

Caution, Steep Hill Ahead: Identifying Keratoconus in Clinical Practice

1 hour – anterior segment

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Are you ready to conquer keratoconus? Early detection of keratoconus is critical to prevent vision loss. Advanced diagnostic instrumentation is beneficial to identify keratoconus, however not every practice has these technologies. This lecture focuses on early identification of keratoconus by recognizing patient characteristics and comorbidities and utilizing common in-office diagnostics that are available in clinical practice. Recognizing the methods to detect keratoconus earlier will shift the treatment paradigm for patients, in order to avert vision loss.

Learning Objectives

1. Be aware of different studies of keratoconus prevalence.
2. Learn how to identify key characteristics in patients with keratoconus.
3. Obtain knowledge of how to utilize common in-office diagnostics that are available in clinical practice.
4. Learn co-management skills to grow your practice.
5. Identify risk factors for keratoconus.
6. Learn how to reduce the economic burden of keratoconus.

Outline

1. Keratoconus prevalence
 - a. Kennedy et al. 1986 0.05% or 1:2000 (US)
 - b. Jones et al. 2009 2.3% (India)
 - c. Millodot et al. 2011 2.3% (Israel)
 - d. Xu et al. 2012 0.9% (China)
 - e. Hashemi et al. 2014 2.5% (Iran)
 - f. Godefrooij et al. 2017 0.26% or 1:375 (Netherlands)
 - g. Torres Netto et al 2018 4.79% (Saudi Arabia)
 - h. Chan et al. 2020 1.2% or 1:84 (Australia)
 - i. Hashemi et al. 2020 (global meta-analysis) 0.14% or 1:700
2. Overview of keratoconus
 - a. Definition
 - b. Prevalence
 - c. Clinical signs
 - d. Hydrops and mitral valve prolapse
 - e. Pathogenesis of keratoconus
 - f. Risk factors that reduce the risk of keratoconus
3. Comorbidities in keratoconus
 - a. Vigorous eye rubbing
 - b. Atopy
 - c. Ocular allergies
 - d. Floppy eyelid syndrome
 - e. Ethnicity
4. Risk factors for keratoconus
 - a. Age
 - b. Genetics
 - i. Family history

- c. Comorbidities
 - i. Down syndrome
 - ii. Connective tissue disorders
 - 1. Marfan syndrome
 - 2. Ehlers-Danlos syndrome
 - iii. Pregnancy
 - 1. Change due to rise in pregnancy-related hormones (estrogen and relaxin)
 - 2. Alter the biomechanical properties of the cornea and increase its refractive power
 - 3. No evidence of reversal after pregnancy
5. Importance of early diagnosis
- a. Corneal collagen cross-linking
 - b. Strengthen the cornea to prevent progression
 - c. Avoid need for corneal transplantation
 - d. Economic burden of keratoconus
 - i. Patients pay more than \$25,000 for cost of care over their lifetime post-diagnosis (<https://www.nkcf.org/living-keratoconus/>)
 - ii. 46% of patients pay more than \$1,000 annually for treatment costs (<https://www.nkcf.org/living-keratoconus/>)
6. Diagnosing keratoconus in any practice without corneal imaging
- a. Retinoscopy
 - i. Scissors reflex
 - ii. Al-Mahrouqi, et al. Retinoscopy as a Screening Tool for Keratoconus, Cornea: April 2019
 - 1. Retinoscopy is a sensitive and reliable test for detecting keratoconus including early disease
 - b. Refractive changes
 - i. Increase in astigmatism
 - ii. Increase in myopia
 - iii. Asymmetry in astigmatism between the eyes
 - iv. Frequent glasses prescription changes
 - c. Visual symptoms
 - i. Blurry vision
 - ii. Reduced best corrected vision
 - iii. Shadows / halos in vision
 - iv. Vision that is not crisp, even when 20/20
 - d. Keratometry
 - i. Steep corneal curvatures – over 47.00D
 - ii. Irregular mires
 - e. Pachymetry
 - i. Thin corneal thickness less than 500µm
 - f. Corneal findings with slit lamp examination
 - i. Vogt's striae
 - ii. Corneal stromal thinning
 - iii. Munson's sign
 - iv. Conical protrusion
 - v. Fleischer ring
 - vi. Hydrops
 - vii. Subepithelial or anterior stromal scars
 - g. Genetic testing
 - i. How to incorporate genetic testing

ii. Testing in children

7. Collaborative care

- a. Refer a keratoconus suspect for corneal topography / tomography
 - i. Family history
 - ii. Any risk factors, especially vigorous eye rubbing
- b. Practice management benefits to keep patients in your practice
- c. Patient evaluation after corneal stabilization

8. Benefits of referring patients for corneal imaging

- a. Prevent progression
- b. Early treatment
- c. Easier to fit glasses and contact lenses
- d. Decrease economic burden of the condition