Special Edition
XXXII Congress of the ESCRS
13 – 17 September 2014, Excel, London, UK

BIERMANN MEDIZIN

European Ophthalmology News

mts
Ophthalmic Winteracademy 2015
8th Mar-13th Mar 2015
Early Bird Registration Fee!
mts-wetlab.com

Corneal cross-linking – a safe procedure

Unexpected corneal responses: haze, keratitis, melt. What are the risk factors?

GENEVA/CH Over the past 15 years of clinical use, corneal cross-linking (CXL) has been introduced for a wide variety of indications, including the management of corneal ectasia, edema, melting, infectious keratitis and lately also in combination with refractive procedures. Unexpected results and complications are rare, but they may occur. It is important to recognize them and react adequately.

Unexpected results and complications may be related to different aspects of the CXL procedure: UV-irradiation, epithelial removal, the postoperative wound healing, and postoperative medication. Some of the unexpected results and complications relate to one aspect only, others might be the result of the interaction of two aspects.

Limbal stem cell damage

Under certain conditions, it is necessary to irradiate the cornea in a decentered manner, i.e. when treating a pellucid marginal degeneration or a peripheral thinning disease like Terrien's marginal degeneration. UV-A light and riboflavin generate free radicals, which might damage the limbal stem cells. Recently Moore et al. showed the upregulation of mRNA of genes involved in DNA damage in cultured epithelial cells and human ex vivo corneas. To investigate the potential effect of UV-A light and riboflavin on the corneal limbus in vivo, Hammer and colleagues irradiated rabbit corneas, using standard fluence settings (5.4 J/cm²), but also twice the fluence currently used in commercial devices (10.8 J/cm²). They did not identify any potential light-induced changes to the limbus, and the speed of epithelial regeneration remained unchanged. Furthermore, no case of limbal decompensation after CXL was reported in the literature since the introduction of clinical CXL in 1999. They concluded that sectorial irradiation of the limbus in peripheral disease may be performed without harm.

Farhad Hafezi

Endothelial damage

The endothelial damage threshold level was determined at 0.36 mW/cm². When applied in corneas with a stromal thickness of 400 µm and more, the current fluence settings allow for safe CXL, because the initial energy is subsequently attenuated in deeper layers following the Lambert-Beer law. As long as overall fluence and minimal thickness are respected, the endothelium should not decompensate. Few reports have been published so far on endothelial decompensation: some used dextrane in the riboflavin solution, which is known to induce stromal thinning, others used handheld ultrasound pachymetry as the sole measure to determine the thinnest point of the cornea. All reports coincide in the fact that the stromal thickness was not remeasured at the end of riboflavin instillation, and prior to UV-A irradiation.

Haze and massive remodelling

Transient haze after CXL is not an unexpected result after CXL, but rather a normal event. Besides transient haze, several groups reported permanent haze. This haze does not disappear after several months, and may be concomitant with a massive and almost immediate reduction in Kmax readings of up to 10 D. Such reactions are rare and were observed in approximately one case in 200. Two separate pathways may exist for haze formation in the cornea. Another risk factor might be far advanced keratoconus, as reported by Raiskup and colleagues.

Infectious keratitis

A number of case reports on infectious keratitis after CXL have been published in the past years. Since the combination of UV-A light and riboflavin acts like a very potent antimicrobial agent, and newer applications of CXL (PACK-CXL, photoactivated chromophore for keratitis-CXL) include treatment of infectious keratitis, it seems unlikely that the cause of the infection is directly linked to the cedure. It is more likely that the surface, resulting from the epith abrasion, may not have been han properly postoperatively. In case infection with subsequent melting authors reported the intense us topical NSAID on the open cor surface. Diclofenac and other NS may upregulate matrix metallo teinases and other collgenases, induce corneal melting.

In conclusion, CXL and PACK- seem to be safe procedures with tively few unexpected and surpr results, when the limitations of method are respected.

Risk factors for unexpected corneal responses

ESCRS/EURETINA Symposium: Vitreoretinal Complications of Anter Segment Surgery

Sat, 13.09.2014 **14.00 –**
Auditorium

Author: Farhad Hafezi, MD, PhD
ELZA Institute, Zurich, Switzerland
University of Geneva, Geneva, Switzerla
University of Southern California, Keck School of Medicine, Department of Opht mology, Los Angeles, California, USA
E-mail: farhad.hafezi@hcuge.ch

References can be provided by the auth

Index

Small incision lenticule extraction
Will intrastromal surgery lead to perfection? ▶ **Page 2**

PREMED study
Fighting a common cause of suboptimal vision ▶ **Page 4**

Trifocal lenses
Improved visual rehabilitation after cataract surgery ▶ **Page 6**

Myopia correction
Intrastromal approach complementary to excimer laser ▶ **Page 8**

Ablation profiles
Personalised treatment with ray tracing ▶ **Page 9**

Corneal cross linking
Unexpected corneal responses: Haze, keratitis, melt ▶ **Page 9**

Corneal inlays
On the way to becoming an established technique ▶ **Page 10**

A mature technology
Looking at the future of multifocal intraocular lenses ▶ **Page 10**