

Customized CXL – 1 year results

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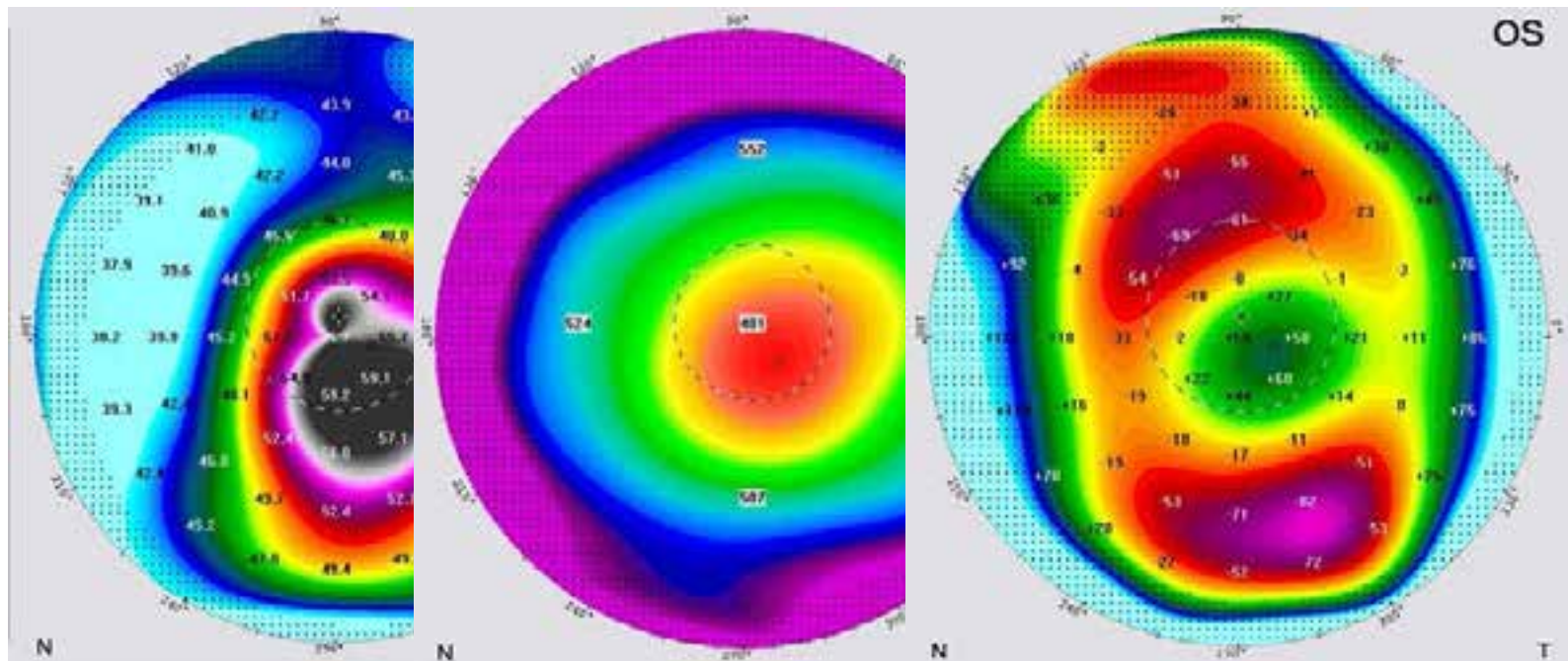
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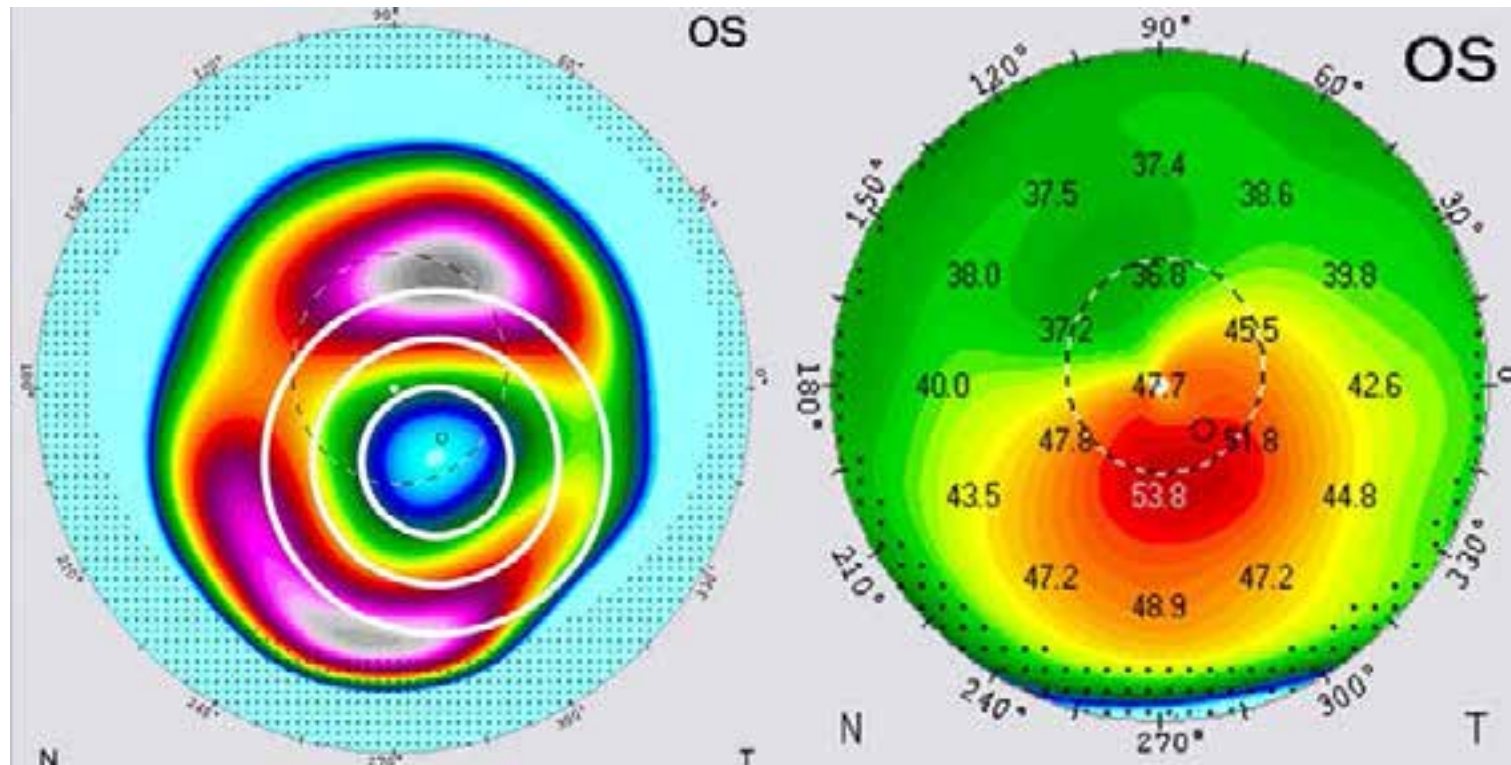
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Why and where customized CXL?



Cynthia J. Roberts, William J. Dupps Jr (2014); Biomechanics of corneal ectasia and biomechanical treatments. J Cataract Refract Surg.; 40:991-8;

pattern area and centration



inner circle: total energy applied $10\text{J}/\text{cm}^2$ – shortest diameter of PF – 0.5mm

intermediate circle: total energy applied $7.2\text{J}/\text{cm}^2$ – average diameter of outer/inner circle

outer circle: total energy applied $5.4\text{J}/\text{cm}^2$ - maximal diameter of PF + 1.0mm

Irradiance: $9\text{mW}/\text{cm}^2$

customized vs. control group (20 eyes each)

examination points: preoperative, 1, 3, 6, 12 months postoperatively

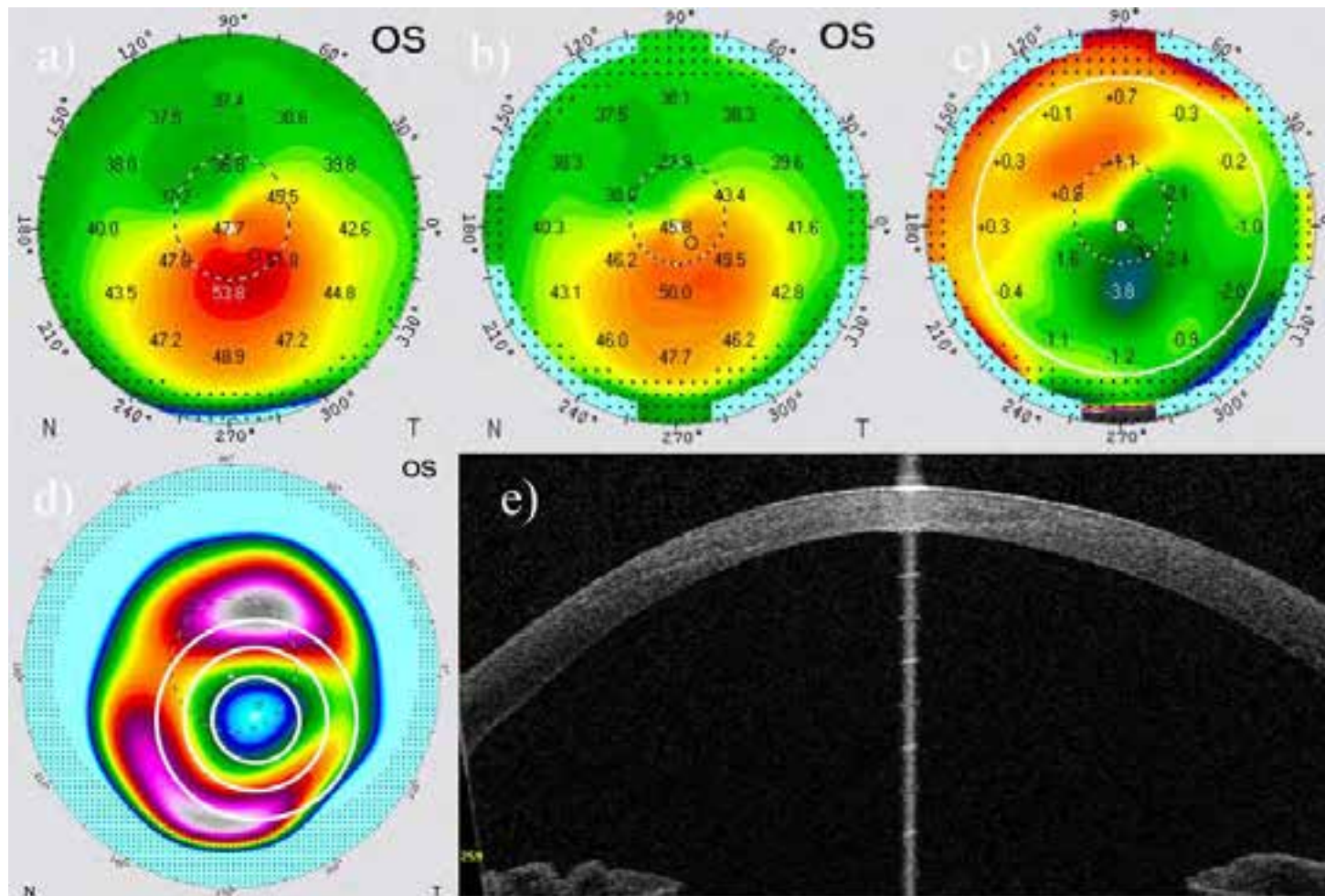
analyzed parameters:

- 1) time for epithelial healing
- 2) K_{\max} , max. posterior float, thinnest pachymetry, BSCVA
- 3) endothelial cell count
- 4) anterior segment-OCT

customized vs. standard CXL group

	customized CXL (n=19)	standard CXL (n=19)	p-value
age \pm SD [years]	28.7 \pm 6.3	25.9 \pm 6.7	0.21
side [OD:OS]	8:11	9:10	0.73
sex [m:f]	15:4	13:6	0.42
endothelial cell count [cells/ mm ²]	2824 \pm 256	2899 \pm 277	0.55
K _{max} [D]	57.0 \pm 6.7	55.3 \pm 5.3	0.31
thinnest pachymetry [μ m]	463 \pm 42	447 \pm 35	0.15
BSCVA [-logMAR]	0.31 \pm 0.26	0.35 \pm 0.32	0.82
posterior float [μ m]	72 \pm 35	65 \pm 23	0.44

typical evolution of customized treated case



regularization
index = 5.3D

significant differences in 1 year changes between groups

	customized CXL	standard CXL	p-value
ΔK_{\max} [D]	-1.7 ± 2.0	-0.9 ± 1.3	0.03
regularization index [D]	5.2 ± 2.7	4.1 ± 3.1	0.03
epithelial healing time [days]	2.56 ± 0.5	3.19 ± 0.73	0.02
Δ -logMAR	-0.07 ± 0.20	-0.04 ± 0.14	0.22

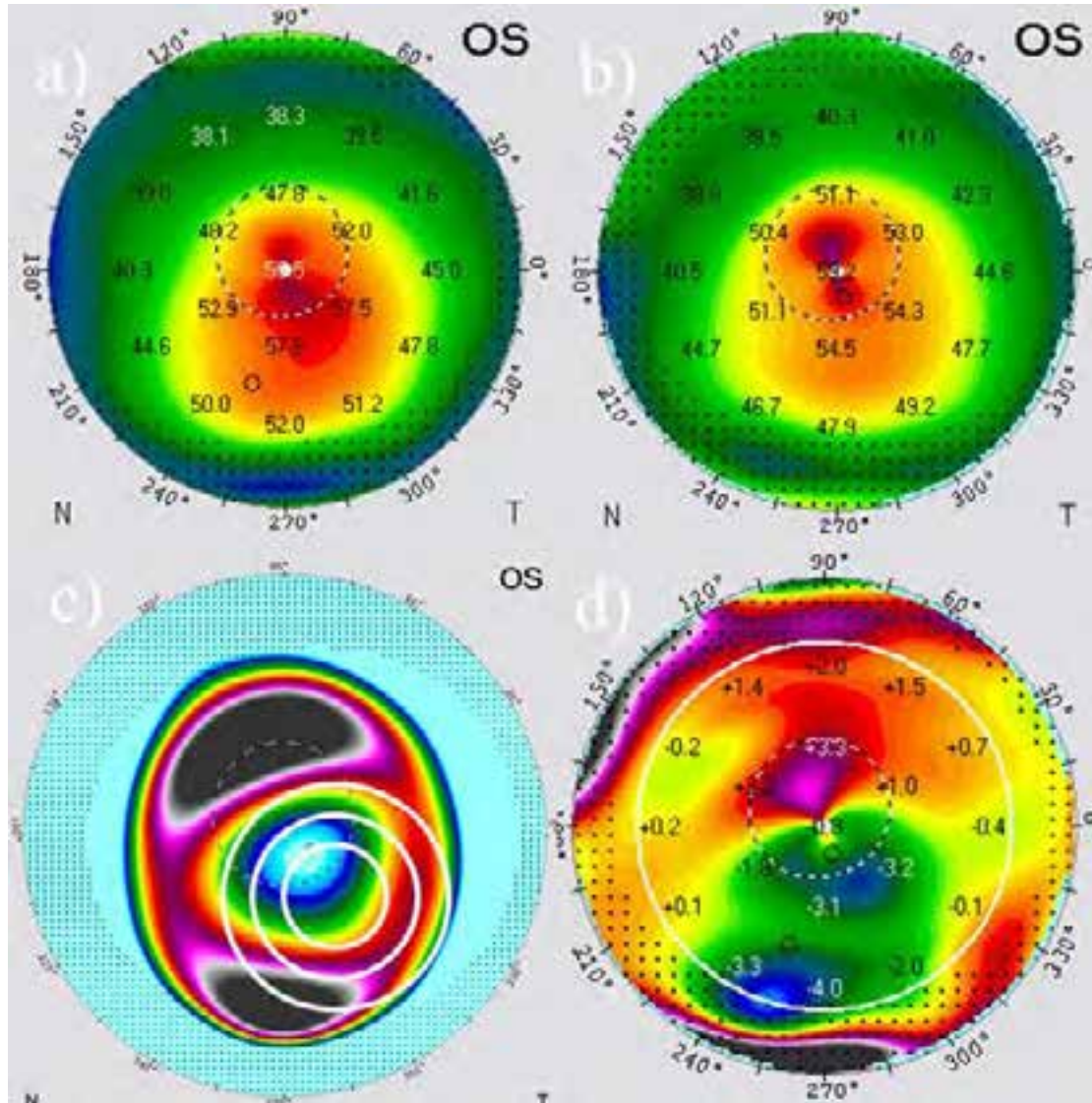
distribution of flattening in K_{\max}

change in K_{\max}	customized CXL	standard CXL
>+2 D	1 (5.3%)	0 (0%)
>+1 D	1 (5.3%)	0 (0%)
+1D to -1D	8 (42.1%)	12 (63.2%)
<-1 D	10 (52.6%)	7 (36.8%)
<-2 D	7 (36.8%)	2 (10.5%)
<-3 D	4 (21.0%)	2 (10.5%)

correlations customized CXL

	preoperative K_{\max}	preoperative pachymetry	preoperative posterior float
r, RI	0.43	-0.63	0.61
p-value, RI	0.049	0.0046	0.0075
r, ΔK_{\max}	-0.32	0.12	-0.34
p-value, ΔK_{\max}	0.12	0.34	0.11

unintended decentration of irradiation pattern



- shorter period until epithelial healing → shorter early postoperative vulnerable phase
- higher quantitative and qualitative flattening in K_{\max}
- regularization index (RI) is higher in customized CXL than in standard CXL
- stronger regularization in further progressed cases



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