses of steroids (e.g. prednisolone 1 mg/kg once a day and methylprednisolone 500–1,000 mg intravenous daily for 1–3 days) can be started and tapered off over 1–3 months once inflammation is controlled. Steroid-sparing drugs (e.g. mycophenolate, azathioprine, cyclophosphamide) should be started when a prolonged disease course is expected.

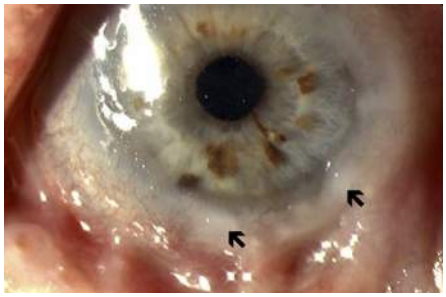
In ocular surface disease that is poorly controlled with topical therapy or where severe sub-acute inflammation persists, steroid-sparing therapy can be used without steroids. The use of such immunosuppressive agents requires specialist knowledge, monitoring, and facilities. These patients should be referred to specialist clinics if local medical services have insufficient support for the use of such agents.

Figure 3. Severe ocular inflammation in ocular surface disease, namely cicatrising (scarring) conjunctivitis



John KG Dart

Significant conjunctival injection with dilated vessels



John KG Dart

Inflammation of the corneal limbus (limbitis)

5 Manage persistent corneal epithelial defects and microbial keratitis

Management of persistent corneal epithelial defects (PCED) is based on eliminating exacerbating factors, stimulating epithelialisation, improving epithelial stability, restoring the basement membrane, and renewing the epithelium. Nerve growth factor drops may be beneficial in cases of PCED secondary to neurotrophic keratopathy. Autologous serum and nerve growth factor treatments have both been shown to stimulate epithelialisation.

Microbial keratitis is a major complication in all patients with chronic ocular surface disorders. In any PCED, this must be excluded using appropriate microbiological techniques. Patients on topical steroids or systemic immunosuppressants may have an infection without a corneal infiltrate. Where infection is suspected, empirical treatment with a broad-spectrum antimicrobial should be initiated. Commonly, first-line treatment would include the use of fluoroquinolones (e.g. moxifloxacin 0.5%, levofloxacin 0.5%). Where fungal infection is suspected or diagnosed, steroid therapy must be discontinued and appropriate anti-fungal therapy commenced.

6 Surgical management

When non-surgical therapies fail to heal a PCED, lid closure with botulinum toxin injection or a temporary central tarsorrhaphy can be used to promote epithelial stability. In refractory PCED, improvement of the basement membrane can be achieved through human amniotic membrane grafts, lamellar keratectomy, or lamellar keratoplasty. Small perforations can be treated with cyanoacrylate glue and a contact lens. Therapeutic lamellar or penetrating keratoplasties are required for larger perforations.

Renewal of the epithelium through surface reconstruction can be considered if all of the above fail. Options for managing ocular surface failure due to limbal stem cell deficiency include allogenic or autologous limbal stem cell transplants.[6]

A conjunctival flap will sacrifice vision, but it reduces discomfort and ocular inflammation and promotes healing. If no conjunctiva is available due to scarring, a buccal mucous membrane graft can be used to provide a stable epithelium.

Involve the patient

Successful management of ocular surface disorders can be difficult. Many conditions, such as allergic eye diseases, are chronic. Symptoms can often be controlled but not completely eliminated. Relapse and flare-ups are also common, and most treatments require the involvement of the patient over a long period of time.

It is important that patients are counselled before any treatment is started. They must understand the nature of their condition and the expected outcomes following treatment, as life-long therapies may be needed. A management strategy should be agreed with patients and they must know how to access medical facilities in the event of a relapse.

Conclusion

Many diseases can cause ocular surface disorders. Accurate diagnosis of the underlying condition may be difficult. In the absence of a definite diagnosis, identifying and treating the functional effects of the underlying disorder on the ocular surface is often sufficient.

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Managing ocular allergy in resource-poor settings

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Ocular allergy is a common inflammatory condition seen almost daily at the outpatient clinic. It occurs because the ocular surface is exposed to a variety of allergens, making it susceptible to allergic reactions. The hallmark of the disease is **itching**, and the clinical symptoms and signs are **bilateral** and vary according to individual cases.

The common predisposing factors of ocular allergy include environmental allergens, genetic predisposition to atopic reactions and hot, dry environments.

The patient may have associated systemic features like eczema, asthma and rhinitis.

Types of ocular allergy

Ocular allergies can be divided into:

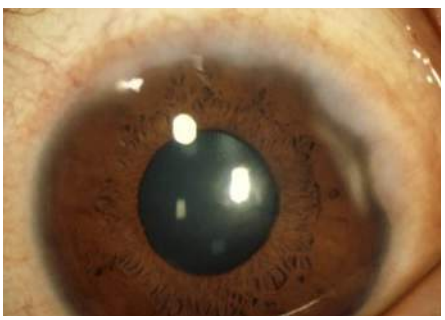
1. Vernal keratoconjunctivitis
2. Atopic keratoconjunctivitis
3. Acute allergic conjunctivitis (includes seasonal and perennial allergic conjunctivitis)
4. Giant papillary conjunctivitis

The first two forms of ocular allergies are sight-threatening. Both can lead to damage of the cornea by causing ulcers and scarring (secondary to inflammation of the ocular surface), ultimately leading to vision loss.

Vernal keratoconjunctivitis

Onset of vernal keratoconjunctivitis is usually in childhood (mean age 7 years) and it tends to become less severe by the late teens. It is more common in boys than in girls. If left untreated, it can result in corneal conjunctivalisation and scarring (Figure 1). The symptoms are severe itching, watering, foreign body sensation and thick mucus discharge.

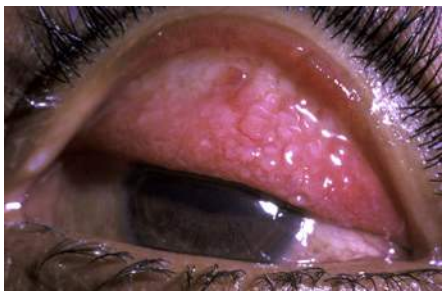
Figure 1. Vernal keratoconjunctivitis showing injection and swelling at the limbus with conjunctivalisation of the cornea



John Dart

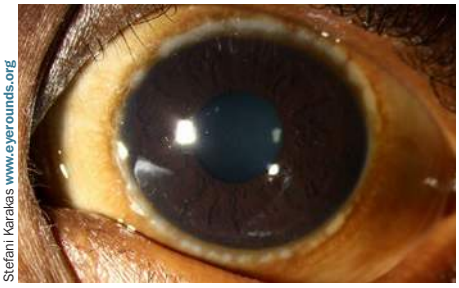
Signs: The hallmark sign of vernal keratoconjunctivitis is papillae formation in the tarsal conjunctiva; these can be large and irregular (known as cobblestone papillae) (Figure 2). There is conjunctival injection and/or hyperpigmentation and there may be peri-limbal small white dots (Horner-Trantas dots) (Figure 3). The limbus can become pigmented and the cornea can be affected with plaques and ulceration of the upper cornea.

Figure 2: Papillae on the everted upper eyelid in vernal keraconjunctivitis



Jock Anderson

Figure 3. Horner-Trantas dots in a child with vernal conjunctivitis



Stefani Karakas www.eyerounds.org

Figure 4. Atopic keratoconjunctivitis

John Dart

Atopic keratoconjunctivitis

Atopic keratoconjunctivitis classically presents in adulthood and has a chronic and unremitting course.

History: History of atopy (asthma, eczema). Severe itching, watering, foreign body sensation, mucus discharge. Symptoms occur year-round.
Signs: Skin changes on the eyelids, e.g. erythema, dryness, scaliness and thickening. Papillae on the tarsal conjunctiva. In severe cases, conjunctival scarring and forniceal shortening may be present.

Other ocular allergies

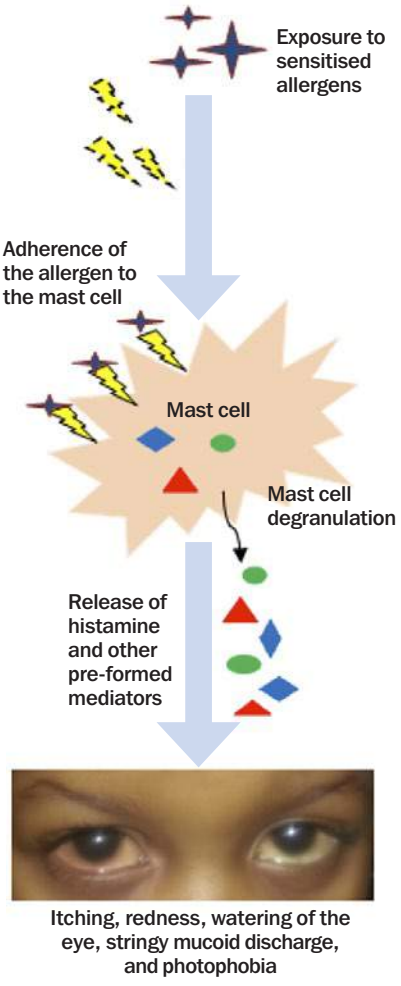
These include acute allergic conjunctivitis (seasonal and perennial allergic conjunctivitis) and giant papillary conjunctivitis. Predisposing factors for giant papillary conjunctivitis include contact lens wear and irritation from exposed sutures or a prosthesis.

NOTE: All ocular allergies can have sight-threatening complications if not managed well, e.g. keratoconus (due to excessive rubbing) and glaucoma (due to the prolonged use or misuse of steroids).

How do ocular allergies develop?

The basic mechanism of these conditions is type-1 hypersensitivity. The inflammatory response in vernal and atopic keraconjunctivitis is due to inflammatory mediators, mainly from mast cells (Figure 5).

Figure 5: The ocular allergy cascade in a sensitised individual



Continues overleaf ➤

Grading of clinical severity

There is no globally accepted system or guidelines for the grading and management of ocular allergy, although several authors have proposed such systems.[1-5]

All patients with ocular allergy should be graded according to the level of severity.[6] This is because the grade of severity has an impact on clinical decision making and helps ascertain the patients' ocular clinical status and risk of vision loss. It also helps to determine the choice of treatment and the timing/frequency of follow-up.

Table 1 is based on a simplified clinical grading system which the authors have developed for use in Kenya and which applies to all ocular allergies. It takes into consideration the clinical signs present during the objective assessment but not the patient's symptoms.

Treatment

The management of ocular allergies in low- and middle-income countries is complicated by the high cost of drugs and the limited options available

Table 2 details the treatment guidelines developed for use in Kenya, based on the severity grading.

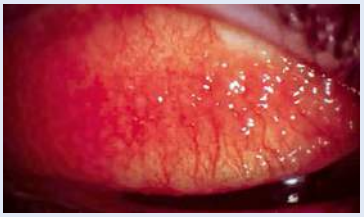
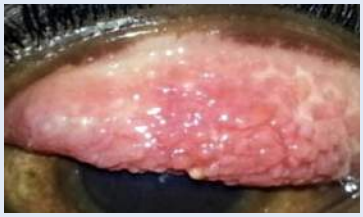
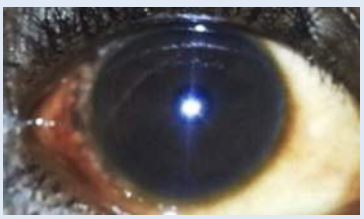
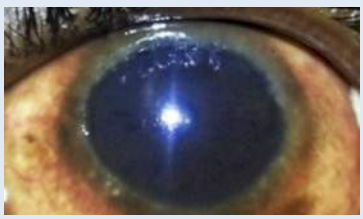
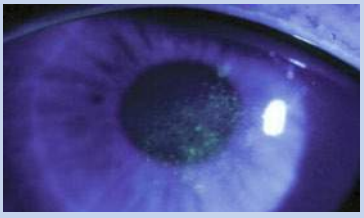
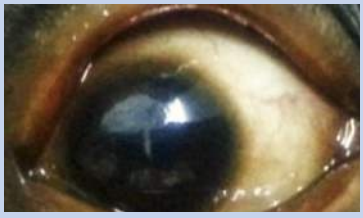
Note: Patients diagnosed with vernal or atopical keratoconjunctivitis should always be treated as **'severe'** cases, whatever their presenting clinical signs.

There are many tools that can be used in the management of ocular allergy.

Non-pharmacological treatment, including allergen avoidance and cold compresses, are important for providing short-term relief from symptoms. The patient should also be advised to avoid eye rubbing.

Topical lubricants, preferably preservative free, are recommended for use in all grades of severity to dilute allergens and reverse tear film instability secondary to chronic inflammation.

Table 1. A grading guide based on the Ocular Allergy Clinical Grading Guide developed for use in Kenya. The grading is determined by the most severe sign present in the most severely affected eye

Grade	Mild	Moderate	Severe
Papillae	 Millicent Bore Micro: <0.3mm	 E Lee Stock and David M Meisler • Macro: between 0.3 and 0.5mm • +/– Fibrosis	 Millicent Bore • Cobblestone papillae: >0.5mm but smaller than 1.0mm • Giant papillae: >1.0mm
Conjunctiva	 Millicent Bore Hyperemia	 Millicent Bore • Hyperemia • Diffuse thin chemosis	 Millicent Bore • Hyperemia • Cyst-like chemosis/scar • Conjunctivalisation of the cornea
Limbus (limbal oedema or Horner-Trantas dots)	 Erhardt Kidson No manifestations	 Millicent Bore <½ of limbal circumference affected	 Millicent Bore ½ or more of limbal circumference affected
Cornea	 Erhardt Kidson Clear	 Millicent Bore Superficial punctate keratitis	 Millicent Bore • Shield ulcer/epithelial erosion • Keratoconus +/– central leucoma

Note that patients diagnosed with vernal or atopic keraconjunctivitis should be treated as **'severe'** cases, whatever their presenting clinical signs.

Table 2. Treatment and follow-up guidelines, based on severity grading (developed for Kenya)

Grade	Mild	Moderate	Severe
Treatment	1 Topical antihistamine (e.g. Emedastine) for 1 month **OR** 2 Multi-action drug, e.g. olopatadine, for 1 month	1 Mild topical steroid, e.g. fluoromethalone 4 times a day for 1–2 weeks +/– steroid ointment at night for 2–4 weeks 2 Mast-cell stabiliser (e.g. cromolyn sodium)	1 Pulsed topical steroid regimen (start frequently then taper) +/– topical cyclosporine 0.5–2% until good remission, then stop. 2 Topical antihistamine + mast cell stabiliser/ multi-action drug for 1 month then mast cell stabiliser for maintenance 3 Steroid ointment at night for 2–4 weeks 4 Cobblestone/giant papillae or refractory cases: subtarsal steroid* (e.g. triamcinolone) 5 Shield ulcer: corneal scraping/superficial keratectomy + topical steroid-antibiotic +/– mydriatic
Follow-up	1 As required	1 Review after 4-6 weeks, then – if stable – as required	1 Review after 1–2 weeks then monthly while on steroids 2 Taper steroids (check IOP) 3 Stagger reviews to 3-monthly once patient is stable

*Avoid repeated use or use in children aged less than 10 years due to the risk of elevated IOP

Topical antihistamines and mast cell stabilisers are considered as first-line treatment. Mast cell stabilisers require a loading period of up to two weeks in order to achieve maximal efficacy. It should be combined with an antihistamine (short duration of action) or a mild topical steroid such as fluoromethalone to provide faster relief. Mast cell therapy should be continued when the steroids are stopped.

Dual-action drugs have both antihistamine and mast cell stabiliser action. They are effective in treating ocular allergy and outperform other groups of drugs. Another benefit is improved compliance because of a reduction in the number of medications to be used.

Topical ocular steroids are effective (probably the most effective of all options), but pose the important risk of frequent side effects (glaucoma, cataracts, corneal ulcers). Mild topical steroids should be used in acute crises for short periods of time; preferably less than 2 weeks. In cases of severe ocular allergy, a pulsed topical steroid regimen (start frequently, then taper) is advised. The duration of use is based on the grade of severity. Steroid ointments can be used at night for a short duration.

The use of **supra-tarsal steroids** is recommended only for severe cases where topical medication does not control symptoms or when there is disease progression (refractory cases). Their use is also recommended in patients with severe papillary reaction leading to corneal epithelial erosions/shield ulcers.[6]

Topical immunomodulators, such as cyclosporin A, have been shown to be of great benefit as steroid-sparing agents in chronic disease[7], although they are not readily available.

Patient counselling

All patients and their carers should be counselled. A well-informed patient and parent/guardian will be in a better position to take part in the management of the condition. Counselling leads to improved compliance with medication and follow-up visits. It also leads to a reduction in self-medication, which in turn reduces possible misuse of steroids.

It is important to make patients with sight-threatening disease aware that it can be blinding, so that they can understand the importance of proper follow-up and keeping their appointments.

'All patients and their carers should be counselled.'

Counselling can also help patients to avoid the complications associated with chronic eye rubbing (keratoconus) and the overuse or misuse of steroids (glaucoma, cataract, etc.).

Talk to patients about what they can do to support themselves, e.g. avoiding allergens, using cool compresses and preservative-free artificial tears, and wearing spectacles or sunglasses when outside. Basic printed information can be issued to patients during clinic visits.

Follow-up

Frequency of follow-up is linked to:

- Clinical severity grading
- Sight-threatening or non sight-threatening condition?
- Clinical response to treatment

A follow-up visit should include recent history, measurement of visual acuity, and slit lamp biomicroscopy. If corticosteroids are prescribed, measurement of intraocular pressure and pupillary dilation should be performed to evaluate for glaucoma and cataract.

If there is inadequate correction of refractive error and a history of frequent changes in spectacle prescriptions, suspect keratoconus. Look out for infections such as viral keratitis and refer all patients with severe disease (i.e. those developing complications) or those not responding to treatment.

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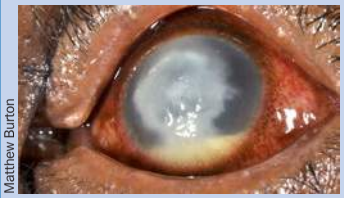
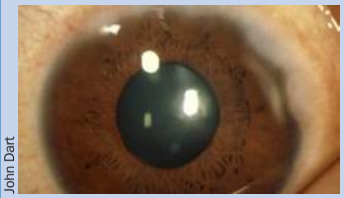
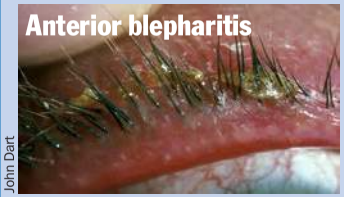
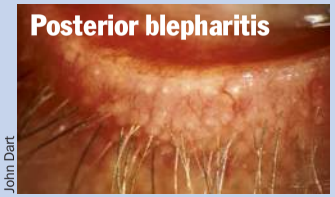
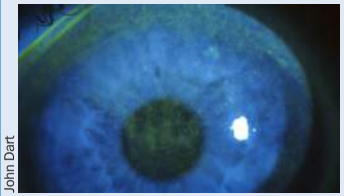
2 Bonini S, Sacchetti M, Mantelli F, Lambiase A. Clinical grading of vernal keratoconjunctivitis. *Curr Opin Allergy Clin Immunol*. 2007;7(5): 436-41.
3 Calonge M, Herreras JM. Clinical grading of atopic keratoconjunctivitis. Curr Opin Allergy Clin Immunol. 2007;7(5): 442-5.
4 Sacchetti M, Lambiase A, Mantelli F, Deligianni V, Leonardi A, Bonini S. Tailored approach to the treatment of vernal keratoconjunctivitis. *Ophthalmol*. 2010;117(7): 1294-9.
5 Bore M, Ilako DR, Kariuki MM, Nzinga JM. Clinical evaluation criteria of ocular allergy by ophthalmologists in Kenya and suggested grading systems. JOECSA.2014;18(1): 35-43.
6 Bore M, Ilako DR, Kariuki MM, Nzinga JM. Current management of ocular allergy by ophthalmologists in Kenya. *JOECSA*.2014;18(2): 59-67.
7 Ozcan AA, Ersoz TR, Dulger E. Management of severe allergic conjunctivitis with topical cyclosporin a 0.05% eyedrops. *Cornea*. 2007;26(9): 1035-8.

Common and important ocular surface conditions

Condition	History and signs	Primary level management
Infectious conditions		
 Matthew Burton **Microbial keratitis**	**History:** Painful, red eye with reduced vision developing acutely over one or two days (bacterial) or sub-acutely over a few days (fungal). **Signs:** Corneal ulcer (epithelial defect) with underlying stromal infiltrate. The conjunctiva will be red. There may be inflammatory cells in the anterior chamber, progressing to a hypopyon in severe disease.	Hourly antibiotic eye drops and refer to a specialist.
 Matthew Burton **Viral conjunctivitis**	**History:** Red, watering eyes, often bilateral. Normal or reduced vision. Mild pain. May have associated sore throat and runny nose. **Signs:** Watery discharge, conjunctival injection, tarsal conjunctival follicles, pre-auricular lymphadenopathy and eyelid oedema. The cornea may be affected with multiple superficial sub-epithelial infiltrates (grey-white spots – see image).	Avoid spread to others through good hygiene. Self-limiting.
 P Vijayalakshmi **Bacterial conjunctivitis**	**History:** Red, uncomfortable eyes with purulent discharge. There is usually redness, grittiness and burning, which may initially have been unilateral but often becomes bilateral. Lids are often stuck together in the morning with dried discharge. **Signs:** Conjunctival injection, papillary conjunctivitis, discharge.	Avoid spread to others through good hygiene. Topical antibiotics for 5–10 days.
Allergic conjunctivitis		
 John Dart **Vernal keratoconjunctivitis (VKC)**	**History:** Allergic conjunctivitis can present at any age as itching and watering due to some known or unknown allergen. A severe form is VKC which presents in childhood with severe itching, watering, foreign body sensation and thick mucus discharge. **Signs:** There is conjunctival injection (see image). Papillae are found in the tarsal conjunctiva, which can be large and irregular (cobblestone papillae). Tranta's spots are small white dots at the limbus. The limbus can become pigmented. The cornea can be affected with plaques and ulceration of the upper cornea.	Avoid allergens. Offer antihistamines, mast cell inhibitors, and/or topical steroids (short-term).
Blepharitis		
 John Dart  John Dart	**History:** Itching, burning, uncomfortable eyes, with or without associated watering and **dry eye** symptoms (see below). There may be an associated history of recurrent meibomian cysts. **Signs:** Hard scales and crusting at the bases of lashes in anterior blepharitis. Look for capped or plugged meibomian gland orifices and hyperaemia (redness) of the posterior lid margin in posterior blepharitis.	**Anterior:** Lid cleaning to remove crusts. **Posterior:** Hot compresses and lid massage.

Dry eye

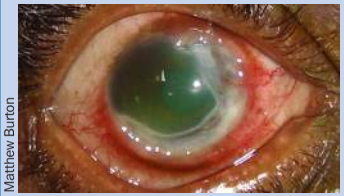

John Dart

Dry eye

History: Uncomfortable, gritty eyes with a foreign body sensation. Severe cases may be photophobic and painful with reduced vision.
Signs: The tear film is abnormal with debris on the surface and a tear break-up time of less than 10 seconds. The tear meniscus may also be thin. Punctate epithelial erosions that stain with fluorescein are the hallmark of dry eye disease.

Topical artificial tears (lubricants).

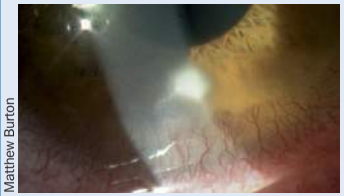
Other inflammatory conditions


Matthew Burton

Peripheral ulcerative keratitis (including Mooren's ulcer)

History: Painful, red eye with loss of vision, developing gradually over several weeks. May have a history of systemic inflammatory disease. Mooren's ulcer is an isolated ocular problem, typically occurring in young males.
Signs: Progressive, circumferential stromal thinning and ulceration. The limbus is inflamed in the area next to the ulceration.

Treat as for **microbial keratitis** (see above) and refer to a specialist.

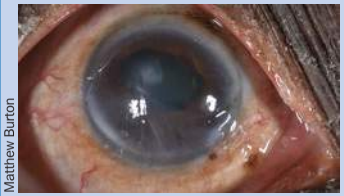

Matthew Burton

Marginal keratitis

History: Moderate pain, mild visual disturbance and redness.
Signs: Blepharitis, subepithelial marginal infiltrates (can be multiple) with an area of clear cornea between the infiltrate and the limbus. There may be an epithelial defect, which is usually smaller than the infiltrate.

Treat initially as for **microbial keratitis**. If the diagnosis is confirmed, prescribe a low-dose topical steroid.

Other non-inflammatory conditions


Matthew Burton

Neurotrophic keratitis

History: This should be considered in the context of systemic conditions (e.g. leprosy) or an ocular cause (e.g. herpetic keratitis or herpes zoster). The patient presents with a red eye with reduced vision. There may or may not be pain.
Signs: Interpalpebral punctate epithelial erosions, persistent epithelial defects, stromal oedema and infiltration.

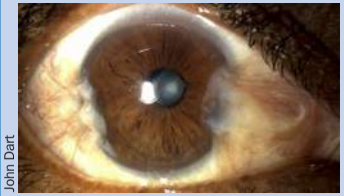
Treat the underlying cause. Protect cornea with lubricants, taping the eyelid closed at night, or lid closure.


Matthew Burton

Ocular surface squamous neoplasia

History: Patients usually present with an awareness of a growing lesion on the ocular surface. This may be uncomfortable or red. There may be pain and reduced vision when large. There may be an association with HIV+ status.
Examination: Thickened conjunctival epithelium that may extend onto the cornea with prominent 'feeder' vessels. There may be surface keratinisation characterised by white patches (leukoplakia), a gelatinous appearance, inflammation or pigmentation.

Refer for wide surgical excision.


John Dart

Pterygium

History: The patient may complain of a red lump, on one or both sides of the cornea, which can occasionally become more inflamed and uncomfortable. There may be blurring of vision, depending on the extent of growth across the cornea, and induced astigmatism.
Examination: There is a fleshy, wing-shaped growth, arising from the conjunctiva, that grows across the cornea.

Surgical excision if vision is threatened.

Compiled by Jeremy Hoffman, Matthew Burton and Allen Foster

Squamous cell carcinoma of the conjunctiva

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Introduction and epidemiology

Squamous cell carcinoma of the conjunctiva is the end-stage of a spectrum of disease referred to as ocular surface squamous neoplasia (OSSN). OSSN is a malignant disease of the eyes that can lead to loss of vision and, in severe cases, death. The main risk factors for both are exposure to solar ultraviolet radiation outdoors, HIV/AIDS, human papilloma virus and allergic conjunctivitis. The limbal epithelial cells appear to be the progenitorsof this disease.

OSSN is an important ophthalmic public health problem in equatorial Africa, where there are both high levels of UV radiation and a high incidence of HIV/AIDS. Africa has the highest incidence of OSSN in the world, affecting about 1.3 people per 100,000 population per year; so, if you work in an eye clinic serving a population of 1 million people, you could expect to see one case each month if they all came to the clinic.[1] By contrast, the incidence in other regions is about 0.1 people per 100,000 population per year, over 10 times lower.

Two disease patterns occur. In equatorial Africa, OSSN affects younger adults and proportionally more women than in other parts of the world. Recent studies in Kenya, for example, found that the mean age of OSSN patients is around 40 years, two-thirds are women and about three-quarters are living with HIV. Elsewhere, OSSN affects older adults (the mean age is about 60 years) and 70% are male.

Clinical presentation

This disease has a variable appearance (Figure 1). Red eye, photophobia, irritation, foreign body sensation and a white, painless, progressive growth on the surface of the eye are common presenting symptoms.[2] Most lesions occur in the interpalpebral fissure, especially on the nasal side.[3] They involve the conjunctiva and may extend onto the peripheral cornea, so visual acuity is often normal in the early stages. It usually only involves one eye. The surface may be gelatinous, papillomatous or fibrovascular. There is usually inflammation, leukoplakia and markedly dilated blood vessels, referred to as feeder vessels. Some brown to black pigmentation of the lesion is common in African population groups. Most lesions are about 7 mm wide at presentation but late presentation with large orbital tumours are not uncommon.

Diagnosis

Most cases are diagnosed from the clinical impression. There is a shortage of histopathology services in most equatorial countries; however, even in countries without this limitation, about half of the lesions are not excised for histopathology. This may be related to the increasing trend to treat these lesions with primary topical medication. However, the clinical impression is unreliable, especially in equatorial Africa, as both benign and malignant lesions have overlapping features. There is also the ethical consideration of using potentially dangerous topical medications, such as cytotoxic drugs, without a tissue diagnosis.

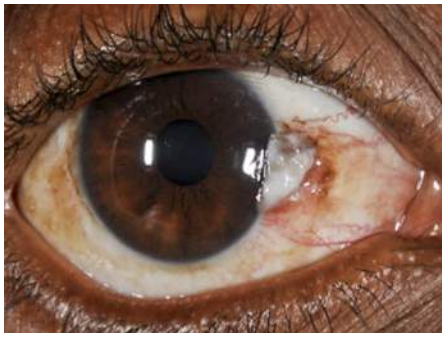
Histopathology is the gold standard for diagnosis: the pathologist will see an abrupt transition between the normal and abnormal tissues. However, histopathology is not without challenges. It requires surgical intervention for excision and the interpretation is subjective, varying between pathologists. It is particularly challenging in the earlier stages of OSSN, when it is pre-cancerous. After excision, the specimen often rolls up if immediately put in formalin, making orientation difficult. This can be counteracted by first placing the specimen on sterile suture packing foam for a few minutes to stiffen before putting it in formalin. Fragmentation of small tumour specimens and shearing of the surface layers may occur during processing, making the judgement of depth of involvement difficult.

Although vital staining with topical toluidine blue 0.05% stains most lesions dark royal blue with a high sensitivity, the specificity is low due to false positives in benign lesions (Figure 2).[4]

Treatment

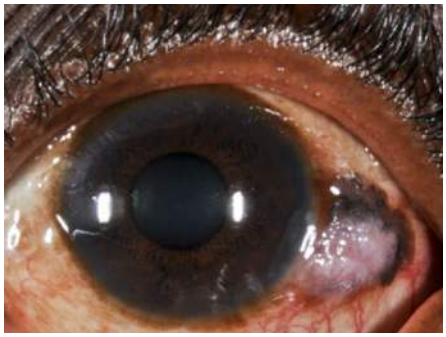
Surgical excision under the microscope is the most commonly used technique. Small lesions are simply excised in total while larger ones involving the orbit may need exenteration, a radical technique that involves removing all the orbital contents including the periosteum.

Figure 1. A range of OSSN presentations seen in East Africa.[1]



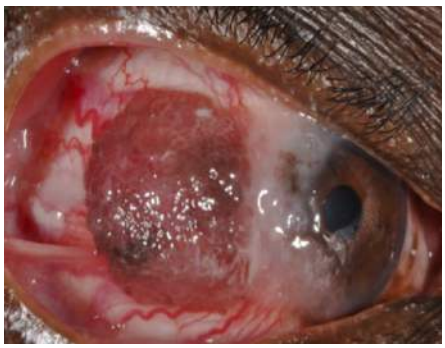
Stephen Gichuhi

Small lesion with leukoplakia



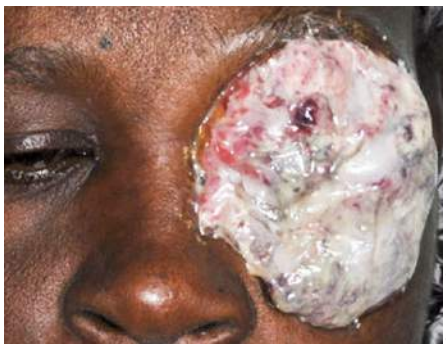
Stephen Gichuhi

Medium-sized lesion with pigmentation



Stephen Gichuhi

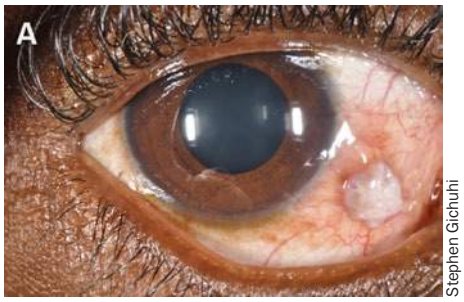
Large lesion with corneal extension but not involving the fornices



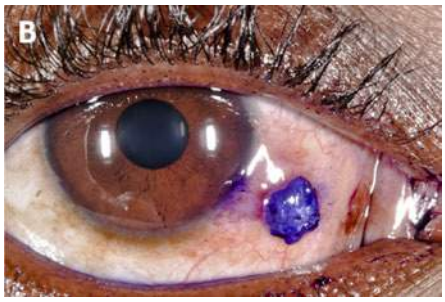
Stephen Gichuhi

Very large lesion extending into the orbit

Figure 2. Conjunctival lesions before and after staining with 0.05% toluidine blue. The pictures in the left column are before staining and those on the right after staining. Images A and B show moderately differentiated squamous cell carcinoma, with deep royal blue staining. C and D show actinic keratosis, with mixed staining (margin and parts of the lesion).



Stephen Gichuhi



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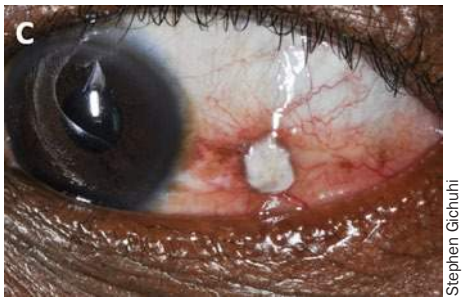

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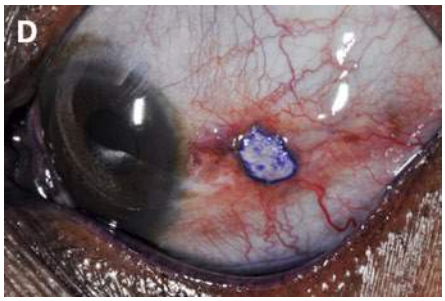


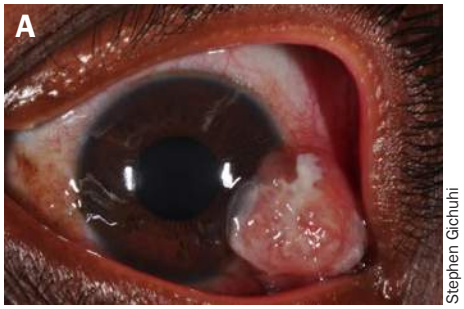
Stephen Gichuhi

Lesions are excised with a 4 mm margin, dissecting down to the sclera without touching the tumour. Some surgeons use the bare sclera technique which allows the conjunctiva to re-epithelialise, whereas others mobilise the surrounding conjunctiva for primary closure of the defect and earlier post-operative adjuvant chemotherapy. Other ways of closing the defect are by autologous conjunctival graft from the other eye or by using commercially available amniotic membrane. Absolute alcohol is applied to the corneal extension of the lesion to loosen the tissue from the cornea, so that it can be dissected microsurgically with a blade.

Adjuvant therapies to augment surgery include cryotherapy, where 2–4 freeze-thaw cycles are used to obliterate residual tumour at the bed and margins. Topical cytotoxic drugs, such as 5-fluorouracil (5FU) and mitomycin C, may be applied to the bed for about 2.5 minutes then washed off. Other agents include interferon alpha 2b drops, cyclosporin A, all-trans retinoic acid, anti-VEGF agents and radiotherapy. Many centres in Africa do not have cryotherapy or other adjuvants, except for 5FU, which is frequently available. Topical antibiotic-steroid combination eyedrops are applied 4 times daily for about 3–4 weeks after the primary excision, until the site heals.

Recurrence after the primary excision can be frequent. Surgical excision alone is associated with recurrences of 3.2% to 67% at an average of 32 months. HIV testing and treatment should be considered standard practice for all patients presenting with OSSN. We recently conducted a randomised controlled trial of topical 5FU 1% eye drops applied 4 times daily after the excision site healed (usually 2–3 weeks after excision) for OSSN lesions <2 quadrants in diameter.[5] It decreased the risk of recurrence one year after excision from 36% to 11%.There were transient adverse effects such as a watery eye, discomfort when applying the drops and eyelid inflammation, which settled within 2–3 weeks after completion of treatment. In Kenya the estimated cost of a 4-week treatment course of 5FU eyedrops is 320 Kenyan shillings (US $3.20).

Figure 3. Picture A shows the pre-operative appearance of a lesion in a 32-year-old woman. She was HIV infected with a CD4 count of 69 cells/µL. The lesion was excised with a 4 mm margin. She was given topical Gentamycin and Prednisolone drops 4 times daily for 3 weeks. Histopathology showed moderately differentiated squamous cell carcinoma. She was given 1% 5FU drops to apply 4 times daily for 4 weeks. (B) shows the eye about a year later; the lesion had not recurred.



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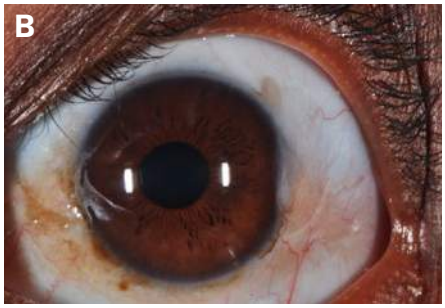

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Follow-up

Follow-up is important to monitor for recurrence, including everting the upper eyelid in case of recurrent tumour on the tarsal conjunctiva. Most recurrences in sub-Saharan Africa present early (3 and 6 months later). Reviews in this region should ideally be done 1, 3 and 6 months after surgery. After one year, reviews may be conducted at month 18, 24 and 36 after surgery. For large lesions that need more radical surgery, the follow-up regimes vary. Some surgeons use radiotherapy after surgery.

Patient counselling

There is no word for OSSN in most local languages. Calm reassurance is needed, especially as this cancer tends not to metastasise and in the majority of cases is not life threatening. Most patients will be anxious when told that they have cancer in their eye. In those living with HIV, this may be compounded by other concerns related to the complications of HIV. For people with large orbital tumours there may be fear of general anaesthesia. The possibility of recurrence and the need to follow up in the clinic is essential.

It is helpful to give patients evidence of the success of surgical excision with adjuvant therapy (for smaller lesions). For example, former patients who are willing to share their experiences with other patients can be very helpful 'change agents,' and can reassure and encourage others to come for treatment.

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Understanding and managing pterygium

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A pterygium is a wing-shaped fibrovascular proliferation of the conjunctiva that grows across the cornea.[1] Pterygium occurs more frequently in people who live in areas with high ultraviolet radiation. Dusty, hot, dry, windy, and smoky environments also play a part.[2] Most occur on the nasal side.

Diagnosis

Step 1. Taking a detailed history

How long has the growth been present? Typically, this would be for many months or years. This helps to differentiate it from ocular surface squamous neoplasia (OSSN), which tends to have a shorter history (see pages 52–53).

Ask the patient if it has been getting bigger. Some pterygia are inactive and have not grown for decades.

What symptoms is the patient complaining of? There may be redness, irritation, blurring of vision, double vision, itching, and a concern about the cosmetic appearance.[3]

Step 2: Examination

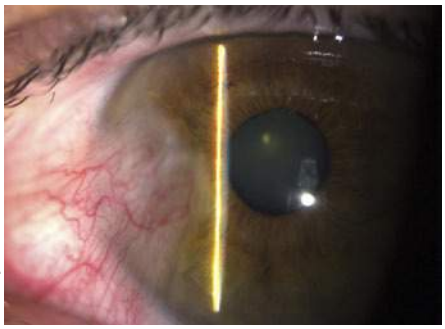
Check the visual acuity. You should always do a complete eye examination and look for other causes of discomfort or vision loss.

Measure the size of the pterygium from the limbus to the apex of the pterygium on the cornea. Record this on a diagram in the clinical record so that, the next time you see the patient, you can tell if the pterygium has grown.

Look for any atypical features that might make you worry about dysplasia (early-stage cancer), such as leucoplakia (an elevated, white, dry-looking patch), a raised gelatinous mass, or a large, prominent feeder blood vessel. Be especially alert if you live in Africa where there is a high prevalence of OSSN.[4]

Examine the eye movements to look for any evidence of restricted movement caused by the pterygium.

Retinoscopy will reveal any with-the-rule astigmatism that may be caused by the pterygium. Corneal topography can be valuable in detecting irregular astigmatism and distortion caused or induced by pterygium.



Anthony Bennett Hall

Pterygium examined using a slit lamp

When to treat

The most important indications for treatment are:

- Involvement of, or threat to, the visual axis
- Loss of vision from astigmatism
- Restriction of eye movement
- Atypical appearance suggesting dysplasia
- Increasing size (documented by an ophthalmologist)

Less important indications are:

- Increasing size (reported by the patient)
- Symptoms of irritation and complaints of redness, etc.
- Cosmetic issues

Counselling patients

Patients benefit from counselling before and after the operation.

Not every pterygium needs to be operated on. Some patients may expect to have their pterygium removed when simple conservative treatments such as lubricating drops or steroids may be all that is needed. It is important to explain to patients that there is a chance of recurrence, so the pterygium may come back even if it has been surgically removed. However, surgery with a conjunctival graft (as described opposite) substantially reduces the risk of recurrence.

> **‘You should always do a complete eye examination and look for other causes of discomfort or vision loss.’**

Compile a list of indications to suit your setting. Use the list to counsel patients about their suitability for an operation. Review them in a few months to see if the symptoms have improved with conservative treatment and to check if the pterygium has grown.

Use an information leaflet to help you to counsel patients. We use a leaflet which has a picture of a pterygium, a list of indications, a description of the procedure, what to expect in the post-operative period, possible complications, and the likelihood of recurrence. The picture is useful in helping you to explain the diagnosis, the indications for surgery and the pterygium operation. Warn patients that the eye may be quite painful for a day or two.

Complications

Patients need to be fully informed about possible complications before you start.

Complications can occur during the operation or may present later.

Intraoperative complications include:

- Perforation of the globe
- Thinning of sclera or cornea from dissection
- Intraoperative bleeding
- Excessive cautery
- Muscle damage
- Reversing the conjunctival autograft (placing it epithelial surface down)

Early postoperative complications include:

- Persistent epithelial defects
- Dellen formation (an area of corneal thinning adjacent to limbal swelling that prevents normal wetting of the corneal surface)
- Haematoma beneath the graft
- Loss of the graft
- Pyogenic granuloma

Late complications include:

- Recurrence
- Corneo-scleral necrosis
- Scleritis
- Endophthalmitis

Recurrence is a major late complication. The highest rate of recurrence occurs in the bare sclera technique.[1,5] The section opposite describes a technique of excision with **conjunctival autografting,** which reduces the recurrence rate.[1] You may wish to consider using adjuvants such as 5-fluorouracil or mitomycin C, but be aware that mitomycin C is associated with a higher rate of visually threatening complications. Adjuvants can be reserved for recurrent cases.[1]

Pterygium surgery: the conjunctival autografting technique

Before the operation

Consider using steroids for a few days preoperatively to reduce inflammation.

Before you begin giving the anaesthetic, check the notes to make sure you are proceeding on the correct eye. Mark the eye, as you would for any eye procedure, to avoid possible confusion.

Give the patient topical anaesthetic drops before they come into the theatre. Dilating drops will help reduce the pain from postoperative ciliary spasm.[5]

Anaesthesia

If you have a cooperative patient, you can infiltrate local anaesthetic under the conjunctiva using a fine-gauge needle. Use a long-acting anaesthetic such as bupivacaine as this can give some hours of pain relief after the operation. Adrenaline will aid haemostasis.

Infiltrate the anaesthetic under the pterygium and under the conjunctival epithelium supero-temporally. The advantage of local infiltration is that the patient retains the ability to move the eye and can be asked to look left, right or down to expose the part of the eye that is being operated on.

Give a sub-Tenon's anaesthetic if the patient is likely to be uncooperative or if you anticipate a lengthy procedure.

You will need to reassure the patient and explain each step as you proceed with the anaesthesia and the excision.

Pterygium excision and autoconjunctival graft

Pterygium surgery should not be delegated to the most junior trainee surgeon. Supervision of trainees should be continued until they are competent at all the steps required. This will reduce recurrence rates.[3]

Prepare the patient as you would for intraocular surgery. Wear a sterile gown and gloves, disinfect the skin around the eye and the conjunctival sac with 5% (aqueous) povidone iodine solution, and drape the patient. A scrub nurse should assist you. A surgical pack containing an eyelid speculum, two pairs of Moorfield's forceps, fine-toothed forceps, Wescott scissors, needle holder, crescent blade or No. 15 blade, bipolar or ball cautery, fine absorbable suture (7-0 or 9-0) or 10-0 nylon and swabs.

Even if you have given a sub-Tenon's block, injecting anaesthetic with adrenaline under the conjunctiva will help to elevate the pterygium off the sclera and separate the conjunctival epithelium from the underlying Tenon's capsule. The vasoconstrictive effect will also limit bleeding. A traction suture may be needed to move the eye if the patient has had a block. This may be inserted through the superior peri-limbal conjunctival tissues or be a corneal traction suture.

Figure 1. Dissecting pterygium off the limbus

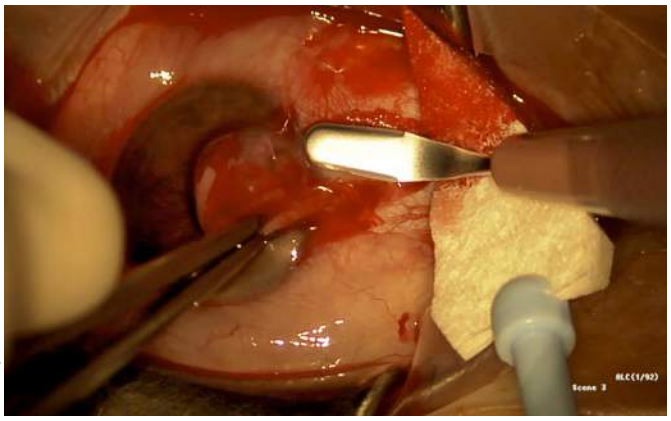


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Figure 2. Dissecting thin graft off Tenon's capsule

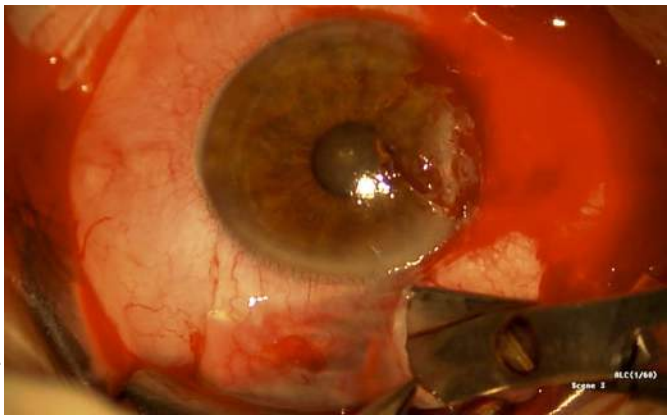

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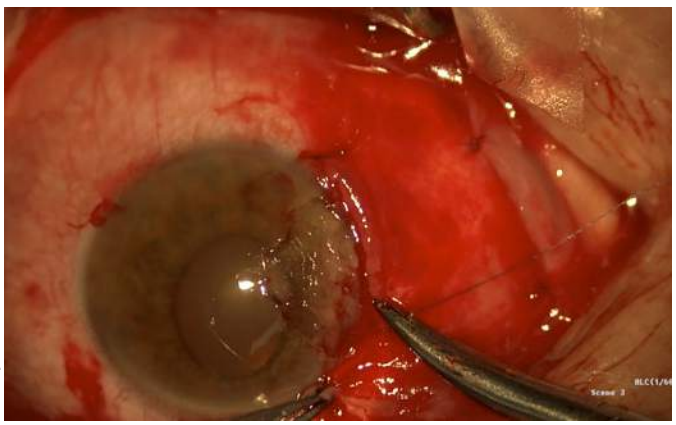
Figure 3. Suturing limbal corner of graft to sclera



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Excising the pterygium

To get a good view, ask the patient to look in the direction away from the pterygium.

Start the excision of the pterygium by grasping it with Moorfields forceps and making radial incisions with Wescott scissors along the edges. Find the plane under the pterygium and Tenon's capsule anterior to the medial rectus muscle. Take care to stay away from the medial rectus muscle so that it is not cut or damaged inadvertently. Cut along the base of the pterygium (parallel to the limbus). Make sure you stay anterior to the plica. The pterygium should lift easily off the sclera. It becomes adherent at the limbus and you will need to use a crescent blade or No. 15 blade to carefully dissect it off the cornea (Figure 1). The sclera must be clean of any Tenon's capsule.

Ask your assistant to keep the field free of blood so that you have a clear view of the depth of your dissection. Most bleeding will stop of its own accord. Only use cautery if the bleeding is so profuse that it is likely to form a large haematoma and lift the conjunctival graft off the sclera. A little blood will act as autologous fibrin glue.

Taking the conjunctival autograft

Ask the patient to look down. Marking the epithelium with a sterile skin marker will help you to identify the surface of the graft. Make two radial incisions in the superior

Continues overleaf ➤

bulbar conjunctiva. The incisions should outline an area that is about the same in size as the nasal conjunctival defect. Carefully dissect the conjunctiva off the underlying Tenon's capsule (Figure 2). Once you are in the correct plane you should incise the conjunctival graft along its posterior edge. Lift the posterior edge and carefully dissect off any adherent Tenon's capsule. Your assistant may hold one corner of the graft for you. The graft may be placed epithelium up on a paper template (suture cover) before it is cut off from the limbus. This improves the handling and orientation of the thin conjunctival tissue.[2]

Placing and suturing the graft

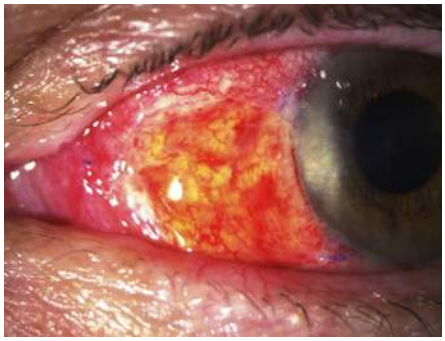
Orientate the graft with the limbal donor edge closest to the nasal limbus.

Fibrin glue can speed up pterygium surgery and may reduce postoperative pain.[2] However, the cost of fibrin glue is prohibitive, even in some high-resource settings. A good alternative is 9-0 or 10-0 nylon: it is widely available, cheap, and causes no tissue reaction.[5]

Anchor the two limbal corners to the sclera to avoid posterior migration of the graft (Figure 3). Suture the remaining corners of the graft to the nasal conjunctiva. If you are using nylon, use a mattress suture to bury the knots. Place additional sutures as required to close any gaps between the graft and the nasal conjunctiva.

Apply chloramphenicol ointment to the conjunctiva and firmly pad the eye.

Figure 4. Graft one week after surgery



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Postoperative care

The patient will need good pain relief after surgery. We prescribe a combination of paracetamol and codeine for a day or two.

Ask the patient to instil steroid and antibiotic drops 4 times a day for a week. The topical steroid should continue for at least a month.

Examine the patient the next day to make sure that the graft is in place.

The next visit is at 1 week (Figure 4). Review the patient at 1 month and 3 months to make sure there are no complications. Signs and symptoms of recurrence usually occur 4–6 weeks after surgery.[5]

Encourage the patient to return in a year so that you can check for any recurrence of the pterygium.

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CLINICAL SKILLS FOR OPHTHALMOLOGY

How to irrigate the eye

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Remember to wash your hands before and after performing all procedures.

Indications

- To remove single or multiple foreign bodies from the eye
- To wash the eye thoroughly following any chemical injury to the eye

Note: Irrigation of the conjunctival sac is an emergency treatment if there has been chemical injury to the eye.

Alkali (e.g. lime) and acid (e.g. car battery) solutions in the eye may cause serious damage to the cornea and conjunctiva, resulting in long-term loss of vision.

The sooner the chemical can be diluted and removed, the less likely there is to be damage to the ocular surface. **Immediate, copious irrigation may save the eye after chemical injury.**

- For foreign body removal, a minute or so of irrigation should be sufficient to remove any foreign bodies.
- For severe acid or alkali burns, emergency irrigation should continue for **at least** 15 minutes; 30 minutes is better. It is advisable to continue to irrigate acid/alkali burn injuries for a further 12–24 hours by setting up a saline drip to continue to gently irrigate the eye.

You will need:

- A large syringe or a small receptacle with a pouring spout, such as a feeding cup
- Irrigating fluid (normal saline or clean water at room temperature)
- Local anaesthetic eye drops
- Towel or gauze swabs
- Lid retractors if available
- A bowl or kidney dish

Method

- Instil local anaesthetic eye drops.
- With the patient lying down, protect the neck and shoulders with a towel or sheet.
- Place the bowl or kidney dish against the cheek, on the affected side, with the head tilted sideways towards it.
- Fill the feeding cup or syringe with the irrigating fluid and test the temperature on your hand.

Heiko Philippin

Irrigating the eye

- Ask the patient to fix his/her gaze ahead.
- Open the eyelids. If necessary, **gently** use eyelid retractors.
- Pour or syringe the fluid slowly and steadily, from no more than 5 centimetres away, onto the front surface of the eye, inside the lower eyelid and under the upper eyelid.
- If possible, evert the upper eyelid to access all of the upper conjunctival fornix.
- Ask the patient to move the eye in all directions while the irrigation is maintained.
- Check and record the visual acuity when the procedure is finished.
- In alkali and acid burns, refer the patient to an ophthalmologist for assessment.

Understanding and caring for an indirect ophthalmoscope

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The binocular indirect ophthalmoscope, or indirect ophthalmoscope, is an optical instrument worn on the examiner's head, and sometimes attached to spectacles, that is used to inspect the fundus or back of the eye. It produces an stereoscopic image with between 2x and 5x magnification. It is valuable for diagnosis and treatment of retinal tears, holes, and detachments. The pupils must be fully dilated for it to work well.

In a dark room, the examiner orientates his/her head so that light from the internal light source is directed into the patient's eye. A positive-powered condensing lens is held by the examiner at its focal length from the patient's eye, serving two purposes (Figure 1):

1. The lens 'condenses' light from the illumination system towards the patient's pupil.
2. Light reflected from the retina passes back through the lens creating a real, horizontally and laterally inverted image of the fundus situated between the lens and the examiner.

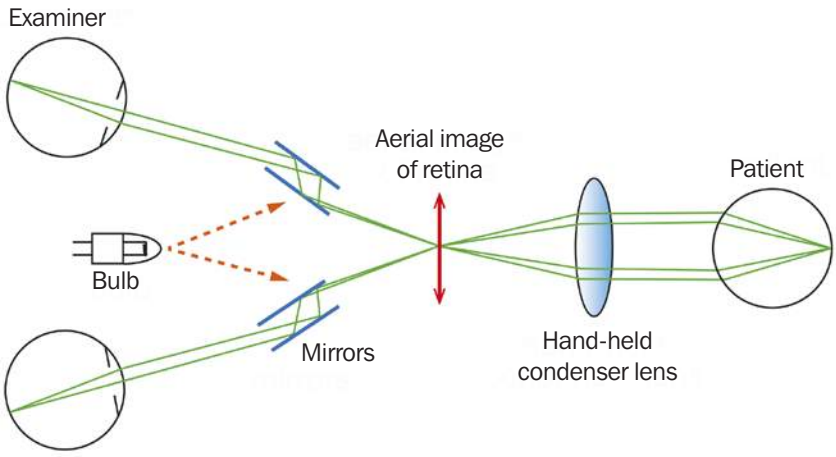
The viewing system of the instrument (Figure 2) consists of a pair of low-powered convex lenses. This design affords the examiner a stereoscopic view of the virtual image. The +20D lens is the standard lens for general examination offering 3x magnification and a field of view of approximately 45°. A +30D lens will offer 2x magnification along with a field of approximately 65°. These higher powered lenses are commonly used to examine small children and those with small pupils. They can be thought of as more forgiving than the lower-powered lenses, and as such are often advocated as a good choice of lens for those new to the indirect ophthalmoscope.

Indirect ophthalmoscopes use halogen bulbs as the light source although many newer models use LED light sources which operate much cooler and last much longer. The newer models may incorporate battery packs that can be worn on the examiner's belt or can even be incorporated into the headband itself. These make it possible to use the indirect ophthalmoscope without the movement restrictions caused by power cables.

The indirect ophthalmoscope offers some advantages over the direct ophthalmoscope:

- It permits binocular vision with depth perception (stereoscopic vision).
- It has a wider field of view.
- It can be combined with scleral indentation to examine the anterior retina.
- It is not affected by the refractive state of the patient' eye.
- It may be used in the operating room without contamination.
- It accommodates a larger and brighter light source, which permits the examiner to penetrate moderate cataracts and to see more retinal detail.

Figure 1. How an indirect ophthalmoscope works



Ismael Cordero

Figure 2. Indirect ophthalmoscope viewing system

Ismael Cordero

Care

- Keep the instrument in its case when not in use.
- Make sure the on-off switch is fully turned off (a click sound will be heard) before placing the instrument in its case.
- Recharge the batteries at the end of each work day.
- Wipe the headband and the instrument surfaces with a cloth dampened in mild disinfectant every day.
- Clean the lens by using hard contact lens cleaner and warm water and then drying it with a soft, lint-free cloth.
- If needed, sterilise the condensing lens by placing the lens in a cidex solution for 5–10 minutes, by ethylene oxide sterilisation, or by placing it in a formalin chamber. You can also autoclave the lens in a steel chamber with perforation for steam.

A case for South-South collaboration for trachoma elimination

Mwele Malecela, Upendo Mwingira, Sultani Matendechero, Michael Gichangi, Rebecca Oenga, Paul Emerson, Teshome Gebre and Girija Sankar.

The East Africa NTD/Trachoma Cross-Border Partnership brings together representatives from the same 'neighbourhood' – Eritrea, Ethiopia, Kenya, South Sudan, Sudan, Tanzania and Uganda – to share experiences of common interest in the delivery of trachoma and other neglected tropical disease (NTD) programmes. These countries understand that they will never reach their individual elimination targets without working together: they are all home to nomadic populations of pastoralists who live on both sides of an international border and are bound more closely by relations, socio-cultural activities and trade than by borders.There are also common programmatic challenges because of shared histories, ethnicities, and languages, an understanding and appreciation of which are critical to provide effective public health services.

The Ministry of Health, Community Development, Gender, Elderly and Children in Tanzania hosted the second annual meeting of this partnership in August 2016. The discussion fostered by the three days of meetings were inspirational, educational and led to concrete actions that will accelerate progress towards the elimination of blinding trachoma and other NTDs.

Finding ways forward

One of the highlights was the first meeting of the district officials with responsibility for implementing the programmes for Maasai communities in Kenya and Tanzania. They were able to share their successes and challenges in working with the Maasai, leading to several 'lightbulb' moments of greater understanding. Likewise, representatives from Ethiopia, Kenya, South Sudan and Uganda (home to the Ateker people, comprising the Jie, Karamajong, Nyangatom, Turkana, and Toposa tribal groups) identified areas for collaborative engagements in NTD and trachoma service provision along the Ateker corridor, including coordinating surgical services and sharing Ateker-speaking surgeons. The Galabat East district in Sudan and the Metema district in Ethiopia have reached their trachoma elimination targets and plans are now in place for joint surveillance activities on either side of the border.

Birgit Bolton for ITI

Mass drug administration (MDA) amongst Maasai communities in Monduli district. TANZANIA

Countries also planned ways to synchronise mass drug administration activities, share health education materials, assist in human resource development (where gaps were identified), enhance efforts on facial and environmental hygiene in villages and schools along the border, and collaborate on surveys.

Global alliances of NGOs and donors can offer technical and financial resources but it is the country programmes that are the engines of disease elimination. The programme staff best able to understand the problems and identify solutions for their local contexts are those who work in close proximity with the communities they serve on a day-to-day basis. However, when the policies they are implementing are not working, the next best place to look for solutions is an adjacent district where different solutions may have been developed for a similar set of problems. Global alliances can provide the framework for such knowledge sharing, but it is when district officials adapt (and extend) these frameworks that the success of service delivery is evident. For example, a few weeks after the Arusha meeting, district health officials from Longido, Tanzania and Kajiado, Kenya met in a border town to finalise a coordinated work plan to provide services for the Maasai population on both sides of the border. During the meeting, representatives of the Tanzania programme, which was struggling to gain acceptance and traction in the Maasai communities, was inspired by the experience of the Kenyans, who had spent more time gaining the trust of the Masaai communities, resulting in them becoming partners in the programme and actively seeking out trachoma treatment and surgical services. Similar meetings are planned for the countries along the Ateker corridor.

> **"The East Africa partnership is proving to be an essential framework"**

A case for regional networks

The East Africa partnership is proving to be an essential framework for supporting this group of national programmes, and is a model that should be replicated wherever there are similar groupings of countries that share common issues. For example, countries in Southern Africa, comprising Malawi, Mozambique, Zambia, and Zimbabwe, will benefit from emulating this model because they share some common ethnicities and languages. The islands of the South Pacific – Fiji, Kiribati, Papua New Guinea, Solomon Islands, and Vanuatu – share common operational issues and can benefit from a regional knowledge-sharing network. The partnerships can go far beyond knowledge sharing and include practical solutions such as the sharing of surgeons that speak the same language. They can also enhance efficiency by minimising replication and providing a platform for district teams to learn and benefit from each other's strengths to improve programmes.

National NTD programmes have to be able to see what is possible and learn from their successes and failures, as well as those of their neighbours, to plan and deliver effective services. Similar cross-border collaborations have recently been reported in the onchocerciasis control programmes in the Mano River Union (West Africa) with very similar findings and recommendations.

With unprecedented resource mobilisation for NTDs, it is now hard to describe these diseases of neglected people as themselves neglected. For the resources to be best utilised, however, delivery programmes must be efficient and effective. Sharing experiences can save country programmes years of trial and error and improve access to freedom from disease for all.

Test your knowledge and understanding

This page is designed to help you to test your own understanding of the concepts covered in this issue, and to reflect on what you have learnt. We hope that you will also discuss the questions with your colleagues and other members of the eye care team, perhaps in a journal club. To complete the activities online – and get instant feedback – please visit **www.cehjournal.org**

1. Ocular surface disease may affect the following:		Tick all that apply
a	Conjunctiva	☐
b	Tear film	☐
c	Iris	☐
d	Cornea	☐
e	Eyelid margins	☐
2. What is important in the treatment of blepharoconjunctivitis?		**Tick all that apply**
a	Systemic prednisolone	☐
b	Tarsorrhaphy	☐
c	Warm compresses to the eyelids	☐
d	Topical atropine	☐
e	Mechanical debridement of eyelash crusts	☐
3. Dry eye syndrome:		**Tick all that apply**
a	Is more common with increasing age	☐
b	Is improved by a hot, dry atmosphere	☐
c	Can cause punctate epithelial erosions	☐
d	Can be treated with artificial tears	☐
e	May result in Mooren's ulcer	☐
4. Which of these statements are true?		**Tick all that apply**
a	Stevens Johnson Syndrome may be associated with HIV positive status	☐
b	Epiphora means a dry eye	☐
c	Vernal keratoconjunctivitis is associated with keratoconus	☐
d	Herpes zoster ophthalmicus may cause corneal anaesthesia	☐
e	Alkali burns to the eye are usually more serious than acid burns	☐
5. The following are useful diagnostic tests in ocular surface disease:		**Tick all that apply**
a	Direct ophthalmoscopy	☐
b	Slit lamp examination of the tear film	☐
c	Fluorescein staining of the cornea	☐
d	Testing for corneal sensation	☐
e	Schirmer's test	☐

ANSWERS

1. Answers **a, b, d** and **e.** As the name indicates, the surface of the eye can be affected, but not the deep tissues such as uvea (iris) and retina.

2. Answers **c** and **e.** Hot bathing and removal of any debris at the base of the eyelashes are important, together with eyelid massage.

3. Answers **a, c** and **d** are correct. Hot dry atmospheres make dry eye symptoms worse. Dry eye syndrome does not cause Mooren's ulcer.

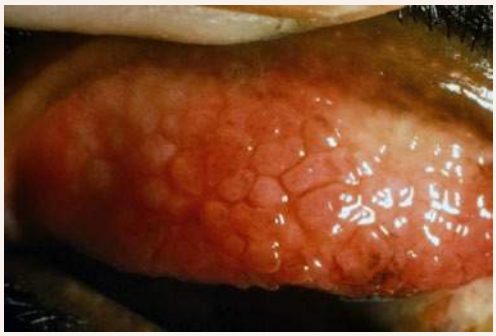
4. All the answers are true except b. Epiphora means a watering eye. Note: Stevens-Johnson syndrome may be due to an adverse reaction to some medications.

5. All are true except a.

REFLECTIVE LEARNING

Visit **www.cehjournal.org** to complete the online 'Time to reflect' section.

Picture quiz



ICEH

This ten-year-old boy presents with itchy, watering eyes with a thick mucous discharge of several months' duration. His visual acuity is 6/9 and 6/12.

Q1. Which of the following signs are visible? (tick all that apply)

a. ☐ Follicles
b. ☐ Horner-Trantas dots
c. ☐ Giant papillae
d. ☐ Pannus
e. ☐ Trachomatous inflammation

Q2. Which of the following is the most likely diagnosis? (tick one)

a. ☐ Bacterial conjunctivitis
b. ☐ Trachoma
c. ☐ Kaposi's sarcoma
d. ☐ Vernal conjunctivitis
e. ☐ Adenoviral conjunctivitis

Q3. Which of the following may be used in treatment? (tick all that apply)

a. ☐ Topical prednisolone
b. ☐ Topical antihistamines
c. ☐ Topical mast cell inhibitors
d. ☐ Topical acyclovir
e. ☐ Topical neomycin

ANSWERS

1. Answer **c.** The slide shows giant papillae (>1.0 mm) on the upper eyelid. Horner-Trantas dots may be seen on the limbus, which is not visible in this picture. There is no evidence of follicles or trachoma.

2. Answer **d.** The most likely diagnosis is vernal conjunctivitis. Bacterial conjunctivitis is associated with a purulent discharge, trachoma often shows follicles, and adenovirus is self-limiting and does not have giant papillae.

3. Answer **a, b** and **c.** Treatment is to reduce inflammation from mast cell degranulation, so mast cell inhibitors, antihistamines and prednisolone may all have a role.

Next issue: online only

The next issue of the *Community Eye Health Journal* will be on **Neuro-ophthalmology**. It will include articles such as 'Understanding vision and the brain' and 'Assessing the neuro-ophthalmology patient'. This issue will not be produced in paper format because of increasing costs in publication and distribution. It will be available online at **www.cehjournal.org**. If you wish to receive an email with a link to download the PDF copy, please send your email address to **web@cehjournal.org**.

The next paper issue, planned for the end of March 2017, will be on **Continued Professional Development**. Thank you for your understanding.

#StrongerTogether

IAPB's 10th General Assembly (10GA), the premier global event discussing public health issues related to blindness and visual impairment, brought together 1,150 eye care professionals from 100 countries in Durban in October 2016.

Over the course of three days, there were over 60 sessions with 200 speakers, and over 250 poster presentations. If you couldn't be there, you can catch up on what you've missed:

- View and download PowerPoint files of all the talks and presentations from **www.iapb.org/10ga-presentations**
- Access IAPB's Vision Atlas, which was launched at the 10GA. It allows access to the latest data and evidence related to avoidable blindness and sight loss: **http://atlas.iapb.org**
- Enjoy the photographs entered into the #StrongerTogether Photo Competition. The winners were announced at 10GA and all entries can be viewed at **http://photocomp.iapb.org**

Courses

German Jordanian University
Email: **vtc@gju.edu.jo**

University of Cape Town Community Eye Health Institute
www.health.uct.ac.za or email **chervon.vanderross@uct.ac.za**

Lions Medical Training Centre
Write to the Training Coordinator, Lions Medical Training Centre, Lions SightFirst Eye Hospital, PO Box 66576-00800, Nairobi, Kenya. Tel: +254 20 418 32 39

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https://twitter.com/CEHJournal

Useful resources for ocular surface disease

Cochrane reviews

Blepharitis
Lindsley K, Matsumura S, Hatef E, Akpek EK. Interventions for chronic blepharitis. Cochrane Database Syst Rev. 2012, 5: CD005556. doi: 10.1002/14651858.CD005556.pub2

Pterygium
Clearfield E, Muthappan V, Wang X, Kuo IC. Conjunctival autograft for pterygium. Cochrane Database Syst Rev. 2016, 2: CD011349. doi: 10.1002/14651858.CD011349.pub2.

Dry Eye
Ervin AM, Wojciechowski R, Schein O. Punctal occlusion for dry eye syndrome. Cochrane Database Syst Rev. 2010, 9: CD006775. doi: 10.1002/14651858.CD006775.pub2.

Herpes simplex
Wilhelmus KR. Antiviral treatment and other therapeutic interventions for herpes simplex virus epithelial keratitis. Cochrane Database Syst Rev. 2015, 1:CD002898. doi: 10.1002/14651858.CD002898.pub5.

Squamous cell carcinoma
Gichuhi S, Irlam JH. Interventions for squamous cell carcinoma of the conjunctiva in HIV-infected individuals. Cochrane Database Syst Rev. 2013 28; 2:CD005643. doi: 10.1002/14651858.CD005643.pub3.

Further reading

Ocular surface
Gipson IK. The ocular surface: the challenge to enable and protect vision: the Friedenwald lecture. Invest Opht Vis Sci 2007;48(10):4390; 4391–4398. Available online: **https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2886589/**

Dry eyes
Methodologies to diagnose and monitor dry eye disease: report of the Diagnostic Methodology Subcommittee of the International Dry Eye Workshop (2007). Ocul Surf. 2007;5(2):108–52. Available online: **www.tearfilm.org/dewsreport/**

Baudouin C, Messmer EM, et al. Revisiting the vicious circle of dry eye disease: a focus on the pathophysiology of meibomian gland dysfunction. BJO Online First, published on January 18, 2016. Available online: **http://tinyurl.com/dry-eye-circle**

Next issue

Edmond J FitzGibbon www.eyewiki.aao.org

The next issue of the *Community Eye Health Journal* is **online** and is about **Neuro-ophthalmology**

ONLINE SUPPLEMENT

Inequities in eye care in South Asia

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Inequities are often discovered and discussed around prevalence studies, which produces data relating to various types of inequities. It sits in the space of periodic assessment and continues to remain predominantly in the knowledge rather than action realm. Therefore there is a need for a paradigm shift in how we think about and approach inequities in service. The goal of "VISION 2020 - The Right to Sight" and that of many organizations and governments engaged in eye care is around "eliminating avoidable blindness". This implicitly means that there are people who are blind, but don't need to be. This is true since proven interventions exist to treat or prevent the major causes of blindness or visual impairment. Globally, it is reported that 39 million people are blind and a further 246 million have moderate or severe visual impairment.[1] A significant number of people with avoidable visual loss are not being reached and served by the current eye care delivery system for a variety of reasons including patient awareness and access to services. Thus, we need to recognize that inequity in the eye care delivery system is a significant cause of the remaining problem of avoidable blindness. Therefore it is relevant to look at how we currently provide eye care and redesign it with an explicit focus on the goal of eliminating inequities. Such a health system design should have inbuilt, on-going monitoring and processes for continuously identifying and correcting inequities as they occur, similar to what is done in clinical audit and care process for reducing complications, infections, etc. It is time that this paradigm shift occurs in the design of eye care services both at institutional and national level. In order to consider the redesign of eye care delivery, it is important to have an understanding of the origin of these inequities. Overall, inequity or those not served fall into a few broad categories:

Inequity due to socio-economic factors:

These relate to gender, literacy, marital status and wealth. They influence individuals on the level of empowerment, awareness, decision making position in the family, priority for eye care and the extent of their mobility. Several studies undertaken in this region have shown a strong association between cataract blindness and these factors. Studies in India have shown that women have a 20% higher chance of being blind than men; illiterate people are 3.7 times more likely to be blind than people who are literate; and unemployed people are twice as likely to be blind than employed people.[2] Similarly studies in Bangladesh have shown that married persons are almost half OR = 0.6 (0.4 – 0.9) as likely to be blind as single / widowed persons.[3]

Inequity in eye care is one of the primary reasons for the continuing problem of avoidable blindness.

Continues overleaf ➤

Source: Current estimates of blindness in India; BJO 2005;89;257-260

Table – 1: Socio-demographic correlates of cataract blindness

Socio-demographic variables	Adjusted Odds Ratio	95 % CI
Female	1.2	(1.2-1.3)
Rural	1.2	(1.1-1.4)
Illiterate	3.7	(2.7-5.2)
Not Working	2.0	(1.8-2.2)

Location:

Which same study? showed that those living in rural areas have a slightly increased risk 1.2 (1.1 – 1.4) of blindness over those living in urban situations.

The locational disadvantage that we see at the individual level also plays out at national level. In the more affluent or developed countries, the overall prevalence of blindness is lower and those blind due to avoidable causes are much less. This will reduce even further with the advent of emerging treatment for conditions like DR, ARMD and Glaucoma. In contrast if we look at low income countries preventable causes of blindness due to trachoma, vitamin-A deficiency and onchocerciasis still occur in some poor communities and blindness due to treatable cataract is still the major cause.

Disease focus:

In design of services and interventions, unconsciously or sometimes due to the purpose of funding (as in the World Bankfunded cataract programme in India), the focus tends to be on certain conditions. At individual or institutional provider level such focus emerges often on account of economic considerations. For instance, in most of the countries in this region and developing countries in general, the overarching focus has been on cataract blindness and provision of cataract surgery.

While this has made an impact on cataract blindness it has also led to a clinical practice which is not comprehensive and people with other conditions, as simple as refractive errors or with complex retinal pathologies have not received equitable attention. Thus the biased preference to some conditions has contributed in its own way to inequity in the treatment and the management of other treatable conditions.

Table – 2: Technology & Quality

Sivaganga & Tirunelveli Surveys				
Vision Category	**Presenting Visual Acuity**		**WHO Standard for Vision Outcomes**	
	IOL (n=840)	Non-IOL (n=989)	Presenting	Best Corrected
Normal (≥ 6/18)	77.3%	49.3%	80%+	90%+
Impaired (<6/18-≥6/60)	18.0%	10.9%	15%+	5%+
Blind (< 6/60)	4.7%	39.8%	<5%	<5%

Human Resource and Infrastructure:

The scarcity of trained ophthalmic manpower is aggravated by the fact that they tend to be based in large urban centres. This in turn dictates the location of eye hospitals and other eye care infrastructure as well. An earlier assessment of distribution in India showed that over 57% of the ophthalmologists were based in 56 cities which accounted for only 11% of the population.[4] Conscious of this urban concentration of eye care services, programmes emerged to reach out to the rural areas essentially through eye camps. However, the reach and impact of this approach has been limited.[5]

Technology and Quality:

Most technologies tend to be developed in the West and are priced to be relevant to those markets. Some technologies, like an intra-ocular lens offer a dramatically better outcome and quality of vision. The studies done in the 1990's showed that presenting visual outcome in the aphakic eyes (non IOL) was categorised as blind (vision less than 6/60) in 40% of the eyes, while in the same survey it showed that amongst the pseudophakic eyes (with an IOL implant) the blindness rate was as low as 4.7%.[6, 7, 8]

Such vast variations in the quality of outcome affect demand and fuels the dynamics of inequity. In this instance the inequity of who got a better outcome was brought about by the high price of the imported lenses. In the case of IOL, this was addressed in India and Nepal, which set up several IOL manufacturing factories and priced the IOLs to suit the economies of South Asian countries. Bringing about such equities has been possible only in a few instances like IOLs, sutures and some pharmaceuticals. In many other areas, inequities in quality driven by technology and their price continue to exist.

Research and Evidence:

Though indirectly, research also seems to have played an unintended role in fuelling inequity. When one looks at the data around research and publication, it shows that over 92% of peer reviewed publications emanate from developed countries, which account for 10% of global blindness. The developing countries which account for over 90% of blindness contributed to less than 8% of the publications.[9,10] The local knowledge and evidence that emerge from research are fundamental for effective design of interventions and services. Conversely the lack of such evidence based design leads to sub-optimal delivery of care and unintentionally results in inequities.

When one looks at the macro design of eye care in developing countries, one sees that the overarching and in some instances, exclusive attention is given to hospital infrastructure. This has been largely at secondary level, essentially to offer treatment to those who present themselves. This is a model that is designed to be reactive to demand. This is quite appropriate to the western world, where most people in need of eye care have the wherewithal and would seek it. However, in developing countries the design has to be more proactive to stimulate demand. Significant emphasis has to be on provision of appropriate eye care service at primary level recognizing the realities of the rural-urban divide, scarcity of skilled human resource and access challenges.

Paying capacity is another significant factor in developing countries where most of the care is financed through out of pocket payments; unlike in the West where the State or near universal insurance mechanism eliminates the affordability barrier. In hindsight, eye care systems in developing countries should have been built on a robust foundation of primary eye care. The evidence for this is just emerging and so is the establishment of primary eye care.

Conclusion & Suggestions:

Inequity should not continue to be a by-product of population studies or a mere means of explaining the growing backlog. It has to influence the design of eye care services by making "inequity" the central concern. Such re-design should happen at both operational care level and at the broader eco-system level. National policies should encourage local evidence and research. Necessary capabilities will need to be developed and funding provided. Likewise regulations and policies should allow for easy access to cost-effective technologies as well as encourage local development. Focus should be to draw strategies and interventions to reach the unreached population and thereby eliminate inequality in eye care.

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Trends in Gender and Blindness in India

Women tend to have a higher rate of blindness with lesser access to health care.

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Mr Hira Ballabh Pant

Mr Souvik Bandyopadhyay

Dr Neena John

Among the many definitions one that succinctly described equity is in a paper published in 2003.[1] The authors defined equity in health as the absence of systematic disparities in health or the major social determinants of health between social groups who have different levels of underlying social advantages or disadvantages and which put people who are already socially disadvantaged at a further disadvantage with respect to their health.[1] The underlying premise was that health is essential to wellbeing and to overcome other effects of social disadvantage.[1]

One of the social determinants of health that has been universally identified is gender. Health inequalities between men and women have been postulated to result from societal structures, role expectations and the cultural context.[2,3] It has been emphasized that women bear a disproportionate burden of health inequity across the globe and face unique barriers in accessing health care.[4] With respect to eye care, women are more likely to have higher rates of blindness and are less likely to access appropriate eye services.[5-8] Available evidence points to a higher prevalence of blindness among women compared to men in all regions of the world after controlling for age as in South Asia, the age-standardized adult prevalence of blindness in women is 1.26 times the prevalence among male adults[9].

India has been one of the countries where efforts to strengthen the evidence-base for blindness control has received significant attention from policy planners and program managers. Over the past four decades a series of population-based blindness and visual impairment surveys have been undertaken in India, using different survey methods. This included detailed eye examination surveys as well as rapid assessments.

To discern the temporal trends in relation to blindness and gender differentials we have used data from two large population-based surveys in India. One was conducted over the period 1999-2001 (detailed eye examination survey)[7] and the other over the period 2006-2007 (rapid assessment of blindness survey).[8] Both surveys looked at populations aged ≥ 50 years and defined blindness based on presenting vision (visual acuity < 3/60 in both eyes).

A total of 108,609 individuals were examined in the two surveys in India (63,432 in 1999-2001 and 45,177 in 2006-2007).

The prevalence of blindness in 1999-2001 was 5.36% [95% CI: 5.2-5.5] while in 2006-2007, it was 3.82% [95% CI: 3.64 – 4.0]. These results show that there was a significant reduction in the prevalence of blindness over this period. The prevalence of blindness amongst males was 4.19% [95% CI: 3.97-4.42] in 1999-2001 compared to 3.05% [95% CI:2.82-3.3] in 2006-2007 while in females it was 6.4% [95% CI: 6.14-6.67] in 1999-2001 and 4.44% [95% CI: 4.19 – 4.70] in 2006-2007. The results show that there is a significant reduction in overall blindness between 1999-2001 and 2006-2007 (X2-138.41; $p < 0.001$). The difference between males in the two rounds of the surveys was also statistically significant (X2-43.41; $p < 0.001$). The same was also true for females (X2-103.79; $p < 0.001$). At the same time the difference in the prevalence of blindness between males and females was statistically significant both in 1999-2001 (X2-152.11; $p < 0.001$) and in 2006 – 2007 (X2-57.96; $p < 0.001$). The risk of blindness in females was 1.41 times higher compared to males in the urban areas, while in rural areas the risk was 1.51 times higher. After adjusting for age, place of residence (urban/rural) and the year of the survey, it was observed that females had a 1.76 times higher risk of blindness compared to males. These findings show that there is a clear cut gender disparity in the prevalence of blindness in India. If one looks at the percentage reduction in prevalence of blindness, it was seen that there was a 71% reduction in the overall prevalence of blindness among those aged ≥50 years over a span of 8 years. Amongst males the reduction was 72.8% compared to 69.4% among females over the same period. Cataract was the principal cause of blindness both in 1999-2001 and 2006-2007. It was observed that males had a 40% lower risk

Table 1: Prevalence of blindness and association with gender in India

Characteristics	1999-2001		2006-2007	
	N (%)	Prevalence[95%CI]	N (%)	Prevalence [95%CI]
No. examined	63,432	-	45,177	-
No. males examined	30,013	-	20,331	-
No. female examined	33,419	-	24,846	-
Prevalence of Blindness	5.36%	5.18 – 5.53	3.82%	3.64 – 4.0
Prevalence of Blindness (Male)	4.19%	3.97 – 4.42	3.05	2.82 – 3.30
Prevalence of Blindness (Female)	6.40%	6.14 – 6.67	4.43%	4.19 – 4.70

of being cataract blind compared to females in both rounds of the surveys. This is an important observation as cataract is a treatable cause of blindness and an important determinant of avoidable blindness. The higher load of cataract blindness in females over the 8 year period demonstrates inequity and suggests that interventions to improve access to cataract services in women have not been sufficient. In India where the overall status of women in society is poor, a gender focus is essential if gender equity is to be ensured, especially when access to services is poor. Exclusive special incentives like higher reimbursement for females operated compared to males or for non-monetary incentives like a certificate of 'women-friendly institution' etc., to operate on the females will help in enhancing access to women and thereby reduce the gender differentials. The situation is likely to be similar in countries of the South Asia region with similar economies to India.

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Inequities in cataract surgical coverage in South Asia

Countries with lower GDP and per capita health expenditure tend to have a higher incidence of inequity in eye care

Countries with lower GDP and per capita health expenditure tend to have a higher incidence of inequity in eye care

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Introduction

Recent estimates from the World Health Organization (WHO) show that globally there are 285 visually impaired people of which 39 million are blind.[1] Cataract is the major cause of blindness and second leading cause for visual impairment (VI).[1] One of the important parameters to measure the impact of cataract services is the Cataract Surgical Coverage (CSC). CSC is also one of the indicators to monitor the progress of the Universal Eye Health: Global Action Plan 2014-19.[2] CSC is defined as the proportion of people or eyes with cataract eligible for cataract surgery who have received cataract surgery in at a given point in time.' It is one of the parameters or measures obtained from the Rapid Assessment of Avoidable Blindness (RAAB) or Rapid Assessment of Cataract Surgical Services (RACSS) studies. It can also be obtained from other population based studies (Table 1 and 2). There is a gross variation in CSC across different countries as well as regions within the same country. Apart from this, gender inequality in CSC has been reported from different low and middle income countries.[3,4] In this article we review the CSC data from countries in South-Asia (SA) and review inequities between and within countries, especially related to gender. We also review the association between country wealth and government health expenditure on CSC i.e. with Gross Domestic Product (GDP) of a country as well as per capita health expenditure. In simple terms, GDP is the total monetary value of all goods and services produced within a nation's geographic borders over a specified period of time. It is a measure of a country's total economic activity. Health expenditure is the sum of public and private health expenditure as a ratio of total population.

Methods

South Asia encompasses Bangladesh, Bhutan, India, Maldives, Nepal Pakistan and Sri Lanka. CSC data (stratified by gender) was obtained from published literature, the RAAB repository, as well as by personal communications with the Principal Investigators (PI) of some studies. CSC data was available for all countries except Maldives. Of the remaining countries, gender specific data was available for all. Data from Bangladesh, Bhutan, Nepal and Pakistan represented the entire country. Data from Bangladesh, Bhutan and Pakistan were from published sources, while data from Nepal was obtained from the RAAB repository. From other countries, regional data were available. Hence, extrapolation of these regional specific data to the entire country may not be appropriate. The CSC data (person and eyes) from these countries (stratified by gender) is shown in Tables 1 and 2.

Results

There is a wide variation in terms of people accessing cataract services. For visual acuity level of < 3/60, the range is from 30.5% (Sindhudurg, India) to 92% (Surat, India). At a CSC cut-off level of <6/60 and <6/18 the CSC is naturally lower than at <3/60. For visual acuity < 6/60, the range is 46.8% (Bangladesh) to 85.9% (Srisailam, India) and for visual acuity level <6/18, it was 32.4% (Bangladesh) to 68% (Integrated Tribal Development Agency area of West and East Godavari, India) (Table 1).

Similar trend was seen for CSC for eyes (Table 2). CSC for eyes with the same cut-off of visual acuity (<3/60; <6/60 and <6/18) was lower than for persons suggesting that most of these participants had unilateral cataract surgery.

All the countries had lower CSC for females as compared to males (Table 1 and 2). In countries like Bangladesh, Bhutan and Sri Lanka the difference was high. A similar difference is seen for other levels of visual acuity (<6/60 and <6/18). This suggests a significant inequity in terms of females accessing services for cataract, especially in Bangladesh, Bhutan and Sri Lanka. These countries also report a lower GDP and per capita health expenditure than the other countries in the region suggesting that in poorer countries, women are less likely to access eye care services compared to economically richer countries. Gender difference could be due to gender-defined social roles, which could be confounded by factors like literacy, socioeconomic status as well as urban-rural differences. It is likely that women in countries with lower CSC are less educated, have other domestic responsibilities and are not the main earning member of the house, thus having less access to eye care as well as other health care services. However, limited data was available in relation to literacy, socio-economic status and urban-rural differences. Data from Bhutan showed that those residing in rural areas had a lower CSC as compared to their urban counterparts[5]. Similarly data from Nepal (Gandaki Zone) showed that CSC was lower in illiterates[6]. A study conducted in Sivaganga also showed that CSC was lower in older people, those with no education as well as those residing in rural areas[7]. Pakistan National Blindness and VI survey also showed lower CSC for illiterates, those residing in rural areas as well as older people, suggesting gross inequity[8].

Conclusions and Recommendations

- There is gross inequity in terms of CSC in countries of South Asia i.e. females have less access than males
- Inequity is also compounded due to other social determinants like socio-economic status, literacy, urban-rural difference etc. However, there is limited evidence for it.
- Countries with lower GDP and per capita health expenditure, are likely to have more inequity
- We recommend that there is a need for data to be collected from countries where there is none. In countries where there is only region-specific data, data is needed to be representative of the whole country. Also data including key social determinants need to be collected.
- All countries should work towards achieving the goal of Universal Eye Health with at least 80% CSC for <3/60 visual acuity category as well as ensuring that women, and those from the lower socio-economic strata and rural areas have improved access to services.

Limitations

One of the limitations of the data is that it is not representative of all the countries. We did not do any analysis to see if the difference between gender was significant or not. There was limited data available in terms of other social determinants (socio-economic status, literacy, urban-rural difference etc).

Table 1: Cataract Surgical Coverage (by person), stratified by gender for countries in South Asia

NA: Not available; ITDA: Integrated Tribal Development Agency; Personal communication: ^; RAAB Repository:@; Population Based Studies:#
*SOURCE: http://data.worldbank.org/indicator/SH.XPD.PCAP?page=3; ** SOURCE: http://data.un.org/CountryProfile.aspx?crName=MYANMAR

Country	Location	Year	Person	Person	Person	Person	Person	Person	Person	Person	Person	GDP at time of survey*	Per capita health expenditure**
			Less than 3/60			Less than 6/60			Less than 6/18				
			Male	Female	Total	Males	Females	Total	Males	Females	Total		
India ^	15 districts in 16 states	2007	NA	NA	82.3	NA	NA	66	NA	NA	NA	$1.23 trillion	$43
India	Nandurbar[9]	2009	NA	NA	NA	NA	NA	NA	NA	NA	NA	$1.36 trillion	$48
India	Kolar[10]	2011	84.6	79.7	81.7	75.7	69.8	72.2	65.6	63.1	64.1	$1.83 trillion	$66
India	Sindhudrug[11]	2010	32	28.4	30.5	NA	NA	NA	NA	NA	NA	$1.17 trillion	$59
India	Sivaganga[7]	1999	NA	NA	NA	80.9	75.2	77.5	NA	NA	NA	$466.86 billion	$18
India ^	ITDA-Khammam & Warngal	2009	88.3	87.8	88	79.6	78.8	79.1	62.4	67.2	65.1	$1.36 trillion	$48
India ^	ITDA-East Godavari & West Godavari	2009	86.2	83.8	84.6	76.5	78.6	77.8	65.1	69.8	68	$1.36 trillion	$48

Continues overleaf

Country	Location	Year	Person	Person	Person	Person	Person	Person	Person	Person	Person	GDP at time of survey*	Per capita health expend-iture**
			Less than 3/60			Less than 6/60			Less than 6/18				
			Male	Female	Total	Males	Females	Total	Males	Females	Total		
India ^	ITDA-Srisail-am	2009	95.7	88.1	91.5	90.1	82.6	85.9	68.9	63.6	65.9	$1.36 trillion	$48
India@	Tribal region in Surat Gujarat	2011	95.7	89.6	92	88.4	79.2	82.7	60.1	51.6	54.9	$1.83 trillion	$66
Bangladesh	Satkhira[12]	2005	63.6	59	60.9	57.9	55.1	56.3	34.5	36.4	35.6	$69.44 billion	$12
Bangladesh	8 districts[13]	2010	76.6	64.3	69.3	51.1	43.9	46.8	35.1	30.5	32.4	$115.27 billion	$23
Bhutan [Urban]	Whole country[5]	2005	81.8	85	83.3	82.6	72	77	60	50	54.7	$818.86 billlon	$66
Bhutan [Rural]	Whole country	2005	75	60	67.4	60.7	43.1	51.2	41.4	27.3	34	$818.86 billlon	$66
Bhutan [Both]	Whole country	2005	77.8	67.7	72.7	67.1	51.1	58.6	46.3	33.3	39.4	$818.86 billlon	$66
Srilanka [40 yrs above and bleow]#	Kandy[14]	2006	90.6	76.7	82.7	80	74.2	76.8	47.3	41.8	41.9	$28.27 billlon	$58
Nepal@	Whole country	2008-2010	88	83	85	72	69	70	56	54	55	$12.54 billlon	$29
Pakistan#	Whole country[8]	2003-2005	79.6	74.9	77.1	70.1	68.4	69.3	44.6	42.8	43.7	$83.24 billlon	$16

Table 2: Cataract Surgical Coverage (by eyes), stratified by gender

NA: Not available; ITDA: Integrated Tribal Development Agency; Personal communication: ^; RAAB Repository:@; Population Based Studies:#
*SOURCE: http://data.worldbank.org/indicator/SH.XPD.PCAP?page=3; ** SOURCE: http://data.un.org/CountryProfile.aspx?crName=MYANMAR

Country	Location	Year	Eyes	Eyes	Eyes	Eyes	Eyes	Eyes	Eyes	Eyes	Eyes	GDP at time of survey*	Per capita health expend-iture**
			Less than 3/60			Less than 6/60			Less than 6/18				
			Males	Females	Total	Males	Female	Total	Males	Females	Total		
India ^	15 districts in 16 states	2007	NA	NA	62.9	NA	NA	47.7	NA	NA	NA	$1.23 trillion	$43
India	Nandu-rbar[9]	2009	NA	NA	NA	NA	NA	9.4	NA	NA	NA	$1.36 trillion	$48
India	Kolar[10]	2011	72.1	67.8	69.6	60	57.3	58.4	50	48.6	49.2	$1.83 trillion	$66
India	Sindh-udrug[11]	2010	NA	NA	NA	NA	NA	NA	NA	NA	NA	$1.17 trillion	$59
India	Siva-ganga[7]	1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	$466.86 billion	$18

Continues overleaf ➤

Country	Location	Year	Eyes	Eyes	Eyes	Eyes	Eyes	Eyes	Eyes	Eyes	Eyes	GDP at time of survey*	Per capita health expend-iture**
			Less than 3/60			Less than 6/60			Less than 6/18				
			Males	Females	Total	Males	Female	Total	Males	Females	Total		
India ^	ITDA-Kham-mam & War-ngal	2009	71.2	68.5	69.6	61.4	61.4	61.4	45.5	50.9	48.6	$1.36 trillion	$48
India ^	ITDA-East Godav-ari & West Godav-ari	2009	68.8	65.1	66.5	60.1	57.3	58.4	41.8	42.4	42	$1.36 trillion	$48
India ^	ITDA-Srisail-am	2009	75.2	72.3	73.6	68	65.2	66.5	49.2	45.4	47.1	$1.36 trillion	$48
India@	Tribal region in Surat Gujarat	2011	89	82.2	84.9	77.7	69.1	72.5	48.1	42.1	44.5	$1.83 trillion	$66
Bangladesh	Satkhira[12]	2005	34.6	34.9	34.8	30.9	30.4	30.6	17.4	18.7	18.1	$69.44 billion	$12
Bangladesh	8 districts[13]	2010	61.5	49.7	55.1	38.2	30.9	33.9	20.1	21.3	22.9	$115.27 billion	$23
Bhutan [Urban]	Whole country[5]	2005	65.1	69.8	67.5	61.2	57.1	59	40.6	38.6	39.5	$818.86 billlon	$66
Bhutan [Rural]	Whole country	2005	59.7	42.6	50.9	44.3	31.4	37.6	27.9	19.5	23.5	$818.86 billlon	$66
Bhutan [Both]	Whole country	2005	61.5	51.3	56.3	49	38.9	43.7	31.3	24.8	27.9	$818.86 billlon	$66
Srilanka [40 yrs above and bleow]#	Kandy[14]	2006	67.2	63.6	65.2	60	60.5	60.3	35.1	33.1	34	$28.27 billlon	$58
Nepal@	country	2008-2010	68.9	65.7	67.1	59.5	56.6	57.9	40	38.8	39.4	$12.54 billlon	$29
Pakistan#	National[8]	2003-2005	64.5	58.4	61.4	54.5	50.0	52.2	42.8	36.6	40.7	$83.24 billlon	$16

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REACHING THE UNREACHED IN SUNDERBANS

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Background

The Sunderbans is situated in the Ganges delta, bordering the Bay of Bengal, with a large component being in Bangladesh. The Indian part, which is in West Bengal State has 106 islands and 24 (Parganas) districts. People live on 52 islands and the adjacent mainland, with the uninhabited areas being mainly mangrove forests.

The Sunderbans is a very challenging areas to live in, and the area is prone to natural disasters such as typhoons and flooding. The population of 19 blocks of Sunderban was estimated at 4.7 million in 2011. It is an area of extreme poverty and ill health exacerbated by access difficulties. Almost half of the population (47%) are historically marginalized groups such as Scheduled Castes and Tribes. More than 40% of households live below the poverty line and 13% are officially declared as the "poorest of the poor".

The main occupations are farming and fishing. Cultivation depends on rain water as the river water has high salinity, and over half of those engaged in farming are landless laborers. To protect fields from salty river water high embankments are built around cultivated land.

Out migration of those of working age to cities and towns is very high and the worst social problem is human trafficking. Areas which have good infrastructure which connect communities to the mainland have higher socioeconomic status than island communities where transport relies on the waterways.

As survival is the main issue, education and health are not given high priority. For example, despite high primary school enrolment, there is very high non-attendance in upper primary levels.[1] Availability of health care facilities varies from less than one to five per 100,000 population,[3] and the morbidity rate is higher in Sunderban than the state average. Children are three times more prone to respiratory diseases and communicable diseases are highly prevalent. People who collect honey in the forests or catch fish are under constant threat of attacks by animals and snake bites.[2]

NGO hospitals are the major service providers but may also Sunderban indicate poor utilization of public facilities. Major part of the Indian Sunderbans belongs to South 24 Parganas District where 83% and 14% cataract surgeries are done by NGO and Government Hospitals respectively.

Sunderban's Eye Health Service Strengthening Project

Standard Chartered Bank, under the "Seeing is Believing" initiative is supporting Sightsavers to implement the "Sunderbans Eye Health Service Strengthening Project". The objective of the five year project, 2013-2018, is to contribute to the elimination of avoidable blindness in the area.

Baseline Study on Eye Health in Sunderban

In order to assess eye health status and health seeking behavior, a population based survey among individuals aged 40 years and above was conducted as the initial step. The survey identified 3,388 eligible individuals living in 19 blocks 2,854 (84.2%) of whom were examined. There was higher non response amongst males due to occupational migration.The prevalence of blindness using the World Health Organization definition (presenting VA<3/60 in the better eye) was 1.9% (2.1% among those aged 50 years and above). Using the Indian (NPCB) definition (presenting VA<6/60 in the better eye) the prevalence was 6.7% (10.0% amongst 50+). The prevalence of blindness was higher among females (8.0%) than males (5.6%).The prevalence of severe visual impairment (presenting VA<6/60 – 3/60) was 4.8% (7.2% among the 50+).

The prevalence of blindness in Sunderbans was 1.88% (NPCB definition) which is almost 40% higher than the national average (1.36%).[4] Amongst those aged 40+, 83.8%of blindness was due to cataract, 12.0% due to refractive errors and 4.2% due to other causes. The commonest cause of blindness among the 50+ population was cataract (83.4%) being higher than the 77.5% reported from a RAAB survey (2007) in West Bengal.[4] Cataract surgical coverage was less than 50%, i.e. a large proportion of cataract-blind are still unreached. Women had a higher prevalence of blindness, higher proportion of cataract blindness and lowercataract surgical coverage than men.

Untreated cataract is the major cause of visual impairment at all levels (VA<3/60, VA<6/60 and VA<6/18 – best corrected VA or pinhole) of visual acuity. Overall, 1.2% of the total population is bilaterally blind due to cataract, and another 0.9% are blind in one eye. Women are disproportionately affected by cataract blindness both bilaterally (1.5% vs 1.0%) and unilaterally (1.0% vs 0.8%).

In total, nearly 11% of eyes in the sample were affected by cataract at VA<6/18 or less. This was greater among women (12.4%) than men (9.4%). Among people aged over 50, this proportion of cataract eyes increased to 18.5%.

The commonest reason given for not undergoing cataract surgery was 'no felt need' (30.8%), with underlying reasons being 'old age', 'normal vision in other eye' and 'other competing priorities'. Amongst men, 'cost of surgery' was the next most common reason while women reported 'lack of awareness about services.'

75.2% of the sample had presbyopia but less than half (46.2%) had access to near correction. More than half (54%) were not even aware that they could benefit from spectacles. Financial reasons were the most commonly reported barrier for not getting a check-up for glasses (51.4%). Broken or lost glasses were the most common reason (38.9%) for discontinuation of spectacle use. People are willing to pay INR 30 for check up and INR 100 for the glasses.[5,6]

Baseline Study on Eye Health in Sunderban

Sightsavers is partnering with three eye care institutions (Southern Health Improvement Samity; Sunderban Social Development Centre and Vivekananda Mission Ashram, Chandi Branch) located near Sunderbans who are already providing services in the region. The Government Health Department is another partner. Both the facilities of Vivekananda Mission Ashram Netra Niramay Niketan are used as the training and referral centre.

Human resource development

The core strategy of the initiative is to use local human resources to strengthen the eye care service because health professionals from outside are not likely to stay in such a difficult location. Local young people have been trained as Vision Technicians (VT) and Community Health Workers (CHW).

Establishing Vision Centres

Seventeen Vision Centres have been established and are managed by trained VTs who perform refraction, recognize cataract and other conditions, referring cases to the NGO or Government hospitals. Spectacles are provided at an affordable or subsidized cost. Each centre has an optical dispensing unit which is supported by an optical laboratory at the base hospital. All these are stand-alone centres for eye care only. Two vision centres are being established within government PHCs.

Awareness generation activities

Trained CHWs and VTs constantly engage in a range of awareness generation activities using IEC materials in group meetings and one-to-one counseling.

Direct Service Delivery

The hospitals undertake outreach eye screening camps in interior locations in Sunderbans. The CHWs and VTs also conduct eye examination of children in schools near the vision centres where they provide free spectacles. People who need cataract surgery are taken to the base hospital and the follow up is arranged at the vision centre. This entire service is offered free of cost to patients.

Strengthening the existing health system

In Sunderbans there are two Sub-Division Government hospitals with facilities for eye surgery. Efforts are underway to improve the volume and quality of cataract surgery through training. The government sub-divisional hospitals in Sunderbans are poorly managed, conducting less than 100 cataract surgeries annually. The project plans a facility survey, to enhance capacity, training on protocol and cataract management and thus hold hands to improve services locally.

Rural Medical Practitioners are important health providers in remote areas and there are plans to train 2,520 of these practitioners in primary eye care and proper referral.

Accredited Social Health Activists (ASHAs) and Auxiliary Nurse Midwives (ANMs) are workers at the grassroots level. 930 health workers of these cadres are being trained in identification of cataract and to create awareness.

Finding children with cataract continues to be challenging in Sunderban. A Higher proportion of boys with cataract was found and this could be due to two reasons. One is the health seeking behavior of the community and traumatic cataracts are greater more among boys.

Challenges and way forward

Gaining the trust of the community was an initial challenge as some had had unpleasant experiences from other eye care providers. The quality and the price of spectacles, and poor quality of clinical services and cataract surgery were the main issues.

Identification of cataract among children is another challenge. Efforts are being undertaken to screen families where hereditary cataract has been detected.

Retaining trained staff continues to be a big challenge. The current strategy is to undertake continuous training of VTs to fill the gaps, and advocacy to change institutional policies in favour of retention. Refresher courses are taking place to improve quality of services.

Making Vision Centres sustainable is currently the toughest challenge. The performance of each centre has been systematically analyzed and attention has been given to strengthening the weaker ones. Emphasis is being placed on increasing uptake of services through better services, increasing the number of spectacles sold, and IT based monitoring of activities. Continuation of service activities beyond the project period mostly depends on the sustainability of these units.

Planning an eye care project in a relatively inaccessible geographic region needs special consideration. An effort should be made to select and train workers from the same region. While budgeting, a significant amount should be allotted for transport. This kind of project can never be a remotely managed one. Active participation of first and second tiers of leadership is very essential for monitoring, motivating field staff, deepening the relationship with the community and over all sustainability.

Sunderbans is an area of extreme poverty and ill health exacerbated by access difficulties

Progress against planned output for 01 October 2015 to 31 March 2016:

Output type	Target	Planned Outputs			Actual outputs to date			Variance%
		M	F	Total	M	F	Total	
PATIENTS								
Surgeries (per eye)								
Cataract surgery: adults	27,000	5,233	5,567	10,800	5,751	6,045	11,796	109
Good outcome VA >6/18	80%	4,606	4,868	9474	4,415	4,155	8,570	90
Cataract surgery: children	200	39	41	80	29	13	42	53
Screening								
School screening (1,308 schools)	457,800 children	114,456	128,871	243,327	98,676	111,543	210,219	86
Adult RE screening	330,000	56,663	59,887	116,550	59,770	61,076	120,846	104
Refraction								
Refractions/ prescriptions (adults):	87,000	18,037	17,563	35,600	31,487	30,781	62,268	175
Spectacles prescribed (adults):	43,200	8,600	9,128	17,728	15,599	16,160	31,759	179
Free spectacles supplied (adults):	3,844	689	785	1,474	757	848	1,605	109
Spectacles supplied (children):	9,156	1,541	1,787	3,328	1,224	1,325	2,549	77

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Emel Hospital, Syria

The civil war in Syria is arguably the worst humanitarian catastrophe since the Second World War. According to recent sources, over 250,000 have been killed, the same number wounded or missing and over half of the country's population of 22 million having been displaced from their homes, with 3.8 million being made refugees.

Aleppo, in the north of the country, has received far more than its fair share of mass destruction and has been the worst hit city in the civil war. It has seven remaining functioning hospitals, but supplies and medical care is dwindling. Several hospitals have been directly hit by bombing on more than one occasion and refugees head out of the city for medical treatment. One of the hospitals providing emergency care, including eye care, is Emil Hospital – located 70km from the centre of Aleppo. Emel Hospital provides most of the surgical services in the area, treating many severe injuries resulting from the violence. It is one of 42 similar field hospitals inside Syria, 65% of which have suffered attacks.

The medical director of Emel Hospital is Ahmed Hassan Batal, a paediatric ophthalmologist from Saudi Arabia. Since the conflict began, he and his team of 10 doctors and 20 nurses have performed more than 9,000 complex surgical procedures on patients with horrific injuries caused by the violence. The medical facilities at Emel are barely adequate: much of the equipment is secondhand, having been donated from several sources, and there is a huge shortage of drugs and dressings.

Thankfully, Emel Hospital has, at the time of writing, been spared the bombing that many other hospitals have endured. A neighbouring hospital, only one kilometer away, has been bombed twice. One can only imagine the anxieties of those working at Emel that it may suffer the same fate. However, Dr Batal describes the morale of the medical staff as remaining "very good". He stresses the fact that staff members ignore the risks of working at the hospital for the benefit of all patients, whatever their beliefs and politics may be. Dr Batal himself has committed to working at the hospital until the conflict ends.

Despite the daily challenges of working at Emel, Dr Batel has remained an active member of the Examinations Committee of the International Council of Ophthalmology (ICO) – an international organisation which represents and serves professional associations of ophthalmologists. In his role, Dr Batal reviews all ICO examination papers, sets appropriate questions, and ensures the validity, accuracy and standardisation of each examination paper. He has also agreed to pay the examination fees of all Syrian ophthalmologists wishing to take ICO examinations and has pledged to continue doing so until the conflict in Syria ends – thereby ensuring that Syrian ophthalmologists are not left behind in their professional development as a result of the

conflict. As a result, 62 Syrian ophthalmologists have already sat the ICO examinations in Damascus and many more wish to take the examinations in 2017.

I would like to thank Dr Batal on behalf of the ICO and the ICO Examinations Committee for his kindness and humanity. He is an example to us all.

Simon Keightley FRCS FRCOphth
Director for Examinations
International Council of Ophthalmology

Emel Hospital is in need of support. If you can help, please contact Simon Keightley via email: s.keightley@virgin.net

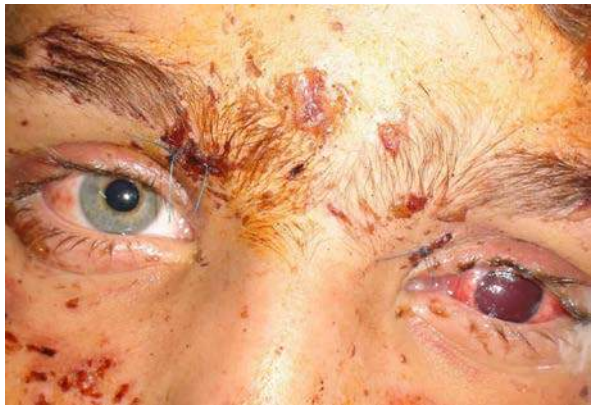
Dr Ahmed Batal (left) at the entrance to Emel Field Hospital. In the centre is Dr Hamedy Osman, the founder of the hospital. Next to him is Dr Nabil Mureden, a volunteer surgeon and chairman of the Italian-Syrian community in Italy

Dr Batal with patient with bilateral lower limb amputations

Dr Batal with a victim of the conflict

Operating theatre following surgery involving a severe trauma case

Child victim of the conflict at Emel Hospital



Severe left eye injury following trauma