CONTACT LENS DISCOMFORT – HOW TO RESOLVE TODAY

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FINANCIAL DISCLOSURES


ABSTRACT

Contact lens wearers abandon wearing at a remarkable annual rate of 12% to 16%, a magnitude where approximately half of all contact lens wearers drop out of contact lenses every four years! The primary reason for dropout is discomfort. This course traces the reasons for discomfort with contact lenses and the journey to resolution by identifying the reasons for discomfort and methods for alleviation. The leading cause of discomfort with contact lenses has been found to be dryness, a non-specific term covering multiple variations and etiologies. This course will provide specific information and direction as to the prime reasons for discomfort, and emphasize how the journey to resolution has provided specific useful treatments that have resulted in dramatic changes in our practice. The course will summarize the underlying research relevant to resolving contact lens discomfort including that of many researchers and Korb’s personal research. One goal is teach the principles that will govern the future of contact lens and dry eye treatment and management. A second goal is to provide take home points for the clinician to immediately implement in their contact lens and dry eye practice.

WHY ARE CONTACT LENSES UNCOMFORTABLE?

- Is “DRYNESS” the primary reason for contact lens intolerance & patient’s terminating CL wearing?
- DRYNESS is the primary reason – in USA annual dropout rate is 16%
- Are there other significant factors?

INTERNATIONAL WORKSHOP ON CONTACT LENS DISCOMFORT – 2013

- 79 experts from around the world met and worked for 18 months
- Analysis of all peer reviewed publications
- Report to Professions in IOVS – September 2013 – 203 pages
- Many important areas – key points include
  - Etiologic considerations, including interactions with the ocular surface and tear film, need better models that will translate to novel products
  - Clinicians must be diligent in working with patients with CLD
  - Important that prevention and management of CLD starts early, even before the onset of symptoms, to improve long-term prognosis
WHAT FACTORS HAVE WE LEARNED ARE NECESSARY FOR CONTACT LENS COMFORT?

Contact lens factors
Tear film = “dryness”
Meibomian glands
Blinking
Immunology
Friction & Lubricity
Lid Wiper
Excess Evaporation
Evaporative Stress
Hyperalgesia

LENS EDGES – PROFILE DESIGN – THICKNESS
- A starting point – an area solved!
- Not solved with scleral lenses

OXYGEN – A LONG JOURNEY BUT SOLVED!

Take home for clinician – The cause of symptoms is rarely oxygen deprivation.

GPC – WE FINALLY DISCOVERED THE ROLE OF THE PALBEBRAL CONJUNCTIVA
- The columnar epithelium is not designed to be rubbed.
  A two step pathogenesis
  1. Chronic trauma induces inflammation & prepares the tissue for immune sensitization.
  2. Exposure to antigens exacerbates immune reaction with resultant GPC.
- Treatment of GPC – Increase depth of Kessing’s space, decrease battering of columnar epithelium, transfer contact to lid wiper.
- One Day Lenses – minimizes exposure to antigens and immunologic challenge with resultant GPC.
- Lens edge designs improved.
- GPC & the palbebral conjunctiva under control – not solved.

Take home for clinician – Itching, mucus, and secretion suggest palpebral response and suggest changing lens material and hopefully lens edge-profile.
IMMUNOLOGY – UNDER CONTROL – NOT SOLVED

Take home for clinician – Hypersensitivity and ocular responses suggest immunologic response. Change to dailies, eliminate potential allergens and improve tear film.

HUMIDITY – THE ROLE OF HUMIDITY IN CL DISCOMFORT?

• 75% - 99% of the total population experiencing discomfort with soft contact lenses can obtain total relief in 100% humidity. (Korb, Adv Exp Med Biol, 1994)
• Why – the tear film of many individuals is inadequate to support the increased evaporation rate encountered with contact lens wear.
• THE PRIMARY CAUSE OF CL DISCOMFORT IS EVAPORATION
  Evaporative dry eye & CL evaporative dry eye
• PRIMARY MECHANISMS
  Lid wiper and lid wiper epitheliopathy
  Tear film desiccating effects and lubricity
• RESULT – Contact lens Induced dryness and sequelae
• Treatments

Take home for clinician – The ambient humidity is a major factor in contact lens discomfort

LID WIPER EPITHELIOPATHY – LWE

• Any compromise to the lid wiper’s epithelia and/or their protective coatings.
• Trauma to the lid wiper results in immediate sensation with continued trauma, exacerbation to lid wiper epitheliopathy and symptoms increase.
• Lid wiper – a critical new histological finding
• Goblets cells isolated or in clusters, arranged towards the most superficial lid wiper layers.
  • Presumably for lubrication during blinking, but the mucus also attaches aqueous
  • Mucus provides lubrication and binds water.
  • Establishes that aqueous, and not lipid is the lubricant between the lid wiper and the ocular surfaces.
  • Boundary vs. hydrodynamic lubrication
  • Treatment of LWE requires hydrodynamic lubrication

Take home for clinician – Lid Wiper is the sentinel for CL sensation

• A hydrodynamic lubricant is necessary
• Aqueous is the lubricant between the ocular surfaces and the lid wipe. Lubricity and lubricious contact lenses are critical factors
EVAPORATION – FROM THE EYE & FROM THE CL
- Evaporation is the primary cause of > 90% of dry eye for non-contact lens wearers
- Contact lenses increase evaporation with sequelae – discomfort and desiccating phenomena

Excess evaporation results in tear film thinning and two routes for CL discomfort

1. TF thinning results in inadequate lubrication – Not Obvious
   - Inadequate lubrication of the Lid Wiper leads to sheer stress
   - Sensation & discomfort
   - LWE, inflammation and Triple Response of Lewis

2. Tear film desiccating effects lead to corneal nonceptor stimulation
   - Burning – tearing
   - Complex sequelae

Take home for clinician – Be aware of humidity as an indicator of discomfort. Consider the clinical use of the goggle test. Consider inserting lens with an oil-in-water eyedrop and using PRN.

MEIBOMIAN GLANDS – HOW IMPORTANT ARE THEY?
- The MGs make the lipid that controls and minimizes evaporation.
- The following statement is an important take home for clinician – “Meibomian gland dysfunction (MGD) may well be the leading cause of dry eye disease throughout the world”
- MGD is ubiquitous, chronic and progressive
  - Leads to CL discomfort and gland dropout
- Meibomian gland dysfunction and contact lens intolerance
- Non-obvious obstructive MGD
- Imaging of meibomian glands – meibography

Both the lens and the meibomian glands have a remarkable impact upon “dryness” and discomfort

Take home for clinician – The Meibomian glands are a leading, if not the primary, cause of contact lens discomfort

MGE – MEIBOMIAN GLAND FUNCTION EVALUATION
- Important for evaluation of contact lens status
- The only method to assess meibomian gland functionality in a controlled manner.

Take home for clinician – A critical procedure to master
TREATMENT

- Drops – oil-in-water emulsions vs. non lipid eyedrops
- Warm compresses
- Expression – scrubs – lid hygiene
- New methods of treatment of MGD
  - LipiFlow
  - Intense Pulsed Light
  - Probing
- Early treatment is necessary to prevent progression of the cascade

CONTACT LENS MATERIALS – SURFACE CHARACTERISTICS

- All manufacturers have been working diligently to improve CL comfort, emphasizing surface properties and wetting.
- A plethora of surface treatments have been used to attempt to solve discomfort.
- Lenses reported to improve surface properties and wetting
  - Acuvue Oasys with Hydraclear Plus – Vistakon
  - Air Optix Aqua and Night and Day Aqua – Alcon
  - Biofinity – Cooper
  - 1-Day Acuvue Moist – Vistakon
  - Dailies Total 1 – Alcon

- What would be the properties of the ideal contact lens?
  - Oxygen – 50-100 Dk
  - Lubricity – surface properties
  - Modulus
    - Lens edge and periphery
    - Center thickness

TREATMENT OF CONTACT LENS DISCOMFORT

- Evaporative stress and MGD, specifically hypossecretion states, are either the root cause or a significant cause of the majority of contact lens discomfort and ocular surface and dry eye disease.
- Palliative treatment
  - Eye drops – lipid eye drops preferred
  - Insert lens with lipid eye drop off label
    - Insert lipid drop as an insertion drop filling the bowl of the lens
  - Usual methods – solutions
- Tear film treatment
  - Treat existing anterior segment conditions
  - Meibomian Gland treatment – remember – “Meibomian gland dysfunction (MGD) may well be the leading cause of dry eye disease throughout the world”
  - Other treatments
**SUMMARY**

- The primary cause of contact lens discomfort is excess evaporation.

- An inadequate lipid layer, which is usually the result of obstructive MGD, compromises the tear film leading to contact lens discomfort.

- The lid wiper is the sentinel for sensation and discomfort. The sequelae of evaporation leads to an inadequate tear film for maintaining a wettable anterior CL surface and providing hydrodynamic lubrication for the lid wiper.

- Excess evaporation from the contact lens surface has many sequelae, and leads to desiccation stress of the ocular surface and inadequate lubrication for the lid wiper.

- Resolution and treatment of CL discomfort requires a combination of two approaches and significant progress has been made in both areas.

  1. Meibomian gland functionality – improve – restore
     - Warm compresses, manual expression, debridement, LipiFlow

  2. Lens material – improve to better mimic the normal ocular surface and improve tear film
     - New contact lenses have made remarkable progress when compared to the first silicon hydrogel lens introduced in the USA in 2001.