Summary

Keratoconus is non-inflammatory processes in which the cornea deforms in association with thinning and biomechanical weakening. The incidence of keratoconus is approximately 1 in 2000. The condition typically starts in adolescence and early adulthood. Reported risk factors for keratoconus include eye rubbing, a family history, and genetic predisposition. Certain systemic disorders such as Down's syndrome, ocular allergy, connective tissue disease, and long-term rigid contact lens wear.

At early stages, the symptoms of keratoconus may be no different from just having the need for spectacle correction. As the disease progresses, the vision deteriorates.

Diagnosing early keratoconus can be tricky, since mild disease often does not show any identifiable signs on slit-lamp examination; however, recent and a more definitive diagnosis can be obtained using corneal topography, in which an automated instrument projects an illuminated pattern onto the cornea and determines its shape from analysis of a digital image. The topographical map reveals distortions or scarring in the cornea, with keratoconus revealed by a characteristic steepness of curvature which is usually below or around the centre of the cornea. The topography record of the degree and extent of the deformation is used for assessing its rate of progression. Also,oculus pentacam provide an intelligent system for detection & asure the presence or absence of the disease .

This disease can result in irregular astigmatism, progressive myopia, or visual impairment secondary to stromal scarring.

Because of optical aberrations caused by this progressive distortion and bowing of the cornea, patients usually require rigid or complex curvature contact lenses to achieve good functional vision; spectacle correction frequently does not result in acceptable quality of vision. Furthermore, keratoconus tends to progress over the second to fifth decades of life and can lead to intolerance of contact lenses and, ultimately, the need for corneal transplantation in 10% to 20% of cases. New treatments available to patients with keratoconus include intrastromal corneal ring segment implantation, and corneal collagen crosslinking (CXL).

So far there has been not one successful way to stop the progression of keratoconus. With current methods using rigid contact lens or intra corneal ring segments, only the refractive error (spectacle numbers) can be corrected, but it has very little effect on the progression of keratoconus.

A new treatment, based on collagen cross linking with Ultraviolet A (UVA, 370nm) and riboflavin (Vitamin B 2), a photosensitizing agent is now available. This changes the intrinsic biomechanical properties of the cornea, increasing its strength by almost 300%.Collagen crosslinking has emerged as a promising technique to slow or stop the progression of keratoconus .In this procedure, riboflavin (vitamin B2) is administered in conjunction with ultraviolet A (UVA, 370 nm). The interaction of riboflavin and UVA causes the formation of reactive oxygen species, leading to the formation of additional covalent bonds between collagen molecules, with consequent biomechanical stiffening of the cornea.

This treatment has been proven to strengthen the weak corneal structure in keratoconus by increasing collagen cross-linking, which are

the natural "anchors" within the cornea. These anchors are responsible for preventing the cornea from bulging out and becoming steep and irregular (which is the cause of keratoconus).

The treatment is performed under topical anesthesia (using anesthetic eye drops). The epithelium is removed then the cornea is treated with application of Riboflavin eye drops for 30 minutes. The eye is then exposed to UVA light for 30 minutes. Hence, the treatment takes about an hour per eye. After the treatment, antibiotic eye drops are applied; a bandage contact lens may be applied, which will be removed few days after complete healing takes place .

Collagen cross-linking treatment is not a cure for keratoconus, rather, it aims to slow or even halt the progression of the condition. Patients may need to continue to wear spectacles or contact lenses (although a change in the prescription may be required) following the cross-linking treatment but it is hoped that it could limit further deterioration in the patient's vision and reduce the need for keratoplasty.

Very few potential risks associated with this treatment have been reported so far, such as discomfort and a short-term haze.

The current study ,like other studies, shows that corneal collagen cross-linking with riboflavin is effective in stopping the progression of keratoconus by “freezing” the cornea. In this study ,we concluded that the improvement in vision after cross-linking is caused by a decrease in astigmatism and corneal curvature as well as by topographical homogenization of the cornea as a result of the increased rigidity in the cross-linked cornea. This leads to an increase in both, the unaided visual acuity and BCVA, not only through astigmatism improvement (K

readings reduction) but also in terms of corneal symmetry indices improvement after cross-linking .

Corneal cross- linking treatment can be combined with Intacs to flatten the KC cone, even more than with Intacs alone. In theses cases, corneal cross- linking treatment stabilize KC from getting worse as well as help the Intacs reverse the KC steeping that had already occurred.