Keratoconus: Diagnose and Manage Like A Pro

Deepak Gupta, OD
deegup4919@hotmail.com

No financial disclosures

How many people have keratoconus?

150,000 to 180,000

What are common patient complaints associated with keratoconus?

Symptoms of Keratoconus

- **Blurred vision/distortion**
- **Diplopia**
- **Glare/Halos around lights**

For keratoconus, what is the most common incorrect diagnosis?

Amblyopia

How to Differentiate

1. Vision stable vs Vision change
2. Cause of amblyopia

Vision

- Most patients with amblyopia will not complain of visual changes, but will say "vision has always been bad"
- Most patients with keratoconus will complain of vision getting worse

R/O Amblyopia: Need at least one of these things

- A tropia or phoria
- Assymetric refractive error
- Extreme bilateral refractive
- Some obstruction along line of sight

Classification of Keratoconus

- Round Cone
- Oval Cone
- Globus Cone

Classification of Keratoconus

- Severity of curvature :

1. Mild (45.00D)
2. Moderate (45.00 - 52.00 D)
3. Severe (more than 52.00 D)

What is average age of onset of keratoconus?

15.4 years old

- If take into account clinical findings, keratoconus is bilateral 96% of times
- If you also take into account corneal topography, it is bilateral 99.75% of times

Things we can do to confirm our diagnosis of keratoconus

Corneal Topography vs. Keratometry – A comparison

Keratometry = 4 points @ 3 mm on the cornea



Corneal Topography

- Measures the curvature and shape of the cornea and displays color-coded maps

Refraction

- Large changes in cylinder
- Shifts in axis
- BCVA not 20/20

Retinoscopy findings for keratoconus

Scissors motion

Slit Lamp Findings

- Vogt's Striae
- Fleisher's ring
- Corneal thinning
- Prominent corneal nerves
- Munson's sign

Vogt's striae

- Stress lines in deep stroma and Descemet's membrane
- Can disappear upon application of mild pressure to lower eyelid

Fleisher's ring



- Iron deposit on epithelium
- Cobalt blue filter might help identifying subtle lines

Munson's sign

Keratometry findings for keratoconus

Distorted mires

Oval mires

Non superimposable central rings

Pachmetry findings for keratoconus

You want thinnest point of cornea

Do every year on keratoconus patients

Quick GP VA Check

- Put in a drop of anesthetic
- Apply GP roughly equivalent to BC
- Do VA and OR

Step 2: Resist the urge to send this patient to an ophthalmologist

Why?

- OMDs don't know the first thing on CL options
- So what are they going to do?
  - –Refer to OD for GP fit
  - –Recommend surgery

Reasons why patients with keratoconus get sent for surgery

Risk of perforation

- How often does the cornea perforate?
- Almost never

Scarring of cornea

- Mostly due to CL abuse and/or improperly fit lens
- As scarring progresses, CL refit can often stop the process. Patients only need surgery if you wait too long to refit them

Progression of keratoconus

GP intolerance

3 main surgical options

- Intacs
- PKP
- Corneal cross linking

Penetrating Keratoplasty

- National Keratoconus Foundation estimates that 10% and 25% of cases will need surgery
- My experience: Less than 2% need a corneal transplant

PKP is second most common transplant done in U.S.

46,000 procedures a year

Post Op

- Eyedrops for months, years, and sometimes forever
- Fluctuating, hazy vision for months
- 2/3 of patients will need a GP to restore vision

After the PKP

- Average VA in immediate post op is around 20/200
- By 6 months mean BCVA is 20/60
- By 1 year BCVA around 20/30

What is the overall success rate of PKP?

But…

Definition of Success: Clear graft at 90 days

What is the 1 year survival rate for a cornea after transplantation?

90%

What is the 10 year survival rate for a cornea after transplantation?

60 to 70%

Average patient age undergoing PKP

Early 30's

For these reasons…

- My recommendation is always to exhaust all options before sending a patient for PKP

What is the goal of Intacs?

To make a cornea more stable for a GP fit

Intacs

- 65% success rate – defined as a patient being able to get a stable CL fit after the procedure
- 75% of patients obtained at least 2 lines of improvement in both UCVA and BCVA

Corneal Cross Linking

Contraindications

- Prior herpetic infections
- Corneal scarring or opacification
- H/O poor wound healing
- Autoimmune disease
- Corneal thinning less than 400 nm

At what age is CXL FDA approved?

14

Main Goal

To Slow or halt the progression of keratoconus

Progression of Kconus

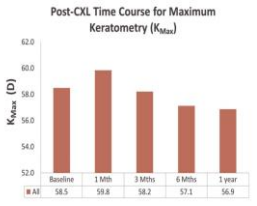
- Most of it happens in teenage years
- A few women progress when they are pregnant
- Progression can be as short as 2-3 year or as long as 10 years

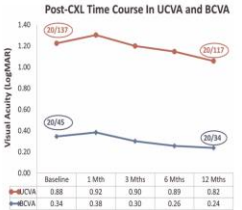
Corneal Cross Linking

Scrubber used to remove epithelium

Corneal Cross Linking

Crosslinking results





How long does corneal cross linking last?

90% at 1 year stable

70% at 5 year stable

Patient Expectations

- Discomfort for several days
- VA return to baseline 2-6 months
- Costs $3000 to $4000

Complications

- **Delayed corneal reepithelization**
- **Infection**
- **Corneal endothelium cell damage – in thin corneas**
- **Corneal scarring**
- **Severe corneal haze**

Newest variations… epi on

- Much safer and faster recovery for patients
- Epioxa – oxygen enriched therapeutic that treats keratoconus without removing corneal epithelium

Epi on Corneal cross linking

- Will ODs be able to perform?
- Why do the procedure at all – just use Riboflavin drops

What I do for progression

- Educate patient on all options
- Fit patient into GP
- Refit q 3months or 6 months while progressing
- Eventually patient will stabilize

Step 3: Stop if you can

- No reason to send the patient to a fellow optometrist
  - OD will take good care of your patient
  - But who makes the money and who's practice gets built?

Final Step

- Do it all by yourself
  - Lots of resources
  - Not as bad as you think

Can these patients use SCL?

- My criteria: if reasonably happy with vision in phoropter then an option
- Biofinity Toric XR up to 5.75 D of cyl
- B&L Ultra Toric up to 2.75 D of cyl

Theoretical Options

- Spherical GP
- Hybrid Lens
- Piggyback fit – GP fit over SCL
- Speciality GP fit
- Scleral Lenses

The Better Than Nothing Method

Success rate: 90%

Knowledge required: almost none

The Better Than Nothing Method

- Get patient's chart and call in K's, topo, MR to lab and they will send the first lens

Next Step

- When lens comes in, apply the lens after instilling topical anesthetic
- After 20 min, check VA and grossly check fit.
- Even if not perfect, send patient home

Next Step

- After 2-3 weeks, when patient comes back check VA, do take pix of SLE, email to lab
- Do NOT worry about fluorescein patterns or whether the fit looks good --- this is no longer your job
- They will send second lens to you, if needed

Then…

- Step 5: Repeat this process until done
- With 2 or 3 lenses, you will successfully fit 90% of your patients

Advantages/Disadvantages

- Advantage:
  - You kept the fitting process in-house
  - You make the money on the patient

Advantages/Disadvantages

- Disadvantage:
  - You still did not learn about how easy it is to fit a keratoconus patient and needed a consultant to help you

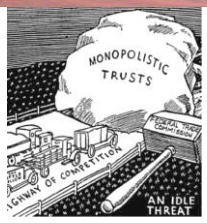
The Method of Choice

Your investment









Its all about the money

- CL Initial Fit: Anywhere from $1000 to $1500
- CL materials: anywhere from $500 to $800

Its all about the money

- Average keratoconus patient worth over $1200 for a new fit/diagnosis
- $400 to $600 for returning annual patients

Your ideal goal in GP fit…

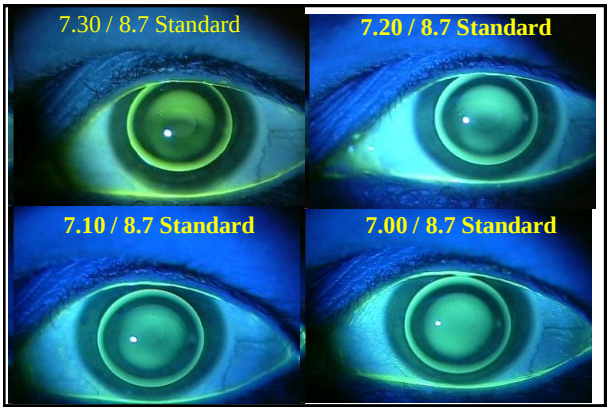
- 3 point touch:
- Minimal bearing (touch) at the corneal apex and an area between the periphery of the lens and the intermediate zone of the cornea

My Fool Proof Method for Fitting Keratoconus Patients

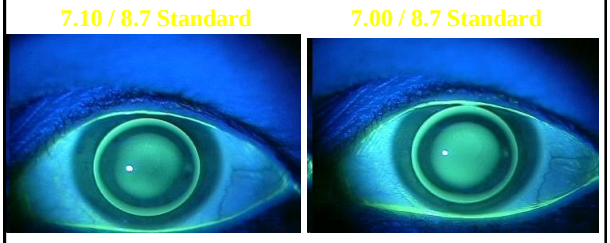
- Find the steepest point of the cornea
- Find the flattest point of the cornea
- Your lens will be somewhere in between

Here we go…

- Select Base Curve – Flatter of the Two K readings from Topography or keratometer
- Evaluate Fluorescein Pattern – should be too flat. Steepen until you achieve a good 3 point touch



CLEK: Most fit too flat



Next Step

- When lens comes in, apply the lens after instilling topical anesthetic
- After 20 min, check VA and grossly check fit.
- Even if not perfect, send patient home

Next Step

- After 2-3 weeks, when patient comes back check VA, do OR, and evaluate fluorescein patterns
- In most cases, you will only need to make minor modifications to BC
- Order second lens if needed

Then…

- Step 5: Repeat this process until done
- With 2 or 3 lenses, you will successfully fit over 90% of your patients

Thank you

Deepak Gupta
deegup4919@hotmail.com