

**WOO UNIVERSITY**

# Increasing Co-Management Comfort of Corneal Crosslinking

Kent L. Wellish, MD  
Stephanie L. Woo, OD

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**WOO UNIVERSITY**

## WELCOME!

Host: Dr. Stephanie Woo

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**WELCOME!**

This event is supported with an unrestricted educational grant from Glaukos, Art Optical and Wellish Vision Institute

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- For a 1.5 hour webinar attendees must be online for a minimum of 75 minutes
- For a COPE certificate, please fill out the survey link in the chat. Also, the survey link will appear when the webinar ends.
- CE certificates will be delivered by email and sent to ARBO with OE tracker numbers
- Ask questions using the zoom on-screen floating panel

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**In person attendees**

- Please keep voices and noise to a minimum
- Please see Taylor if you have need anything during the event or after the event

Taylor Twete  
Woo University Administrator

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**Increasing Co-Management Comfort for Corneal Collagen Crosslinking (CXL)**  
Co-Management Update May 2021

Kent L. Wellish, M.D.  
Stephanie Woo, O.D., FAAO, FSLs

Clinical Faculty, SCCO & Western College of Optometry  
Clinical Directors, Wellish Vision Institute

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**Co-management Guidelines for Corneal Collagen Crosslinking (CXL)**  
**Lessons From 9 Years of CXL Experience**

**FDA Approved since 2016**  
 Co-Management Update May 2021


Kent L. Wellich, M.D.      Tigran Kostanyan, M.D.  
 Eissa Hanna, M.D.      Isaac Ortiz, O.D.  
 K.C. McCandless, O.D.      William May, M.D.  
 Matthew Chiapa, O.D.

Clinical Faculty, SCCO & Western University  
 Clinical Directors, Wellich Vision Institute

Top 100 Doctor Las Vegas      Wellich Vision Institute

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**Co-management Guidelines for Corneal Collagen Crosslinking (CXL)**  
 Shaping the Future



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This Course reviews for the Primary Eye Care Practitioner

**Advanced Concepts in the Co-management of Corneal Collagen Crosslinking (CXL)**



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**Course Learning Objectives**

- To review the pre- and post-op care for patients being treated with Corneal Collagen Crosslinking (CXL)
- To share clinical pearls for targeted diagnosis and treatment, including Indications
- To review Evaluation by the Primary Eye Care Physician

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**Course Learning Objectives**

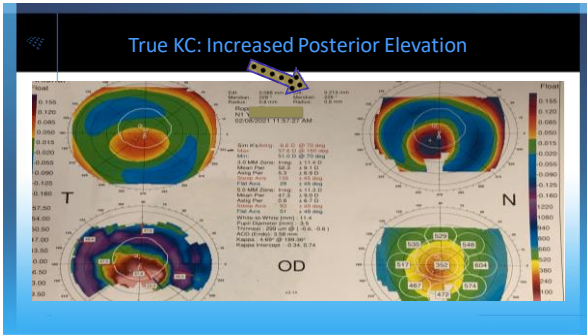
- To review Evaluation for Corneal Collagen Crosslinking (CXL)
- Role of the OD
- Role of the Consulting Surgeon
- Case Study Reviews
- To provide an opportunity for Questions and Answers

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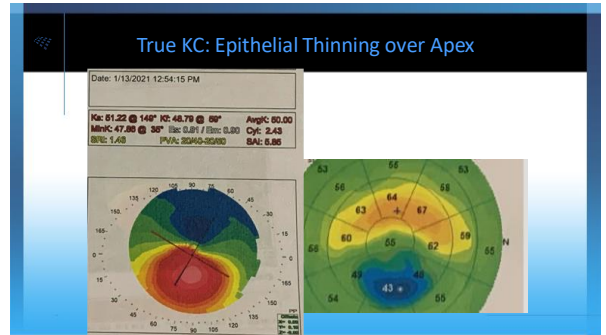
**Keratoconus vs. Pseudo KC**

- KC
  - Elevated posterior cornea
  - Epithelial Thinning Over Apex of Cone
- Pseudo KC
  - No elevation of Posterior Cornea
  - Epithelial Thickening of Apex of Cornea

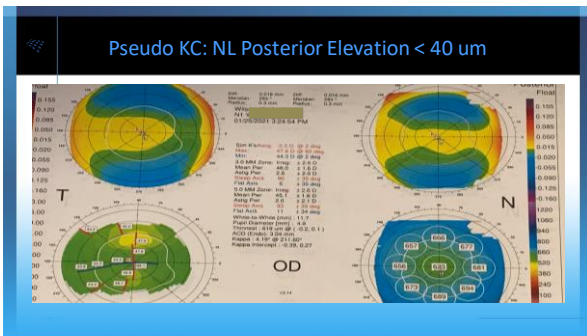
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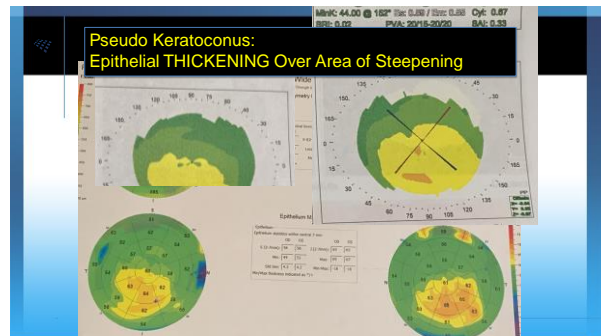
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**Before CXL & Intacs We Were Taught**


- Keratoconus was a progressive condition that could not be treated or halted, other than with:
  - No eye rubbing
  - Allergy drops
  - Glasses, CTLs
  - Lamellar graft
  - PKP



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  - Glasses, CTLs
  - Lamellar graft
  - **PKP**



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### Before CXL & Intacs We Were Taught

- Invariably some patients would progress on to a painful condition called hydrops, and then need a corneal transplant



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**Before CXL & Intacs We Were Taught**


- While PKP is the most successful transplant, “surgery leads to more surgery”:
  - Cataracts from steroid drops



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**Before CXL & Intacs We Were Taught**

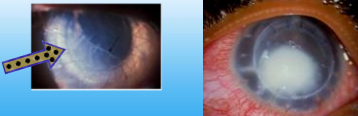
- While PKP is the most successful transplant, “surgery leads to more surgery”:
  - Cataracts from steroid drops
  - Glaucoma surgeries from steroids raising IOP



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**Before CXL & Intacs We Were Taught**

- While PKP is the most successful transplant, “surgery leads to more surgery”:
  - Cataracts from steroid drops
  - Glaucoma surgeries from steroids raising IOP
  - Repeat PKP from Graft rejection



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**Before CXL & Intacs We Were Taught**

- While PKP is the most successful transplant, “surgery leads to more surgery”:
  - Cataracts from steroid drops
  - Glaucoma surgeries from steroids raising IOP
  - Repeat PKP from infections, etc.



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**Before CXL & Intacs We Were Taught**

- While PKP is the most successful transplant, “surgery leads to more surgery”:
  - Cataracts from steroid drops
  - Glaucoma surgeries from steroids raising IOP
  - Repeat PKP from Graft rejection, infections, etc.
  - Multiple visits to the eye doctor for the rest of their life

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**Before CXL & Intacs We Were Taught**

- That’s Just the Way it Is



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### Then Intacs Came Along in 1999

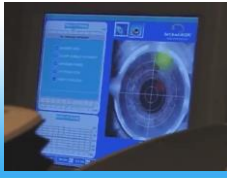
- For the first time we could stabilize & partially even reverse progressive keratoconus & ectasia



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### Then Intacs Came Along in 1999

- We at Wellish Vision taught the national course & wet lab for Intacs almost 10 years ago & have more experience with Intacs & CXL than any other practice in Nevada



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### CXL Was Developed in 1998 Dresden Protocol (10 yrs before iPhone1)

- Doctors in Europe & around the world reported great success in stabilizing progressive KC & ectasia, since 1998
- Success also reported in treating infectious keratitis
- Several FDA studies were started in 2008 & completed with no approval, so patients had to travel out of town or out of the country while the FDA took time to review before finally approving in 2016

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### Then CXL Was Developed in 1998 Dresden Protocol → LV Use in 2012

- In 2012 Wellish Vision Institute was one of 90 sites around the country invited to serve as an FDA Study site for the Avedro KXL treatment for KC & Corneal Ectasia



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### CXL Performed since 1998: WVI a Leader in FDA Trials

- Wellish Vision Institute was one of the few sites to have a very high rate of f/u
- our **data** and **successful outcomes** were instrumental in the FDA's decision to approve CXL here in the U.S. in July 2016



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### Lessons Learned from Intacs & CXL

- No excuse just watching KC & Ectasia worsen when we now have great treatments



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### Lessons Learned from Intacs & CXL After 9 Years of Experience & > 300 treated

- Keys to Success: Follow the Science -> DEWS2
- **Aggressive Dx & Tx of Dry Eye / MGD BEFORE CXL is critical to attaining good outcomes – LipiView, Lipiflow & IPL are important parts of this approach, along with the overall assessment and treatment plan outlined in the WVI Dry Eye Passport**



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### Lessons Learned from Intacs & CXL After 9 Years of Experience & > 300 treated

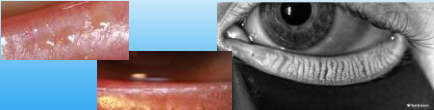
- **The Vast Majority of CXL Patients will Never Need IPL, Lipiflow, or Anything More than Stage 1 or 2 DEWS 2 Treatments**
  - AFTs, Lid Hygiene, Omega-3's, maybe Lacrimal Plugs
  - Possibly Topical Cyclosporin
- 5-10% May Need IPL, Lipiflow, Serum Tears, and/or Amniotic Membrane Tx to Treat the Pre-Existing or Resulting Dry Eye
- Well Known: All Corneal Procedures Can Cause or Worsen Dry Eye



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### Lessons Learned from Intacs & CXL After 9 Years of Experience & > 300 treated

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### Dry Eye Passport Part 1

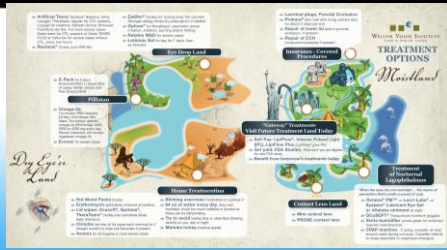


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### Dry Eye Passport Part 2



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### Lessons Learned from Intacs & CXL

- No excuse just watching KC & Ectasia worsen when we now have great treatments
- BUT, Aggressive Dx & Tx of Dry Eye / MGD BEFORE Tx is critical to attaining good outcomes – LipiView, Lipiflow & IPL are important parts of this approach, along with the overall assessment and treatment plan outlined in the WVI Dry Eye Passport**

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### Lessons Learned from Intacs & CXL

- No excuse just watching KC & Ectasia worsen when we now have great treatments
- Aggressive Dx & Tx of Dry Eye / MGD BEFORE Tx is critical to attaining good outcomes – LipiView, Lipiflow & IPL are important parts of this approach, along with the overall assessment and treatment plan outlined in the WVI Dry Eye Passport & DEWS 2**

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### Lesson: 5 Minute Fluorescein Test

Many cases of Dry Eye are missed because of Delayed Corneal Staining:  
No Visible Staining Immediately After Fluorescein Instilled

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### Lesson: 5 Minute Fluorescein Test

Many Cases of Clinically Significant Dry Eye are Missed Unless this Test is Rigorously Performed Pre-op

Corneal Staining noted 5 Minutes After Fluorescein Instilled

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### Lesson: 5 Minute Fluorescein Test

Many Cases of Clinically Significant Dry Eye are Missed Unless this Test is Rigorously Performed Pre-op

This Test is Above & Beyond the "Standard of Care", but... Failure to Perform this Test Results in Delayed Epith Healing → Corneal Haze & Decreased BSCVA

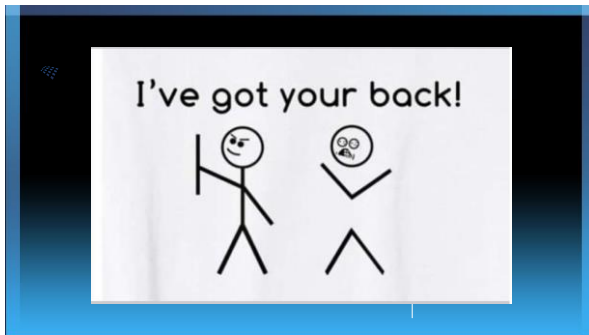
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### Why Is All This Dry Eye Testing, Education & Treatment so Important?

Because It lets our patients know something even more important than just doing their CXL for KC...

... It lets our patients know that...literally...

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FDA Avedro Study - Lessons Learned:  
8-10% of Patients Lost  $\geq$  1 Line of BSCVA

- In the FDA Avedro study, although the results were good enough to gain approval, we felt that loss of BSCVA was an unexpected disappointment
- In looking at our data, we saw that this occurred in those with delayed epithelial healing

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FDA Avedro Study - Lessons Learned:  
8-10% of Patients Lost  $\geq$  1 Line of BSCVA

- These patients were not cleared for surgery if they had pre-existing moderate to severe dry eye
  - unless adequately treated pre-op with no fluorescein staining on pre-op exam,
  - clearly the FDA protocol missed something, and therefore so did we...

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FDA Avedro Study - Lessons Learned:  
8-10% of Patients Lost  $\geq$  1 Line of BSCVA

- Shortly after starting this FDA study in 2012, we were invited to be an FDA study site for a Dry Eye treatment that was later called Xiidra
- In the Xiidra study, the protocol required judging corneal staining immediately after instilling fluorescein and then again 5 minutes after instilling fluorescein

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FDA Avedro Study - Lessons Learned:  
8-10% of Patients Lost  $\geq$  1 Line of BSCVA

- We were surprised at how often patients with little to no staining immediately after instilling fluorescein developed *very significant staining* after 5 minutes, even though we had them keep their eyes closed for the 5 minutes

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FDA Avedro Study - Lessons Learned:  
8-10% of Patients Lost  $\geq$  1 Line of BSCVA

- It's easy to see how this undetected staining could lead to delayed epithelial healing and hence corneal haze & decreased BSCVA

Delayed Corneal Epithelial Healing Leads to Increased Risk of Corneal Haze → Decreased BSCVA

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**FDA Avedro Study - Lessons Learned:  
8-10% of Patients Lost >= 1 Line of BSCVA**

- We theorized that if we added a “5 minute fluorescein test” to our pre-op clearance, and followed the DEW2 Study recommendations in order to achieve complete lack of corneal staining in the area to be debrided and treated, **this could prevent the loss of BSCVA**

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**FDA Avedro Study - Lessons Learned:  
8-10% of Patients Lost >= 1 Line of BSCVA**

- Today, after treating over 300 Eyes with our protocol (and a few other surgical pearls I developed & adopted based on my observations), we do not have a single patient with any loss of BSCVA.
- If there are 1 or 2 we don't know about, we are still at <1% vs. 8-10% in the FDA Trial, following the “on label” FDA Protocol

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**FDA Avedro Study - Lessons Learned:  
8-10% of Patients Lost >= 1 Line of BSCVA**

- We have more than a few who actually gained one or more lines of BSCVA!
- This is especially gratifying when we consider that all treated patients were actually worsening & unstable prior to their CXL

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**WHAT IS CXL?**

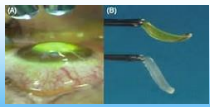
- The cornea is strengthened by application of riboflavin (vitamin B2) followed by treatment with UVA light



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**WHAT IS CXL?**

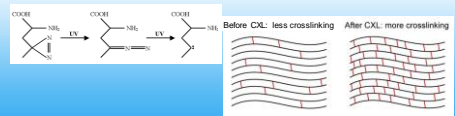
- Numerous studies have shown that treatment can increase the rigidity of human corneas 300% or more



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**WHAT IS CXL?**

- Biomechanical rigidity and biochemical resistance of the cornea is increased through:
  - Instantaneous formation of covalent bonds (crosslinks) and inhibition of collagenase



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### WHAT IS CXL?

- Biomechanical rigidity and biochemical resistance of the cornea is increased through:
  - Long-term stabilizing effect by **synthesis of new collagen** with different structure and resistance

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### PURPOSE of CXL?

- To halt progressive corneal ectasia
- Prevent disease progression through corneal stabilization
  - Early disease – prevent necessity for rigid contact lens wear → glasses only
  - Moderate disease with rigid lens wear → stabilizes the cornea to prevent the need for corneal transplantation

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### PATIENT SELECTION: Unstable KC

- In general, 14 years or older (FDA Approval) with the ability to cooperate during treatment (we have treated as young as 10 yrs old off label)
- Keratoconus, Progressive corneal ectasia
- Increase in spherical and/or cylindrical component of refraction

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### PATIENT SELECTION: Unstable KC

- Topography showing alteration in corneal shape and disease progression
- Significant corneal scarring and/or the inability for RGPs to provide reasonable vision are indications the patient cannot be successfully visually rehabilitated with CXL alone, since CXL does not reverse the steepness nearly as well as Intacs

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### PATIENT SELECTION

- Referral form: Include historic & current MR
- Ks, Topography if available, any evidence of changes

Corneal Crosslinking / Intacs Evaluation & Referral for Treatment

PERSON'S SECTION	REFERRING PEDIATRIAN
Name: _____	Name: _____
Address: _____	Address: _____
Phone: _____	Phone: _____
Date of birth: _____	Date of birth: _____

Reason for Referral:  Keratoconus  Progressive ectasia  Other: \_\_\_\_\_

Medical History

Indications	Contraindications
<ul style="list-style-type: none"> <li>• Age &gt; 14 years or 10 years or older with the ability to cooperate during treatment</li> <li>• Progressive corneal ectasia</li> <li>• Keratoconus or other form of corneal ectasia</li> <li>• Unstable astigmatism</li> <li>• Decrease in best corrected visual acuity</li> <li>• Progressive myopia</li> <li>• Significant dry eye</li> <li>• Significant ocular surface disease</li> <li>• Significant ocular inflammation</li> </ul>	<ul style="list-style-type: none"> <li>• Pregnancy</li> <li>• Bleeding disorders</li> <li>• Current or recent use of systemic or topical corticosteroids</li> <li>• Current or recent use of systemic or topical retinoids</li> <li>• Significant ocular infection</li> <li>• Significant ocular trauma</li> <li>• Significant ocular surgery</li> <li>• History of laser eye surgery</li> </ul>

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### EVALUATION FOR TREATMENT

- Topography with CTLs left out 2 weeks prior
- K readings
- Manifest refraction with BCVA
- Pachymetry (want pach >= 400 um at time of uv Tx → now able to increase pach with hypotonic riboflavin drops and/or SCL)
- Please send refraction & BCVA with glasses & w/ RGP lenses on referral
- Comprehensive eye evaluation

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### CONTRAINDICATIONS

- Pachymetry less than 400 microns, with some exceptions
- Prior herpetic infection
- Current infection
- History of poor epithelial wound healing
- Severe ocular surface disease

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### CONTRAINDICATIONS

- Autoimmune disorders
- Significant corneal scarring
- RGPs no longer provide functional vision or otherwise contact lens intolerant
- Severe dry eye
- Unrealistic expectations

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### PROPER PREPARATION PREVENTS POOR PERFORMANCE

- Identify & Treat Dry Eye Pre-op to point of No Stain on 5 Minute Fluorescein Test
- No Vitamin C from 1 week pre-op until 1 day post-op
- Patient needs to be prepared to miss work, stay home in clean environment for 4-7 days post-op to avoid delay in epithelial healing

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### TREATMENT

- Assess and Decide Tx Based on Severity
  - Mild KC, glasses and/or CTL tolerant → CXL
  - Moderate KC, CTL intolerant → Intacs + CXL
- Patient Education & Informed Consent
- Day of Procedure
  - Remove Corneal Epithelium → (9mm = FDA "on label" vs "Base of Cone")
  - Saturate Cornea w/ Riboflavin → UV Tx
  - Post-op Meds & BSCL

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### TREATMENT: Step by Step

**Step 1:**

**Remove Corneal Epithelium**



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### Corneal Epithelium Debrided

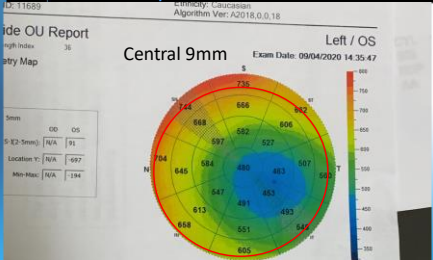
Identify the Base of the Cone vs Central 9mm

Side OU Report

Exam Date: 09/04/2020 14:35:47

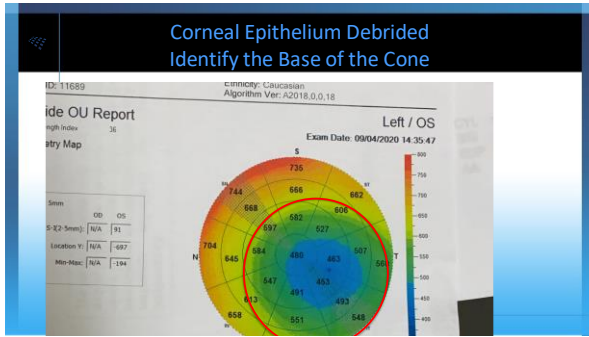
Central 9mm

Left / OS

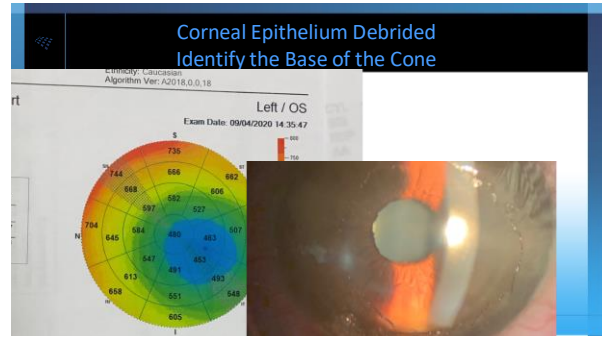


OD	OS
Right Index	36
Left Index	36
Sty Map	
Exam	09/04/2020 14:35:47
Q (2-5mm)	N/A   91
Location T	N/A   -597
Min-Max	N/A   -194

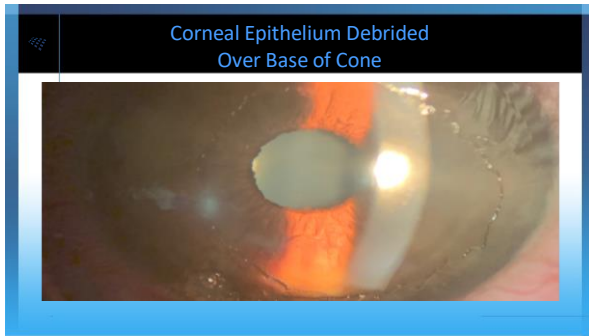
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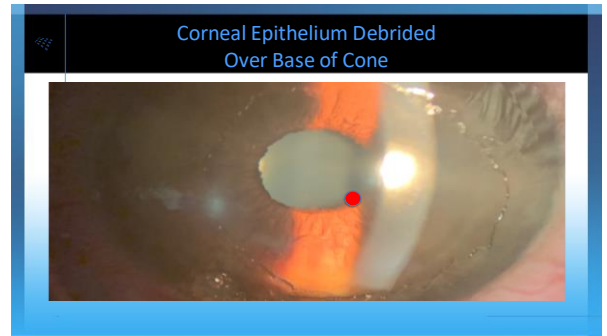
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### TREATMENT: Step by Step

The picture can't be displayed.

**Immediate Post-op Exam at Slit Lamp**

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### DISCHARGE INSTRUCTIONS

- Mild steroid drops like PRK post-op
  - FML, Flarex, Lotemax, or Invelty
  - qid x 1 month, taper q month
- 4<sup>th</sup> Generation Fluoroquinolone (Moxifloxacin) to operative eye – q2h x 1 day, then tid until re-epithelialized
- Non-steroidal anti-inflammatory: Prolensa – 1gtt qd until epithelialized following procedure

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### DISCHARGE INSTRUCTIONS

- PAIN PREVENTION:
  - > Refrigerated Non-preserved AFTs q 30-60 min for 1<sup>st</sup> day, then as needed for next 3-4 days
  - > Frozen Bag of Corn or Peas over the closed eyelids under the goggles
  - > OTC Tylenol + Oral NSAID q 6 hrs, prn
  - > Used to Rx Hydrocodone as needed for “pain” but with increasing Opioid Abuse protocols now just recommending Benadryl as need if above pain meds not enough

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### DISCHARGE INSTRUCTIONS

- 100% UV Protection for 1<sup>st</sup> 6 months Post-op

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### DISCHARGE INSTRUCTIONS

- Frequent use of preservative free artificial tears
- Patients are educated to avoid exposure to sunlight for a minimum of 24 hours
- If riboflavin is still evident during the 1 day post-op slit lamp exam (yellow tinged corneal tissue), UV protection should be continued
- Patients are instructed to be out of their contact lenses for 2 weeks post-operatively
- Vitamin C in foods OK starting 1 day post-op

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### RECOVERY

- Similar to PRK
- Topical NSAID and prescriptive oral pain medication prescribed to improve comfort

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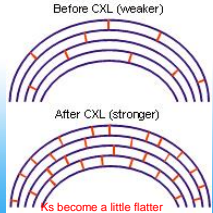
### POST-OPERATIVE CARE

- 1 day
  - VA, slit lamp evaluation
- 3-5 days
  - VA, slit lamp evaluation, BCL removal if epithelialized
  - If not epithelialized, consider amniotic membrane tissue
- 1 month
  - VA, AR, IOP, slit lamp evaluation, topography
  - Expect temporary increased Corneal Steepening and Decreased BSCVA at 1 month post-op due to corneal healing

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### KXL Post-Operative Care

- Earliest time to **be fit with glasses or contact lens** is after the **1 month post op** visit.
- May want to wait until 3 months as the cornea continues to change.
- After 1-6 months post-op cornea starts to flatten as the epithelial layer becomes more compact



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### POST-OPERATIVE CARE

- 3 months
  - VA, AR, IOP, slit lamp evaluation, topography
- 6 months
  - VA, AR, MR, IOP, slit lamp evaluation, topography
- 12 months
  - VA, AR, MR, IOP, slit lamp evaluation, topography including Kmax
  - Additional treatment may be considered if continued progression is evident on topography. Studies show previous CXL does not reduce effect of follow-up procedures.

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### HEALING

- Maximum keratometry and visual acuity is typically worsened at 1 month followed by improvement and stabilization after 3-6 months
- There is **initial epithelial thinning, stromal edema and keratocyte apoptosis** on **confocal microscopy** that explains the **initial worsening at 4-6 weeks**

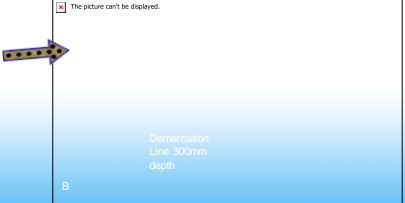
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### HEALING

- Improvement after 3 months is demonstrated by epithelial thickening, decreased edema and collagen compaction
- Demarcation line

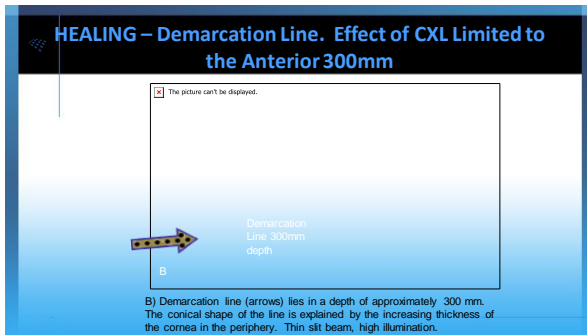
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### HEALING – Demarcation Line. Effect of CXL Limited to the Anterior 300µm

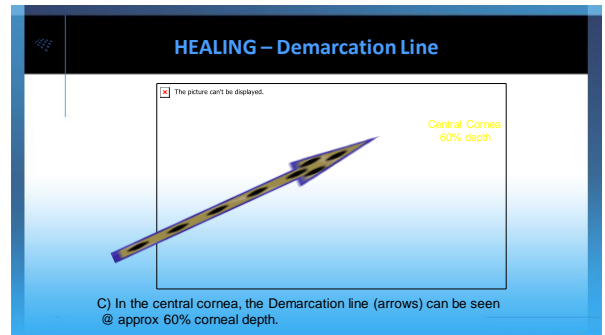


B) Demarcation line (arrows) lies in a depth of approximately 300 µm. The conical shape of the line is explained by the increasing thickness of the cornea in the periphery. Thin slit beam, high illumination.

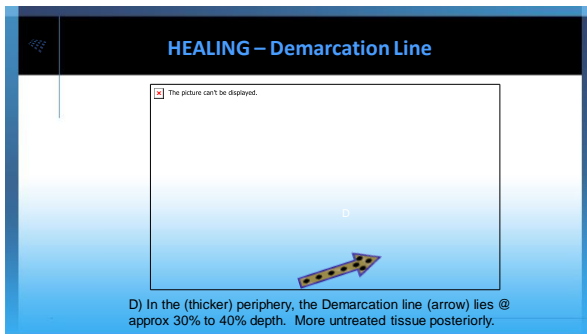
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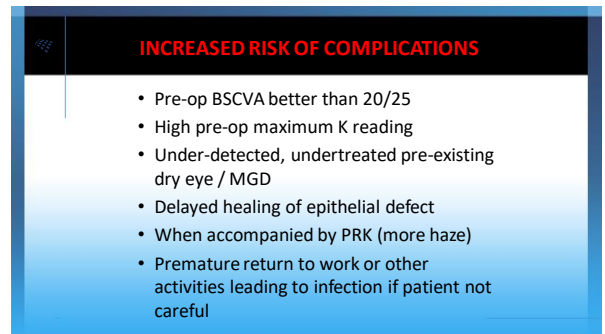
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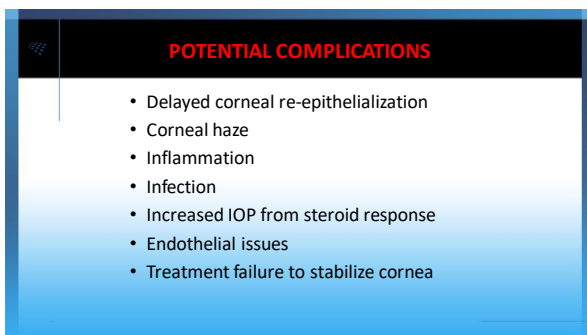
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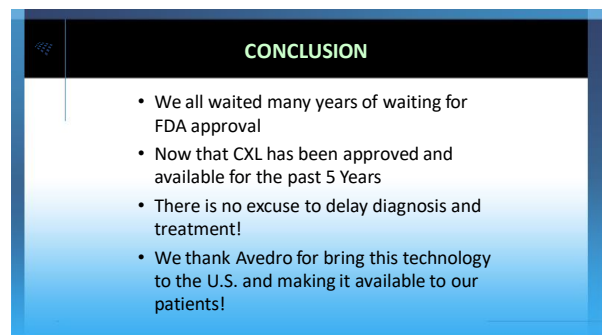
111



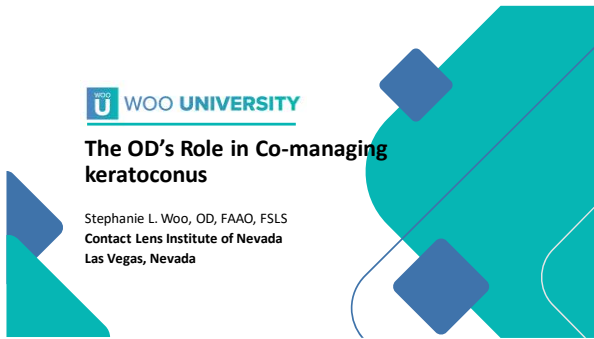
112



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**WOO UNIVERSITY**

## The OD's Role in Co-managing keratoconus

Stephanie L. Woo, OD, FAAO, FSLs  
**Contact Lens Institute of Nevada**  
 Las Vegas, Nevada

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### Financial disclosures

- |                          |                                |
|--------------------------|--------------------------------|
| Alcon                    | GPLI                           |
| Art Optical              | STARLE program                 |
| Bausch and Lomb          | Scleral Lens Education Society |
| Blanchard Contact Lenses | Contamac                       |
| Essilor Contacts         | Synergeyes                     |
| X-cel Contacts           | Triad ophthalmics              |
| Specialeyes              | Ophthalmogix                   |
| Biotissue                | ABB                            |
| Katena                   | Ovitz                          |
| Visionary optics         | Tarsus                         |
| Shire                    | Woo University                 |
| Avellino                 | Kala                           |

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### Dr. Stephanie Woo

- Graduated from SCCO
- Cornea/Contact Lens Residency at UMSL
- Owned 3 private practices in AZ and CA (traditional optometric care)
- Opened Contact Lens Institute of Nevada in January 2020 – A clinic dedicated entirely to the needs of specialty contact lens patients
- Founder: Woo University



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### Managing a keratoconus patient

- Initial diagnosis and explanation of disease
- Examination and special testing
- Treatment Options
- Managing a complex fitting process from behind the scenes
  - Contact Lens Options
  - Medical contact lens agreements
  - Patient communication



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### Signs/Symptoms

- Decreased vision
- Distorted/halos/glare
- Large changes in Rx (especially cyl)
- BCVA not 20/20
- Scissoring on retinoscopy
- Thinning/Striae viewed with slit lamp
- Steep K's
- But I don't have any fancy equipment?



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### NEW! Genetic test for keratoconus NOW AVAILABLE!



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Avellino launched AvaGen

AvaGen checks genetic risk factors for corneal dystrophies such as keratoconus

Objective polygenic keratoconus risk score - data based on multiple gene clusters that have a high correlation with keratoconus -to inform early and accurate management decisions



### Good candidates

- Patient with a known diagnosis of keratoconus that wishes to understand family member risk
- Child with unstable or suspicious refraction
- Suspicious topographies
- Patient interested in LASIK/PRK with suspicious corneal or refractive findings

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### Newly Diagnosed Patient

- Explanation of the disease
- Review progressive nature
- Review treatment options
- Provide patient resources
- Answer questions

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### Explaining Keratoconus

- The front part of your eye is covered with a clear membrane called the cornea. Normally, the cornea is a spherical shape like a marble, but the shape of your cornea is now more like a cone. This new shape can cause your vision to become blurry and distorted.

\*Image borrowed from aao.org

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### Explaining Prognosis

- Keratoconus is a progressive condition, meaning that it will get worse and worse over time.
- If you don't do anything, your vision will continue to decline, and you will be at risk for other eye events.



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### Explaining Treatment Options

- Glasses
- Contact Lenses
  - Soft, hybrid, g
- Surgical Option:
  - Crosslinking, ir
- Nothing

**Corneal cross-linking versus conventional management for keratoconus: a lifetime economic model**

Richard L Lindstrom, John P Berdahl, Eric G Dammendorf, Vance Thompson, David Kratochvil, Chang Sheng, Heather Foley, Grace Lytle, Marc F Botteman & John A Carter

**Conclusions**  
Keratoconus is a progressive and life-altering disease with substantial clinical, economic, and humanistic consequences. The economic value of cross-linking is maximized when applied earlier in the disease process and/or younger age, and extends to improved work productivity, out-of-pocket costs, and quality of life



125

### Educate patient on what treatment YOU feel is best for them

- Age?
- Severity?
- Lifestyle?
- Current situation?

126

### Patient resources

- National Keratoconus Foundation (NKCF.ORG)
- Livingwithkeratoconus
- Social media forums (good and bad)



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### Common Questions

- Why did I get this?
- Is this hereditary?
- Will I go blind?
- What if I don't do anything?
- Can I make it worse?
- Why can't I just wear glasses?



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### Co-managing Corneal Crosslinking

You referred the patient for CXL now what?

### Follow-Up Schedule



VISIT	PLAN
Day 1 to 1 Week	<ul style="list-style-type: none"> <li>• Topical antibiotic, steroid</li> <li>• Frequent lubricants</li> <li>• No eye rubbing</li> <li>• Remove BCL once epithelium heals</li> </ul>
Month 1	<ul style="list-style-type: none"> <li>• OCT imaging</li> <li>• Tomography / Topography</li> <li>• Vision assessment</li> <li>• Contact lens refitting evaluation</li> </ul>
Month 3, 6, 12 <i>(Follow-ups potentially performed and billed by diagnosing physician depending on practice preference)</i>	<ul style="list-style-type: none"> <li>• Continued evaluation utilizing tomography / topography</li> <li>• Vision assessment</li> </ul>



No Global Period! Follow-up visits can be billed to insurance.

129

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### Day 1

- Check Vision
  - Review Medications
  - Slit lamp exam
  - Check Bandage Contact Lens
  - Continue topical antibiotics, steroids, lubricants as directed
- Billing Codes:
  - 99212/99213 depending on complexity of visit
  - 92071 if bandage contact lens needs to be replaced



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### Week 1

- Case history
  - Check vision
  - Slit lamp exam
  - Remove BCL if appropriate
  - Continue eye drops as recommended
- Billing:
  - 99212/92313 if appropriate
  - 92071 if BCL needs to be replaced




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### Month 1

- Case history
- Check vision
- Slit lamp exam
- Topography and/or Tomography
- IOP
- Continue medications as directed

- Billing:
  - 99212/92313 if appropriate
  - 92025: Topography
- If patient stable, ok to refit into specialty contact lenses




133

### Month 3

- Case history
- Check vision
- Slit lamp exam
- Topography and/or Tomography
- IOP
- Continue medications as directed



- Billing:
  - 99212/92313 if appropriate
  - 92025: Topography
- If patient stable, ok to refit into specialty contact lenses



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### Treatment Options: Spectacles


- Even if vision is not ideal, glasses are necessary as a back up
  - Provides SOME functional vision
  - Early keratoconics may see ok with glasses
  - Important to have!
- Things to consider
  - Anisometropia – often large amounts
    - May not want to Rx the whole thing!
  - Amount of astigmatism in the prescription
    - How much to prescribe in glasses?
  - Trial frame can save time and money

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### Fitting Specialty Contact Lenses: Prepping your office



- How do you get fitting sets?
- Which fitting sets should I get?
- Tools and Solutions needed around the office
- Should I buy any fancy equipment?
- What does my staff need to know?

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### Poll – What is your go to lens modality for keratoconus patients?



- Soft toric lenses
- Custom soft lenses for keratoconus
- Hybrid lenses
- Corneal GP lenses
- Scleral lenses

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### Treatment: Soft lenses

- Early KCN patients may be able to wear standard soft toric lenses
  - Important to inform patient that this is a progressive disease, and Rx will change
- Most KCN patients will need a more custom design
  - Many soft custom lenses available
  - Many soft custom designed specifically for keratoconus
- Return policies of Custom SCLs

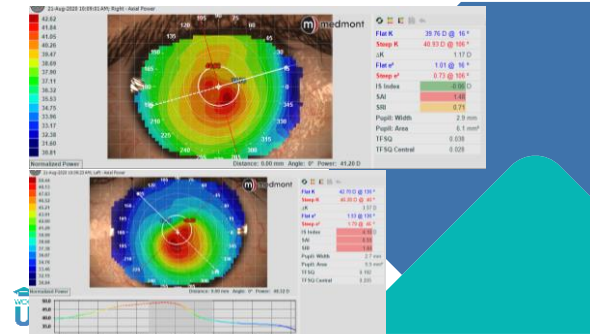
138

### Case Report

- 33 year old white female
- Dx with KCN in 2019
- Had CXL in OS early 2020; no plans for CXL in OD
- Complains of strained vision, double vision, headaches
- BCVA with specs 20/40 "double" OD and OS



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### Brief discussion

- Fit her into scleral lenses
- Constant dryness "wanted to rip them out"
- Added Hydrapreg coating
- Changed materials
- Added Restasis and other lubricants = no effect



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### Poll: What contact lens would you try next?

- Keep trying scleral lenses
- Hybrid lens
- Standard soft toric lens
- Custom soft lens
- Corneal gas permeable lens



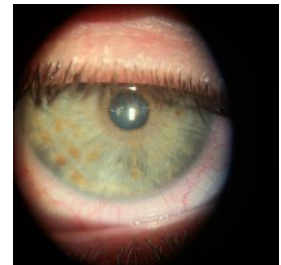
142

Ultrahealth OD



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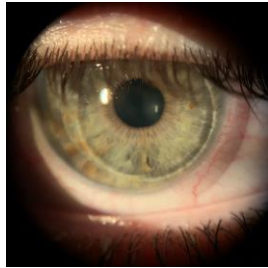
OD: Kerasoft thin/ 8.6 BC/ 14.5 OAD



144

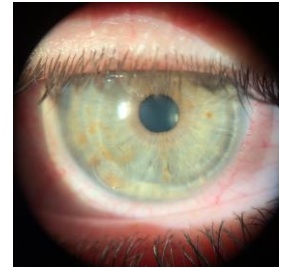


OD: Kerasoft thin/ 8.4 BC/  
14.5 OAD



145

OD: Kerasoft thin/ 8.2 BC/  
14.5 OAD



146

OD Kerasoft Thin/ 8.4 BC/ 14.50/Plano

- SCOR: +0.50-2.25x051 (20/20-)
- Lens order:
- Kerasoft thin
- 8.40 BC
- 14.50 diameter
- +0.50-2.25x051
- ct 0.24
- Discussion



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Treatment: Corneal Gas Permeable Lenses

- GP lenses offer very good vision for early to advanced KCN
- Lens bears entirely on cornea
- Good candidates:
  - Nipple or oval cones
  - Patients wanting a lower cost
  - Patient who've tried and failed
- Risks:
  - Apical touch can lead to scar tis
  - Lost follow up

ORIGINAL ARTICLE  
**Comparison of Flat and Steep Rigid Contact Lens Fitting Methods in Keratoconus**

KARLA ZADNIK, OD, PhD, FICO, JOSEPH T. BARR, OD, MS, FAO, KAREN STEIGER-MAY, MA, TIMOTHY B. EDINGTON, OD, MS, FAO, TIMOTHY J. MAMARRON, OD, FAO, and MAE O. GORDON, PhD, THE COLLABORATIVE LONGITUDINAL EVALUATION OF KERATOCONUS (CLEK) STUDY GROUP  
The Ohio State University College of Optometry, Columbus, Ohio, USA; The Department of Ophthalmology & Visual Sciences, Washington University School of Medicine, St. Louis, Missouri, USA; The Southern California College of Optometry, Redlands, California, USA; and the Department of Ophthalmology and Visual Sciences, University of Illinois at Chicago, Chicago, Illinois, USA (TJEM)



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 WOO UNIVERSITY

Case Report



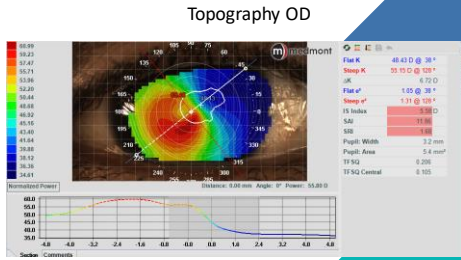
BW

- 34 year old BF
- Keratoconus
- CXL epi off OD May 2020 and OS August 2020
- Uses Systane tears and oasis tears PRN
- Complains of photophobia, blurry vision, and double vision
- Has not used specs or CLs at all in 3 years
- UCVA OD 20/50 and OS 20/100



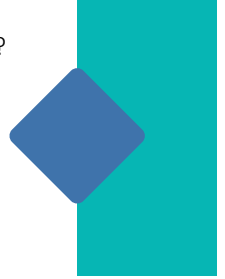
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Poll – What lens would you fit?

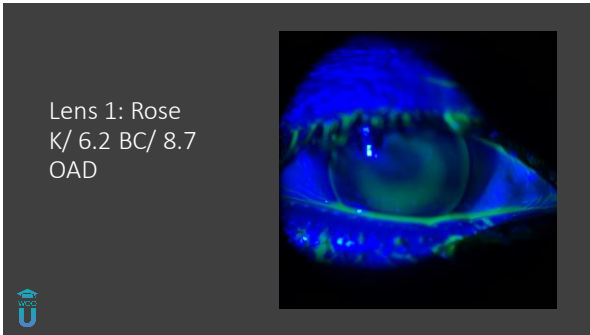
- Standard soft lens
- Custom soft lens
- Hybrid lens
- Corneal gas permeable lens
- Scleral lens



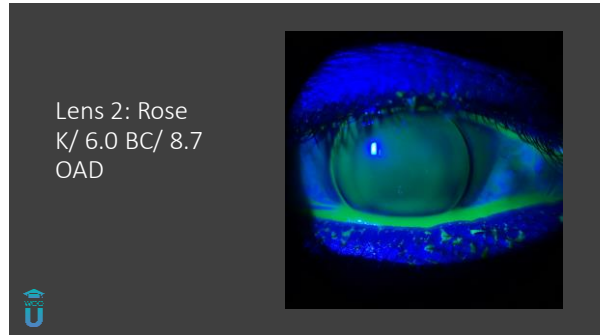
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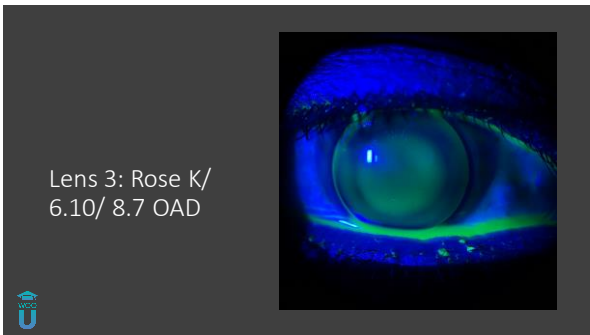
152



153



154



155

Discussion, lens order

OD: Optimum Comfort

- Rose K2
- 6.05 BC
- -13.50 power
- 8.50 diameter
- ct .16
- front oz 6.80
- plasma

156

## Treatment option: Scleral Lenses

> Am J Ophthalmol. 2018 Jan;155:43-47. doi: 10.1016/j.ajo.2017.10.022. Epub 2017 Nov 16.

- Great co
- Easier to
- No lens c
- No foreign
- Fluid res
- Ability to

### Scleral Lenses Reduce the Need for Corneal Transplants in Severe Keratoconus

Carina Koppen <sup>1</sup>, Elke O Kleps <sup>2</sup>, Lieselotte Anthonissen <sup>3</sup>, Maarten Van Hooy <sup>3</sup>, Sorcha Ni Dhúilligháil <sup>4</sup>, Louise Vermeulen <sup>4</sup>

Affiliations → expand  
 PMID: 29103959 | DOI: 10.1016/j.ajo.2017.10.022  
 Free article

#### Abstract

**Purpose:** To investigate the success and failure rates of scleral lens correction in severe keratoconus.  
**Design:** Retrospective case series.



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## Case Report

158

## 17 year old WM

- Diagnosed with keratoconus 2 years ago
- Had CXL in OD 1 year ago. Intacs in OS 1 year ago
- Has not tried any glasses or contacts since eye surgeries
- Complains of decreased vision, blurred vision, issues with glare
- BCVA (20/200 OD and 20/200 OS)



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Right Eye



Left Eye



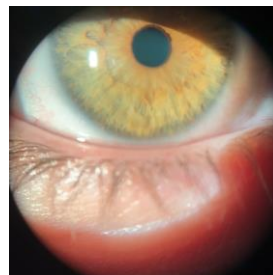
160

## Discussion

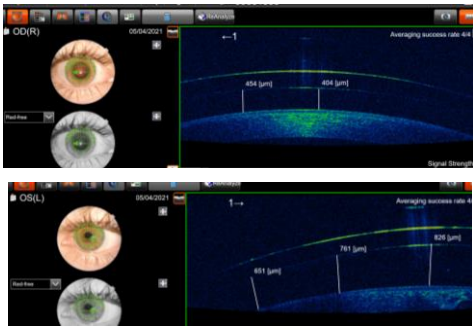
- Reviewed pros and cons of each lens design, patient's father opts for scleral lens
- OD: Ampleye/ 4200 sag/ 16.50 OAD/ 8.04 BC/ -2.00
- SCOR: -6.00 = vision 20/20!
- OS: Ampleye/ 4400 sag/ 16.50 OAD/ 8.04 BC/ -4.00
- SCOR: -4.50 = vision 20/20!



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Plan

- Decrease sagittal depth in each eye
- Ordered lenses and will dispense this week



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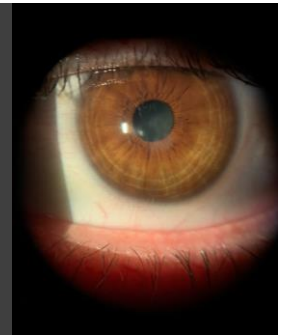


Case report: Scleral Lens

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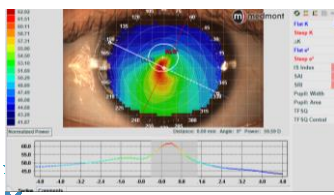
TM – 38 year old Hispanic male

- Referred by OMD for contact lens consult OS only
- History of KCN
- Wore GP lenses for 10+ years but complains of discomfort with lenses and frequent dislodgement
- Wants to see if there are other options
- BCVA 20/80
- Corneal scar



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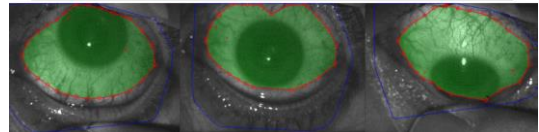
Case report



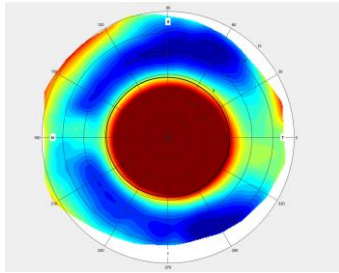
- Discussed all options with patient and he opted for a custom scleral lens
- Corneoscleral topography images taken

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Fluorescein Coverage



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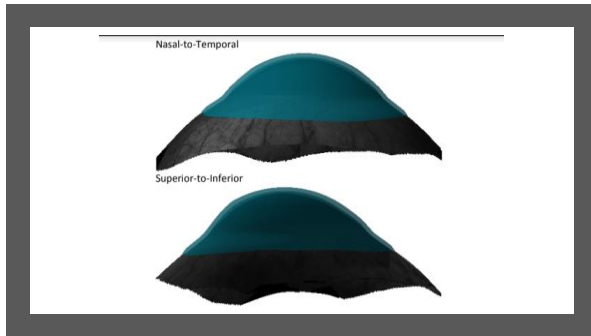
169

### Lens Fit

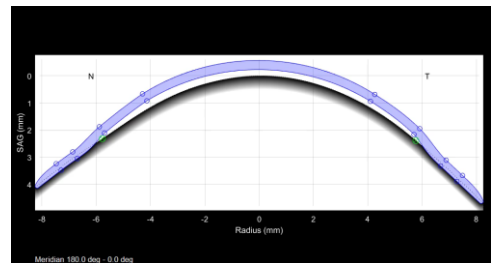
- Diagnostic lens:
- Europa OS: 47 BC/ 4750 sag/ -2.50/ 16.50 OAD
- SCOR was -2.00-1.50x014 (20/30-2)



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### Lens Dispense

- Vision 20/30
- Alignment and centration excellent
- Comfort excellent
- No SCOR
- Follow up 2w, 1 m, 3 m = no changes

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### Case Report

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SJ – 66 year old WF

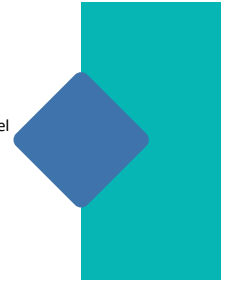
- Referred from Dr. Wellish for consultation on the OD
- OD had LASIK years ago and developed post-lasik ectasia
- Nieces and nephews have keratoconus
- Had 2 Intacs OD – inferior Intac developed issues and had to be removed.
- Wondering if corneal transplant is an option



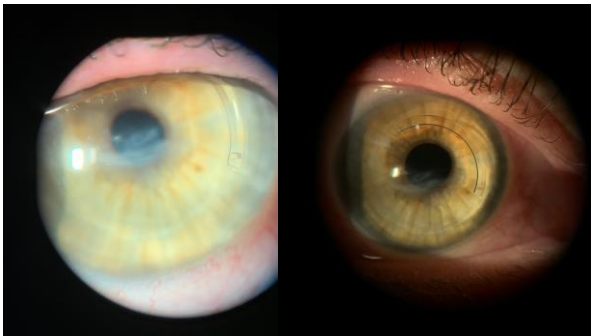
175

SJ

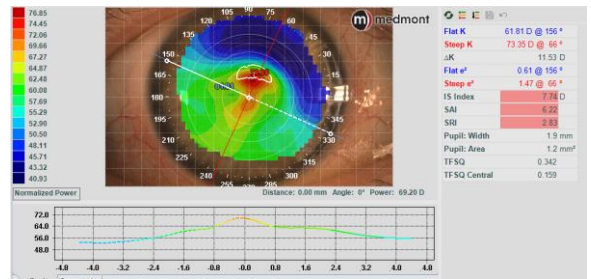
- Also suffers from dry eye syndrome.
- Uses Restasis BID, Oasis tears PRN, Systane gel at night. Lipiflow once per year.
- BCVA OD: Count Fingers
- Discussed pros and cons of each lens design and patient opted for EyePrint Prosthetic



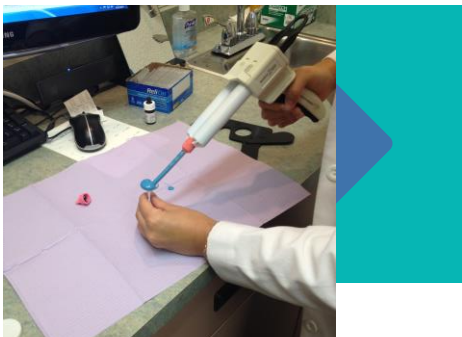
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179

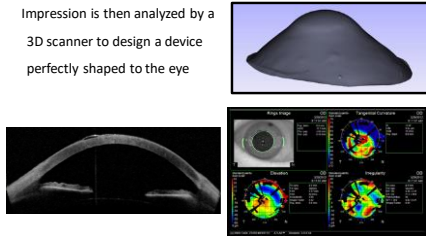


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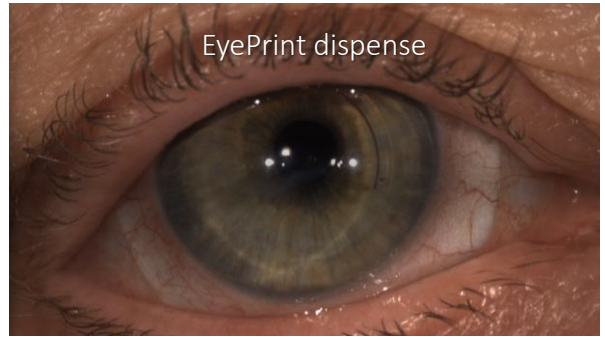


### EyePrint Prosthetics LLC

Impression is then analyzed by a 3D scanner to design a device perfectly shaped to the eye



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### EyePrint dispense

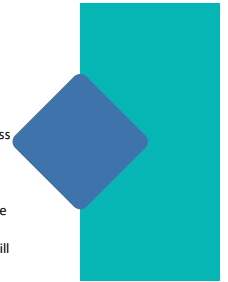
- Vision = 20/20!
- Patient stated comfort was great
- Wishes she would have come in sooner, wants to tell her nieces and nephews about this technology



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### Clinical Pearls

- Develop a plan for patients needing specialty lenses BEFORE you see them
- Consider a CL agreement to outline the fitting process and fees involved
- Review all treatment options with the patient
- If contact lenses are the treatment pursued, make sure you select the appropriate lens to avoid multiple fittings, follow ups, and re-orders
- If patients know how complex the process is, they will appreciate your time and skills and can be a huge asset to your practice.



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### Questions?

[Stephanie L. Woo, OD](mailto:Stephanie.L.Woo,OD)  
[www.drstephaniewoo.com](http://www.drstephaniewoo.com)  
[drwoo@clinevada.com](mailto:drwoo@clinevada.com)

Kent L. Wellish, M.D.  
 702-339-2020 (cell)  
[drwellish@gmail.com](mailto:drwellish@gmail.com)

@drstephaniewoo  
 @wellishvisioninstitute



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This formally concludes the CE portion of the event. Attendees are invited to remain online for a message from our supporters.



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Scan QR code with OE tracker app to earn credit instantly!

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If you require a printed certificate, please see Taylor  
 Please return your name tags for future use



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