CONTACT LENS COMPLICATIONS
CLINICAL CONSIDERATIONS

What are the challenges in eliminating complications?

How have silicone hydrogel lenses helped?

What are the most effective treatment strategies?

Industry’s ability to provide us with safe and effective technologies will forever be challenged by our patients’ ability to do some pretty creative things!


1496 patient visits reviewed in a managed care practice

- 39% contact lens related visits involved a complication
- 17.3% punctate keratitis & 11.4% corneal neovascularization

Complications more likely to occur in patients:

- Abusing wear time schedules (ew>3 days)
- Non-complying with proper lens care (non-approved lens care)
Why are we concerned?


Closed eye tear film results in increased:
- Total tear protein
- Secretory IgA
- Serum albumin
- Complement & plasminogen
- Activated pmn's

Why are we concerned?


Closed eye post-lens tear film thickness:
- Baseline = 2.0μ
- 15 minutes closed eye = 1.20μ
- 30 minutes closed eye = <1.0μ

What are our concerns?


- Corneal "homeostasis"
  Limbal stem cells -> migratory basal cells
  -> wing cells -> surface (squamous) cells
- O/N wear diminishes cell shedding
- Paradoxical epithelial thinning

What conditions 'mimic' contact lens related complications?
- Ocular surface disease
- Ocular allergy
- Adenoviral keratoconjunctivitis
- Chlamydial keratoconjunctivitis
- HSV keratoconjunctivitis
- Theodore's superior limbic keratoconjunctivitis
CONTACT LENS PATHOLOGY
CLINICAL CONSIDERATIONS

Clinical case: 16 yom

History
Myopia with daily wear soft contact lenses
Variable lens care with replacement "as needed"
Wears overnight ~ 2 nites per week
Lee 18 months ago
Internet lens purchases

c/o red, painful OD x 1 day

Diagnosis: CLARE OD

Treatment:
- Cycloplege in office
- Steroid-antibiotic gtt q3h
- F/u visit 48 hours

CONTACT LENS PATHOLOGY
CLINICAL CONSIDERATIONS

Case report: 17 yom

History
Myopia with daily wear soft contact lenses
OptiFree Express qhs & monthly replacement
No cold or uri

C/o red, scratchy, teary OD x 4 days

Diagnosis: Mechanical keratitis OD

Treatment:
- Discontinue contact lenses x 2 days
- Lubricate gtt OD q3h

CONTACT LENS PATHOLOGY
CLINICAL CONSIDERATIONS

- ETIOLOGY
  TRAUMA / HYPOXIA / TOXIC / ALLERGY / INFECTION
- CLINICAL COURSE
  DIFFUSE INFILTRATES vs CLARE vs CLPU vs ULCER
- DIAGNOSIS
  HISTORY & CLINICAL PRESENTATION
- LABORATORY
  R/O NON-LENSES RELATED ENTITIES

CONTACT LENS COMPLICATIONS
INFLTRATIVE KERATITIS

What do we really know about infiltrates?

Histology
Can be pmn's, lymphocytes, plasma cells, or macrophages
Can be bacterial colonies

Cell origin – tear film, limbalvasculature, or basal epithelium (?)

Trigger mechanism – epithelial damage results in chemotaxis

Etiology – mechanical, toxic, immunogenic, or infectious
**CONTACT LENS COMPLICATIONS**

**INFILTRATIVE KERATITIS**

Chalmers, Roseman


- 2324 CL patients
- Prevalence of focal infiltrates
- 2.6% of extended wearers
- 1.4% of daily wearers


Annualized incidence of EW related infiltrates
- Asymptomatic infiltrative keratitis (AIK) ~ 1.5%
- Infiltrative keratitis (IK) ~ 1.7%
- Contact lens acute red eye (CLARE) ~ 1.4%
- Contact lens peripheral ulcer (CLPU) ~ 0.8%

**CONTACT LENS COMPLICATIONS**

**INFILTRATIVE KERATITIS**


- Histology of 3 biopsies
- Focal loss of epithelium
- Intact epithelium
- Dense underlying of pmn's

**CONTACT LENS COMPLICATIONS**

**INFILTRATIVE KERATITIS**


N = 11 CLPU's
- Single (<2 mm) lesion
- Full thickness epithelial defect
- Irritation, pain, photophobia, & tearing
- Resolved in 1 week without treatment

Donshik, Suchecki, Ehlers


N = 52 patients with CLPU
85% single infiltrate
15% multiple infiltrates
66% extended wear & 33% daily wear
50% (8/16) culture positive

**CONTACT LENS COMPLICATIONS**

**INFILTRATIVE KERATITIS**

Contact lens peripheral ulcer (CLPU)

- 'Staged' treatment
  - Discontinue CL wear
  - In office cycloplegia
  - Observation with lubrication…or …
  - Steroid-antibiotic gtt … or …
  - Antibiotic gtt
### Contact Lens Complications

#### Infiltrative Keratitis

- **Contact lens acute red eye (CLARE)**
  - Gram (-) microbes lead to CLARE
  - All pseudomonas aeruginosa not equal
  - Fleizig 9th INTL CL CONF (AUSTRALIA) 1996.
  - Pseudomonas aeruginosa trapped between a contact lens and the eye for 2-3 hours can lead to epithelial adherence

**Where do the microorganisms come from?**

#### Contact Lens Acute Red Eye

**Clinical Considerations**

- **CLARE acute phase treatment**
  - Discontinue contact lens wear
  - Implement lubricating gtt or antibiotic-steroid gtt
  - No indication for nsaid gtt

- **CLARE contact lens treatment**
  - Consider lens refit -> discontinue overnight wear
  - Strict lens hygiene & hand hygiene
  - Replace contact lenses more frequently

- N = 48 B&L “O” series extended wearers followed for 48 weeks
- CLARE: 15% of ‘pm’ replacement vs 2% of ‘quarterly’ replacement

#### Contact Lens Complications

**Clinical Considerations**

- **When is it infectious and when is it not?**
  - Compared culture (-) & culture (+) cases
  - Important patient symptoms?
    - ‘dull’ pain & purulent discharge
  - Important examination findings?
    - epithelial defect
    - Infiltrate
    - AC reaction

- SYMPTOMS: NONE = 0 / MILD = 1 / MODERATE = 2 / SEVERE = 3
- LID EDEMA: NONE = 0 / PRESENT = 2
- CONJUNCTIVAL INJECTION: LOCALIZED = 1 / DIFFUSE = 2
- INFILTRATE: ROUND = 1 / IRREGULAR = 3
- INFILTRATE SIZE: <1mm = 1 / 1+mm = 2 / >2mm = 3
- EPITHELIAL DEFECT: YES = 1
- SURROUNDING CORNEA: EDEMA = 1 / DESCEMET’S FOLD = 2
- ENDOTHELIAL DEBRi: YES = 1
- HYPOPYON: YES = 2
- CLPU < 7 / ‘GRAY ZONE’ 8 - 11 / CORNEAL ULCER > 12
CORNEAL INFILTRATES

CLINICAL CONSIDERATIONS

What is the incidence of infiltrates in silicone hydrogel continuous wear?

N = 353 patients wearing Purevision for 30 nite continuous wear
N = 151 patients wearing Purevision for 6 nite extended wear
Annual incidence of corneal infiltrates
2.3% in 6 nite group & 4.5% in 30 nite group

N = 658 patients wearing Night & Day for 30 nite continuous wear
5% patients experienced infiltrative keratitis
42% episoded in the first month
Risk factors: under 29 yoa, smokers, history of CLARE or CLPU

CONTACT LENS COMPLICATIONS

MICROBIAL KERATITIS

Are there predictors for infiltrative keratitis?

- N = 317 Patients @ 19 investigator sites
- Lotrafilcon A cw up to 30 nights
- Infiltrate episodes:
  yr 1 = 16, yr 2 = 7, yr 3 = 4
- Probability of remaining infiltrate free:
  94% in yr 1, 92% in yr 2, 90% in yr 3
- Limbal redness & corneal staining predictive of infiltrative events

What about corneal staining?

- Corneal staining in 75% of all contact lens wearing visits
- Corneal staining in 37.5% of all non-lens wearing visits

"While the incidence of staining in the subject group was 100% and the control group 75%, none of the staining was judged severe enough to affect patient management.

What about corneal staining?

- Increased incidence of staining in Group II and silicone hydrogel lens wearers using Polyhexamethylene biguanide (PHMB) solutions
- N-vinyl pyrolidone (NVP) binds to PHMB adsorbed onto lens surface
- www.staininggrid.org ????
- IER Matrix Study
- Kislan & Hom

Use professional discretion
CONTACT LENS COMPLICATIONS
INFILTRATIVE KERATITIS

Clinical case: 36 yom
Ocular history
- Daily wear qd x 15 hours
- Occasional overnight wear
- Saline qhs & replaces prn (1+ month old)
- Good general health
- C/o: ‘eyes feel scratchy, red, teary, and light sensitive, OD>OS, for 3 days’

Examination
VA cc 20/30+ OD & OS. No adenopathy
SLE - Gr 1 papillae & follicles, gr 1 conjunctival injection, gr 1 spk ou

Impression: Superficial keratitis ou.
Plan: d/c lenses, lubricate gtt qid, cool compresses prn, return 48 hours

CONTACT LENS COMPLICATIONS
INFILTRATIVE KERATITIS

Clinical case: 36 yom - 2 day f/u visit
Ocular history
- C/o ‘eyes worse’
- Using lubricating gtt & cool compresses

Examination
VA cc 20/50 OD & 20/30 OS
(+) Rt side adenopathy
SLE – Gr 1 papillae & follicles, gr 1+ conjunctival injection, gr 2+ spk & infiltrates OD>>OS

Impression: Adenoviral keratoconjunctivitis OU
Plan: Tobradex qid, lubricating gtt qid, cool compress prn, f/u 1 week

CORNEAL INFILTRATES
CLINICAL CONSIDERATIONS

What are the non-lens related differential diagnosis?
- Adenoviral keratoconjunctivitis
- Chlamydial keratoconjunctivitis
- Herpes simplex keratoconjunctivitis

ADENOVIRAL KERATOCONJUNCTIVITIS

Etiology
Adenovirus or picornavirus

Clinical course
Associated uri
3 week duration

DIAGNOSIS
Acute follicles
SPK
Adenopathy

LABORATORY
Most cases of conjunctivitis can be diagnosed on the basis of history and examination. However, in some cases additional diagnostic tests are helpful.

### Viral Diagnostic Tests

Viral cultures are not routinely used to establish a diagnosis. A rapid, in-office immunodiagnostic test using antigen detection is available for Adenovirus conjunctivitis. It is low-cost, highly sensitive and specific, and can be performed by a trained physician, technician, or nurse. The test takes approximately 10 minutes.

Reference 28

### Adenoviral Keratoconjunctivitis

#### Acute ‘paliative’ treatment
- Irrigate & lubricate
- Cool compresses
- Decongestant gtt
- No nsaid gtt

#### Secondary consideration
- Antibiotic-steroid gtt
- Betadine eye wash in office

When to resume contact lens wear?
Check the bulbar conjunctiva for LG staining
Can take a month …. Or longer (Dosso, et al Cornea 28(3):2008)

### Chlamydial Keratoconjunctivitis

- **Etiology**
  - Chlamydia trachomatis
  - Chlamydia pneumoniae

- **Clinical course**
  - UTI involvement & chronic sx

- **Diagnosis**
  - Chronic follicles
  - Corneal infiltrates
  - Adenopathy

- **Laboratory**
  - Cell cultures, immunofluorescence, PCR, serology
CHLAMYDIAL KERATOCONJUNCTIVITIS

CDC Chlamydia Prevalence Monitoring Program (2005 Report)

- 976,445 cases reported to FDA
- 3x number of cases of gonorrhea cases reported
- 1986 – 2005 increased # of cases reported to FDA from 51 per 100,000 to 497 per 100,000
- At risk population:
  - 15 – 19 yof: 2800 per 100,000 per year
  - 20 – 24 yof: 2700 per 100,000 per year

OCULAR TREATMENT

- Discontinue contact lenses
- Irrigation
- AzaSite gtt*

SYSTEMIC TREATMENT

- Oral antibiotics*
- Systemic medicine consult
- Patient education

At risk population:

- Cochereau, et al. BJO 91(667):2007. Azithromycin 1.5% gtt bid x 2 days as effective as single dose oral azithromycin in tx of active trachoma.
- Katusic, et al. AJO 135(4):2003. Azithromycin 1g po as effective as Doxycycline 50mg po bid x 10 d in eradicating c. trachomatis (92% vs 96%)

CHLAMYDIAL KERATOCONJUNCTIVITIS

Adult Inclusion Conjunctivitis ocular co-morbidities

- Adenoviral Keratoconjunctivitis
  - 3% co-existence
- Central Retinal Vein Occlusion
- Stewart, et al AJO 140(1):2005
  - chlamydia induced vascular inflammation & infection
- MALT lymphoma
  - non-responsive follicular conjunctivitis

CONTACT LENS COMPLICATIONS

CLINICAL CONSIDERATIONS

- Clinical case: 27 yom
- Hx: Referred by PCP for dilated pupil OD
c/o redness, itching, & discharge OD x 3 days
- Daily wear soft contact lenses ou qd x 16 hr
- Variable lens care, currently using saline, replaces lenses prn
- Systemic Hx: Excellent. No meds. NKDA
- Familial Hx: Non-contributory
- But ...
  - Current contact lenses > 1 year old
  - Does not have eyeglasses
  - Works in a dental lab with poor air quality
  - Self medicating with Visine Red Eye gtt
CONTACT LENS COMPLICATIONS
CLINICAL CONSIDERATIONS

Clinical case: 27 yom
Externals: VA cc 20/30- OD & 20/25 OS
Pupils - 6.5 mm OD / 4.5 mm OS / NO APD
Mild ptosis / No adenopathy / Eom f & s / CF full to fc ou
SLE - OD Gr 3 GPC, trace conjunctiva inj, trace spk, ac d&q
SLE - OS trace GPC, trace conjunctiva inj, trace spk, ac d&q
Impression: GPC OD>>OS

PLAN:
- Daily disposable scl OU qd
- 1gt Lotemax OD qid
- D/C Visine gtt
- F/U visit 2 weeks

CONTACT LENS COMPLICATIONS
CLINICAL CONSIDERATIONS

Clinical case: 27 yom – 14 day f/u examination
CC: 'Eyes feel great' VA cc OD 20/20
PUPILS - PERRLA / No APD
SLE OD - Gr2 GPC, conjunctiva & cornea clear
SLE OS – Trace GPC, conjunctiva & cornea clear
Impression: Resolving GPC OD >> OS
Plan: Continue daily disposable OU, Lotemax OD bid, F/U 2 weeks

Clinical case: 27 yom – 28 day f/u examination
CC: 'Eyes feel 100%' VA cc OD 20/20
SLE OD - Gr1+GPC, conjunctiva & cornea clear
SLE OS – Lids flat, conjunctiva & cornea clear
Impression: Resolving GPC OU
Plan: Patanol ou qhs prn, DWSCL ou qd, Complete qhs, Replace q 1 mth

CONTACT LENS COMPLICATIONS
CONTACT LENS PAPILLARY CONJUNCTIVITIS

Clinical case: 27 yom – Questions for consideration
- Was the use of daily disposables during treatment appropriate?
- Are topical steroids appropriate in treating GPC?
- Should I have stayed with daily disposables?
- Are silicone hydrogels a better option?
- What about MPS vs peroxide?

CONTACT LENS COMPLICATIONS
PAPILLARY CONJUNCTIVITIS

223 GPC pts / Loteprednol Vs Placebo
1 gtt ou qid x 6 wks
No contact lenses

- Gr 1+ reduction in papillae
  78% Loteprednol
  51% Placebo

- Improvement in Itching
  95% Loteprednol
  81% Placebo
CONTACT LENS COMPLICATIONS
PAPILLARY CONJUNCTIVITIS
Should we have stayed with daily disposable lenses?
N = 47 Patient retrospective review (Replacement q1day -> 12 weeks)
- 21.3% developed GPC
- 4.5% developed GPC when replacing more frequently than q 1 mth
- 36% developed GPC when replacing less frequently than q 2 mth
- Allergies are systemic risk factor for GPC
- Age, sex, lens material, and daily wear time were not risk factors

Are silicone hydrogels better for managing papillary conjunctivitis?
- GPC symptoms in 6% of lotrafilcon & 9% of tefilcon wearers
- Tarsal abnormalities in 21% of lotrafilcon & 31% of tefilcon wearers

CONTACT LENS PATHOLOGY
CLINICAL CONSIDERATIONS
What are the non-lens related differential diagnosis?
- Vernal keratoconjunctivitis
- Pyogenic granuloma
- Molluscum conjunctivitis

VERNAL KERATOCONJUNCTIVITIS
Etiology
Type I & IV hypersensitivity
Clinical course
Acute onset, seasonal flares, & years duration
Diagnosis
Tarsal follicles & limbal involvement
Laboratory
Eosinophilia on scrapings
**VERNAL KERATOCONJUNCTIVITIS**

**Primary treatment**
- Cool compresses
- Irrigation & lubrication
- Topical steroid gtt

**Secondary ‘maintenance’ treatment**
- Mast cell stabilizer & antihistamine
- Cyclosporin emulsion (inhibit IL-2 release)

**Recalcitrant case management**

Pandey & Saini OSN 19(5):2001
Supratarsal injection (38 eyes) of 20mg triamcinolone or 2mg of dexamethasone
- Triamcinolone more effective
- 86% experienced resolution of signs & symptoms

**PYOGENIC GRANULOMA**

**DIFFERENTIAL DIAGNOSIS**

**Etiology**
- Chronic inflammatory response to foreign body

**Clinical course**
- Unilateral

**Diagnosis**
- Isolated pyogenic granuloma

**Treatment**
- Lesion excision

**MOLLUSCUM CONTAGIOSUM**

**DIFFERENTIAL DIAGNOSIS**

**Etiology**
- Molluscum contagiosum

**Clinical course**
- Unilateral (?) presentation
- Waxes & wanes

**Diagnosis**
- Molluscum body
- Follicular conjunctivitis

**Treatment**
- ‘Core’ lesion
- Excise lesion

**CONTACT LENS PATHOLOGY**

**CLINICAL CONSIDERATIONS**

Case report: 48 yof

**Ocular History:**
- Daily wear soft lenses qd x 12 hr
- Various MPS solutions qhs
- Replaces q3mth

**Systemic History:**
- (+) Htn - Vasotec qd
- (+) Thyroid - Synthroid qd
- C/o foreign body, burning, dryness OD > OS x 2 weeks
Case history: 48 yof

**Differential Diagnosis:**
- Contact Lens SLK
- Theodore’s SLK

**Treatment:**
- D/C contact lenses
- Lubricating gtt
- Steroid gtt
- Contact Lens Refit

**Acute Treatment:**
- D/C contact lenses
- Lubricating gtt
- Steroid gtt

**Chronic Treatment:**
- Upper lid punctal occlusion
- Mast cell stabilizer gtt
- Cyclosporin gtt

**Contact Lens Options**
- Alter lens care
- Refit soft lens
- Refit gpcl lens

**What are the non-lens related differential diagnosis?**
- Theodore’s SLK
- Chlamydial keratoconjunctivitis
- Herpes Simplex keratoconjunctivitis
THEODORE SLK
DIFFERENTIAL DIAGNOSIS

Etiology
- Unknown .... Immune vs mechanical

Clinical course
- Bilateral
- Chronic with wax & wane

Diagnosis
- Superior limbal conjunctivitis
- Filamentary keratitis

Laboratory
- r/o thyroid disease

Acute Treatment
- Lubrication & UL punctal occlusion
- Steroid gtt
- Vitamin A ung
- Mast cell stabilizer gtt
- Pressure patch & bandage lens

Chronic treatment
- Cyclosporin gtt
- Autologous serum gtt
- Silver nitrate cautery
- Conjunctival diathermy or cryotherapy
- Conjunctival resection

HERPES SIMPLEX VIRUS KERATOCONJUNCTIVITIS

Etiology
- Herpes simplex type 1 virus

Clinical course
- Primary vs Secondary

Diagnosis
- Lid vesicles
- Epithelial dendrite
- Hypoesthesia

Laboratory
- Culture techniques

Acute Infectious epithelial keratitis
- Antiviral gtt
- Oral antiviral (?)

Immune stromal keratitis
- Antiviral & steroid gtt
- Oral antiviral

Neurotrophic keratopathy
- Oral antiviral & steroid gtt
- Doxycycline (?)

Endothelitis
- Cycloplegia, steroid gtt, oral antiviral, ocular hypertensives
HERPES SIMPLEX VIRUS KERATOCONJUNCTIVITIS

Herpetic eye disease study I
- Prednisolone gtt resolved active stromal disease
- No benefit in Rxing oral acyclovir, antiviral gtt, & steroid gtt for stromal disease

Herpetic eye disease study II
- Oral acyclovir (400mg po qd) reduced future herpetic eye disease by 41%

- Reviewed 97 trials involving 5,102 patients
- Topical vidarabine = trifluridine = acyclovir > idoxuridine
- Interferon monotherapy comparable to antivirals

HERPES SIMPLEX VIRUS KERATOCONJUNCTIVITIS

Oral antivirals in HSV disease?

Indications
- Infectious epithelial keratitis (?)
- Endothelitis
- Immunocompromised patients
- Pediatric patients non-responsive to topical treatment
- Recurrent infectious epithelial keratitis prophylaxis
- Post surgical prophylaxis (PKP, LASIK, etc)

Dosages for prophylaxis
- Acyclovir 400 mg qd
- Valacyclovir 500 mg qd
- Famciclovir 250 mg qd

Dosages for acute treatment
- Acyclovir 400 mg tid x 10 days
- Valacyclovir 1 gm bid x 7 days
- Famciclovir 250 mg tid x 7 days

CONTINUOUS WEAR CONTACT LENSES

Clinical Considerations

Thank you for attending!!

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PAPILLARY CONJUNCTIVITIS

Clinical Considerations

- Etiology
- Hypersensitivity / mechanical
- Clinical course
- Chronic with exacerbation
- Diagnosis
- Tarsal papillae
- Soiled contact lens
- Laboratory
- R/O non-lens related entities
CONTACT LENS COMPLICATIONS
CLINICAL CONSIDERATIONS

HOW CAN WE ELIMINATE COMPLICATIONS?

THE MANY FACES OF EYELID DISEASE …

TX FOR BLEPHARITIS & MGD?
• LID HYGIENE & COMPRESSES
• ANTIBIOTICS
• COMBINATION ANTIBIOTIC gtt
• ORAL AGENTS