Summary

Keratoconus is described as a disease characterized by progressive corneal steepening, most typically inferior to the center of the cornea, with eventual corneal thinning, induced myopia, and both regular and irregular astigmatism. The prevalence of keratoconus in the general population appears to be relatively high and is reported to be between 50 – 230 per 100.000.

Patients with keratoconus often complain of decrease in visual acuity, visual discomfort similar to a patient with uncorrected astigmatism. They report glare of halos around lights.

The ocular manifestation of keratoconus is limited to the cornea. They include steepening of the cornea, especially inferiorly alteration of red reflex, thinning of the corneal apex, prominent corneal nerves, scaring at the level of Bowman's layer, and deep stromal stress lines (Vogt's strieae), iron deposition ring accumulates in the epithelium at the base of the cone, (Fleischer's ring). The steepening of the cornea leads to clinical signs, which include protrusion of the lower lid on down gaze (Munson's sign), focusing of a light beam shown from across the cornea in an arrowhead pattern at the nasal limbus (Rizzuti sign), reduced corneal sensation in the inferior in the inferior cornea and appearance of corneal hydrops.

The keratometer aids in the diagnosis of keratoconus in which there's absence of parallelism and inclination of the mires.

Treatment of keratoconus depends on the severity of the condition and can be divided into two categories, surgical and nonsurgical.

The non-surgical management of keratoconus is essentially refractive. Early in the disease, spectacles are successful in restoring vision. As the condition advances the contact lenses become more desirable option.

Rigid gas permeable contact lens is the main type of contact lens used in the treatment of keratoconus.

The surgical management include *intra stromal corneal ring* or ring segments (INTACS) which is an ophthalmic device that cause corneal flattening. Reduce the size of cone. *Penetrating keratoplasty* is used if the contact lens no longer provides acceptable vision. The major complication of penetrating keratoplasty is graft rejection which, although its incidence is rare, but it is major cause of surgical procedure failure. With the advances of deep anterior lamellar keratoplasty technique, the visual outcomes were improved and approaching the penetrating keratoplasty outcomes with the superior advantages of minimal rejection and complications.

A new technique of *collagen crosslinking* has been developed by a research group at Dresden Technical University aiming at slowing down or arresting the progression of keratoconus to delay or avoid the need for keratoplasty. Unlike othe treatment methods that only address the refractive effects of the disease, this new method treats and prevents the underlying pathophysiological mechanism.

Using UVA at 370nm and the photosensitizer riboflavin; the photosensitizer is excited into its triplet state generationg so-called reactive oxygen species which can react further with various molecules inducing chemical covalent. The wave length of 370 nm was chosen because of an absorption peak of riboflavin at this wavelength.

Combined riboflavin-UVA treatment should be safe for the endothelium as long as the dose is less than the endothelial cytotoxic dose in human corneas, which is only reached in corneas thinner than 400 μm. Therefore, pachymetry measurements should be performed routinely before riboflavin/UVA treatment to identify unsuitable cases.

This effect is most pronounced in the anterior portion of the stroma. This feature is the main morphologic alteration underlying the increased biomechanical stiffness of the cornea after collagen crosslinking using riboflavin and UVA.