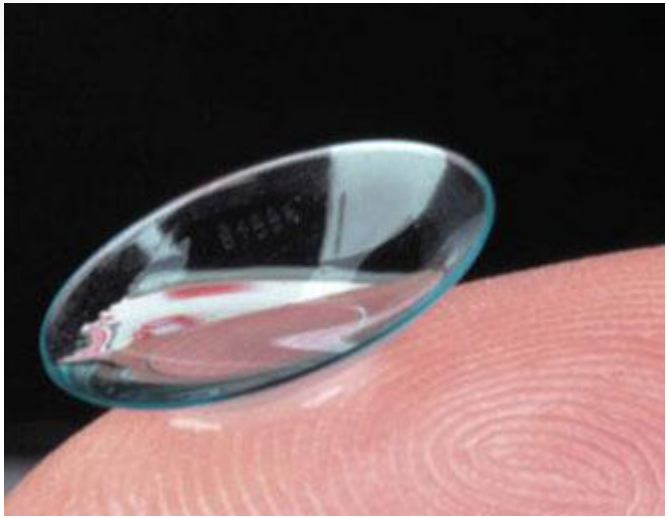
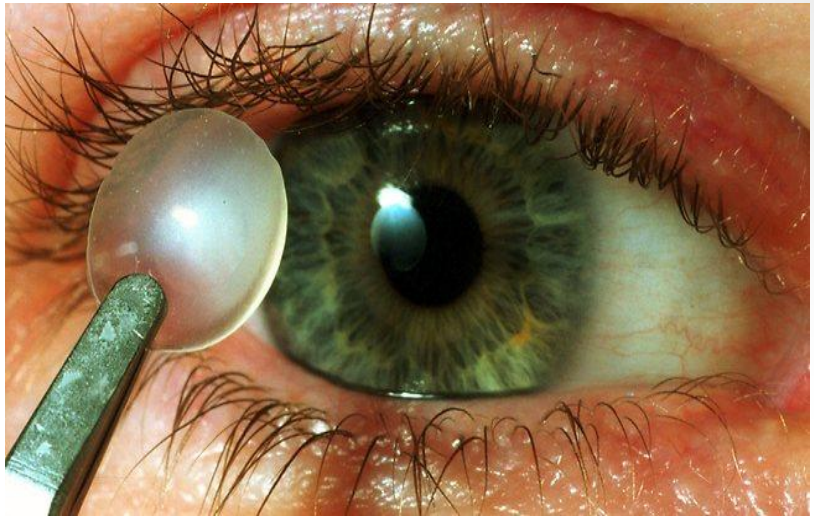




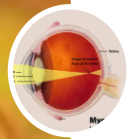
# Contact Lens Complications

# Contact lens uses


Refractive errors

Prosthetic use


Aphakia



Myopia management

Keratoconus

Corneal irregularity

Bandage

Occlusion

Complications of contact lens use can occur in any patient who wears contact lenses

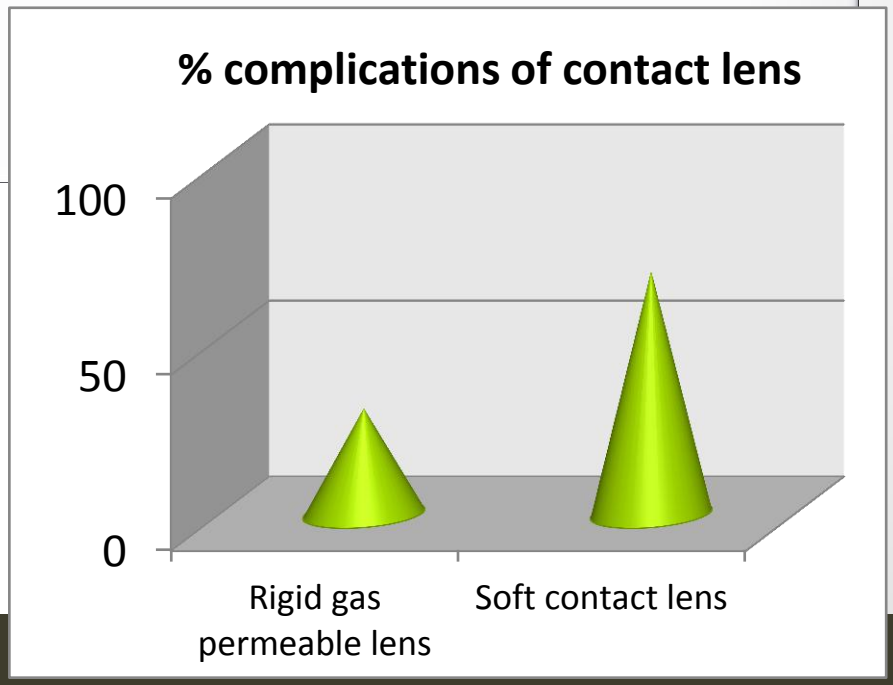
*Contact Lens & Anterior Eye 34 (2011) 266–268*
**OPTOMETRIC CLINICAL PRACTICE GUIDELINE CARE OF THE CONTACT LENS PATIENT 2nd Edition 2006**

# Prevalence of contact lens complications in India is 20.58%

**Etiology of complications :multifactorial, depends on**

- Type of contact lens
- Contact lens material
- Wearing schedule
- Contact lens solutions
- Compliance towards care regimen

Contact lens complications are less common with rigid gas permeable (30%) lenses as compared to soft contact lens (69%)




*Contact Lens & Anterior Eye 34 (2011) 266–268*
*Kelechi Mezu-Nnabue Contact Lens Complications & Management QEI Winter 2009 Newsletter*

# Types of Complications

| Location | Non-infectious complication | Infectious complication |
|---|---|---|
| Eyelids | Toxicity, Allergy, Ptosis<br>Meibomian Gland Dysfunction | Blepharitis |
| Conjunctiva | Injection, Edema, Staining,<br>Giant Papillary Conjunctivitis | Bacterial Conjunctivitis<br>Viral Conjunctivitis |
| Cornea<br>(all layers) | • Hypoxia<br>• Abrasion<br>• Foreign body tracking<br>• Dimple veil, blebs<br>• Neovascularizations<br>• Superficial cornea pannus<br>• Dry eyes | **Microbial corneal infections.**<br>• **Amoebic** (Acanthamoeba),<br>*eruginosa*<br>Adenovirus<br>Herpes simplex virus |

**Most common complications :**
contact lens induced **papillary conjunctivitis (CLPC) (31.05%),** followed by corneal **neovascularisation (19.48%)** and **superficial punctate keratitis (SPK) (16.86%)**

# Contact lens-Induced Ocular Complication Rates by Contact Lens Type

| Category | Complication | GP, % | Soft, % | Piggyback, % |
|---|---|---|---|---|
| Conjunctiva | GPC | 10.3 | 32.6 | 17.6 |
| | Papillae | 15.5 | 9.6 | 5.9 |
| | Conjunctival injection | 0.0 | 2.4 | 0.0 |
| | Other | 1.1 | 0.5 | 0.0 |
| | Follicles | 0.8 | 0.4 | 0.0 |
| | Chemosis | 0.0 | 1.1 | 0.0 |
| Cornea | Neovascularization | 5.4 | 34.1 | 14.7 |
| | Diffused SPK | 7.3 | 1.6 | 11.8 |
| | Localized SPK | 3.3 | 0.3 | 5.9 |
| | 3–9 staining | 7.3 | 0.3 | 0.0 |
| | Other | 2.2 | 1.3 | 0.0 |
| | Corneal abrasion | 0.5 | 0.1 | 0.0 |
| | Infiltrates | 0.0 | 0.7 | 0.0 |
| | SEAL | 0.0 | 0.1 | 0.0 |
| | Corneal ulcer | 0.0 | 0.1 | 0.0 |
| | Corneal edema | 0.0 | 0.0 | 0.0 |

Eye & Contact Lens 2009;4: 176180

# Dry Eye

**Worsens & complicates** contact lens wear **in 50% of patients**

- **Patient complaints**: burning, dryness, irritation, blurry vision when wearing contacts for a prolonged period
- **Diagnosis:** TBUT, schirmer test, phenol red thread tests, rose bengal/lissamine green staining
- **Management:**

✓ Artificial tears

✓ Proper lid and lens hygiene

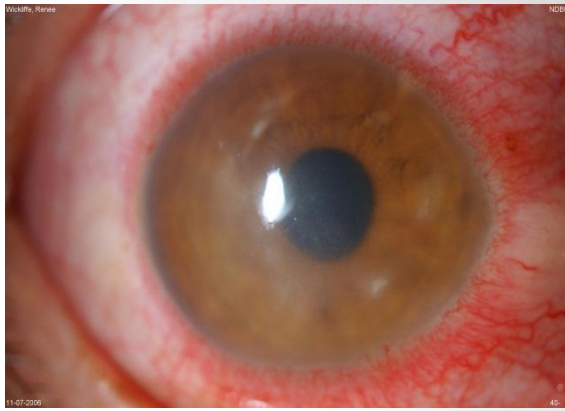
✓ More frequent blinking

✓ One can also consider changing the lens material

✓ In recalcitrant cases, more aggressive therapy like punctual plugs and immunomodulating topical drugs like cyclosporine

- Oral administration of omega-6 fatty acids

# Mechanical Corneal Abrasion



Occurs when **epithelial layer of cornea may be damaged** during insertion / removal of the lens or by problem with the lens itself

- **Symptoms:**

✓ Extremely painful, decreased vision, marked photophobia and excessive tearing

✓ On examination, a defect may be noted with the naked eye

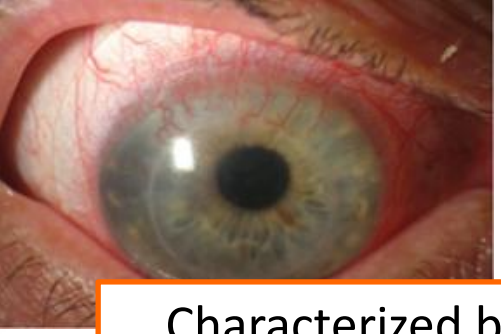
- **Treatment:**

✓ Topical broad-spectrum antibiotic drops (fluoroquinolones)

✓ Cycloplegic drops to provide pain relief

✓ Patching of the eye should be avoided

✓ Frequent slit lamp examinations are also required



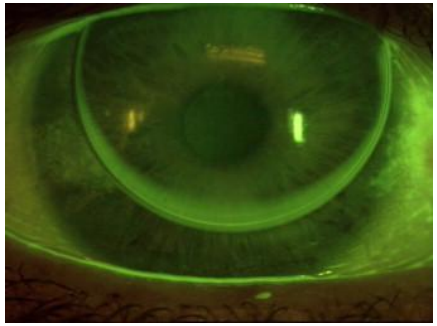
# Neovascularization

Characterized by the **growth of blood vessels into the normally avascular cornea** to supply oxygen and nutrients to this tissue

- Commonly seen **in patients using soft extended contact lenses or wearing daily wear** contacts
- **Diagnosis**:

✓ Can be seen at the limbus in cases of chronic hypoxia from contact lens wear

✓ **In patients wearing rigid gas permeable (RGP) contacts, pannus** can occur from epithelial desiccation, and is characterized by chronic 3 and 9 o'clock staining



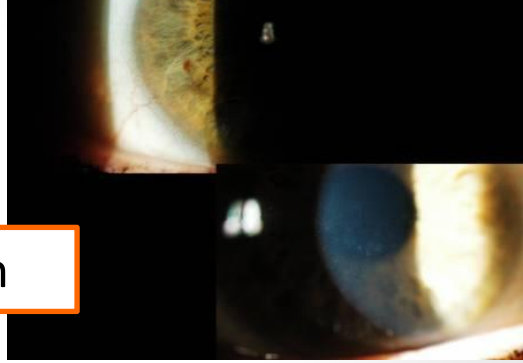
- **Management:**

✓ Switch to a more appropriate contact lens material

✓ Refitting with an RGP lens, or reducing the wearing schedule

✓ Condition may resolve with complete cessation of lens wear

# Corneal Hypoxia



Occurs when cornea is deprived of much needed oxygen

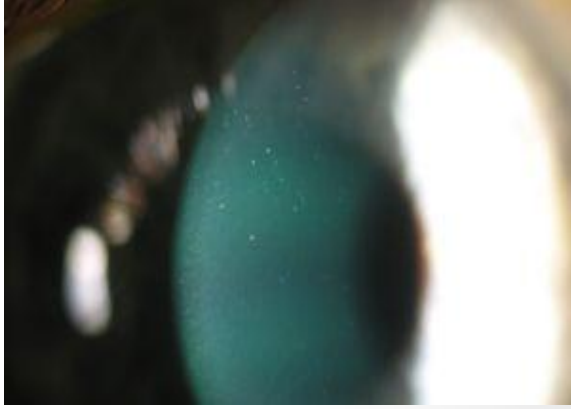
- Should be considered when someone presents with a **history suggestive of contact lens overwear**
- **Signs and symptoms:** Decreased vision, photophobia, corneal changes like microcysts, central corneal clouding, reduced sensitivity, adhesions and in some instances infiltrates
- **Diagnosis:** Most clinical signs of corneal hypoxia are only visible at slit lamp examination
- **Management:**

✓ Reduction in wearing schedule for contacts in those with compromised corneas

✓ Changing the lens material to a higher Dk material/ to an enhanced tear exchange design that will increase the availability of oxygen to the anterior corneal surface

*Kelechi Mezu-Nnabue Contact Lens Complications & Management QEI Winter 2009 Newsletter*
**S Afr Pharm J 2011;78(8):31–34**

# Microcysts



- Observed **in 10-20% in daily lens wearing** patients
- **Increased numbers** are seen in patients wearing **extended-wear lenses**

- **Symptoms**: Patients with microcysts rarely report symptoms
- **Diagnosis**:

✓ Small (15 µm to 50 µm), irregularly shaped inclusions commonly found in the paracentral to mid-peripheral zones of the cornea

✓ Develop secondary to hypoxia and reduced epithelial regeneration

✓ Observed best on the slit lamp in retro-illumination

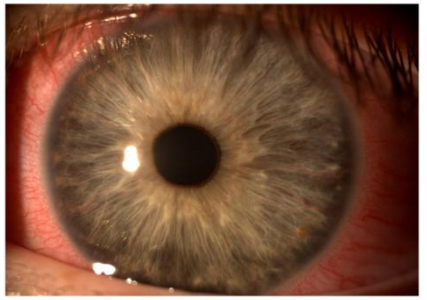
✓ Show reversed illumination due to a suspected higher refractive index than the surrounding tissue

- **Management**:

✓ Should be fitted with the highest tolerable oxygen permeability (Dk) silicone hydrogel lens possible

*Kelechi Mezu-Nnabue Contact Lens Complications & Management QEI Winter 2009 Newsletter*
Contact Lens and Anterior Eye *(2001)* 24, *73-79.*

# Contact Lens-induced Acute Red Eye (CLARE)



- Sudden onset of corneal infiltration **during extended wear of hydrogel contact lenses** seemingly occurring with sleep
- Characterized as a non-ulcerative, sterile keratitis

- Associated with colonization of gram-negative bacteria
- **Can occur with well-fitted/immobile lenses** of any material or oxygen transmission
- Can be a recurrent condition in some patients
- **Patient complaints**: uniocular pain, irritation/foreign body sensation, redness, watering
- **Diagnosis:**

✓ Visual acuity is unaffected

✓ Focal or diffuse sub-epithelial infiltrates in the mid-periphery of the cornea near limbus

✓ Marked circumferential limbal injection, but no cells or flare in the anterior chamber or lid edema

- **Management:**

✓ Subside with temporary discontinuation of contact lens wear along with aggressive ocular lubrication to ameliorate the signs and symptoms

✓ Switch to daily wear lenses in recurrent cases

# Contact Lens-Related Superior Limbic Keratoconjunctivitis (CLKC)

Usually starts **after 2 months to as long as 3 years of lens wear**

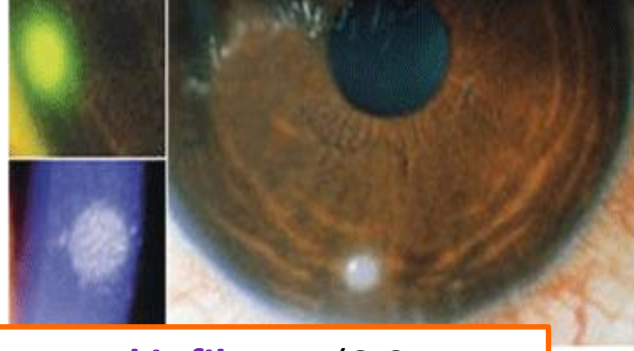
- **Patient complaints**: burning, itching, red eyes with increased secretions and photophobia
- **Diagnosis**: **Clinical signs include**

✓ Injection of the superior bulbar conjunctiva
✓ Punctate staining of the superior limbus and cornea
✓ Epithelial and sub epithelial opacities
✓ Superior corneal vascularization
✓ Fine papillary hypertrophy of the superior tarsus

- **Treatment**

✓ Decreasing wearing time
✓ Refitting into a more appropriate lens material
✓ Cessation of contact lens wear in severe cases.
✓ In severe cases, one may consider the use of topical steroids

# Contact Lens-induced Peripheral Ulcer (CLPU)



Circular, well-circumscribed, dense, yellowish-white, focal **corneal infiltrate** (0.2 mm-2.0 mm in diameter) located **in the peripheral to mid peripheral cornea**

- Always located in the anterior stroma and has a **complete loss of overlying epithelium**
- **Symptoms:** pain or soreness, irritation and watering
- **Diagnosis:**

✓ Differentiate CLPU from Microbial Keratitis (MK)

✓ In CLPU, there is reduction of severity of signs and symptoms after lens wear is discontinued.

✓ There is less likely to be significant inflammation and anterior chamber reaction (flare and cells, possible hypopyon)

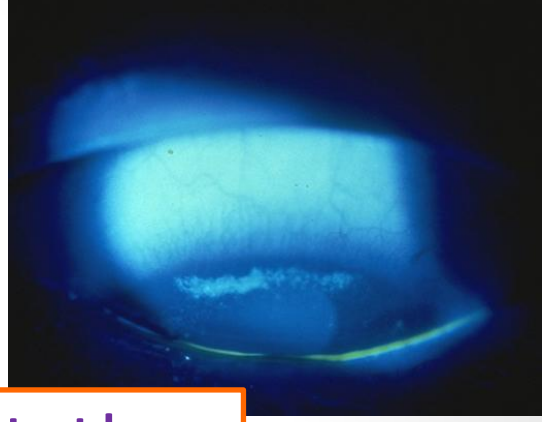
- **Management**:

✓ Topical fluoroquinolones

✓ Discontinue lens wear till the ulcer heals

✓ Patient should discard their current contact lenses even after resolution

# Superior Epithelial Arcuate Lesion (SEAL)



**Splits in the superior epithelium secondary to contact lens wear** are commonly termed SEALS

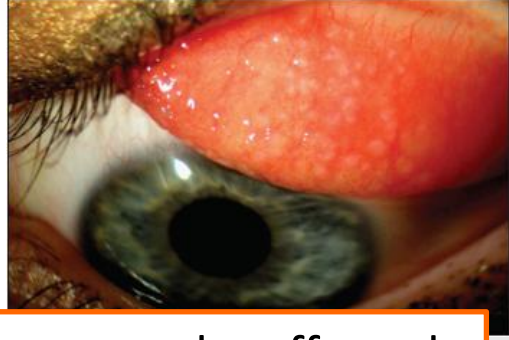
- Thin, arcuate white lesion in the superior cornea, usually located within 1 mm to 3 mm of the superior limbus between 10 and 2 o'clock
- 0.5 mm wide and range from 1 mm to 5 mm in length
- **Diagnosis:** The **characteristic finding in SEAL is the presence of the peripheral white lesion**, which should be obvious even without the use of vital stains
- **Management:**

✓ To alleviate the problem, patients should cease lens wear for 3-4 days

✓ Switch from high Dk lens

✓ Lubrication with artificial tears

# Contact Lens-induced Papillary Conjunctivitis (CLPC)



**10% of wearers of soft lenses** and **3% of wearers of rigid lenses** may be affected

- Can occur from **mechanical abrasion** from poor edge design and protein film abrasiveness
- May become **manifest clinically months or even years after starting lens wear**
- **Symptoms**: itching, stringy/ ropy mucous discharge, excessive lens movement/ decentration, decreasing comfort and blurred vision
- **Diagnosis**: **Signs of CLPC**: ranges from mild hyperemia of the upper tarsal conjunctiva with a few, small papillae to severe hyperemia with large, raised cobblestone-like papillae, oedema, cellular infiltration and presence of viscid mucus
- **Management:**

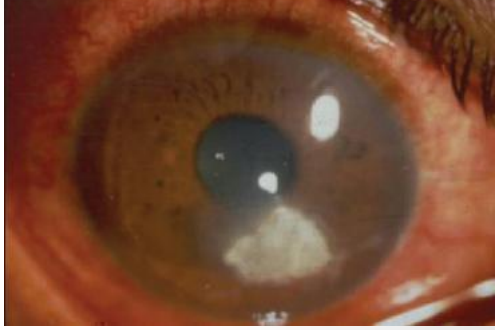
✓ Lens material, design or fitting characteristics may need to be modified

✓ Modern silicone hydrogel lens designs are a good choice for a treatment option

✓ Anti-histamines are not very effective

✓ Some cases may be helped by the administration of mast cell stabilising agents in the form of eye drops, such as 2% sodium cromoglycate

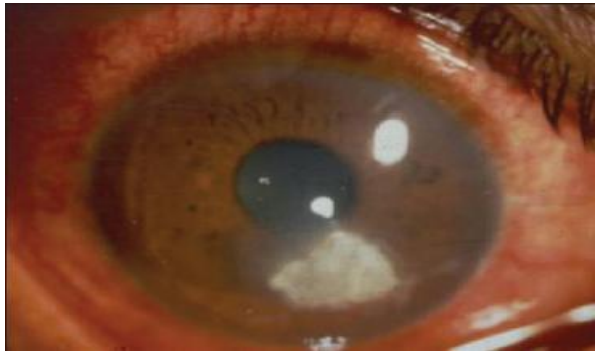
# Microbial Keratitis (MK)



Patients who use **extended-wear contact lenses or who wear their contact lenses overnight** are at much higher risk

- In contact lens wear, usually preceded by hypoxia and/or an epithelial break
- **Symptoms:** rapidly increasing pain, severe redness, intense epiphora, photophobia, blurred or hazy vision
- **Diagnosis**:

✓ Common signs: corneal infiltration (usually central or paracentral; large irregular infiltrate; diffuse infiltration surrounding epithelial lesion; infiltrate usually anterior to mid-stromal), epithelial loss overlying the infiltrate and cells adhering to the endothelium



- **Risk factors:**

✓ **Extended wear of hydrogel lenses** is a major risk factor

✓ **Other risk factors**: use of contaminated lens care solutions and products such as storage case, use of corticosteroids during contact lens wear, wearing a therapeutic contact lens in the presence of an epithelial defect, diabetes and smoking

- **Management:**

✓ Discontinue contact lens wear

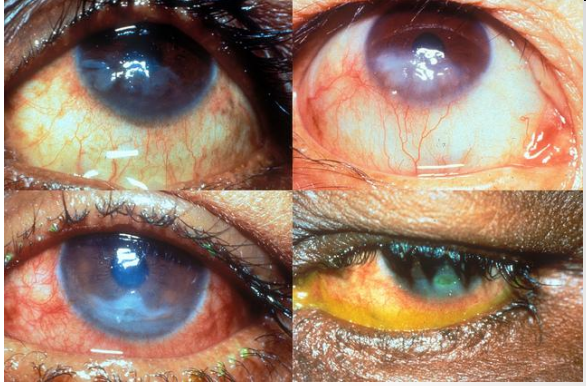
✓ Aggressive treatment with topical ophthalmic anti-microbials

✓ Fluoroquinolones should be used according to established protocols

✓ Avoid use of topical steroid in infectious keratitis especially if epithelium is not intact

✓ Close follow-up is recommended

# Exposure Keratitis



Exposure keratitis or Keratoconjunctivitis occurs due to **incomplete closure of the eyelid** causing dry, inflamed eye

- **Diagnosis:** Significant punctuate staining is seen, especially on the inferior aspect of cornea
- **Management:**

✓ A therapeutic contact lens that can stay on the eye safely overnight and protect the cornea from desiccation

✓ In addition, lubrication during the day with tear supplements and ointment at bedtime can considered

# Infiltrates

May be caused by **contact lens solution sensitivities, hypoxia, microbial infection, or unrelated complications** such as adenoviral infection

- **Diagnosis:**

✓ Infiltrates are usually of infectious etiology if they are single rather than multiple; are large rather than small; and are associated with pain, photophobia; and an epithelial defect.

✓ Presence of adnexal inflammation (injected conjunctiva, swollen lid and anterior chamber reactions) also suggests infection

**Be cautious to rule out herpes virus infection/ acanthamoeba keratitis masquerading as sterile infiltrate**

# Differential characteristics of sterile and infective infiltrates

| FEATURE | PROBABLY STERILE IF: | PROBABLY INFECTIVE IF: |
|---|---|---|
| History | Long | Short |
| Pain | Mild or absent | Present |
| Discharge | Absent | Present |
| Size | <1mm diameter | >2mm diameter |
| Position | Peripheral | Central or mid-peripheral |
| Epithelial defect | Absent | Present |
| Anterior chamber activity | Absent | Present |

- **Management:**

✓ Assume all contact lens-associated corneal infiltrates to be infectious until proven otherwise

✓ Discontinue contact lens wear

✓ Treat aggressively with topical antibiotics (fluoroquinolones)

| CONDITION | AETIOLOGY | LENS TYPE | SYMPTOMS | SIGNS | ACTION |
|---|---|---|---|---|---|
| Abrasion | Trauma<br>Foreign body<br>Clumsy handling<br>Damaged lens | Rigid>soft | Pain<br>Lacrimation<br>Watering<br>Photophobia | Red eye<br>Linear corneal fluorescein uptake | Remove lens<br>±G homatropine 2%<br>G/Oc chloramphenicol |
| SEAL | Mechanical | Soft | Chronic discomfort | Superior (usually) paralimbal epitheliopathy | Refit |
| Anterior corneal opacity | ?Trauma<br>?metabolic | Rigid>soft | Rarely ↓ vision | Central superficial corneal opacity | Withdraw lens and refit |
| Acute epithelial necrosis ('Overwear') | Metabolic (hypoxic/toxic) | PMMA>soft>RGP | Visual blur<br>Pain<br>Watering<br>Photophobia | Red eye<br>Lacrimation<br>Diffuse punctate corneal fluorescein uptake | Remove lens<br>G homatropine 2%<br>G chloramphenicol |
| Tight-lens syndrome | Change in lens geometry in acid pH | EWS | Visual blur<br>± pain | Red eye<br>Immobile lens<br>Limbal indent<br>± corneal ulcer<br>& stromal oedema | Remove lens<br>Ulcer requires urgent specialist attention |
| Microcystic epitheliopathy | Hypoxic/toxic | All | Recurrent pain<br>& watering | Microerosions | Withdraw lens<br>± Oc Lacrilube nocte |
| Epithelial oedema | Hypoxic/toxic | All | Visual blur on lens removal | Dull corneal reflex | Reduce wear time<br>± refit |
| Corneal vessels | Hypoxia | Soft>PMMA>RGP | Visual blur if vessels cross axis | Corneal vessels<br>± lipid | See text |
| Stromal oedema | Metabolic (osmolarity change due to lactate accumulation) | Usually EWS | ± visual blur | ± corneal haze<br>Pachymetry<br>Slit-lamp microscopy | Withdraw lens<br>Seek specialist opinion |
| Corneal warpage | Mechanical | Rigid | Transient spectacle blur | Irregular keratometry<br>± corneal indent if lens binds | ± refit in different rigid material, or change to soft lens |
| Corneal warpage | Metabolic | PMMA>RGP>Soft | Prolonged spectacle blur | Irregular keratometry | Refit in RGP lens |
| Endothelial blebs | Metabolic<br>? pH change | All | None | Slit-lamp microscopy | Observe |
| Keratic precipitates ('endothelial bedewing') | ? inflammatory<br>?2° to hypoxia | All | ± discomfort and ↓ tolerance<br>± ↓ vision | Endothelial deposits | ↓ wear time<br>Observe carefully |

| CONDITION | AETIOLOGY | LENS TYPE | SYMPTOMS | SIGNS | ACTION |
|---|---|---|---|---|---|
| Posterior corneal opacity | ? inflammatory<br>? 2° to metabolic stress | ? rigid>soft | Rarely ↓ vision | Central deep corneal opacity | Withdraw lens |
| Endothelial polymegethism & pleomorphism | ? metabolic | All | None | Specular microscopy<br>? refit in RGP lens | Observe |
| Toxicity | Chemicals | Usually soft | Severe pain on inserting lens | Ciliary flush<br>Punctuate corneal fluorescein uptake | Remove lens and rinse thoroughly |
| Toxicity/allergy | Thiomersal | Usually soft | Chronic irritation | Superior limbal hyperaemia<br>Superficial punctate keratopathy | Withdraw lens<br>Seek specialist opinion |
| Sterile keratitis | Hypersensitivity to deposits on lens | Usually soft | Discomfort<br>Redness<br>Watering | Peripheral corneal infiltrates<br>± ulceration | Withdraw lens<br>Seek specialist opinion |
| CLAPC | Hypersensitivity to deposits on lens | Soft>RGP>PMMA | Mucous discharge<br>Itching<br>Lens displaces papillary | Superior tarsal hyperaemia and infiltrate | Seek specialist opinion |
| Lens related red eye | Lens spoilation | Soft>rigid | Chronic discomfort<br>Redness<br>↓ tolerance | ± punctate corneal fluorescein uptake | Clean or renew lenses<br>Re-instruct patient re: lens care |
| Infection | Contamination of lens or lens care materials<br>Altered corneal response | Soft>rigid | Pain<br>Red eye<br>Purulent discharge<br>Visual blur | Red eye<br>Purulent discharge<br>Corneal ulcer<br>Corneal oedema<br>A/C activity | Culture lens and lens case<br>Seek urgent specialist attention |
| Dellen, three and nine o'clock stain | Local drying | Rigid | ± redness<br>± discomfort | Interpalpebral redness | Blinking exercises<br>± alter lens geometry |
| Inferior closure stain | Local drying | Rigid>soft | Redness<br>Discomfort | Inferior redness and punctate corneal fluorescein uptake | Blinking exercises |
| Dimple veil | Static air bubble under lens | Rigid | ± visual blur | Fluorescein pool in depressions | Refit |

# *Take home message

- An ever increasing number of people are exposed to contact lenses and the potential problems they may cause
- Complications may range in severity from mild and innocuous, to severe and sight-threatening
- May have a potential to force wearers to abandon their lenses permanently
- Utmost importance to distinguish accurately between minor complaints and those that could potentially lead to loss of vision

**S Afr Pharm J 2011;78(8):31–34**
*JUNE 4 • 1999 OPTOMETRY TODAY:26-35*


THANK
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