Financial Disclosures:

No financial disclosures or conflicts of interest as it pertains to this presentation.

Comprehensive Review:

http://www.revophth.com/content/i/1211/c/22833/

What about eye rubbing?

Eye Rubbing “old school”:

• KC more likely to be “allergic”
• Allergic patients rub their eyes
• Therefore, KC patients are more likely to demonstrate allergic eye rubbing

Eye Rubbing “update”:

Connecting the Dots:
• 15 distinguishing features between allergic and KC eye rubbing
• “buries her fist in her eyes”
• “better than sex”
• “I feel like I want to press so hard that someday I will touch my brain”

“But Doctor I Don’t Rub My Eyes”

Follow up visit:
• “Since you called it to my attention, I am now aware of my eye rubbing.” (unaware, habitual)
• “I asked my family, friends, coworkers about eye rubbing and they observed behavior that I was unaware.”
• “My mom reminded me that I used to be a horrible eye rubber.” (reformed)
• “OK, yes, I rub. I suppose you going to ask me if I also wet my bed.” (embarrassed)
• “Honestly, I can’t find any history or pattern of eye rubbing.”
The KC Patient During Sleep:

Connecting the Dots:

- Asymmetric KC: Over 80% of patients prefer to sleep on the side that is worse.
- Pattern of “pillow pressure” also seen with post-LASIK Keratoectasia
- Face down sleeping position common.
- Position impacted by OSA and Rx.

Connecting the Dots:

- This is also a component link to FES
- And also “ANC Sign”

Which side do you sleep on?

- Does mechanical “injury” help explain why only 7% of KC patients have a positive family history?
- Is corneal crosslinking less likely to be the optimal solution if it is merely making the cornea more resistant to trauma?

Question

- Does mechanical “injury” help explain why only 7% of KC patients have a positive family history?
- Is corneal crosslinking less likely to be the optimal solution if it is merely making the cornea more resistant to trauma?
Clinical Observation

- 1985-1988
- Most common indication for PK in a patient age 15-45 y.o. was KC.
- Making these patients 39-72 y.o. now
- Where are they now?

<table>
<thead>
<tr>
<th>Study</th>
<th>Range</th>
<th>Mean</th>
<th>Other Details</th>
<th>Sample</th>
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<tbody>
<tr>
<td>Lass et al</td>
<td>12-78</td>
<td>35 +/-11</td>
<td></td>
<td>417</td>
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<tr>
<td>Yeung et al</td>
<td>7-71</td>
<td>37.9 +/-12</td>
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<td>106</td>
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<tr>
<td>Lim &amp; Vogt</td>
<td>16-69</td>
<td>34.9</td>
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<td>130</td>
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<tr>
<td>Weed et al</td>
<td>12-72</td>
<td>30.9</td>
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<tr>
<td>Erkan &amp; Mehtaoglu</td>
<td>9-73</td>
<td>28 +/-9</td>
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<td>Zadnik et al</td>
<td>39.3 +/-11</td>
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<tr>
<td>Owens &amp; Gamble</td>
<td>37 +/-12</td>
<td></td>
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<tr>
<td>Lass</td>
<td></td>
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<td>10% &gt; 50yo</td>
<td>417</td>
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<tr>
<td>Pohelle et al</td>
<td></td>
<td></td>
<td>7.4% &gt; 50yo</td>
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<tr>
<td>Moodaley et al</td>
<td></td>
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<td>Majority &lt; 40yo</td>
<td>557</td>
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<tr>
<td>Yildiz et al</td>
<td></td>
<td></td>
<td>40% &gt; 50yo</td>
<td>697</td>
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</tbody>
</table>

Practitioner | Mean Age Between 10 oldest nonKC vs KC pts |
LO            | 20.4 p< 0.001                             |
JK            | 21.0 p< 0.001                             |
JM            | 7.6 p< 0.001                              |
GB            | 20.9 p< 0.001                             |
PB            | 25.1 p<0.001                              |
GW            | 14.2 p<0.001                              |
NC            | 2.8 p>0.317                               |
DK            | 4.6 p<0.046                               |
JL            | 20.3 p<0.001                              |
KR            | 14.7 p<0.001                              |
Means         | **15.2 p<0.001**                          |

Data from CL fitting optometrists in community-based private practice. Zero KC Pts >90yo and even when adjusting for sample size, the number of Pts > 80yo was less than 1/6 what was anticipated.

Maybe KC is not a disease isolated to the Cornea.
Beardsley and Foulks:  
Association of KC and MVP  
Overall prevalence = 38%  
Heterogeneous population  
PK 44%  

Beardsley TC, Foulks GN. An association of keratoconus and mitral valve prolapse.  
Ophthalmology 1982;89:35-7

“In the past, MVP has been grossly over-diagnosed - up to 35% of patients in some reports were said to have MVP. However, careful studies have now shown that the actual incidence is roughly 2% to 3% of the general population. It seems likely, however, that many physicians still greatly over-diagnose this condition.”

Patients undergoing penetrating keratoplasty for KC were found to be significantly heavier (14.4 kg on average) than controls who were non-KC patients requiring keratoplasty for corneal scarring. The average body mass index was high for both groups, but 52.8% of the KC group fulfilled the criteria of severe obesity, compared with 23.8% of the controls.


Gupta PK, Stinnett SS, Carlson AN. Prevalence of sleep apnea in patients with keratoconus.  
Cornea 2012
Obstructive sleep apnea–hypopnea (OSA–HS) syndrome

- HTN
- Pulmonary HTN
- Cardiac arrhythmias
- Cardiovascular disease
- Gastroesophageal reflux
- Obesity

A Syndrome?

- Keratoconus
- FES
- OSA
- Obesity

A Syndrome?

- Floppy Cornea
- Floppy Eyelid
- Floppy Soft Palate
- Floppy Belly

Monday?

- Is my patient contributing to the progression of their KC with eye rubbing or pressure during sleep?
- How does this impact my consideration of CCCx?
- Where are my elderly KC patients?
- Is there a reason to obtain a formal sleep study to establish whether or not they have OSA?

Monday?

- Eye Rubbing
- Sleep position
- FES and KC
- Sleep position
- Eyelash misdirection
- Weight Gain
- MVP
- OSA
- Recurrent KC post-PK
- Post-LASIK Kerato-ectasia
- ?Cross-Linking
- Where are the elderly KC patients?

Conclusion (Video):