

# CXL COMPLICATIONS

Adherence to treatment protocols maintains safety but there can be surprises

by Roibeard O'hEineachain in Warsaw

**C**orneal Collagen Crosslinking (CXL) can have several potential complications most of which are avoidable, but even with the best technique the results are not 100 per cent predictable, said Farhad Hafezi MD, PhD, chairman of the Department of Ophthalmology, University of Geneva, Switzerland.

The complications of CXL can arise from each step of the procedure: from overexposure to the ultraviolet rays, from the wound-healing process after the treatment and from the epithelial removal, Prof Hafezi said, in a keynote lecture he delivered at a Cornea Day session at the 17th ESCRS Winter Meeting.

With regard to ultraviolet exposure, Prof Hafezi noted that adherence to the established treatment protocol will ensure that the treatment does not extend too far into the cornea and damage the endothelium. That means first applying the riboflavin to the eye for at least 25 minutes to ensure an even concentration throughout the cornea, which should be at least 400 microns thick. The eye should be then exposed to no more than a total dose of 5.4 Joule, using fluences of 3 mW, 9 mW and 18 mW, respectively.

"In the past 11 years, I have not seen a decompensation in any case where this rule has been respected," he said.

In addition, Prof Hafezi's studies in rabbit eyes (*Richoz et al., submitted*) indicate that the CXL treatment does not affect the limbus or pose any risk of limbal stem cell insufficiency even when performing decentred treatments in eyes with pellucid marginal degeneration.

Observations of corneal wound healing are raising some very intriguing possibilities. In a small minority of patients there has been an unexpected postoperative dense haze that has been accompanied by a massive postoperative flattening of the cornea (*Hafezi et al., Br J Ophthalmology, 2010*).

Typically after crosslinking there is an arrest of the progression of the cone in about one-third of patients and a slight regression of the cone, by about two or three dioptres, in about two-thirds of patients. In nearly all eyes there is also a transient haze, like that which occurs after PRK, only deeper.

However, in about one out of every 200 procedures there is haze that does not go away and in these cases there has also been massive remodelling that results in a corneal flattening of up to 11 D. The improvement in refraction is so dramatic in most cases that patients are very happy and do not complain about the pronounced haloes and other photic phenomena induced by the haze, Prof Hafezi noted.

"This massive remodelling might be highly beneficial for the patient, what we have to figure out is how we can induce it and control it," he said.

In some patients re-epithelialisation is delayed, which can be frustrating for the patient, although it is easily managed in most cases. Topical NSAIDs are very strongly contraindicated in such cases and may lead to infectious

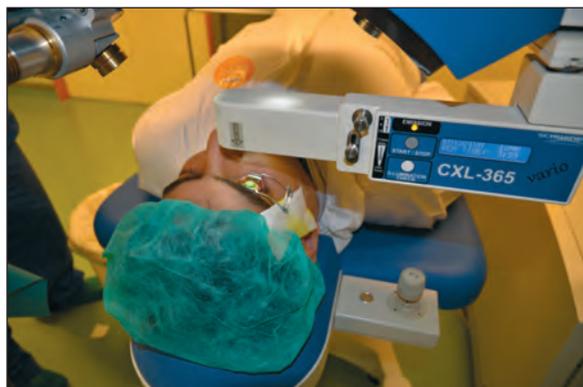


Figure 1: Epithelium-off CXL performed in a patient with progressive keratoconus

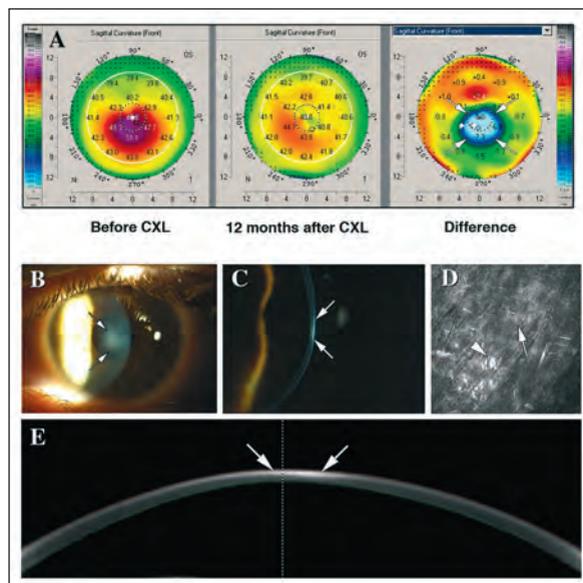


Figure 2: Remodelling process following CXL: topographical changes and assessment of stromal haze. (A) Scheimpflug analysis of the anterior corneal surface (true net power) before (left) and at 12 months after CXL (middle). The difference image (right) shows a strong reduction of Kmax values readings of up to 9.5 D. (B,C) Slit-lamp images of the central deep stromal haze (arrows) in the left eye. (D) Corneal confocal microscopic sections of the anterior corneal stroma at 170 µm depth. The stroma shows activated keratocytes (arrow) and hyperreflective deposits corresponding to subepithelial fibrosis (arrowhead). (E) High-resolution Scheimpflug imaging of the corneal haze (arrows)

[Reproduced from *British Journal of Ophthalmology*; authors Farhad Hafezi, Tobias Koller, Paolo Vinciguerra, Theo Seiler; Volume 95, Issue 8; Licence date March 22, 2013; with permission from BMJ Publishing Group Ltd]

corneal melting via activation of matrix metalloproteinases, Prof Hafezi added.

"Crosslinking is an extremely safe procedure if the surgeon stays within the indication's limits and has experience with open surfaces," he concluded.

## contact

Farhad Hafezi – farhad@hafezi.ch

Scan this QR code to gain access to EuroTimes podcasts



# EYE CHAT

Exclusive interviews  
Up to date information  
Problem solving



## What Makes The Perfect Surgeon?



Dr Oliver Findl talks to Dr Jack Holladay about the importance of surgical technique

**podcast**  
www.eurotimes.org

Also available on iTunes

