



Confocal Microscopy after corneal cross-linking

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Purpose: to investigate corneal tissue alterations after corneal collagen cross-linking in patients with keratoconus.

Results:

EPITHELIUM: new epithelium formation is complete after five days with soft contact lens bandage (Fig.1). Any persistent epithelial defect was evidenced.

SUBEPITHELIAL and ANTERIOR STROMAL NERVES: preoperative confocal microscopy analysis of the subepithelial nerve plexus revealed abnormal sub-basal nerve morphology with reduction in density and thicker nerve fiber bundles in the stroma corneal nerves were more visible for increased tortuosity and diameter (Fig. 2).

Absence of the subepithelial and anterior stromal nerves within the treatment zone was found 1 month postcorneal cross-linking treatment. The nerve plexus regenerated over the next months (3 to 6 months postoperatively), while there were no peripheral corneal alterations outside the treatment zone (Fig. 3). Subepithelial nerves regrow from the borders of the irradiated area and the anterior stromal nerves from the deeper stroma at month 3.

Methods: 50 patients with keratoconus were treated with corneal cross linking and analysed with *Confoscan 4* at baseline and month 1, 3, 6,12.

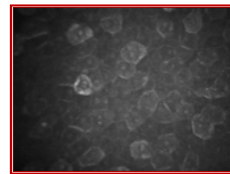


FIG. 1

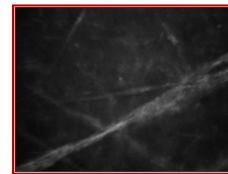


FIG. 4

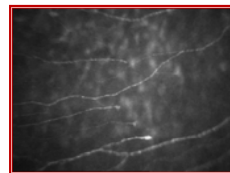


FIG. 2

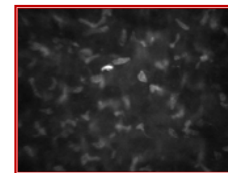


FIG. 5

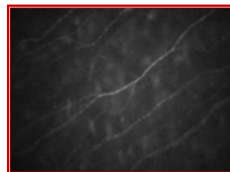


FIG. 3

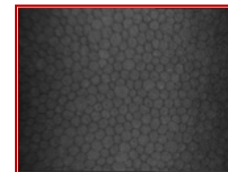


FIG. 6

STROMA: at the level of the anterior and mid stroma corneal stromal edema (honeycomb-like or spongy) and absence or rarefaction of keratocytes was demonstrated at 1-month (Fig. 4).

Stromal repopulation begins at month 3 and continues at month 6 and 12. At 3 postoperative months, corneal confocal microscopy demonstrated the presence of highly reflective activated keratocytes with signs of edema at the level of the anterior stroma that continues to 6 month (Fig. 5).

Transitory corneal opacity like haze with higher reflectivity of the stroma with undistinguished keratocyte nuclei was found in 5 cases still present at month 6. The deep stroma showed normal keratocytes with indications of increased density and no signs of activation and edema.

ENDOTHELIUM: no endothelial damage, no plemorphism or polymegatism was observed at any time (Fig. 6).

Conclusions: Keratocyte nuclei apoptosis in the anterior and intermediate corneal stroma with collagen alterations were observed during the first 3 post cross-linking months. Gradual keratocyte repopulation was demonstrated in the following months. The effect of the treatment reached 320 micron depth. *Confoscan 4* can help in the detection of the modifications of corneal microstructure after the treatment.

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