

ICRS as a Key Option in Keratoconus

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Corneal ectatic disorders can result of non-inflammatory corneal dystrophies, such as keratoconus, pellucid marginal corneal degeneration (PMCD) and keratoglobus, as well as from refractive surgeries. They are characterized by progressive corneal thinning and subsequent anterior bulging of the cornea leading to severe astigmatism, visual distortion, increased sensitivity to light and associated reduction in best corrected visual acuity (BCVA) [1-7].

Spectacles and contact lenses can be successful in treating the early stages of the keratectasias, however, some patients can become intolerant to contact lenses or achieve an unacceptable visual performance. In moderate or advanced cases surgical solutions are necessary to achieve a satisfactory visual outcome [8-14]. Corneal transplant procedure is not anymore the only surgical method of treatment currently available when these modalities are no longer successful. Despite its results, problems such as allograft rejection, significant endothelial cell loss (especially when the life expectancy is long), irregular astigmatism, side effects caused by use of long-term topical corticosteroids (e.g. secondary glaucoma, cataract) and recurrence of the ectatic disorder may be considered [15,16]. The literature reports several alternative methods used to treat keratoconus such as thermal keratoplasty, epikeratoplasty, excimer laser, cross linking, lamellar keratoplasty and intrastromal corneal rings (ICRS) [14,17-28].

The implantation of ICRS has been proposed and investigated as an additive and minimally invasive surgical procedure for keratoconus and was first performed in human eyes by Nose. The use of ICRS for treating corneal ectasias may defer or potentially eliminate the need for a corneal transplant, by creating a more regularly shaped corneal surface [24,29-40]. It may allow spectacle correction and restore contact lens tolerance to finally improve the functional vision. Treatment with ICRS may not always eliminate the progression of the ectatic disorder, but it may delay a corneal transplant procedure and slow down the progression of the corneal thinning associated with the disease [39].

In a global consensus on keratoconus and ectatic diseases, panelists found that the most important target of non surgical treatment is to halt progression and the second is visual rehabilitation. They agreed that although extremely beneficial to correct vision in many patients, contact lenses do not slow or halt the progression of ectasia. They highlighted the fact that as the keratoconus comes in a wide range of severity and scenarios regarding corneal astigmatism, corneal thinning and refractive errors, it may be difficult to determine the best surgical approach for keratoconus. They suggested that anyone with progressive ectasia should undergo CXL (no matter what age or level of vision). They also felt it was better not to proceed with other surgery than CXL, if patients were satisfied with their vision with glasses or contact lenses. ICRS were not performed by all panelists [41].

A prospective study was done for evaluating the impact of ICRS implantation on the quality of life of patients with keratoconus using the NEI-RQL (National Eye Institute Refractive Error Quality of Life) instrument. The NEI-RQL was used before and 4½ to 8 months after surgery. There was a significant improvement in all NEI-RQL scales and the overall scale. "Clarity of vision," "far vision," "near vision," "activity limitations," "appearance" and "satisfaction with correction" had the greatest improvement. Best spectacle-corrected visual acuity and binocular BCVA improved significantly, and there was a significant decrease in keratometric values [42].

ICRS has been proven to be effective in reshaping ectatic corneas to a more regular corneal surface, improving visual acuity, reducing the refractive error and mean keratometry, allowing spectacle correction or contact lens fitting without removing corneal tissue or invading the central optical zone with the great advantage of reversibility of the procedure. Long term follow-up is needed to corroborate the stability of visual, refractive and aberrometric outcomes achieved by these implants. Up to the moment ICRS implantation seems to be an additional and efficient option for the treatment of patients with keratectasias not only by improving the clinical parameters, but also by adding a positive impact on patients' quality of life.

In case of advanced or proven progressive keratoconus with unsatisfactory spectacle corrected vision, when CXL is not suitable anymore, should we still consider contact lens as an option before ICRS, taking the risks of an evolution towards a corneal graft ?

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