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Título: **New Intrastromal Corneal Ring with a 340-degree arc length in a Post-Keratoplasty Patient: a 12-month follow-up**

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Palavras-chave: Keratoconus; Ring; Astigmatism; Keratoplasty; Intrastromal.

Introduction

Even after a successful corneal transplantation, ametropia, astigmatism and anisometropia can compromise a patient's final visual outcome and rehabilitation.[1-2] - Post-keratoplasty astigmatism and ametropia can be managed with nonsurgical options like spectacles and contact lenses. [3-4]

Several surgical options have been reported for the treatment of ametropia following corneal transplantation, including manual astigmatic keratotomy (AK),[5] femtosecond laser AK,[6] limbal relaxing incisions (LRI),[7] wedge resection,[8] excimer laser-based photorefractive procedures,[9] repeat keratoplasty [10] and intrastromal corneal ring segments. [11]

Purpose

To assess the clinical outcomes after the implantation of a new 340-degree arc length corneal ring segment aided by femtosecond laser in post-keratoplasty patients after 12-month follow-up.

Design

Prospective consecutive interventional study

Methods

Twenty eyes of 18 patients with previous keratoplasty who underwent an intrastromal corneal ring segment (ICRS) implantation assisted by femtosecond laser were included in this study.

Primary outcome measure: Change in uncorrected distance visual acuity (UCVA) at 12 months postoperatively. Secondary outcome measures: Corrected distance visual acuity (CDVA), refraction outcome, and corneal tomography 1,3, 6 and 12 months after surgery. The astigmatism results were analyzed using vector analysis through the Double-Angle polar plot.

TABLE 1. Patients Demographics

Characteristics	Baseline Value (± SD)		
	Mean ± SD	Median	Range
Refractive sphere (D)	-2.52 ± 2.81	-2.00	-8.00, 1.00
Refractive cylinder (D)	-5.36 ± 1.72	-5.50	-8.00, -1,50
SE (D)	-5.22 ± 2.96	-5.00	-11.00, -1.50
K1 (D)	45.49 ± 3.25	44.90	36.50, 50.60
K2 (D)	51.05 ± 3.57	50.70	43.70, 58.10
Corneal astigmatism (D)	5.55 ± 2.29	5.04	1.80, 10.40
Kave (D)	47.96 ± 3.32	47.50	39.70, 53.50
Kmax (D)	58.53 ± 6.91	58.35	49.60, 74.30
CCT (µm)	482.40 ± 56.19	477.00	383.00, 597.00
Q-val	-0.29 ± 0.73	-0.54	-1.15, 1.33

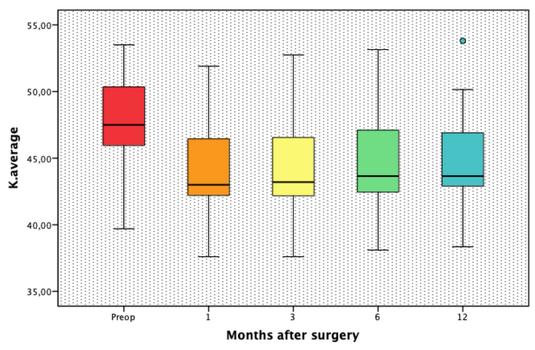
Results

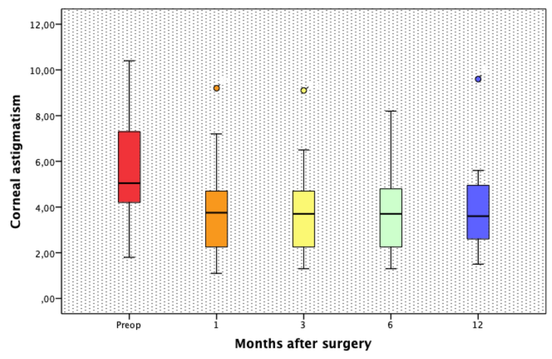
Patients were recruited for this study from only one site between February 1, 2016, and December 31, 2017. A total of 24 patients were screened to participate in this study. Two did not meet the inclusion criteria (1 glaucoma, 1 cataract), 1 patient decided not to participate and 1 fulfilled an exclusion criterion, for these reasons 4 were withdrawn from the analysis set. Eighteen participants started the study, underwent surgery and were included in the full analysis set (FAS). There were no complications. All patients were followed up for 12 months.

- 7 MEN (38.9%) x 11 WOMEN (61.1%)
- Mean age: 39.3 years, ranging from 20 to 64 years old (SD: ± 11.3)
- Median interval between corneal keratoplasty and ICRS implantation was 5.7 years, ranging from 2.1 to 11.3 years

TABLE 2. Preoperative and 12-months postoperative evaluated parameters

Parameters	Preoperative	Postoperative	P value
UDVA	1.15 ± 0.41	0.54 ± 0.31	<.001
CDVA	0.26 ± 0.12	0.10 ± 0.10	<.001
Refractive sphere (D)	-2.52 ± 2.81	-1.23 ± 2.56	0,005
Refractive cylinder (D)	-5.36 ± 1.72	-2.60 ± 1.19	<.001
SE (D)	-5.22 ± 2.96	-2.52 ± 2.83	<.001
K1 (D)	45.49 ± 3.25	42.84 ± 3.47	<.001
K2 (D)	51.05 ± 3.57	46.77 ± 4.03	<.001
Corneal astigmatism (D)	5.55 ± 2.29	3.92 ± 1.82	<.001
Kave (D)	47.96 ± 3.32	44.91 ± 3.69	<.001
Kmax (D)	58.53 ± 6.91	56.38 ± 6.38	0,016
CCT (µm)	482.40 ± 56.19	497.35 ± 54.57	0.03
Q-val	-0.29 ± 0.73	0.32 ± 0.59	<.001





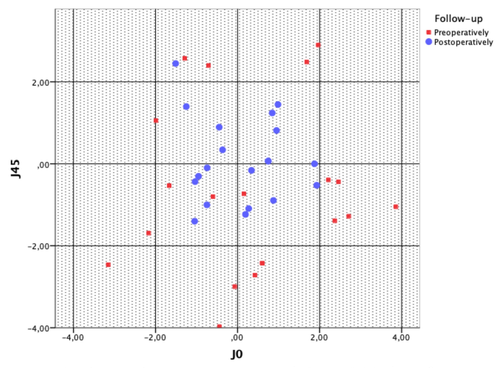


Figure 4. Astigmatic power vector (J0 and J45) before and 12 months after intrastromal corneal ring segment (ICRS) implantation.

Conclusion

<u>Conclusion:</u> A new intrastromal corneal ring with a 340-degree arc length was effective in treating post-keratoplasty eyes with improvement in visual acuity and reduced corneal astigmatism.

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