Clinical Outcomes of iris fixated phakic toric intra ocular lenses in patients with corneal ectasia

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Introduction

- Corneal ectatic conditions like keratoconus, pellucid marginal degeneration and post LASIK ectasia share common management options where a single procedure is not enough to correct the refractive error and offer good visual outcomes.
- Implantation of phakic intraocular lens has been reported previously in keratoconus eyes. Its however is not suitable in eyes with shallow anterior chambers, lower endothelial cell counts and eyes with inflammation.
- The study aims at the efficacy and safety of Artisan phakic intraocular lenses in eyes with corneal ectasia previously treated with crosslinking, intracorneal rings or keratoplasties.

Methods

A retrospective, no comparative study of eyes with corneal ectasia who underwent consecutive implantation of Artisan phakic IOLs between August 2013 and October 2019 at Queen Victoria Hospital, UK.

Inclusion criteria: Patients with irregular astigmatism associated with mild to moderate corneal ectasias (keratoconus, pellucid marginal degeneration, post LASIK ectasia) All patients has subjective intolerance to contact lenses and has stable refraction and topographic parameter at two consecutive measurements

Exclusion criteria: Patients with ocular co morbidities like corneal, lens opacities, ocular inflammation, glaucoma, anterior chamber depth of <3mm or endothelial cell counts of <2200 cells /mm2

Results

Twenty-two men and 7 women of mean age 39.7 years were included in the study. All patients had ectasia due to keratoconus except one had post laser ectasia. Nineteen patients had cross-linking, 15 had intra corneal rings, whereas 7 had previous lamellar keratoplasties, 19 patients had cross-linking, 15 had intra corneal rings, whereas 7 had previous lamellar keratoplasties. Mean pre-operative Log MAR UDVA was 0.78 ± 0.24 improving to 0.16 ± 0.09 (p= 0.008). Mean pre-operative Log MAR CDVA was 0.12 ± 0.13 improving to 0.10 ± 0.09 (p= 0.10). Mean pre- operative (SE) was -2.13 ± 2.95 improving to -1.06± 1.11 (p= 0.20) at 12 months. The mean value of ECC was 2,632.30 ± 367.55 cells/ mm2 preoperatively and 2,471.52 ± 350.29 cells/mm2 at the 12-month follow-up.

Overall sample visual and refractive data

Mean (S. D)	Preoperative (33)	1-day Post Operative (30)	1-Month Post Operative (26)	3-Month Post Operative (26)	6-Month Post Operative (19)	12-Month Post Operative (22)	18-24 Month Post Operative (18)	24-36 Month Post Operative (4)	36-42 Month Post Operative (3)	p-value
UCVA	0.75(0.35)	0.55(0.35)	1.47(0.34)	0.30(0.22)	0.28(0.213)	0.16(0.15)	0.23(0.24)	0.03(0.24)	0.02(0.17)	0.000
S	-1.19(3.87)	0.18(2.14)	-0.48(2.09)	0.13(1.22)	0.06(1.28)	0.25(1.65)	-0.12(2.04)	-1.15(0.63)	-0.92(0.52)	0.310
C	-4.62(1.50)	-4.09(2.21)	-3.26(2.39)	-2.34(1.94)	-2.51(1.32)	-2.08(1.29)	-2.85(1.94)	-2.8(1.65)	-3.67(3.06)	0.000
SE	-3.5(3.9)	-1.78(2.51)	-2.09(2.11)	-1.01(1.61)	-0.98(1.44)	-0.67(1.68)	-0.86(1.95)	-2.55(1.32)	-2.75(1.39)	0.000
CDVA	0.163(0.17)	0.299(0.27)	0.174(0.13)	0.10(0.10)	0.11(0.15)	0.08(0.104)	0.07(0.08)	0.03(0.14)	0.02(0.17)	0.000

Table 1: Overall sample visual data (UCVA)uncorrected visual acuity and(CDVA) corrected visual acuity (LogMAR), refractive data (S) sphere, (C) cylinder and (SE) spherical equivalent analyzed at each post-operative period. (ANOVA)

Keratometric data for the overall sample

Mean(S. D)	Preoperative (33)	1-day Post Operative (3)	1-Month Post Operative (8)	3-Month Post Operative (20)	6-Month Post Operative (16)	12-Month Post Operative (17)	18-24 Month Post Operative (17)	24-36 Month Post Operative (6)	36-42 Month Post Operative (3)	p-value
Anterior K1	44.75(3.89)	44.8(0.51)	44.7(2.1)	44.4(4.19)	46.07(3.06)	45.06(4.34)	45.06(4.34)	45.9(3.74)	44.47(2.96)	0.966
Anterior K2	48.5(4.04)	56.3(4.12)	51.3(4)	48.5(4.42)	50.26(3.06)	48.14(4.26)	48.14(4.26)	49.55(3.89)	48.6(4.01)	0.048
Anterior KM	44.88(10.07)	49.87(1.75)	47.7(2.8)	46.3(4.1)	48.06(2.96)	46.74(4.55)	46.74(4.55)	47.57(3.79)	46.43(3.45)	0.797
Anterior Astigmatism	3.62(1.98)	11.53(3.95)	6.6(2.7)	4.12(2.89)	4.2(1.47)	3.48(1.51)	3.48(1.51)	3.5(1.17)	4.17(1.16)	0.000
Anterior K max	55.17(4.31)	60.97(3.35)	57.99(5.1)	55.2(4.27)	56.86(3.93)	55.55(3.93)	55.55(3.93)	55.1(4.21)	55.1(3.57)	0.326
Posterior K1	-6.64(0.57)	-7.6(1.49)	-6.4(0.62)	-7.48(0.56)	-6.79(0.68)	-6.75(0.7)	-6.75(0.7)	-6.67(0.7)	-6.43(0.45)	0.000
Posterior K2	-7.46(0.64)	-7.4(1.93)	-7.6(0.93)	-6.6(0.7)	-7.5(0.63)	-7.48(0.68)	-7.48(0.68)	-7.48(0.66)	-7.33(0.55)	0.004
Posterior KM	-7.01(0.51)	-7.2(0.55)	-6.9(0.5)	-6.99(0.45)	-7.13(0.54)	-6.97(0.62)	-6.97(0.62)	-7.05(0.66)	-6.87(0.5)	0.978
Posterior Astigmatism	0.95(0.50)	2.53(1.36)	1.4(0.87)	1.08(0.58)	0.91(0.48)	0.82(0.42)	0.88(0.38)	0.8(0.18)	0.87(0.15)	0.000

Table 2: Corneal topographic data of the anterior and posterior corneal surface obtained during the follow-up in the overall sample. Abbreviations: K1, flattest keratometric reading; K2, steepest keratometric reading; KM, mean keratometry; Kmax, maximum keratometry.

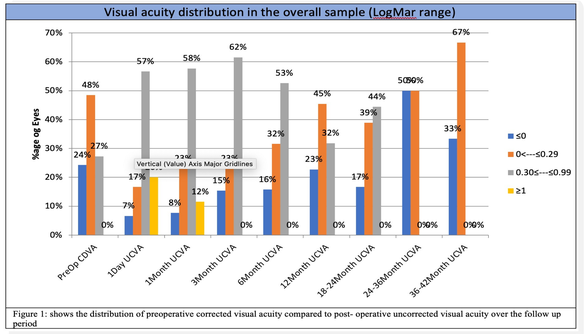


Figure 1: shows the distribution of preoperative corrected visual acuity compared to post- operative uncorrected visual acuity over the follow up period

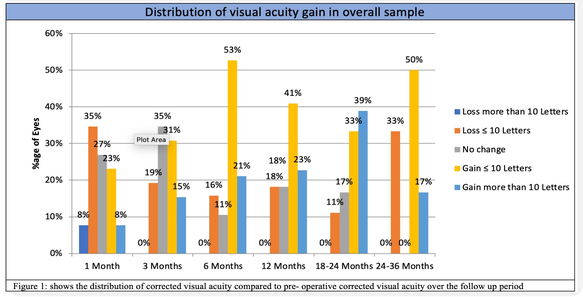
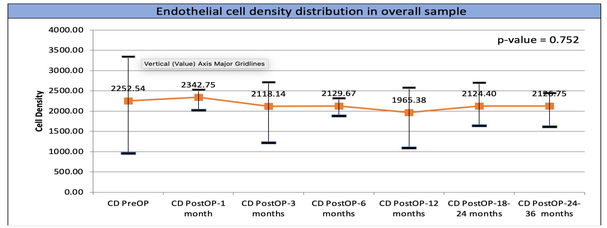
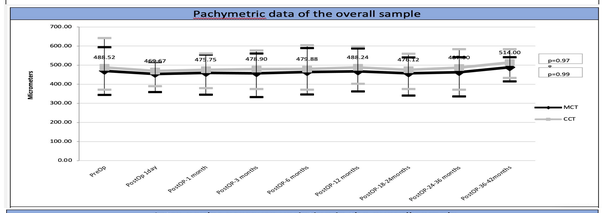
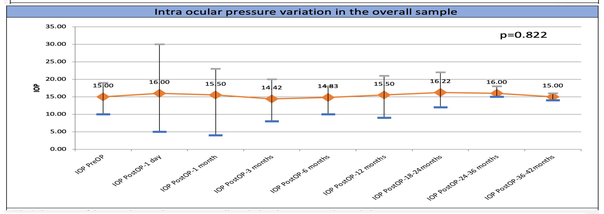


Figure 1: shows the distribution of corrected visual acuity compared to pre- operative corrected visual acuity over the follow up period







Conclusion

Implantation of Iris fixated phakic toric IOLs has shown high efficacy (0.125) and safety (0.125) in the patients with mild to moderate astigmatism in corneal ectasia. The percentage reduction in sphere (79%) in the overall sample was greater as compared to percentage reduction in cylinder (55%) highlighting the predictability of spherical correction compared to cylindrical correction.

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