

# Diagnosis and Management of Keratoconus

Deepak Gupta, OD

No financial disclosures

What is the incidence of keratoconus

Roughly 60-150 per 100,000

What is the cause of keratoconus?

- Unknown
- Biochemically, the eye breaks down collagen fibers faster than it makes them
- Excessive eye rubbing

What is average age of onset of  
keratoconus?

15.4 years old

Is keratoconus unilateral or bilateral?

- 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

### Why Do We Need Corneal Topography?

- Measures the curvature and shape of the cornea and displays color-coded maps
- The cornea is 2/3 of the refractive power of the eye

### Billing for Topography

- CPT Code: 92025
- Can be done once a year
- Average Reimbursement: \$38

### Topography: Common ICD-10 codes

- Irregular astigmatism (H52.21-)
- Keratoconus (H18.6-)
- Complications of corneal graft (T85.328)

### Initial 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

## 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

## The Ugly

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

## The Bad

- 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 good

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

## My criteria

- If reasonably happy with vision in phoropter then an option

## 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

## 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

## Its all about the money

- CL Initial Fit: Anywhere from \$700 to \$1200
- CL Yearly Update: Anywhere from \$60 to \$200
  
- CL materials: anywhere from \$380 to \$700

## 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

## Basic Premise

- 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

## Once you have this info...

- Order that lens
- When lens comes in, apply anesthetic and lens. Check vision and grossly check fit.

## Next Step

- After 2-3 weeks, when patient comes back check VA, OR, and evaluate fluorescein pattern
- Order second lens if needed.
- Repeat this process until you are done.

## Advantages

- You keep all revenue in house
- You are building your own practice and not someone else
- You did it all by yourself!!!!

## ACG – classic signs

- Increased IOP
- VA hazy
- Pt has headache and/or nausea
- Mid fixed pupil
- Steamy cornea

We rule out ACG

## Most likely diagnosis

Acute hydrops

## Acute hydrops

Acute corneal hydrops is caused by the acute disruption of Descemet's membrane in the setting of corneal ectasia.

Hydrops denotes the abnormal accumulation of fluid

## How many patients with Keratoconus get acute hydrops?

Roughly 5-10%

## Clinical Presentation

Conjunctiva/sclera: Diffuse 1+ injection

Cornea: Inferior conical protrusion, focal area of massive inferior corneal edema with overlying microcystic edema and bullae, epithelium intact, no infiltrates or keratic precipitates

Anterior chamber: Deep, rare cell

Iris: Normal architecture, dilated

## Most significant risk factor

Eye rubbing

## Management

- Most cases of acute corneal hydrops spontaneously resolve over 2-4 months
- Do we Rx anything?

## Acute hydrops

Hypertonic sodium chloride to reduce epithelial edema

Cycloplegic for patient comfort.

Topical steroids to help reduce the inflammation and subsequent neovascularization that can accompany these episodes.

A large diameter bandage contact lens can be placed for comfort.

## 3 basic options

- PKP
- Intacs
- Corneal cross linking

## Risk of perforation

- How often does the cornea perforate?
- Almost never

## As the cornea thins...

VA degrades, but the risk of perforation doesn't come into play until roughly 350 microns or less



## 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

## GP intolerance

## My definition

- I did not do an adequate job of properly preparing and selecting my patient for this fit and now I need to find a way to blame him/her

## GP Intolerance/Poor fit

- The percentage of patients who are truly GP intolerant is WAY over-rated
- 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. 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

## Penetrating Keratoplasty

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

## How many corneal transplants per year?

46,000

## 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

## Post Op

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

## What is the overall success rate of PKP?

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

91%

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

60 to 70%

Two most important factors in graft failure

- Corneal neovascularization
- Ocular inflammation

What signs should you warn a patient about post PK?

- R – redness
- S – sensitivity to light
- V – vision changes
- P - pain

Intacs



What is the goal of Intacs?

## Main Goal of Corneal Crosslinking

To Slow or halt the progression of keratoconus

## Contraindications

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

## Postoperative treatment:

- 0,1% prednisolone 3 times/day
- Ciprofloxacin 4 times/day
- Artificial tears hourly

## 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 1-3 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

### Is a patient better of getting refit multiple times or surgery?

Which is less risky?  
Progression is usually a finite time period

### 3<sup>rd</sup> to last point

Eye rubbing is associated with development and progression of keratoconus, with graft rejection, and with acute hydrops

Suggest lubrication and/or allergy drops for all keratoconus patients

### 2<sup>nd</sup> to last point

Think about the education we received in optometry school.

You will be bored long term if you only handle simple routine exams and contacts

### Last point

Keratoconus is one of the “high” ticket conditions we can treat. Reimbursement is high and patients are loyal.

Stop building someone else’s practice