Contact Lens Complications

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Disclosures

NONE
OVERVIEW

Five Primary Categories of Contact Lens Complications

Eyelids
Tear Film
Conjunctiva/Limbus
Cornea
Other
Contributory Factors

Hypoxia: Virtually all CLs reduce oxygen supply to the cornea

Desiccation/Alteration of tear film: CLs are much thicker than the tear film
SCLs evaporate to the atmosphere

Deposit build-up:
SCL>RGP, but all develop deposits made of proteins, mucous, lipids, dirt and microbes
Contributory Factors

Lens Material:
- DK/L
- Wettability and deposit attraction
- Stiffness and other physical properties

Lens Design and Fitting:
- Lens to cornea relationship
- Position and movement
- Thickness profile
Contributory Factors

Wear Time

DW vs. EW:
  Daily vs. part time
  Patient’s physiology

Patient Compliance:
  Wear time
  Cleaning and disinfection
  Lens replacement schedule
  Follow up visits
EYELIDS

• Brief Anatomy and Physiology
  • Meibomian Glands
  • Glands of Zeis
  • Glands of Moll
  • Accessory Lacrimal Glands
  • Glands of Krause
  • Glands of Wolfring
  • Goblet Cells
EYELID ANATOMY
Problems Related to the Eyelids

- Meibomian Gland Dysfunction (MGD)
- Blepharitis
- Giant Papillary Conjunctivitis (GPC)
- Lid Wiper Epitheliopathy (LWE)
Meibomian Gland Dysfunction
MG Functions

Located in upper and lower lids serve two main functions:

1. Form a hydrophobic lining along the lid margins which prevents epiphora.
2. Form a thin lipid layer over the surface of the aqueous tear phase – retards evaporative fluid loss.
MG Dysfunction

Normal secretions are clear
Abnormal secretions are creamy yellow oil.

CL related symptoms:
- Smeary vision
- Greasy lenses
- Dry eyes from rapid evaporation
- Reduced tolerance to lens wear
MGD Management

Warm Compresses with Massage
Melts solidified lipids-unblocks ducts

Lid Scrubs
Keeps lid margins clear of debris

Mechanical Expression (squeezing)
Helps to push out oils

Antibiotics

Surfactant Lens Cleaning
Blepharitis
Blepharitis

• Infections of the base of the eyelashes at the lid margin

• Two kinds:
  – Staphylococcal blepharitis
  – Seborrheic blepharitis
Blepharitis

• Staphylococcal Blepharitis
  – Can lead to dermal and epidermal ulcers
  – Often associated with atopic eczema
  – Staph releases toxins
    • Conjunctivitis
    • Corneal infiltrates
Blepharitis

• Seborrheic Blepharitis
  – Disorder of glands of Moll and Zeis
  – Not as damaging as Staph infection
  – Causes mild conjunctivitis and corneal staining
Blepharitis Symptoms

- Burning
- Conj and lid margin redness
- Dryness
- Lid Edema
- Foreign Body Sensation

- Ocular fatigue
- Photosensitivity
- Sticking of lids mostly upon waking
- Tearing
- Itching
Treatments

Antibiotic Ointment

Lid Hygiene

   Scrub lash line with mild baby shampoo

Weak Topical Corticosteroids

Artificial Tears

If episode is moderate to severe, discontinue CL wear or switch to Daily Disposables to avoid cross contamination/reinfection
Contact Lens-Induced Papillary Conjunctivitis (GPC)

- Typical symptoms
  - Itchiness
  - Stringy mucous discharge
  - Lens intolerance

- Hallmark sign is large papillae on the superior palpebral conjunctiva
• A combined immunological and mechanical response to denatured tear proteins that have adhered to the lens surface

• Simple Terms: Proteins get stuck on the lens surface. The eye develops an allergic-like reaction called GPC
• Causes

• Aged lens
• Poor compliance to cleaning regimen
• No enzymatic cleaning
• Enzymatic Cleaners

• Enzymatic Cleaners for RGPs (periodic): B&L Boston One-Step Liquid Enzymatic Cleaner; Menicon Progent GP Protein Remover

• Daily Protein Removers: Alcon Opti-Free Supra-Clens and Advanced Vision Technologies Naturalens GP Cleaner.
• **Enzymatic Cleaners**

• **Enzymatic Cleaners for SCLS: Abbott Medical Optics Ultrazyme Enzymatic Cleaner**

• **Daily Protein Removers for SCLs: Alcon Opti-Free Supra-Cleans Daily Protein Remover; Alcon Clerz Plus Lens Drops**
• SYMPTOMS

• Itchiness
• Mucous discharge: white stringy
• Lens awareness / intolerance
• Blurry Vision
TREATMENT

• STAGE 1: Discontinue lens wear; PFAT; Educate the patient in proper lens care.
TREATMENT

• STAGE 2: Discontinue lens wear; PFAT; Educate the patient in proper lens care.
TREATMENT

• STAGE 3: Discontinue lens wear; Allergy Drop; NSAID or Steroid Drop; PFAT; Refit to Daily Disposables.
TREATMENT

• STAGE 4: Discontinue lens wear; Allergy Drop; NSAID and Steroid Drop; PFAT; Refit to Daily Disposables or no further contact lens wear.
LID WIPER
EPITHELIOPATHY
The Lid Wiper: Localized portion of the marginal conjunctiva of the upper lid.

Has a rubbing effect on the cornea during blinking

Essential for spreading the tear film over the ocular surface

Reduced tear film = increased friction
Increased friction causes inflammation

Symptoms are lens awareness, especially on blinking, and dry eye complaints

Tear film disruption is contributory

Possible causes include ability of lens material to hold tears or solutions that disrupt CL surfaces – theoretical at this point
Since CL surface is the major cause of tear film instability treatments are:

AT (especially lipid emulsion like Systane Balance) during CL wear

Steroids; punctal plugs, ung after lens removal (like Genteal Gel); meibomian gland management

Discontinue lens wear or change to different material
TEAR FILM

Brief Anatomy and Physiology

Three Primary Layers: Lipid, Aqueous, Mucoid

Meibomian Glands and Glands of Zeis

Lacrimal Gland and Accessory Glands of Krause and Wolfring

Goblet Cells
TEAR FILM

Lipid (oil) layer:
lubricates and prevents evaporation

Aqueous (water) layer:
nourishes and protects the cornea

Mucin layer:
adheres tears to the eye

Meibomian glands:
create the lipid (oil) layer of the tear film, a blockage can lead to evaporative dry eye
Lacrimal System

- Superior lacrimal (tear) gland
- Inferior lacrimal (tear) gland
- Lacrimal sac
- Lacrimal ducts
- Nasolacrimal duct (drains into the nasal cavity)
Problems Associated with Tears

Two Primary Problems

Dry Eye

Mucin Balls
Problems Associated with Tears

Dry Eye

- Poor Lipid Layer
- Low Tear Volume
- Rapid Tear Breakup Time
- Corneal Epithelium Staining
Problems Associated with Tears

Mucin Balls
Goblet cells produce excessive mucous; Roll up in little balls on the cornea
Can indent epithelium
Most often in Silicone Hydrogel CLs
Management

Dry Eyes
- Change lenses
- Alter solutions
- Artificial tears
- Nutritional supplements
- Medications
- Reduce tear drainage
- Manage associated disease
- Discontinue CL wear
Management

Mucin Balls

Refit lenses steeper
Artificial tears
More frequent lens removal
Refit with non silicone CLs
Discontinue overnight wear if EW lens
Conjunctiva

UL (Upper eyelid)  LL (Lower eyelid)

Palpebral Epidermis  Palpebral Epidermis

Palpebral Conjunctiva  Palpebral Conjunctiva

Bulbar Conjunctiva  Bulbar Conjunctiva

Periderm  Cornea
Problems Associated with the Conjunctiva/Limbus

Conjunctival Staining
- Lens Edge Stain
- Diffuse Stain

Conjunctival Redness
- Mechanical Irritation
- Allergic Reaction
- Inflammation/Infection
Lens Edge Stain

Tight Lens Syndrome
CL is excessively steep
Soft lenses stain at the limbus with conj redness
RGPs stain around the central cornea
Lens will be immobile

Symptoms:
Lens is difficult to remove
Variable acuity or blur after removal
Urge to rub eyes after removal
Tight Lens Syndrome
Lens Edge Stain

Treatment:

AT before removal
Steroids and/or antibiotics
Refit: Flatter BC for soft lenses; flatter BC and/or smaller optic zone for RGPs
3 and 9 Staining (RGPs)

Lens edge is excessively sharp or poorly rounded
Roughly 30% of RGP wearers have it

Signs/Symptoms:
Stage 1: Small area of stain at 3 and 9. No symptoms
Stage 2: Larger areas of stain. No symptoms
Stage 3: Dense keratopathy w/conj injection and significantly reduced wear time.
Stage 4: All of stage 3 plus a dellen and increased limbal vascularization.
3 & 9 Staining
Dellen:

Small concave area on the cornea. Can be mistaken for a marginal ulcer

Form as a result of chronic dryness and prolonged chafing of the epithelium by a RGP

Final result of long term 3 & 9 staining
Dellen
Diffuse Staining

Most common cause is a toxic reaction to solutions

Diffuse staining will also be present on the cornea

Symptoms: Irritation; some decreased VA; decreased wear time

Easiest Fix: Change the solution and or any artificial tears.
Diffuse Staining
Conjunctival Redness

Mechanical Irritation

Allergic Reaction

Inflammation/Infection
Mechanical Irritation

Loose fitting soft lenses can cause trauma to the conjunctiva mast cells

Histamine is released causing vasodilation

Symptoms: Conj redness, irritation

Management: Refit to a tighter lens, AT, possible use of an allergy drop (Patanol, Zaditor)
Conjunctival Redness

Allergic Reaction

Most often due to solutions, material, preservatives or seasonal allergies

Symptoms: Diffuse Conj redness, irritation, itchy eyes, reduced wear time, intermittent blurry vision.

Management: Depends on cause
Conjunctival Redness

Inflammation/Infection

These are the hardest to diagnose and treat

Inflammation is usually the result of injury
Trauma, trapped debris, torn lens

Several kinds of infections
Bacterial, viral, gonococcal, chlamydial, allergic
Conjunctival Redness

Inflammation/Infection

Symptoms

Inflammation: reduced vision, FBS, irritation or pain, reduced wear time

Infections: Usually include a discharge of some kind
  Viral: clear, watery
  Bacterial: thick, goopy, green, yellow, creamy
  Allergic: white, stringy
Conjunctival Redness

Inflammation/Infection

Treatments:

Bacterial: Antibiotics
Viral: Self-limiting
Allergic: Antihistamines, eliminate the cause

Universal Precautions: Lots of hand washing, discontinue CL wear until resolved, discard current CLs (soft) and lens case.
Limbal Redness

Vascularized Limbal Keratitis

Superior Limbic Keratoconjunctivitis
Limbus
Vascularized Limbal Keratitis

Unusual complication of RPG extended wear.

Characterized as an inflammation of the limbus in association with a process of vascularization.

Progresses in 4 stages with increasing symptoms:

Stage 1: no symptoms. Beginnings of heaping corneal and limbal tissue.

Stage 2: Mild ocular irritation, mild redness, some reduced wear time. Mass gets bigger and becomes vascular. Possible corneal infiltrates.
Limbal Redness

Vascularized Limbal Keratitis
Limbal Redness

Vascularized Limbal Keratitis

Stage 3: mild to moderate discomfort, more redness, reduced wear time, notices a reddish bump on eye. Increased mass, edema, more vessels encroach on the cornea.

Stage 4: considerable discomfort, and light sensitivity, unable to wear lens at all. Significant redness and erosion of the mass.
Vascularized Limbal Keratitis

Treatment:

Stage 1: Discontinue extended wear. If already in daily wear, reduce wear time to 6-8 hours daily. Redesign the lens for more edge lift. AT several times a day.

Stage 2: Stop lens wear for at least 5 days. Redesign lens as above and reduce diameter and/or flatten the base curve.

Stage 3: All of the above with the addition of tissue scrapings to analyze for infectious causes. Topical steroids.

Limbal Redness

Superior Limbic Keratoconjunctivitis
Superior Limbic Keratoconjunctivitis

Contact Lens Related

Inflammatory reaction of cornea in superior limbic region

**Causes:** Allergic reaction to MP solutions or hypoxia

Happens in both eyes equally but not always

**Symptoms:** Stinging or burning at the time of lens insertion, itching, lens awareness
Limbal Redness

Superior Limbic Keratoconjunctivitis  
Contact Lens Related

**Signs:**
- Superior limbic redness
- Superior bulbar conj swelling (chemosis)
- Vessels growing into the cornea (pannus)

**Treatment:**
- Change MP solutions or switch to Hydrogen Peroxide.
CORNEA

Brief Anatomy and Physiology
Problems Associated with the Cornea

Corneal staining:
- Mechanical
- Exposure
- Metabolic
- Toxic
- Allergic
- Infectious
CORNEA

Mechanical

Foreign Body Tracks

Superior Epithelial Arcuate Lesion
CORNEA

Exposure

Inferior Epithelial Arcuate Lesion

3 & 9 Epithelial Staining
CORNEA

Metabolic

Epithelial Plug
CORNEA

Toxic
CORNEA

Allergic
CORNEA

Infectious
Problems Associated with the Cornea

Epithelial Problems

Microcysts / Vacuoles

Edema

Wrinkling
CORNEA

Epithelial Microcysts
CORNEA

Epithelial Edema
CORNEA
Epithelial Wrinkling
Problems Associated with the Cornea

Stromal Problems

Edema

Neovascularization

Keratitis
CORNEA

Stromal Edema
CORNEA

Neovascularization
Problems Associated with the Cornea

Keratitis

Infiltrative

Microbial
CORNEA

Infiltrative Keratitis
Problems Associated with the Cornea

Keratitis

Infiltrative

Microbial
CORNEA

Microbial Keratitis
OTHER

Defective Lenses

Patients
OTHER

Defective Lenses
Defective Lenses
OTHER

Defective Lenses
OTHER

PATIENTS

Using the wrong or expired solutions
Trading contact lenses with other people
Not changing solutions in the lens case (topping off)
Overwear of the lenses
Wearing DW lenses on EW schedule
Not following up with you
Handling lenses with lotions on fingers
Pseudomonas Keratitis  Acanthamoeba Keratitis
What did we learn?
There are lots of potential complications

They have similar symptoms

Ask enough questions
QUESTIONS?
THAT’S ALL THERE IS

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