

Keratometric and Pachymetric Outcomes of Corneal Collagen Crosslinking for Keratoconus Patients at Sussex Eye Hospital: 5 Years Results

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Introduction:

Corneal crosslinking (CXL) is an effective treatment to slow down or stop keratoconus progression.

Since introduction of *Dresden protocol*, several accelerated protocols have been introduced to reduce the treatment time and patient's discomfort.

There is paucity of data on long term effect of epi-off CXL.

Our study sought to:
Evaluate CXL's impact on flattening corneal cones in central, paracentral, and peripheral locations at 5 year's

Assess changes in pachymetry at 5 year's

Assess any correlation of age, gender, cone location and pre-op anterior Kmax with post-op cone flattening.

Methods:

Observational study

Inclusion criteria:

Consecutive patients with progressive keratoconus between 2014 and 2019 with minimum follow up of 60 months who underwent:

- Epithelium-off non-accelerated-CXL at Sussex Eye Hospital, United Kingdom

Exclusion criteria:

Corneal scarring, history of hydrops, thinnest pachymetry <400 µm, excessive eye rubbing and severe atopy, iatrogenic ectasia and other types of ectasia like pellucid marginal degeneration

Data collection:

- Collected data on age, sex, cone location, and keratometry parameters at baseline, 1 year, and 5 years post-CXL.
- Multiple regression for factors responsible for cone flattening .

Patients: 53 eyes from 53 patients (36 males, 17 females) with keratoconus were included.
Age in years: Central 24.45 ± 8.05, paracentral 25.5 ± 10.7, and peripheral 39 ± 7.69.
Cone Distribution: Central 31 (58.49%), 16 paracentral (30.19%), 6 peripheral (11.32%).
Follow-up Period: Mean follow-up for central cones (69.81±13.65 months), paracentral (80.25±20.37 months), peripheral (77.17±18.84 months).

	Non-accelerated CXL (Brighton, United Kingdom)
Progression criteria	>1D increase in K max over 6-12 months
Fluence (J/cm²)	5.4
Soak time and interval	10 minutes, q1
Intensity (mW)	3
Treatment time (minutes)	30 minutes
Epithelium status	Epithelium-off
Chromophore	Riboflavin (Vibex Rapid, Avedro, USA)
Chromophore carrier	HPMC
Chromophore osmolarity	Iso-osmolar
Chromophore concentration	0.1%
Light source (device name)	Avedro (Avedro KXL system, Waltham, MA, USA)
Irradiation mode (interval)	Continuous
Protocol modifications	nil
Protocol abbreviation in manuscript	Non-A-CXL(10*30)

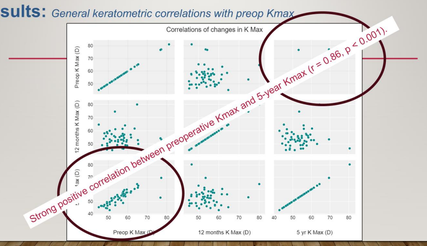
Results:

1- **General Keratometric changes:**
- The general keratometric observations (not based on cone location): Preoperative Kmax (56.1±77.45) was greater than 1-year Kmax (54.57±6.61) and 5-year Kmax (53.64±6.75).
- Preop. Vs. 5-year change was significant (P<0.01)

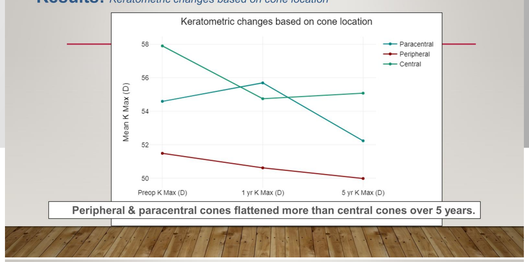
2- General pachymetric changes:
- The general thinnest pachymetry observations (not based on cone location): Preoperative (463.9±39.6) was greater than 1-year Kmax (458.6±40.4) and 5-year Kmax (458.8±43.9).
- Preop. Vs. 1 year change was significant only (p<0.05)

3- Multiple regression to assess factors for post operative cone flattening at 5 years
A one-unit change in preoperative Kmax (D) leads to A -0.2 change in Kmax flattening (p=0.008)

Results: *General keratometric correlations with preop Kmax*

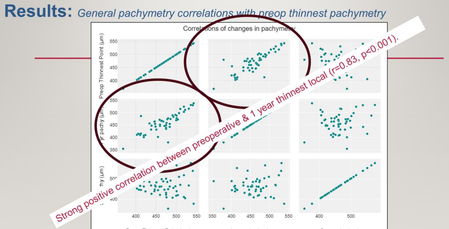


Results: *Keratometric changes based on cone location*

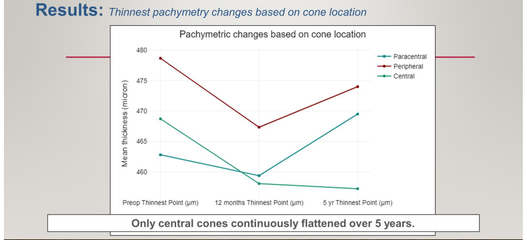


Peripheral & paracentral cones flattened more than central cones over 5 years.

Results: *General pachymetry correlations with preop thinnest pachymetry*



Results: *Thinnest pachymetry changes based on cone location*



Only central cones continuously flattened over 5 years.

Conclusion:

- **Kmax:**

Preop. Vs. 5-year change was significant and positively correlated
Peripheral & paracentral cones flattened more than central cones over 5 years.

- **Thinnest pachymetry:**

Preop. Vs. 1 year change was significant and positively correlated.
Only central cones continuously flattened at 5 years.

- One unit change in preop Kmax caused -0.2 unit change in cone flattening at 5 years.