Accelerated Continuous vs. Accelerated Pulsed Corneal Crosslinking for Keratoconus

Marcello Leucci
El M Gore
Vijay Anand
Nikolaos Kopsachilis
Michael N Nicholae
Michail I Malandrakis
Bruce D Allan

iCXL Zurich, 2nd December 2016

Financial disclosures: None
Study Objective

To report 24-month results of accelerated continuous vs. pulsed corneal cross-linking in progressive keratoconus using the Avedro KXL® system

Primary Outcome Measure:
• Keratometric stability / Failure rates

Secondary Outcome Measure(s):
• Vision
• Rate of infective keratitis
Accelerated Corneal Crosslinking for Keratoconus

Methodology

- Prospective Case Series
  - Inclusion Criteria
    - Pre-Op ectasia progression $\geq 1$D or $\geq 2.5$D
  - Exclusion Criteria
    - Minimum Stromal thickness $< 375 \mu m$
    - Active ocular surface disease

- 10 minutes Riboflavin 0.1% soak
  - Continuous UVA exposure at 30mW/cm² for 4 minutes (2013-14)
  - Pulsed UVA exposure at 30mW/cm² (1.5 seconds on/off) for 8 minutes (2014 onwards)
Staging and Disease Severity

Topography: 2 Stages

- Stage 1: $K_{\text{max}} < 55\text{D} = +1\text{D}$
- Stage 2: $K_{\text{max}} \geq 55\text{D} = +2.5\text{D}$

Vision Analysis: Anterior K2

- Stage 1 $\leq 48\text{D}$
- $>48\text{D}$ Stage 2 $\leq 53\text{D}$
- $>53\text{D}$ Stage 3 $\leq 55\text{D}$
- Stage 4 $\geq 55\text{D}$

¹ Differential precision of corneal Pentacam HR measurements in early and advanced keratoconus (Tom H Flynn, Daya P Sharma, Catey Bunce, Mark R Wilkins); Br J Ophthalmol doi:10.1136/bjophthalmol-2015-307201;
Results: Topography at 24 months
282 eyes; Age 26±6 years

Stage 1: $K_{\text{max}} < 55\text{D}$
Topography Baseline to 24 months

Stage 2: $K_{\text{max}} \geq 55\text{D}$
Topography Baseline to 24 months
### Results: Topography at 24 months

**282 eyes; Age 26±6 years**

<table>
<thead>
<tr>
<th></th>
<th>CONTINUOUS (n=139)</th>
<th>PULSED (n=143)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 55D</td>
<td>≥ 55D</td>
</tr>
<tr>
<td><strong>n</strong></td>
<td>38</td>
<td>101</td>
</tr>
<tr>
<td><strong>Staged</strong></td>
<td>9.7% (3.7)</td>
<td>5.3% (5.4)</td>
</tr>
<tr>
<td><strong>1.5</strong></td>
<td>5% (1.9)</td>
<td>13% (13.1)</td>
</tr>
<tr>
<td><strong>2.5</strong></td>
<td>1.3% (0.5)</td>
<td></td>
</tr>
</tbody>
</table>
Results: Best Corrected Visual Acuity at 24 months
243 eyes; Age 26±6 years

Repeated Visual Acuity Measurement: Establishing the Patient’s Own Criterion for Change (BROWN, BRIAN PhD; Loive –Kitchin, Jan 1993; OVS)
Results: Best Corrected Visual Acuity at 24 months
243 eyes; Age 26±6 years
Conclusion

Efficacy was similar for both accelerated continuous and pulsed CXL in stabilising disease progression in keratoconus.