

Keratoconus: Do All You Can Do

No financial disclosures

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Types of Amblyopia

- Refractive
- Strabismic
- Form Deprivation

What is the incidence of keratoconus

Roughly 60-150 per 100,000

Classification of Keratoconus

Classification of Keratoconus



Nipple cone



Oval cone



Globus cone

⊙ 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

Making the Diagnosis

Is a topographer required?

Diagnosis

- If you don't have a topographer...
- Refraction
- Retinoscopy
- Slit Lamp Findings
- Corneal Pachmetry
- Keratometer
- Quick GP refraction

Refraction

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

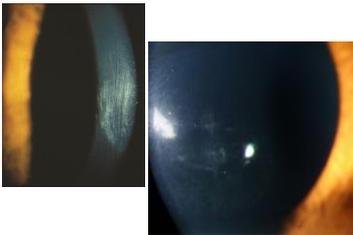
Retinoscopy findings for keratoconus

Scissors motion

Slit Lamp Findings

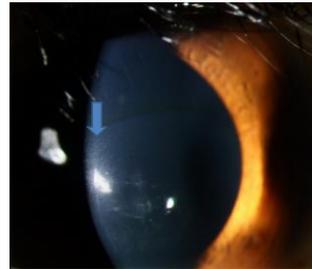
- Vogt's Striae
- Fleisher's ring
- Corneal thinning
- Prominent corneal nerves
- Munson's sign

Vogt's striae



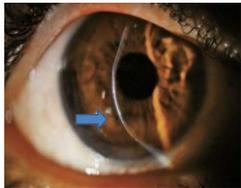
- Stress lines in deep stroma and Descemet's membrane
- Can disappear upon application of mild pressure to lower eyelid

Fleischer's ring



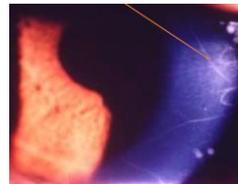
- Iron deposit on epithelium
- Cobalt blue filter might help identifying subtle lines

Corneal thinning



- Thin cornea at apex
- Increased endothelial reflection

Prominent corneal nerves



Munson's sign



Keratometry findings for keratoconus

Distorted mires

Oval mires

Non superimposable central rings

Pachmetry findings for keratoconus

Normal cornea 540 Microns but that is central cornea

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

If you have a topographer...

Corneal Topography

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



Corneal Topography vs. Keratometry –
A comparison

Keratometry measures 4 points on only 3 mm on the cornea

What do we do after making the diagnosis?

Worst thing

- Send him to an ophthalmologist
 - OMDs don't know the first thing on CL options
 - Surgical options for keratoconus are limited

Next in line

- Send him to a fellow optometrists
 - OD will take good care of your patient
 - But who makes the money and who's practice gets built?

The best

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

Refractive Options

- Spectacles
- Contact Lenses
- Surgery

What if he wanted a GP

Options

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

My Order of Options

- Eyeglasses
- Soft contact lenses
- Specialty GP fit

Keratoconus Fitting Strategies

- The Easy Way
- The Right Way

The easy way

- 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

You Will Need One of These

Preparation



Best positive motivator



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

- Billing codes – 92072
 - Initial CL fitting of patient with keratoconus

Its all about the money

- GA modifier – have sign patient sign waiver

Its all about the money

- Pray that this patient has Eye Med/VSP

Its all about the money

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

Do the Math

The average optometrist sees at least one patient a month with keratoconus

Your ideal goal in GP fit...

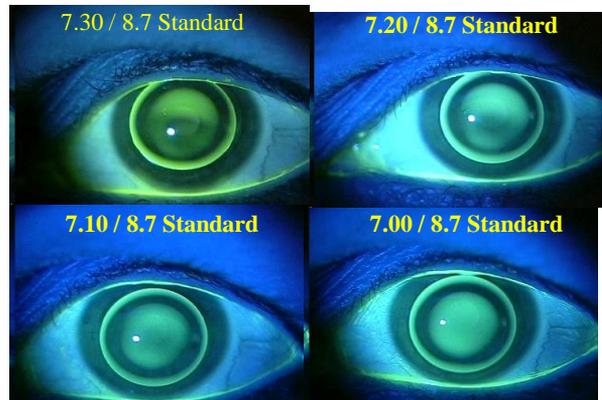
- 3 point touch:
- Minimal bearing (touch) at the corneal apex and an area between the periphery of the lens and the intermediate zone of the cornea
- CLEK study found that most Ods fit too flat

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



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

3 basic surgical options for keratoconus

- PKP
- Intacs
- Corneal cross linking

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 Kconus

- Most of it happens in teenage years
- A few women progress when they are pregnant

What You Say...

GP intolerance

- Patient is not able to tolerate CL for the amount of time he/she wishes to wear them

What I Say...

- The percentage of patients who are truly GP intolerant is WAY over-rated
- I find 1-2 patients a year at the most who are GP intolerant
- The vast majority of them have not been properly fit or prepared for the process

Ways to avoid GP intolerance

- Make sure patient is properly motivated
- 1. Wait for vision to be bad enough to motivate the patient to work through the discomfort
- 2. Discuss surgery
- 3. Make sure your fees are high enough

Ways to avoid GP intolerance

- Use large diameter lens
- Be liberal with punctal plugs, artificial tears, and/or allergy drops
- Build up wear time slowly

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

Now what happens?

Lots of patience needed

Post Op

- Eyedrops for months, years, and sometimes forever
- Fluctuating, hazy vision for months

Astigmatism after PKP

- The vast majority of patients are left with residual astigmatism
- Refraction may be difficult or imprecise in these patients
- Glasses may not work to correct this astigmatism. GP are often needed to fully restore vision

But...

What is the overall success rate of PKP?

Definition of Success: Clear graft at 90 days

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

91%

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

60 to 70%

What is the most common reason for a PKP?

Average patient age undergoing PKP

29.5

For these reasons...

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

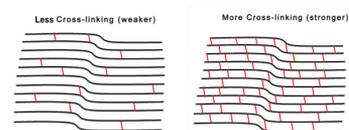
Intacs



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



Main Goal

To Slow or halt the progression of keratoconus

Postoperative treatment:

- **0.1% prednisolone 3 times/day**
- **Ciprofloxacin 4 times/day**
- **Artificial tears hourly**

Crosslinking results

Contraindications

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

Recommended PO visits

- Day 1 – obvious complications
- Day 3-4 – remove BCL
- 1 month – early refraction
- 3 months - refraction
- 6 months
- 12 months

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**
- **Keratouveitis**
- **Severe corneal haze**

Newest variations... epi on

- Much safer and faster recovery for patients
- Will ODs be able to perform?
- Why do the procedure at all – just use Riboflavin drops

Something to think about...

- Progression is most common in teenagers
- Should surgery really be utilized so young?
- Progression is for a finite period of time. If you fit and refit, eventually patient will stabilize