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Torsional and flattening effect on corneal astigmatism after cataract surgery

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Purpose: To evaluate the torsional and flattening effect of steep meridian incisions and influence of posterior corneal astigmatism (PCA) on total corneal astigmatism (TCA) after cataract surgery.

Methods: 132 eyes underwent cataract surgery with steep meridian 2.2mm microcoaxial and 2.85mm conventional clear corneal incisions. Eyes were divided into with-the-rule (WTR) astigmatism and against-the-rule (ATR) astigmatism groups depending on the steeper meridian and measured with autokeratorefractor and Pentacam® before surgery, at 1 day, 1week, 1 and 2 months postoperatively. Polar vector analysis was used to evaluate torsional effect of steep meridian incisions.

Results: A decrease in astigmatic polar value (AKP) (+0) was observed in both keratometric and total astigmatism (TA) after 1 and 2 months, although the decrease was only statistically significant in TA ($p < 0.05$). The AKP(+45) was more significant in the conventional group than the microcoaxial group at 2 months postoperatively ($p < 0.05$, respectively). There was a significant correlation between corneal thickness of the superior quadrant and PCA in the WTR group ($p = 0.028$). In eyes with anterior corneal astigmatism smaller than 0.55D of WTR astigmatism and PCA greater than 0.35D of WTR astigmatism showed greater shifting of steep axis and also increment of refractive cylinder powers.

Conclusions: In eyes with superior corneal thickness greater than 714.5 μm and PCA greater than 0.35D of WTR astigmatism, steep meridian incision may cause a significant torsional effect and off-steep meridian change, contributing to an increment of postoperative residual manifest astigmatism after cataract surgery.

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