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We are grateful to our friends and colleagues at Moorfields Eye Hospital for permitting us to use their guidelines as a basis for our own.
INTRODUCTION TO THE CORNEAL SERVICE

The Corneal team comprises:

Mr C Liu
Mr M Nanavaty

Anterior Segment Fellow

Corneal OST

Lisa Stanton, Secretary and OOKP Administrator

Patients requiring an urgent corneal opinion should be discussed with the corneal fellow or one of the consultants. Patients requiring urgent corneal follow-up should be booked into the next available corneal clinic (see master rota or liaise with reception staff in A+E)
BLEPHARITIS

1. **Symptoms**
   - Discomfort, especially in the mornings
   - Lid margin reddening and cysts
   - Crusting of anterior lid margin
   - Abnormal thickened Meibomian secretions (toothpaste, not olive oil)
   - Lid margin deformity
   - Seborrheic blepharitis rarely causes symptoms.

   Blepharitis should be classified into anterior or posterior lid disease (meibomian gland disease – MGD), or both.
   - Ask for the sign and symptoms associated with ocular rosacea.

2. **Treatment**
   - Lid hygiene instructions (leaflets available)
   - Posterior lid margin disease responds to hot compresses for three to five minutes to liquefy meibomian secretions, followed by massage of the tarsal plate with a cotton-bud to express lipid from the glands. Commercially available preparations include BlephaClean and EyeBag.

   - oc Chloramphenicol or Fucithalmic nocte to all four lid margins reduce bacterial commensal load

   Where lid margin hyperaemia / inflammation is marked, - Occ betnesol bd 2 weeks

   Oral Doxycycline 100mg od for 3 months. Should have 2-3 month break between treatments. There is some evidence that dietary consumption of omega-3 oils may help in MGD either in the form of flaxseed oil or fish oil capsules (suggested 2g tds) although not all patients tolerate this. Alternatively, regular consumption (at least thrice a week) of fish in diet can suffice.

   If marginal keratitis exists, treat as above + G Prednisolone 0.5% qid, reducing to zero over two weeks.

   Treatment of any secondary tear film dysfunction (ie associated dry eye)

3. **Outcome**
   - Cases should be referred to the Corneal Clinic if:
     - Six weeks or adequate therapy does not produce a sufficient response
     - Moderate or severe keratitis
     - Rosacea blepharo-kerato-conjunctivitis
     - Sclero-keratitis
     - Atypical keratitis
     - Suppurative keratitis
     - Any other concern

   *Unilateral recalcitrant blepharitis - beware of masquerading malignancy*
**DRY EYES**

1. **Assessment**
   - Lid function (blinking) and adequacy of lid closure
   - Lid apposition - entropion, ectropion and lagophthalmos.
   - Posterior lid margin disease, ie - Blepharitis
   - Marginal tear strip
   - Debris in tear film
   - Mucus filaments (adherent, ie filamentary keratitis)
   - Tear break-up time less than 10 seconds
   - Extensive punctate staining (Rose Bengal), conjunctiva and cornea
   - Anaesthetic cornea
   - Herpes simplex keratitis
   - Conjunctival metaplasia
   - Associated immuno-complex disease (Sjögren's 1º or 2º)
   - Cicatricial disease of conjunctiva, lids or lacrimal ducts
   - Lacrimal gland surgery

2. **Treatment** – note different classes of lubrication - patient will need to trial which combinations work best. Suggest starting with the simplest and cheapest first (in descending order)
   - G. Hypromellose up to 2 hourly
   - Optive as frequently as needed (alternatives include celluvisc 0.5% or 1% and hylotears)
   - Simple eye ointment and lacrilube nocte are useful night time supplements.

3. **Lid Margin Treatment**
   - Epilation/Electrolysis/Cryotherapy/Lid Margin Rotation/lateral tarsal sling/tarsorraphy.
   **REMEMBER: ANY EVIDENCE OF NEUROTROPIA = URGENT TARSORRAPHY TO PROTECT CORNEA. SUCH CASES SHOULD BE DISCUSSED WITH THE CONSULTANTS PRIOR TO TARSORRAPHY PROCEDURES.**

4. **Outcome**
   - Referral to the Corneal Clinic should occur for failure of an adequate trial of topical treatment, or impending secondary complications such as corneal scarring, filamentary keratopathy, vascularisation, corneal melt or abscesses.
   - Please do not wait until complications occur.
# MANAGEMENT OF ADENOVIRAL / CHLAMYDIAL CONJUNCTIVITIS

<table>
<thead>
<tr>
<th></th>
<th>Adenoviral</th>
<th>Chlamydial</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>History</strong></td>
<td>Usually 7 - 10 days</td>
<td>Usually more than 2 weeks. Typically over a month at least.</td>
</tr>
<tr>
<td><strong>Symptoms</strong></td>
<td>Foreign body sensation</td>
<td>Grittiness, sticky discharge</td>
</tr>
<tr>
<td></td>
<td>Epiphora, commonly bilateral +/- upper respiratory tract infection</td>
<td>Usually <strong>unilateral</strong></td>
</tr>
<tr>
<td></td>
<td>Start unilaterally. May have unequal signs and symptoms in each eye.</td>
<td>Mechanical ptosis</td>
</tr>
<tr>
<td><strong>Signs</strong></td>
<td>Hyperaemia and chemosis with or without ecchymoses, small follicles +/- pseudo-membrane</td>
<td>Variable redness with pseudo-ptosis and large follicles</td>
</tr>
<tr>
<td><strong>Conjunctiva</strong></td>
<td>Epithelial punctate keratitis +/- sub-epithelial punctate keratitis.</td>
<td>+/- limbitis, +/- micropannus, few epithelial punctate changes and sub-epithelial punctate keratitis</td>
</tr>
<tr>
<td><strong>Cornea</strong></td>
<td>Granular or ground-glass type sub-epithelial punctate keratitis</td>
<td></td>
</tr>
<tr>
<td><strong>Investigations</strong></td>
<td>Conjunctival swab</td>
<td>Conjunctival swab (chlamydia). Ask for chlamydial swabs specifically.</td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td>Cold compresses. Symptomatic e.g. lubricants and G. Chloramphinicol qds for 2 weeks. Advice as to risk of spread.</td>
<td>Usually part of a STD infection, and the patient should be referred to GUM Clinic to look for co-infection and contact tracing. Do not start oral doxycycline - GUM physician will do so. Use supportive lubricating eye drops instead.</td>
</tr>
<tr>
<td><strong>Disposal</strong></td>
<td>Discharge if mild conjunctivitis or mild keratitis. Refer to Corneal Clinic only if severe conjunctivitis (eg pseudomembranous) or visual acuity is reduced.</td>
<td></td>
</tr>
</tbody>
</table>
MANAGEMENT OF HERPES SIMPLEX VIRUS

<table>
<thead>
<tr>
<th>VERY BASIC RULES</th>
<th>Severity of disease</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild</td>
</tr>
<tr>
<td>Mechanism of lesion</td>
<td>Viral replication</td>
</tr>
<tr>
<td></td>
<td>Immune reaction</td>
</tr>
</tbody>
</table>

**HSV blepharitis** *(viral replication)*

1. First approach: assess if lesions affect the border of the eyelid or if they are only in the skin.
2. Treatment:
   - If border not affected: no need for antiviral treatment. Antibiotic ointment over the skin lesion may allow preventing bacterial superinfections. No need for referral.
   - If border affected: risk of ocular involvement: need prophylaxis with topical antivirals (see infectious epithelial keratitis for topical antiviral therapy).
3. Referral: advice the patient to come back if getting worse.

**HSV conjunctivitis** *(viral replication)*

1. **First approach:** think of this possibility if patient refers recurrent follicular conjunctivitis. Most usually it will be accompanied by the typical skin lesions, but not always.
2. **Treatment:** topical antivirals (see infectious epithelial keratitis).
3. **Referral:** advice the patient to come back if getting worse.

**Infectious epithelial keratitis** *(viral replication)*

Dendritic ulcers
Treatment:
- First choice: Oc Acyclovir x5 for 7 days, then TDS for another 7 days (preferred for Mr Liu’s patients). Alternatively, oral Aciclovir can be considered (preferred for Mr Nanavaty’s patients). **Refer to corneal service if the keratitis does not respond**
  - Ganciclovir (same protocol as acyclovir).

3.2. Geographic Keratitis

1. **Treatment:**
   - Start same topical antiviral treatment as in dendritic ulcers.
   - If patient was on topical steroids previously because of chronic immune stromal keratitis, discontinue or reduce the steroids depending on the inflammation and resume after 3-4 days.
   - If it appears over a corneal graft, topical steroids are necessary to control for the possibility of rejection.

2. **Referral:** They should be reviewed within 48h to assess response to treatment. If over a graft, refer urgently to the corneal service. Such patients need urgent tarsorrhaphy.

**Stromal Disease**

**Necrotizing stromal keratitis (viral replication + severe immune reaction)**

1. **First approach:** ulcer densely infiltrated and with stromal necrosis in a severely inflamed eye. It needs differential diagnosis with a microbial infiltrate: perform usual scrapes for bacteria, etc, and include swabs for viral PCR.

2. **Specific treatment:**
   - High dose antivirals and steroids (to be decided by corneal team).

3. **Referral:** It should be seen by a corneal consultant asap.
**Immune stromal keratitis (mainly immune reaction)**

1. **First approach:** stromal infiltration with usually no epithelial defect, but this may be present when combined with infectious epithelial keratitis. Usually present: AC reaction, stromal oedema, stromal vessels (new or old from previous episodes).
   If no previous history of HSK and no dendritic ulcer present at that moment, suspect it if decreased corneal sensation and areas of corneal scarring.

2. **Treatment:**
   - Topical steroids: adjust dose and type of steroid depending on severity of inflammation.
   - If infectious epithelial keratitis is also present, treatment should be started with topical antivirals and wait 3-4 days for steroidal treatment (if patient was on topical steroids previously because of chronic immune stromal keratitis, discontinue or reduce the steroids depending on the inflammation and resume after 3-4 days).
   - Prophylaxis of epithelial keratitis with antivirals may be done with topical antivirals in a regime of one application per drop of topical steroid, until steroids are down to OD, when topical antivirals can be stopped. Nevertheless, oral antivirals, instead of topical, may be useful if there is important inflammation since steroids will be used frequently for several weeks:
     - PO acyclovir 400 mg BID or valacyclovir 500 mg OD.

3. **Referral:** to Corneal Clinic. Adjust time to follow-up depending on the severity of the inflammation.

**Disciform endotheliitis (mainly immune reaction + possible viral replication)**
1. **First approach**: diagnosed based on localized KPs with disc-shaped stromal oedema.

2. **Treatment**: same as immune stromal keratitis.
   If important inflammation, patient may benefit from oral antiviral treatment:
   - PO acyclovir 400 mg 5 times a day or valacyclovir 500 mg BID.

3. **Referral**: same as immune stromal keratitis.
MANAGEMENT GUIDELINES FOR SUSPECTED MICROBIAL KERATITIS

All patients with a corneal ulcer and stromal suppuration should be presumed to have microbial keratitis. Unexplained corneal melts should also be suspected as microbial infection particularly in patients who are topically or systemically immunosuppressed and who may have little or no stromal suppuration to indicate an infection. The main risk factors are contact lens wear, ocular surface disorders and corneal trauma/surgery.

**Corneal scraping is performed as the main investigation and should be performed on all patients if possible.**

Culture is more likely to be positive if the patient is not currently on antibiotics. Corneal scraping provides material for microbiology, debrides necrotic tissue and enhances antibiotic penetration.

**Samples should be sent to Microbiology:**

- Glass slide (Mark the site of the specimen by circling it on the slide with a felt tipped pen/pencil)
- Blood agar plate
- Chocolate agar plate
- Sabarouds dextrose agar
- Consider E.coli seeded non-nutrient agar plate for acanthamoeba if indicated (not routine) these plates should be present in the fridge in A+E and on Pickford ward

Call porters to take sample over to the lab. Call microbiology technician to inform them that the sample is on its way and to examine the slide, this is especially important out-of-hours when they may be off-site.

It may be useful to send contact lenses and lens cases if they are available.

**Corneal culture and smear procedures**

- Anaesthetise the eye with unpreserved topical anaesthetic
- Wash hands.
- Take samples at slit-lamp.
- Be very careful to avoid contamination of needles/swabs/plates/bottles with fingers and avoid contamination of the needle against the conjunctiva and lids.

1. Firstly remove loose mucus and debris with sterile swab. This can be plated onto part of a blood agar plate.
2. Scrape from the edge then the base of the ulcer (treat this like taking a micro-
biopsy), to obtain corneal stromal material on needle tip.

3. Agar plates: wipe needle onto surface to produce a row of C shaped streaks for
dilutional effect. Do not break the surface (creates inhibitory anaerobic
environment). Close lids with small amount of sellotape or patient labels.

4. Glass slides: spread sample evenly over small area slide. Then place in slide
box.

Label all specimens clearly with name and hospital number or date of birth plus date
of specimen. State current or previous antibiotic regimen clearly on the microbiology
form along with what samples obtained.

Documentation after scraping

![Diagram: Max thinning = 70%
Epithelial defect = 7 mm x 6 mm
Infiltrate = 5.5 mm x 5 mm
Fibrin
Hypopyon = 2 mm](image)

Figure 2  The following indices of disease severity are normally recorded:
(1) the dimensions of the lesion – recording the maximum length and the
width of the epithelial defect and the subjacent infiltrate in two
orthogonally placed axes with an indication of their orientation; (2) an
estimate of the maximum stromal thinning – expressed as a percentage of
normal corneal thickness, together with an indication of the location of
maximal thinning within the lesion; (3) the height of any hypopyon, and
the extent of any anterior chamber fibrin deposition and cellular reaction.
Pain is an important subjective index of disease progression. Baseline
examination should also include a full assessment of ocular surface
integrity with special consideration of factors such as lid function, the tear
film, and corneal sensation.
Availability of results
Gram stains and microscopy of contact lens cases ready in few hours, initial culture ready 48hours, culture for fungi and amoebae continued for minimum 14 days. If fungi suspected- please call microbiology within 48 hours to keep the plates for 14 days. Microbiology departments usually discard the plates after 48 hours of no growth unless specified otherwise.
Indolent or progressive ulcers may require cessation of antibiotics for 24-48hours followed by repeat scraping or corneal biopsy.

Treatment for mild bacterial contact lens related keratitis(<3-4mm in diameter with no stromal suppuration).

Instillation of G. levofloxacin or ofloxacin hourly day and night for 48 hours then hourly by day for a further three days. This can then be reduced to qds as infection settles and epithelium heals. Patients requiring round the clock treatment are best admitted as few can manage at home.

Contact lens wearers can present with small infiltrated ulcers of <1mm. These patients should also be treated with Levofloxacin/Ofloxacin and not Chloramphenicol. Chloramphenicol can mask an early pseudomonal ulcer and reduce symptoms in the early period.

Treatment of moderate to severe microbial keratitis (including Contact lens induced keratitis with extensive stromal infiltrate and suppuration, eyes with ocular surface disease, previous corneal procedures and transplants, etc)
G. Cefuroxime 5% and G. Gentamicin 1.5% every hourly day and night for 48 hours on ward.
After 48 hours reduce the frequency and modify the antibiotics depending on the culture results.
Once epithelial defect is healed, to start with G. Prednisolone 0.5% (minims) bd and to increase the frequency of steroids to 4-6 times a day once improvement is noted to reduce the amount of corneal scarring.

Please refer to the flow charts over page, which summarize the treatment pathway at initial assessment and at review 1 week later. From;
Strategies for the management of microbial keratitis

Bruce D S Allan, John K G Dart

Follow up and review

It is reasonable to ask for a corneal opinion/review or at least ask the on call corneal team for advice regarding severe infected corneal ulcers. Patients should be reviewed after 48-72 hours depending on severity. Daily review is unnecessary and may be confusing particularly as inflammation and cellular lysis in the early stages can make the clinical appearance seem worse.

Micro-ulcers measuring < 1mm do not need to seen by the corneal team on call and can simply be reviewed a few days later in a A&E. If there is progression at this stage please ask for a second opinion
Initial therapy—phase 1—sterilisation

At presentation

Severe infection? (Ulcer >6 mm or >50% max thinning)

YES

NO

Perforation? (Threatened or actual)

YES

NO

Urgent referral
Continue hourly primary therapy
Add systemic antibiotics

Outpatient
Primary therapy hourly by day for 5 days then 4 times a day until epithelium healed

Admit
Primary therapy hourly day and night for 2 days then hourly by day for 3 days then 4 times a day until epithelium healed

At early review (after 48 hours of treatment)

Early progression? (that is, clear expansion of ulcer)

YES

NO

Perforation? (Threatened or actual)

YES

NO

Check culture results

Culture positive

Check sensitivity results
Organism sensitive to primary therapy?

YES

NO

Excluded poor compliance
Admit patient and restart primary therapy

Culture negative

Restart algorithm
with specific antimicrobial therapy

Figure 3 This flow chart summarises options for patient management at presentation and initial review in the sterilisation phase of initial therapy in microbial keratitis. Bold arrows indicate relative proportions of patients following each management route. The majority (>80%) of primary presentations are not severe infections (unpublished data—see legend to Fig 4). Early progression and perforation at presentation are both unusual.
At review after 1 week of therapy

Complete resolution?

YES
Stop medication
Review prophylaxis and visual rehabilitation

NO

NO

No change or progression

YES
Culture negative

NO

Sensitivity?
Isolate sensitive to primary therapy?

YES

restart algorithm
at phase 1 with specific antimicrobial therapy

NO

NO

Partially resistant isolate?
Culture positive and isolate only partially sensitive to primary therapy

YES

ReEnter phase 2
Continue primary therapy 4 times a day
Treat any exposure/dry eyes/trichiasis, etc
Use unpreserved medication where possible
Add topical steroids in culture positive cases
Review after 1 week on this regimen

NO

Poor compliance?

YES
Admit

NO

Suspect polymicrobial infection

Figure 4. Strategies for patient management at review around 1 week after presentation are summarised in this flow chart. A soild arrows denote relative proportions of patients following each route. In a review of consecutive patients (n=70) treated in this department in 1993/4 (unpublished data), using either ofloxacin or fortified combination treatment (cefoxoxime and gentamicin) as intensive initial therapy, approximately two thirds of patients had healed at 1 week and over 90% had healed within 1 month (that is, after up to 3 weeks of phase 2 therapy).
Acanthameoba keratitis

*Acanthamoeba keratitis is a potentially devastating corneal infection which typically affects contact lens wearers and is commonly misdiagnosed during the early stages of presentation.*

Early diagnosis is essential to secure a good prognosis. If effective treatment is delayed for 3 weeks or more the prognosis deteriorates. AK should be considered in any case of corneal trauma complicated by soil contamination or contaminated water. This is particularly the case when the onset is slow, and the features are atypical for bacterial or fungal keratitis. In addition, the disease must be considered when there is a failure to respond to first-line therapy for bacterial or herpes simplex virus (HSV) keratitis, even when there has been a positive culture for another organism, because 10% to 23% of cases of AK may be polymicrobial.

A high index of clinical suspicion and awareness are key to diagnosis. Professor Dart has recently written an excellent review of AK and its treatment and OSTs are recommended to read this;

*Perspective*

*Acanthamoeba Keratitis: Diagnosis and Treatment Update 2009*

JOHN K. G. DART, VALERIE P. J. SAW, AND SIMON KILVINGTON


*Common presenting features (from Mr Darts paper)*
<table>
<thead>
<tr>
<th>Clinical Feature</th>
<th>Early Disease(^a) (Percentage)</th>
<th>Late Disease(^b) (Percentage)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punctate keratitis</td>
<td>46</td>
<td>21</td>
</tr>
<tr>
<td>Dendritiform ulcer</td>
<td>14</td>
<td>4</td>
</tr>
<tr>
<td>Epithelial loss</td>
<td>38</td>
<td>75</td>
</tr>
<tr>
<td>Perineural infiltrate</td>
<td>57</td>
<td>29</td>
</tr>
<tr>
<td>Limbits</td>
<td>95</td>
<td>96</td>
</tr>
<tr>
<td>Ring infiltrate</td>
<td>19</td>
<td>83</td>
</tr>
<tr>
<td>Uveitis</td>
<td>5</td>
<td>79</td>
</tr>
</tbody>
</table>

\(^a\)Less than 1 month of symptoms.
\(^b\)Greater than 2 months of symptoms.
Diagnosis and treatment of suspected acanthamoeba keratitis

**Corneal sampling** is initially by epithelial sheet biopsy, followed by corneal scrape, and formal corneal biopsy as necessary. **Radial keratoneuritis** is pathognomonic of acanthamoebic keratitis.

**The primary treatment of AK** is with triple therapy with hourly PHMB (polyhexamethylenebiguanide) 0.02%, Chlorhexidine and Brolene for 48 hours reducing gradually over the subsequent weeks.

To counsel the patients about the potential ocular surface toxicity (which is reversible on stopping the drops) with triple therapy and the long term nature of the treatment. AK takes anything between few weeks and few months for complete settlement. Steroids should be avoided except in iritis and scleritis. Please consult the Corneal team.

**Policy for referral and review**

Suspected cases of AK should be referred to the corneal team urgently.

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**MANAGEMENT OF ALLERGIC EYE DISEASE**

Suitable patients for referral to the Corneal Service will have either:

1. Vernal keratoconjunctivitis (VKC)
2. Atopic keratoconjunctivitis (AKC)
3. Giant papillary conjunctivitis (GPC)
4. Seasonal and perennial allergic conjunctivitis (SAC, PAC)

**1. VKC** - Onset less than 10 years of age and male predominance. Personal and family history of atopy.

**Symptoms:** Itching, redness, watering, stringy exudate, blurred vision, photophobia, morning misery.

**Signs:** Giant papillary hypertrophy with hyperaemia and mucorrhoea, Tranta's dots on limbus, punctate epithelial keratopathy which may progress to macroerosion and plaque usually in upper half of cornea.

**Management:** Cromoglycate drops and steroid drops.

Refer to Corneal Clinic promptly before the development of corneal complications (e.g. vernal plaque), as there is a risk of amblyopia depending on the age of the child.

**2. AKC** - Adult equivalent of VKC, often associated with corneal vascularisation and thinning, and may also develop HSV keratitis, keratoconus or atopic cataract.
Management: Includes treatment of facial eczema and lid margin disease. Refer to Corneal clinic.

3. GPC - Localised allergic response to physically rough or deposited surface (contact lens, prosthesis or suture)

Symptoms: Itching and stringy exudates.
Signs: Papillary hypertrophy or upper tarsal conjunctiva with hyperaemia, cellular infiltration and focal scarring. No corneal signs.
Management: Attend to contact lens - prosthesis hygiene or polish prosthesis/replace contact lens or discontinue contact lens wear. Remove broken or loose suture as needed.
Treatment: Cromoglycate drops. Topical steroid not justifiable except in prosthesis wearers. Please refer to Corneal clinic.

4. Seasonal and Perennial Allergic Conjunctivitis

Symptoms: Itching, redness, epiphora.
Signs: Tarsal and bulbar hyperaemia, mild cellular infiltration, mild papillary response. No limbal or corneal signs.
Management: Avoid antigen if possible. Cromoglycate or Olopatadine drops. Steroid not usually justifiable. Topical or systemic anti-histamines are usually effective. SAC and PAC are not sight-threatening and rarely require referral.

MANAGEMENT GUIDELINES FOR PATIENTS WITH CORNEAL GRAFTS

Patients with three types of Corneal Grafts may present to Emergency:

1. PK (Penetrating Keratoplasty) – Full thickness Grafts.
2. DSAEK (Descemets stripping automated endothelial keratoplasty) – Endothelial Keratoplasty, a posterior lamellar graft including Descemets membrane and thin layer of posterior corneal stroma.
3. DMEK (Descemets membrane endothelial keratoplasty) – endothelial keratoplasty with Descemets membrane only.
4. DALK - Deep Anterior Lamellar Keratoplasty, an anterior lamellar graft.
5. SALK – Superficial anterior lamellar keratoplasty, small thin corneal flap of the size <150µm is transplanted.

Patients with PK, SALK and DALK may have Interrupted or a Continuous Suture In-Situ.
Routine Immunosuppression Post Corneal Grafts (As per Clinical Guidance Policy):

Post-op routine for PK and Posterior lamellar grafts

First 6 weeks The topical regime for uncomplicated phakic cases is G Dexamethasone 0.1% and G Chlor both four times daily for the first six weeks. The antibiotic can be stopped at this stage providing there is no inflammation or keratopathy.

6 weeks to 3 months G Dexamethasone 0.1% tds.
3 months to 5 months G Dexamethasone 0.1% bd.
5 months to 6 months G Dexamethasone 0.1% od.

Postop routine for Deep anterior lamellar grafts
Same as PK.

Do NOT stop their steroids without consulting the corneal team.

The Corneal Graft Patient with a Red Eye or Decreased Vision

The differential diagnosis includes:

1. **Graft Rejection** – See Below – Requires intensive immunosuppression.
2. **Microbial Keratitis** – See Below.
3. **Loose or Broken Suture** – See Below.

A slow progression of decreased vision, in an uninflammed eye, with a old graft, may be due to **graft failure** – however this should be a diagnosis of exclusion after other causes are ruled out.
Suture Management

Loose Sutures or broken sutures need to be removed immediately:
- They are providing no mechanical support.
- They are a cause of both graft rejection and microbial keratitis.

Always use Fluorescein drops in any graft patient presenting to Emergency to look for epithelial defects, leak, and staining sutures – which indicates that they are loose.

When removing loose or broken sutures:
- Use Topical Povidone-Iodine and Aseptic Technique.
- After suture removal patients need antibiotic and steroid cover:
  o Dexamethasone 0.1% and Chloramphenicol 4x daily for two weeks.
- Organise Follow-up in the corneal clinic.

Wound Leaks and Wound Rupture

In the early postoperative period – there may be a leak from the graft-host junction in patients with penetrating grafts. These should always be discussed urgently with the corneal team.

A small leak – with a formed anterior chamber, in the immediate postoperative period may settle with the use of a bandage contact lens.

Any more significant leak – especially if there is significant shallowing of the anterior chamber – will need definitive management by urgent resuturing in theatres.

All patients require continued topical antibiotic and steroid cover.

Traumatic injury in patients with corneal grafts may result in rupture of the graft host junction – these require urgent definitive repair in theatres – this should be considered in all patients with grafts who experience ocular trauma.

Microbial Keratitis in Graft Patients

There should be a high index of suspicion for microbial keratitis in graft patients – and this may be difficult to differentiate from graft rejection.

A dense corneal infiltrate or abscess, associated with an epithelial defect, with associated risk factors such as a broken suture in the region – should alert to the diagnosis of microbial keratitis.

Management as discussed in the section of microbial keratitis with G. Cefuroxime 5% and G. Gentamicin 1.5% hourly for 48 hours on ward followed by tapering/ changing
the antibiotic as per clinical response and microbiology reports. Use of concurrent steroids in graft patients with microbial keratitis to be discussed with corneal consultants.

**CORNEAL ALLOGRAFT REJECTION - MANAGEMENT GUIDELINES**

**Rejection** Any flare up of inflammation or increase in graft oedema (often apparent as blurring of vision to the patient), in the absence of an intercurrent unrelated problem, should be treated as graft rejection with intensive topical steroid. **All patients with such symptoms should be discussed urgently with the corneal team.** During intercurrent infection or inflammation, unrelated to the graft, use topical steroids as prophylaxis against graft rejection.

Suspected corneal allograft rejection should be referred immediately to the Corneal Service for intensive therapy. Most patients will require admission.

**Symptoms:** Photophobia
Redness
Blurred vision
Watering

**Risk Factors:** Loose sutures
Recent decrease in steroid therapy
Trauma
Herpes simplex or bacterial infection
Inflammatory disease
Previous rejection
Previous keratoplasty in the same eye
Host corneal vascularisation

**Signs:** Anterior chamber cells
KP on the graft endothelium +/- rejection line
Graft oedema
Sub-epithelial opacities similar to adeno viral keratitis (Krachmer spots)

**Initial therapy:** Hourly steroid such as G dexamethasone 0.1% PF +/- mydriatic
Anti-viral prophylaxis for known previous herpes simplex keratitis
Tb. Prednisolone 60 mg od tapering 10 mg every 3 days. Some patients may also require IV methyl prednisolone 125mg stat (to be discussed and approved by the consultant).
If no improvement or slow improvement – 20 mg Kenalog subconjunctival in inferior fornix along with the above.
DSAEEK – Endothelial Keratoplasty - posterior lamellar graft.

Patients with DSAEK – have specific complications – especially in the early postoperative period:

1. Dislocation of the donor disc – This may require repositioning in theatres – look for a de-centered disc, which is not attached to the posterior corneal surface.
2. Acute Glaucoma – Always check the intraocular pressure and status of the angle.
3. Rejection (typically after 4-6 months postop) – same as above
4. Primary failure – graft edema not settling after 6 weeks. Needs repeat DSAEK.

ANTERIOR SEGMENT INJURY

Penetrating trauma should be referred urgently to the on-call consultant

1. **Blunt Trauma**
   
   i. **Corneal abrasion**
   Management: Evert lid to check for foreign body
   Gut. Chloramphenicol 0.5% qid for 1 week
   Oral analgesia → Froben 50-100mg tid/prn po
   Review in A&E follow up clinic in 1 week

   ii. **Corneal foreign body**
   Management: Evert lid
   Remove foreign body at slit lamp
   Gut. Chloramphenicol 0.5% qid for 1 week
   Gut. Dexamethasone 0.1 qid for 1 week
   Review in A&E clinic in 1 week

   iii. **Traumatic uveitis**
   Management: Check for associated damage to other ocular structures
   Gut. Dexamethasone 0.1% qid for 1 month
   Gut. Cyclopentolate tid until next visit
   Add topical chloramphenicol if associated epithelial defect
   Refer severe injuries (associated damage to anterior segment structures) to external disease clinic
iv. **Hyphaema**

Management: Advise strict bed rest for 1 week  
Gutt. Dexamethasone 0.1% qds for 1 month  
Gutt. Atropine 1% bd  
Avoid NSAID’s – risk of re-bleeding  
Consider admitting:  
- IOP > 30mmHg  
- Hyphaema > 50%

2. **Conjunctival trauma**

Management:  
- Superficial laceration involving only conjunctiva  
  - Check carefully for underlying scleral injury  
  - If there is doubt, the patient may need to go to theatre for formal exploration under anaesthesia

3. **Chemical Injury**

a. Weak acids/alkalis

Management:  
1. Check pH  
2. **Copious irrigation** for 30min, until pH normal  
3. Prophylactic topical antibiotic: Chloramphenicol 0.5% qid  
4. Topical Dexamethasone 0.1% hourly (during day only) for few days only. **DO NOT CONTINUE INTENSIVE HOURLY TOPICAL STEROIDS LONGER THAN A WEEK AS THIS LEADS TO CORNEAL MELT.**  
5. Oral analgesia prn  
6. Refer to corneal clinic in 1-2 weeks.

b. Strong acids/alkalis

Acute Management:  
1. Check pH  
2. Copious irrigation for 30min, continue if pH abnormal  
   a. Use normal saline/hypotonic saline
b. Avoid solutions containing phosphate \( \rightarrow \) precipitate corneal calcification

3. Recheck pH every 15 min for an hour to ensure all caustic material removed

4. Evert eyelids and remove any particulate matter

5. Prophylactic antibiotic
   a. Preservative free chloramphenicol 0.5% qid until re-epithelialised

6. Cycloplegia

7. Pain relief

8. IOP control as necessary

9. Topical corticosteroid
   a. Preservative free dexamethasone 0.1% 1hrly
   b. Indicated in the 1st 7 days, then start tapering and withdraw by day 14
   c. Contraindicated after day 21 if epithelium not intact

10. Oral doxycycline 100mg bd po

11. Ascorbate drops 1-2hrly until cornea re-epithelialised (prevents melting)

12. Oral vitamin C
   a. Orally 1 gram bd po

13. Contact corneal team

4. Radiation Injury
   i. Arc Eye &
   ii. Snow blindness
   Management: Chloramphenicol 1% ointment both eyes
   Eye pads + tape (double pad)
   Cycloplegia
   Oral analgesia

MANAGEMENT OF REFRACTIVE SURGERY PROBLEMS

Please be extra cautious regarding patients who have had previous refractive surgery (e.g. LASIK). Refer to corneal service early any patient who has had trauma to a lasered eye or has developed keratitis.

You may need to specifically ask patients about prior laser, it may not be volunteered to the triaging nurse.
OOKP PATIENTS

Sussex Eye Hospital is a quaternary referral service for OOKP patients.

Management of OOKP patients is complex. The notes for these patients are kept in the doctors’ mess and can be accessed at any time.

Any patient presenting with an urgent OOKP related problem should be discussed immediately with the corneal fellow or Mr Liu.