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## Long-term results of simultaneous transepithelial phototherapeutic keratectomy and conventional photorefractive keratectomy (Cretan protocol plus) followed by corneal crosslinking for keratoconus

Dimitrios A. Liakopoulos, Michael A. Grentzelos, Athanasios Economou,  
Charalambos S. Siganos, Miltiadis K. Tsilimbaris,  
Ioannis G. Pallikaris, George D. Kymionis

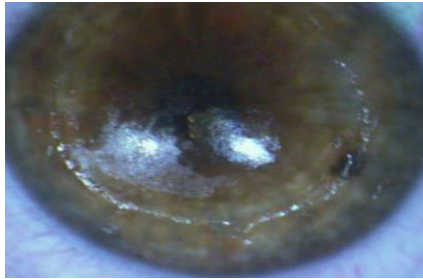
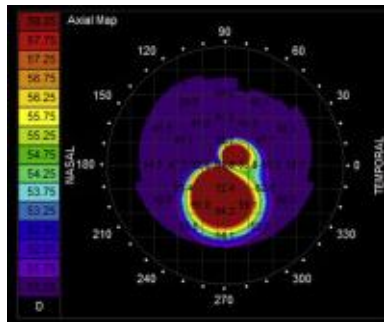
*No financial interest in any materials or methods described herein*

Vardinoyiannion Eye Institute of Crete (VEIC), Faculty of Medicine, University of Crete



# Introduction

- Corneal cross-linking (CXL) is a well-established treatment for keratoconus used to stiffen the corneal ectatic tissue and halt the progression of the disorder
- Visual outcomes are only slightly improved after CXL in most of the cases
- Epithelial removal with transepithelial phototherapeutic keratectomy (t-PTK) during CXL (Cretan protocol) results in better visual and refractive outcomes in comparison with mechanical epithelial debridement
- T-PTK during CXL acts actually as a “customized” procedure in keratoconic corneas due to the thinner epithelium at the apex of the cone



T-PTK (in an intended ablation depth of 50  $\mu\text{m}$ ) during CXL removes the corneal epithelium along with a small amount of anterior stromal tissue on the cone apex (areas with epithelium thinner than 50  $\mu\text{m}$ ) regularizing the anterior corneal surface

# Purpose

To present the long-term visual, refractive, and topographic outcomes after combined simultaneous t-PTK and conventional PRK followed by CXL for keratoconus

# Methods

- Prospective, interventional case series
- Inclusion criteria: progressive keratoconus, age  $\geq 18$  y.o., corneal thickness  $\geq 400$   $\mu\text{m}$
- Exclusion criteria: history of corneal or intraocular surgery, herpetic keratitis and any other corneal or anterior segment pathological signs, pregnancy and lactation
- All patients underwent uneventful procedure (Cretan protocol plus), using the Allegretto Wavelight excimer laser (Wavelight Technologies, Erlangen, Germany)
- T-PTK was performed at a 6.5 - 7.0 mm zone at an intended depth of 50  $\mu\text{m}$
- The de-epithelialized area was enlarged mechanically by scrapping the epithelium with a beaver blade at an intended 8.0 - 9.0 mm zone
- Maximum ablation of conventional PRK was up to 50  $\mu\text{m}$  in depth and at a maximum 5.5 mm zone

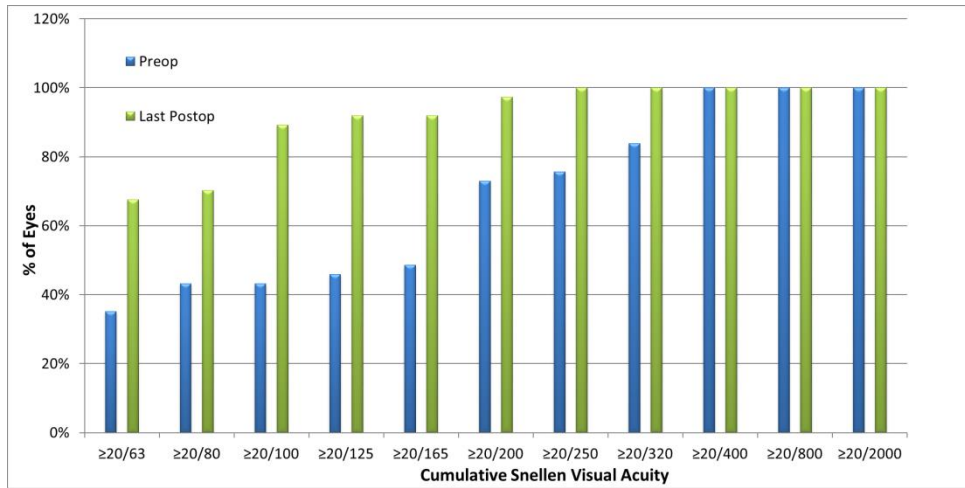
# Results

- 25 patients (37 eyes), 19 males/6 females
- Mean patient age was  $26 \pm 8$  years
- Mean last postoperative follow-up was 7.62 years (range from 6 to 10 years)
- Mean preoperative corneal thickness was  $481 \pm 26 \mu\text{m}$
- Mean PRK ablation depth was  $23.0 \pm 11.6 \mu\text{m}$  (range from 8 to  $50 \mu\text{m}$ )
- The residual stromal bed after PTK-PRK ablation was  $409 \pm 25 \mu\text{m}$  (range from 365 to  $466 \mu\text{m}$ ).

	Preop (mean $\pm$ SD)	Last Postop (mean $\pm$ SD)
UDVA (LogMAR)	$0.80 \pm 0.38$	$0.42 \pm 0.30$ <b>P&lt;0.001</b>
CDVA (LogMAR)	$0.18 \pm 0.19$	$0.06 \pm 0.11$ <b>P&lt;0.001</b>
SEQ	$-5.08 \pm 4.59$	$-2.29 \pm 2.45$ <b>P&lt;0.001</b>
Steep K	$50.03 \pm 4.04$	$45.95 \pm 3.19$ <b>P&lt;0.001</b>
Flat K	$45.84 \pm 2.73$	$43.38 \pm 2.72$ <b>P&lt;0.001</b>
Corneal Ast.	$-4.20 \pm 2.55$	$-2.57 \pm 1.58$ <b>P&lt;0.001</b>

## Preop vs Postop UDVA

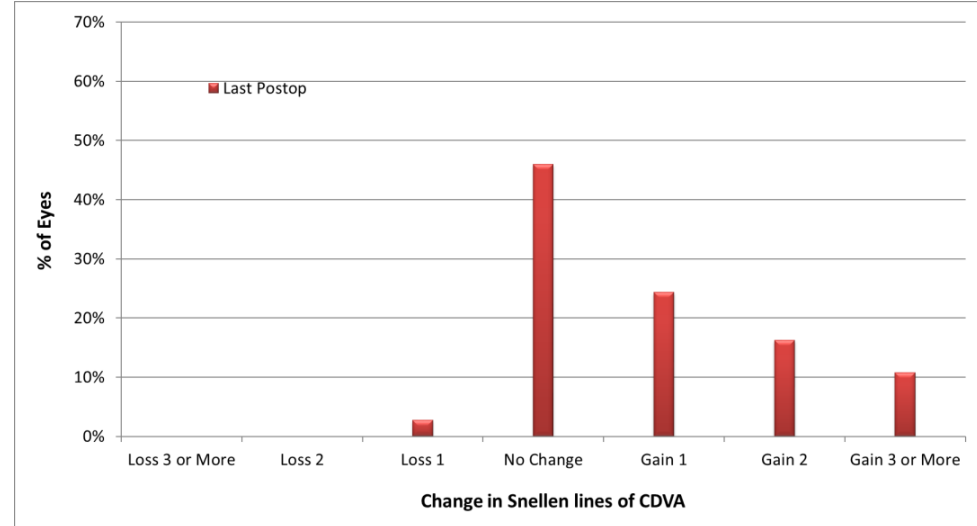
- 35% of eyes were at UDVA  $\geq 20/63$  (Snellen) preoperatively, whereas 68% of eyes presented UDVA of  $\geq 20/63$  (Snellen) at last postop follow-up



## Safety

At last postop follow-up:

- 51% of eyes gained  $\geq 1$  lines of CDVA
- 46% of eyes neither gained nor lost any line of CDVA
- Only 1 eye (3%) lost 1 line of CDVA



# Conclusions

Combined simultaneous t-PTK and conventional PRK followed by CXL (Cretan protocol plus):

- resulted in a significant improvement in visual acuity as well as in keratometric values
- is capable of offering patients a functional vision (t-PTK and conventional PRK) and stabilization (CXL) of keratoconus
- seems to be an effective and safe treatment for keratoconic patients over a long-term follow-up period