# 2-year Audit of Corneal Cross-linking for Progressive Keratoconus: An Opportunity in Patient Education and Service Modernisation

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## Introduction & Aim

Corneal collagen cross-linking (CXL) has been shown to be an effective and safe procedure[1]. Our aim was to audit the CXL service delivered to a **diverse population** in a large tertiary centre covering six boroughs in South East London and parts of Kent. This will investigate the **effectiveness** and **safety of treatment** for progressive keratoconus across 3 evidence-based treatment protocols and **identify areas for service improvement**.

## Design & Method

A **retrospective, non-comparative interventional case series** across 30 months for patients treated at King's College Hospital, Denmark Hill & Queen Mary's Hospital, Sidcup

**Study Population:** all patients who underwent epithelium-off CXL between Jan 2018 and July 2020
**Primary Outcome:** Change of >1 dioptre (D) in maximum keratometry (Kmax) from pre-operative to 12- and 24-month visits
**Treatment Protocols:** Accelerated (standard), Dresden (patients aged ≤17 years), Modified (high risk <400 microns)

**Medisoft & Oculus Pentacam® data collection**: **[1]** *Patient demographics* (age, gender, ethnicity), clinical exam, non-attendance; **[2]** *CXL protocol performed;* **[3]** Status pre-CXL data and follow-ups at 3/6/12/24/36 months of: *Pentacam topography (K1, K2, Kmax, CCT), Visual acuity (UA, PH, BCVA) and Subjective refraction (Sphere, cylinder, spherical equivalent), Post-op complications* at follow-up intervals

Statistical analysis performed using IBM SPSS Statistics, **paired Student *t* test, *P* value <0.05 significance**.

## Results [1]

**140 patients, 167 eyes** | **Mean age: 24 yrs** | **White 37%, Afro-Caribbean 25%, Asian 10%, Other 15%, N/a 15%**

**DIAGNOSES** **Progressive keratoconus: 137 patients, Post-LASIK ectasia: 3**

**DISEASE SEVERITY** **Kmax >55D: 65%, Kmax <55D: 14%, Thin <400µm: 17%, Very thin <375µm: 4%**

## Results [2]

| Sub-group | *Topography* | | | | *Visual acuity* | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Pre-CXL | 12 months | Change | *P* value | Pre-CXL | 12mo | Change | *P* |
| **Kmax <55D** | 51.9 | 51 | *-0.9* | 0.32 | 0.2 | 0.1 | *-0.1* | 0.12 |
| **Kmax >55D** | 63 | 62 | *-1* | 0.06 | 0.3 | 0.3 | *0* | 0.01 |
| **<400µm** | 66 | 63 | *-3* | 0.10 | 0.4 | 0.3 | *-0.1* | 0.15 |
| **<375µm** | 73 | 69.4 | *-3.6* | 0.47 | 0.4 | 0.5 | 0.1 | 0.10 |
| **White** | 61.7 | 59.5 | *-2.25* | 0.22 | **Total mean:** | | **-0.01** | **0.022** |
| **Afro-Carib** | 61.6 | 60.1 | *-1.5* | 0.03 | *Protocols* | | | |
| **Asian** | 56.7 | 57.2 | +0.8 (*-0.9*)* | 0.05 (*0.12*)* | **Accelerated** | 60.2 | 58.4 | *-1.8* | 0.06 |
| **Other/Mixed** | 60.3 | 56.3 | *-4* | 0.11 | **Dresden** | 63 | 58.8 | *-4.2* | 0.03 |
| **Total mean:** | | | **-2.3** | **0.031** | **Modified** | 63.5 | 59.5 | *-4* | 0.14 |

*AT 24 MONTHS

**DNA ≥2 follow-ups: 27%, pre-CXL Kmax of these pts: 61.1D *(46% DNA 12 month f/u)***

**DNA all follow-ups: 11%, pre-CXL Kmax of these pts: 59.2D**

**Progressed & re-CXL: 1 case** | **Required DALK (pre-op CCT 374µm): 1** | **Hydrops: 1 (then DNA)** | **Keratitis: 0**

## Conclusion

In a diverse patient population with extremes of disease severity, **all treatments either halted disease progression at 12 months, or at 24 months in the Asian population**. A significant proportion of our cohort, patients averaging **severe disease**, **did not return** for on-going management. We propose a **telephone survey** to identify the cause of non-attendance, and a **QR code-based information leaflet** to highlight the **importance of patient compliance**.

## References

1. Hashemi H, Heydarian S, Hooshmand E, et al. The Prevalence and Risk Factors for Keratoconus: A Systematic Review and Meta-Analysis. *Cornea.* 2020;39(2):263-270

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