

Changes of Corneal High-Order Aberrations and Anterior Chamber Parameters After Trabeculectomy Using Scheimpflug Corneal Topographer

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Introduction

- ◆ High order aberration
 - 10% of total aberration
 - 3rd~8th order
 - Spherical aberration, Coma, Trefoil..
 - Cannot be corrected with sphero-cylindric lenses
 - Affecting postoperative visual function
- ◆ Ocular surgeries increase the incidence of ocular and corneal higher order aberrations.
- ◆ High-order aberration of after Trabeculectomy
 - Induce changes in refraction and visual function
 - Incidence of ocular coma-like and total higher aberrations increased at 1 month, postoperatively, but, returned to the preoperative level by 3 months

Castro LE et al., *Actaophthalmol scand* 2007;85:106-110

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Purpose

- ◆ To evaluate the changes of corneal keratometry, high-order aberrations (HOAs) and the anterior chamber parameters after antiglaucoma surgery using Pentacam (Oculus Inc., Germany).



Methods

◆ Patient

- From July, 2011 and May, 2012, 60 patients with uncontrolled and complicated glaucoma were admitted to the GNUH.
- 40 eyes from 40 patients who underwent trabeculectomy with mitomycin-C
- Changes of anterior chamber parameters and ocular aberrations were evaluated with pentacam at 3months postoperatively
- This study was approved by the GNUH Institutional Review Board

◆ Surgical technique

- Trabeculectomy with mitomycin-C
 - Limbal - based
 - Fornix - based

◆ The Pentacam (Oculus Inc., Dutenhofen, Germany)

- Software allows evaluation and quantification of anterior chamber parameters
- Higher order aberrations : calculations were performed at 4-mm pupil



Results

Table 1. Changes in intraocular pressure(IOP) in mmHg, following trabeculectomy (after 3months)

	Trabeculectomy					
	(Limbal based, N=20)			(Fornix based, N=20)		
	Preoperative	Postoperative	<i>p</i> -value	Preoperative	Postoperative	<i>p</i> -value
Mean IOP(mmHg)	32.32±11.81	14.60±4.21	0.000	37.62±9.81	12.60±2.81	0.000
Mean No of medications	2.94±0.24	1.17±1.07	0.000	2.89±0.38	1.02±2.88	0.000

P-value : Mann-Whitney *U* test



Results

Table 2. Changes of refractive errors, anterior chamber parameters after antiglaucoma surgery

	Trabeculectomy					
	(Limbal based, N=20)			(Fornix based, N=20)		
	Preoperative	Postoperative	<i>p</i> -value	Preoperative	Postoperative	<i>p</i> -value
Spherical(D)	-0.94±1.95	-0.71±2.10	0.357	-0.92±1.26	-0.85±1.10	0.652
Cylinder(D)	-0.53±1.04	-0.71±1.19	0.433	-0.62±0.96	-0.69±0.65	0.596
Vertical K(D)	43.22±1.63	43.17±1.32	0.218	41.98±1.23	42.08±1.08	0.317
Horizontal K(D)	43.98±1.50	44.37±1.74	0.496	42.58±1.20	43.32±0.74	0.596
ACD (mm)	3.10±0.81	3.07±0.81	0.610	3.08±0.51	3.12±0.78	0.750
ACV (mm³)	160.10±43.87	148.83±33.60	0.218	152.50±25.52	139.23±13.60	0.488

***P*-value : Mann-Whitney *U* test**



Results

Table 3. Changes in high-order aberration after trabeculectomy (after 3months)

	Trabeculectomy		
	(Limal based, N=20)	(Fornix based, N=20)	[†] <i>p</i> -value
Total RMS			
Preoperative	0.95 ± 0.61	0.85 ± 0.25	0.253
Postoperative	1.02 ± 0.53	0.93 ± 0.23	0.536
*<i>p</i>-value	0.218	0.102	
Coma			
Preoperative	0.16 ± 0.14	0.12 ± 0.14	0.123
Postoperative	0.14 ± 0.07	0.11 ± 0.85	0.109
*<i>p</i>-value	0.658	0.792	
Trefoil			
Preoperative	0.23 ± 0.26	0.18 ± 0.95	0.632
Postoperative	0.23 ± 0.30	0.20 ± 0.12	0.232
*<i>p</i>-value	0.413	0.208	
Spherical aberration			
Preoperative	0.02 ± 0.05	0.08 ± 0.02	0.095
Postoperative	0.04 ± 0.014	0.06 ± 0.12	0.083
*<i>p</i>-value	0.413	0.653	

* :Mann-Whitney *U* test, † : Paired *t*-test



Conclusion

- ◆ Postoperative corneal keratometry and anterior chamber parameters do not significantly change compared to preoperative values in glaucoma patients after performing trabeculectomy.
- ◆ The high-order aberrations after limbal based trabeculectomy and fornix based trabeculectomy do not significantly change compared to preoperative values in glaucoma patients .
- ◆ Most of high-order aberrations that affected quality of vision were not change in the limbal-based trabeculectomy or fornix-based trabeculectomy.

