Intraocular Lens (IOL) Power Selection Pattern of Two Different Toric IOL Calculators

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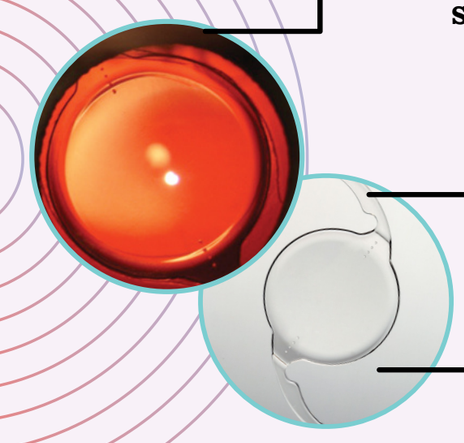
INTRODUCTION

The postoperative astigmatism during modern cataract surgery can be corrected with the implantation of toric IOL.[1]



One of the primary challenges in lens replacement for high astigmatism cases is the toric IOL power selection.[2]

The accuracy of toric IOL power selection is crucial to obtain better postoperative refraction and patients' satisfaction.

OBJECTIVES

To evaluate the IOL power selection pattern of two commonly-used toric IOL calculators & its agreement in IOL power selection.

METHODOLOGY

1) Two calculators were employed:

Barrett Toric Calculator 2.0 (BTCalc)

VS

ZCalc IOL Calculator 2.2 (ZCalc)

Surgically induced astigmatism prediction error (SIA_{err}):

SIA_{err}
(Actual SIA - Predicted SIA)

2) Two groups of surgeons with different SIA_{err} were recruited:

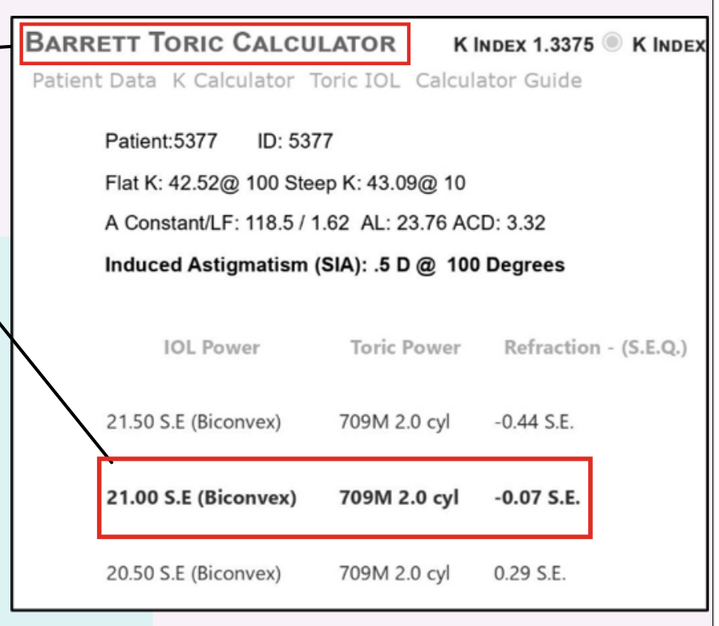
Underestimated SIA (Predicted SIA < Actual SIA)	Overestimated SIA (Predicted SIA > Actual SIA)
• Surgeon A & C	• Surgeon B & D
Group 1 (SIA_{err} < 0.25 D)	**Group 2 (SIA_{err} > 0.25 D)**
• Surgeon A & B	• Surgeon C & D

3) Pattern of IOL selection for each calculator was assessed.
The agreement between the calculators was evaluated by limits of agreement (LoA).

50 eyes of **46** post-phacoemulsification patients with toric IOL implantation

RESULTS & DISCUSSION

BTCalc



Recommended Toric IOL

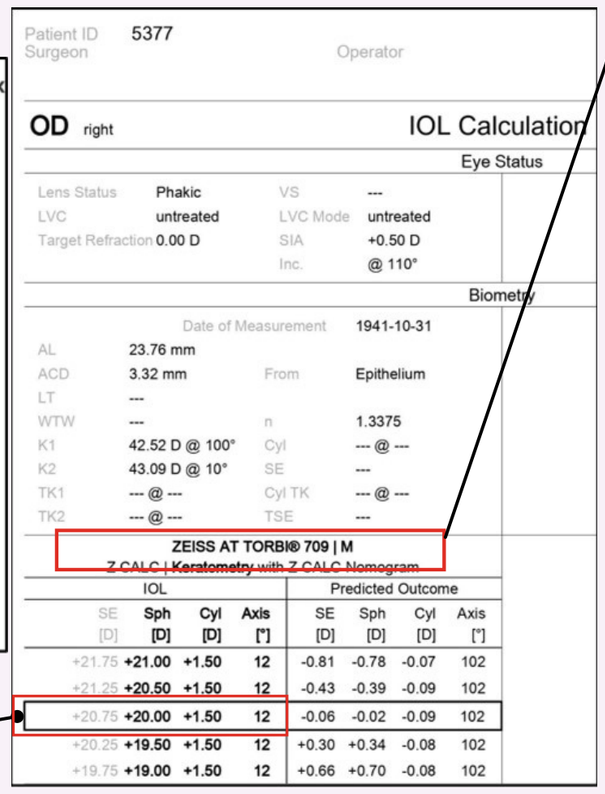
Toric IOL Selection Pattern

↑ IOL Toricity

↑ IOL SE & vice versa

- These selection patterns were consistent in Group 1 & Group 2.

Recommended Toric IOL



ZCalc

Toric IOL Selection Pattern

- IOL power selection patterns for ZCalc were varied.
- No consistent pattern was found neither in Group 1 nor Group 2 surgeons.
- Underestimated SIA : Surgeon A & C

  ↓ IOL Toricity ↑ IOL SE
- Overestimated SIA: 2 distinct IOL power patterns

  Surgeon B : ↓ IOL Toricity ↓ IOL SE

  Surgeon D: ↑ IOL Toricity ↓ IOL SE

- BTCalc incorporates posterior corneal curvature and effective lens position into toric IOL calculation.[3]
- ZCalc applied mathematical compensation of posterior corneal astigmatism that is comparable to anterior corneal curvature to avoid double compensation (Carl Zeiss Ltd.)
- The effect of SIA prediction error on toric IOL selection pattern on BTCalc is less than ZCalc due to the considerations of posterior corneal surface and effective lens position thus, has better predictability in toric IOL power selection pattern.

Table 1: The 95% Limits of Agreement of Toric IOL Power between ZCalc and BTCalc

Compared calculators	Surgeons	Lower 95% LoA	Upper 95% LoA	Difference
ZCalc - BTCalc	Group 1 : SIA prediction error < 0.25 D			
	A	-0.391	0.361	0.752
	B	-0.325	0.565	0.890
	Group 2 : SIA prediction error > 0.25 D			
	C	-1.121	0.805	1.926
	D	-1.075	1.765	2.840

The 95% LoA between the two calculators for Group 1 surgeon showed < two-step (±1.00 D) meanwhile, Group 2 surgeon showed > two-step (±1.00 D)

CONCLUSION

- Both calculators have different IOL power selection patterns and its agreement was low when SIA_{err} > 0.25 D.
- BTCalc is able to produce a predictable IOL selection pattern and it is therefore suggested to be used either for surgeons with SIA_{err} < or > 0.25 D.

REFERENCES

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