Surgically Induced Astigmatism Calculator: Holladay versus Alpins Methods

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1 Introduction

- Astigmatism amount caused by cataract surgery is known as surgically induced astigmatism (SIA) value. The SIA value is vital in toric intraocular lens (IOL) selection.
- There are two accepted methods in SIA calculation; Holladay method and Alpins method.
- Nevertheless, the agreement between these two calculators are remain under-explored.

SIA

Incision

2 Objective

The objective of this study was to compare the SIA values produced by Holladay and Alpins method SIA calculators.
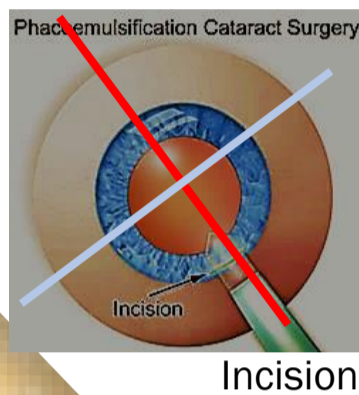
3 Methodology

- Study design
  - Cross-sectional
- Subject inclusion criteria
  - 35-85 years old
  - Uneventful phacoemulsification November 2017-February 2018
  - Postoperative period > 6 weeks
  - No corneal scar, corneal dystrophies, corneal ectasia, history of previous ocular surgery
  - Regular cornea
- Surgeon criteria
  - Four institutional ophthalmic surgeons.
  - Clear corneal incisions (CCI):
    - 2.20 mm at 90°
    - 2.75 mm at 70° or 110°
- Calculators
  - SIA 2.1 (Holladay method)
  - VectrAK (Alpins method)
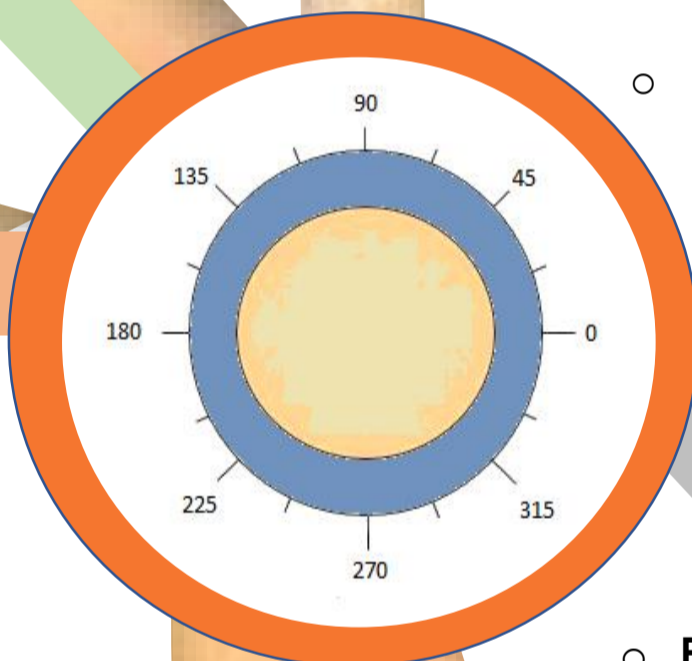
4 Results & Discussion

Table 1: The 95% LoA of Mean Individual SIA Values Between Calculators

Compared Calculators	Individual SIA (D)	Range 95% LoA (D)
SIA 2.1	0.7181 ± 0.41 D	-0.003 to +0.003
VectrAK	0.7184 ± 0.41 D	

- There was no difference in mean individual SIA between the two calculators ($P = 0.71$).
- Bland and Altman analysis showed the two calculators were agreeable to each other.
- These results suggest that regardless of Holladay[1] or Alpins[2] methods is incorporated into SIA calculator, the SIA value produced would be the same.
- It is explained by the vector analysis based on the Cartesian coordinate which applied in both Holladay and Alpins methods.

5 Conclusion

- Both Holladay and Alpins method SIA calculators are able to provide identical individual SIA values.
- Therefore, any of these calculators can be used interchangeably.

Figure 1: SIA 2.1

VERSUS

Figure 2: VectrAK

6 References

1. Holladay JT, Moran JR, Kezirian GM. Analysis of aggregate surgically induced refractive change, prediction error, and intraocular astigmatism. *J Cataract Refract Surg*. 2001;27(1):61-79.
2. Alpins N. Astigmatism analysis by the Alpins method. *J Cataract Refract Surg*. 2001;27(1):31-49.