Comparing visual acuity, low contrast acuity and refractive error after implantation of a low cylinder power toric or a non-toric IOL

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Purpose

- To compare uncorrected and best corrected visual acuity, low contrast acuity, residual refraction and ocular biometry after implantation of a low cylinder power toric intraocular lens (IOL) or non-toric IOL.
- Why?
  - Surgical variability may limit effectiveness
  - Low levels of refractive cylinder may not be clinically important

Methods

- Non-interventional comparative study of visual outcomes after uncomplicated cataract or refractive lens exchange surgery:
  - T2 group: low cylinder power (AcrySof® T2 IQ Toric)
  - Non-toric group: similar design (AcrySof® IQ IOL)
- All eyes were eligible for T2 implantation, non-toric IOL implantation was a strictly financial decision.

Preoperative Data (from files)

	Low_Toric	Non_Toric
patients/eyes	45/51	37/43
MRSE (D)	-0.31 ± 2.43 (-4.88 to 3.63)	0.57 ± 2.19 (-6.00 to 3.63)
Average keratometry (D)	43.68 ± 1.53 (40.21 to 46.95)	43.74 ± 1.26 (41.41 to 46.41)
Corneal astigmatism (D)	0.63 ± 0.39 (0.07 to 1.46)	0.75 ± 0.42 (0.10 to 1.45)
Anterior corneal astigmatism orientation (WTR/OBL/ATR)	20/21/10	17/21/5

- Groups were well-matched

Postoperative refractive summary

	Low_Toric	Non_Toric	p
follow-up time (days)	522 ± 205 (132 to 791)	452 ± 268 (35 to 903)	0.16
MRSE (D)	0.04 ± 0.38 (-0.63 to 1.00)	0.18 ± 0.49 (-1.50 to 1.25)	0.13
manifest refractive cylinder (D)	0.31 ± 0.28 (0.00 to 1.00)	0.53 ± 0.38 (0.0 to 1.25)	< 0.01
Eyes with absolute MRSE ≤ 0.50 D	40 (75%)	31 (72%)	0.48
Eyes with ≤ 0.25 D of cylinder	33 (65%)	18 (42%)	0.03
Eyes with ≤ 0.50 D of cylinder	43 (84%)	30 (70%)	0.09

T2 Group

- Statistically significantly lower manifest refractive cylinder (~0.25 D)
- Significantly more eyes with ≤ 0.25 D of refractive cylinder

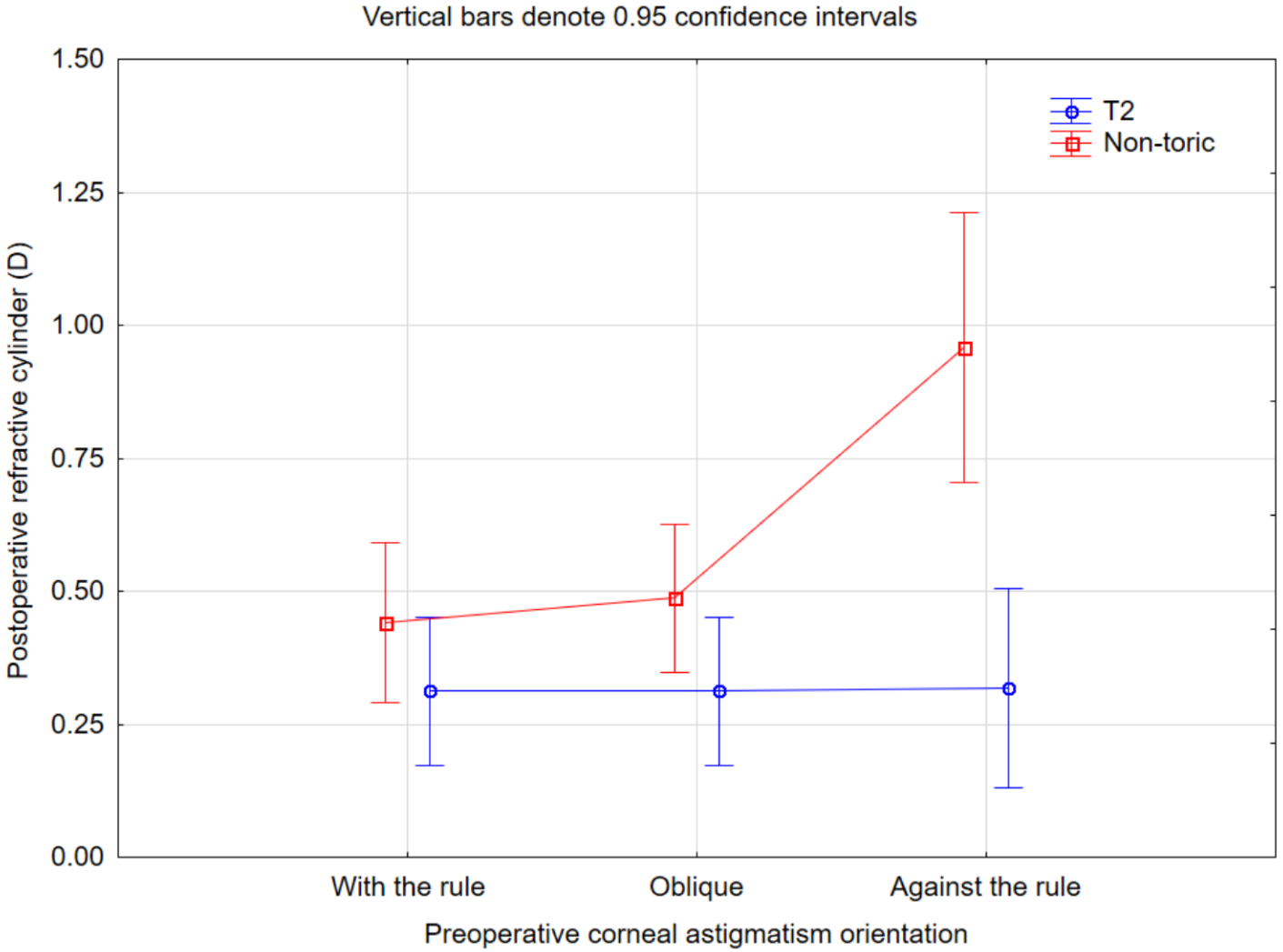
Postoperative visual acuity (logMAR)

	Low_Toric	Non_Toric	p
Uncorrected distance			
High contrast photopic	0.01 ± 0.12 (-0.18 to 0.34)	0.07 ± 0.13 (-0.10 to 0.44)	0.02
Low contrast photopic	0.37 ± 0.18 (0.10 to 0.80)	0.44 ± 0.18 (0.10 to 0.92)	0.09
Low contrast mesopic	0.59 ± 0.13 (0.36 to 0.94)	0.62 ± 0.16 (0.32 to 1.10)	0.13
Eyes 20/20 or better uncorrected	36 (71%)	22 (51%)	0.05
Best corrected distance	-0.05 ± 0.06 (-0.20 to 0.14)	-0.03 ± 0.05 (-0.10 to 0.08)	0.07

T2 Group

- Statistically significantly better uncorrected high contrast VA
- Significantly more eyes with 20/20 or better uncorrected VA

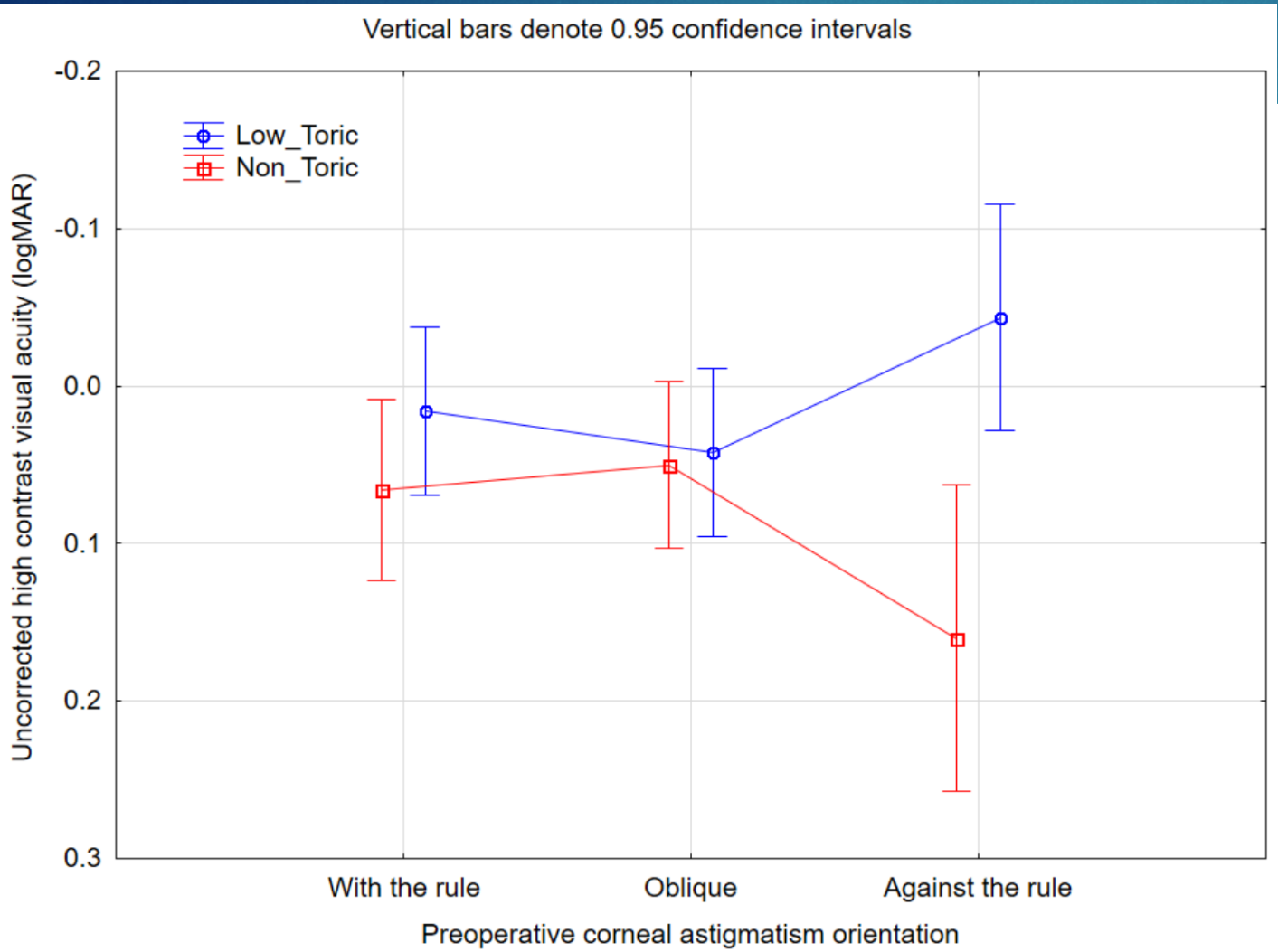
Effect of preoperative corneal astigmatism orientation: refractive cylinder



- Greater difference ATR
- Possible reasons
  - Superior incision
    (may increase ATR astigmatism)
  - Low “n” may be a factor:

n	T2	Non-toric
WTR	20	17
Oblique	21	21
ATR	10	5

Effect of preoperative corneal astigmatism orientation: uncorrected VA



- Greater difference ATR
- Possible reasons
  - ATR astigmatism more noticeable to patients
  - Low “n” may be a factor

n	T2	Non-toric
WTR	20	17
Oblique	21	21
ATR	10	5

Effect of preop corneal astigmatism orientation does not appear related to SIA effects

Surgically Induced Astigmatism	Low_Toric	Non_Toric	p
vector magnitude (D)	0.51 ± 0.29 (0.04 to 1.34)	0.62 ± 0.37 (0.10 to 1.60)	0.09
x coordinate (D)*	-0.29 ± 0.40 (-1.28 to 0.63)	-0.15 ± 0.49 (-1.32 to 1.12)	0.12
y coordinate (D)*	-0.06 ± 0.33 (-0.82 to 0.53)	-0.23 ± 0.48 (-1.32 to 0.85)	0.05
* double angle plot			

- No significant difference by lens group

Conclusions

- The AcrySof T2 (toric) IOL provided better uncorrected visual acuity and lower residual refractive cylinder than the Acrysof IQ (non-toric) IOL after cataract or refractive lens exchange surgery.

- The orientation of preoperative corneal astigmatism may be a confounding factor. This will be the focus of additional research.