



ASSOCIATION BLEB MORPHOLOGY FEATURES AND INTRAOCULAR PRESSURE FOLLOWING TRABECULECTOMY IN PRIMARY GLAUCOMA

Masitha Dewi Sari,\*Faisal Bustami and Aslim D. Sihotang

Department of Ophthalmology, Medical Faculty Sumatera Utara University Medan, Indonesia

ARTICLE INFO

Article History:

Received 6<sup>th</sup> October, 2017

Received in revised form 10<sup>th</sup>

November, 2017

Accepted 26<sup>th</sup> December, 2017

Published online 28<sup>th</sup> January, 2018

Key words:

Bleb morphology, Intraocular pressure, Trabeculectomy.

ABSTRACT

**Background:** Glaucoma is the second leading cause of blindness in the world. Trabeculectomy is indicated for eye with primary glaucoma that have an inadequate IOP with maximum tolerated medical therapy. The success of this surgery depends on the functionality of the filtering bleb, aqueous humor drainage and IOP lowering effect.

**Methods:** A serial prospective analytic case study, we analysed 21 eyes (19 patients) primary glaucoma patients who underwent trabeculectomy. Bleb morphology grading was scored according to Moorfields Bleb Grading System Scale and intraocular pressure was measured by non contact tonometry. The IOP and bleb morphology was assessed before surgery and on day 1<sup>st</sup>, 7<sup>th</sup>, 14<sup>th</sup> and 30<sup>th</sup> post operative.

**Results :** Blebs of 21 eyes were assessed until 1 month. All subjects had IOP < 21 mmHg on the 1<sup>st</sup>, 7<sup>th</sup>, 14<sup>th</sup>, 30<sup>th</sup> day although 1 subjects reached IOP >21 mmHg on the 30 day. There was tendency of increasing mean IOP but still normal meanwhile all variable of morphology bleb had decreasing gradation in average. There was only significantly associated in the first day after trabeculectomy in central bleb area with IOP (p<0,05) but in other variables there was no significantly differences (p>0,05).

**Conclusion:** The gradation of each variable bleb morphology had decreased and IOP tended to normal postoperatively according to follow up time but from statistical analysis there was not strongly correlated between each variable bleb morphology with IOP.

Copyright©2018 Masitha Dewi Sari.,Faisal Bustami and Aslim D. Sihotang. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Trabeculectomy is indicated for eye with primary glaucoma that have an inadequate IOP with maximum tolerated medical therapy. The principle of the surgery is to reduce IOP by circumventing the outflow tract and allowing aqueous humor to exit beneath the scleral flap and under the conjunctiva where it forms a filtering bleb.<sup>1</sup> The success of this surgery depends on the functionality of the filtering bleb, aqueous humor drainage and IOP lowering effect.<sup>2,3</sup> Further, the ability of the bleb to remain functional determines the maintenance of desired intraocular pressures and the long-term success of surgery. Bleb morphology has always been an important clinical parameter as an indicator for bleb function.<sup>2</sup> The description of bleb morphology and function is usually based on clinician's subjective judgment. Bleb appearance, as assessed by slit lamp biomicroscopy is widely used to predict the possible functionality and the structure of blebs, but it is difficult to see internal structures, which may have an effect on bleb function.<sup>4,5</sup>

\*Corresponding author: Faisal Bustami

Department of Ophthalmology, Medical Faculty Sumatera Utara University Medan, Indonesia

MATERIALS AND METHODS

Subjects

This serial prospective analysis study was performed in the Eye Clinic of Adam Malik Hospital. Eligible patients with primary open angle glaucoma and primary angle closure glaucoma were recruited from January until April 2017. The study was conducted in accordance with the ethical standards of Declaration of Helsinki and approved by Medical Faculty University of Sumatera Utara ethics committee. Written informed consent was obtained from all patients. All subjects underwent ophthalmologic examination included measured of best corrected visual acuity (BCVA), intraocular pressure by non-contact tonometry (NT 530-Nidek), slitlamp examination, gonioscopic (Carl Zeiss Meditec AG, Jenna Germany), visual field with Octopus 301 and reliable SAP, optic disc with direct funduscopy (Neitz, Germany) The inclusion criteria were primary glaucoma (POAG and PACG) patients over 17 years old with medically uncontrolled IOP and progressing glaucoma, scheduled for surgical treatment. Patients with secondary glaucoma, previous ocular surgery, pregnant or nursing woman, patients with uncontrolled systemic diseases, and patients with history of other eye diseases or trauma were excluded from this study. Non contact tonometry was

performed before and one month after surgery. All participants underwent trabeculectomy. Bleb function was considered to be successful if IOP ≤ 18 mmHg without glaucoma medications. The limited success if IOP ≤ 18 mmHg with glaucoma medications. The failure if IOP > 18 mmHg with glaucoma medication. Conjunctiva/bleb evaluation with slit lamp biomicroscopy was performed at 1<sup>st</sup>, 7<sup>th</sup>, 14<sup>th</sup> and 30<sup>th</sup> postoperative. Biomicroscopy was used to measure bleb area with Moorfields Bleb Grading System: central bleb area (score 1-4), maximal bleb area (score 1-4), height (score 1-4) and vascularization (score 1-5). Two clinicians independently evaluated the bleb. If the difference in terms of evaluation was within one, a mean was performed, if the difference was higher, the bleb was reevaluated by a third operator and a mean was taken.



Figures 1 Moorfields Bleb Grading System

**Statistical Analysis**

The collected data write in the research publication and keep in the computer. The collected data kept in the computer analysed by using the stactical software. Spearman test was used to employed the correlation bleb morphology with intraocular pressure. Statistical analysis were performe with SPSS 19,0 and the level significance were p<0,05 in all statistical test.

**RESULT**

Twenty one eyes of 19 patients with primary glaucoma (POAG and PACG) were included in the analysis. The clinical and demographic baseline characteristics are summarized in Table 1.

Table 1 Patients demographics and baseline characteristics

Patients	19
Eyes	21
Gender (M/F)	6/13
Age	56±7,6
Snellen BCVA	6,38±3,23/10
MD (dB)	-10,6±6,45
Preoperative IOP	31,8±6,4

BCVA : best corrected visual acuity; MD : mean deviation of visual field test

**IOP and Medication Use**

At one month postoperative, surgery was success for 17/21 eyes (81%), a limited success for 3/21 eyes (14%) and failure for 1 patients (5%)

Table 2 Mean IOP through 1 months postoperatively

IOP (mmHg)	N	Mean±SD
Pre-operation	21	31,8±6,4
IOP-1	21	9,7±2,3
IOP-7	21	11,7±1,9
IOP-14	21	13,9±1,3
IOP-30	21	16,0 ±3,3

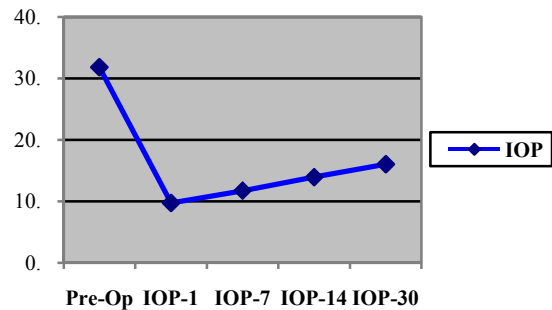


Chart 1 IOP Graph



Pict 1<sup>st</sup> day.  
Abch; score 4, Abmh score 3,  
Hh score 3,  
Hh score 3.

Pict 7<sup>th</sup> day.  
Abch, Abmh score 3,  
Hh score 3,  
Vsh, Vph, Vnh score 3

Fig 2 Sample of patients to evaluate bleb morphology features in 1<sup>st</sup>, 7<sup>th</sup>, 14<sup>th</sup>, and 30<sup>th</sup> days.

Table 3 Correlation bleb morphology and IOP the 1<sup>st</sup> day post operative

IOP	N	Range	P
Abch	21	0,455	0,038
Abmh	21	0,251	0,273
Hh	21	0,287	0,207
Vsh	21	0,095	0,681
Vph	21	0,095	0,681
Vnh	21	0,095	0,681

Abch: Bleb morphology central area; Abmh: Bleb morphology maximal area; Hh; height; Vsh: Central vascularization; Vph: Peripheral vascularization; Vnh: Non-bleb vascularization

From table 3, there was significantly differences between bleb morphology central area and IOP (p<0,05).

Table 4 Correlation bleb morphology and IOP the 7<sup>th</sup> day post operative

IOP	N	Range	P
Abch	21	0,109	0,637
Abmh	21	0,275	0,227
Hh	21	0,094	0,685
Vsh	21	0,164	0,477
Vph	21	0,164	0,477
Vnh	21	0,164	0,477

From table 4, there was no significantly differences between bleb morphology features and IOP ( $P>0,05$ ).

**Table 5** Correlation bleb morphology and IOP the 14<sup>th</sup> day post operative

IOP	N	Range	P
Abch	21	0,190	0,410
Abmh	21	0,307	0,176
Hh	21	0,193	0,402
Vsh	21	0,273	0,231
Vph	21	0,273	0,231
Vnh	21	0,273	0,231

From table 5, there was no significantly differences between bleb morphology features and IOP ( $P>0,05$ )

**Table 6** Correlation bleb morphology and IOP through 30<sup>th</sup> post operative

IOP	N	Range	P
Abch	21	0,194	0,398
Abmh	21	0,347	0,123
Hh	21	0,058	0,802
Vsh	21	0,303	0,182
Vph	21	0,095	0,682
Vnh	21	0,010	0,967

From table 6, there was no significantly differences between bleb morphology features and IOP ( $p>0,05$ ).

## DISCUSSION

The main aim of filtering surgery is to achieve low levels of IOP in order to prevent further visual field loss. Assessment of trabeculectomy has taken a major turn since the last view decades. Along with this, the conventional method of assessing the bleb on slitlamp also developed step by step and various bleb graing systems were published, such as the Indiana bleb grading system, the Moorfield bleb grading system and the WBCS.<sup>6</sup> The Moorfield bleb grading and Indiana bleb grading system were mainly based on the pictures that were to be compared with the bleb to be assessed, and the bleb was then graded according to the pictures where it would fit the best.<sup>7</sup> In our study to evaluate the bleb morphology features, we allowed Moorfields Bleb Grading System. The bleb is assessed either photographically or at the slit lamp biomicroscope and characterized with respect to height and to vascularity in three zones: central bleb, peripheral bleb and non bleb.<sup>8</sup>

Accordingly, a bleb having less vascularity as compared to normal conjunctiva microcysts and is predictive of long term good functioning, and any deviation from these may lead to failure if proper management is not done on time. In our study, we considered Trab as success when IOP was less than 18 post surgery for 17 eyes (81%). Succesful glaucoma filtering surgery is characterized by the passage of aqueous humor from the anterior chamber to subconjunctival space, which results in the formation of a filtering bleb. A trabeculectomy bleb, like any other tissue, undergoes different phases of postoperative wound healing. The first phase is an immediate inflammatory response that occurs in the initial postoperative days. The second phase comprises activation, migration and proliferation of episcleral fibroblast, angiogenesis and the formation of collagen bundles. The third phase involves remodeling and final healing of the wound, when contraction of the collagen fibers and formation scar tissue occurs, ultimately resulting in reduction of aqueous drainage and subconjunctival absorpion.<sup>9,10</sup>

The Moorfields Bleb Grading System (MBGS) is capable of describing these variant appearance. Vascularity grading in the MBGS is scored for three zones: central bleb, bleb edge, and non-bleb conjunctiva. Capture of information about vascularity and bleb size in this way allow for numerical description of a wide spectrum of bleb morphology.<sup>11</sup>

In our study, MBGS not strongly connected with IOP. There is a connection only on central area bleb and IOP on 1<sup>st</sup> day post operative, meanwhile the other variables no statistically significant differences ( $P>0,05$ ). Bleb morphology was change all the time during the wound healing until the maximal area bleb. There was a gradation in central area bleb. The first day central area bleb with score 4 in 80, 9% and decreased with score 2 on the 7<sup>th</sup>, 14<sup>th</sup>, and 30<sup>th</sup> postoperative in 85,71%. Smith reported that was no significantly differences between central bleb area with IOP for two years post operative. The bleb height with score 2 (90,4%) for 1 month postoperative. There is no correlated between the height bleb and IOP for 1 monthpostoperative, but suggested the elevated of IOP caused by decreasing of bleb height. This correlated with Smith reported that the higher of the bleb caused IOP decreased.<sup>12,13</sup>

Our study also reported central vascularization in 1<sup>st</sup>day post operative with score 5 (severe) (76,1%), and score 3 (mild) in 14<sup>th</sup> (95,2%) and score 2 (normal) in 30<sup>th</sup> (85,7%). The decreasing of the vascularization gradating postoperative also in peripheral bleb and non bleb with the normal IOP. but there was no statistically significant differences between bleb vascularization with IOP in 30<sup>th</sup> days post operative. Futhermore our study found that there was no statistically differences associated bleb morphologic features and IOP in primary glaucoma.

In conclusion the gradation of each variable bleb morphology had decreased and IOP tended to normal postoperative according to follow up, so further long term studies are needed in order to evaluate stabilization of glaucoma progression based on morphological parameters of filtering blebs with large sample size and long follow up.

## Acknowledgment

The authors are deeply indebted to Medical Faculty Sumatera Utara University for providing equipment and scientific apparatus

## Conflict of Interest

The authors declare that there are no conflicts of interest

## References

1. Stamper RL, Liberman MF. Becker-Shaeffer's Diagnosis and Therapy of Glaucoma. 7<sup>th</sup> Ed. Missouri: Mosby; 1999: 583-622
2. Cairns JE. Trabeculectomy. Preliminary Report of A New Method. *Am J Ophthalmol.* 1998;66:673-9
3. Cantor LB, Mantravadi A, WuDunn D, Swamyathan K, Cortes A. Morphologic Classification of Filtering Blebs After Glaucoma Filtration Surgery. *J Glaucoma.* 2003; 12(3):266-71
4. Picht G, Grehn F. Classification of Filtering Blebs in Trabeculectomy: Biomicroscopy and Functionality. *Curr Opin Ophthalmol.* 1998;9(2);2-8
5. Singleton BJ. Management of The Failing Glaucoma Filter. *Surg Rev* 1996;27,445-51

6. Addicks EM, Quickley HA, Green Wr, Robin AL. Histologic Characteristic of Filtering Blebs in Glaucomatous Eyes. *Arch Ophthalmol* 1993; 101(5):795-8
7. Stalmans I, Gillis A, Lafaut AS, Zeyen T. Safe Trabeculectomy Technique: Long Term Outcome. *Br J Ophthalmol*. 2006;90:44(7)
8. Moorfields Bleb Grading System. Available from: <http://www.blebs.net>. Last update September 2007
9. Cordeiro MF, Schultz GS, Ali RR, Bhattacharya SS, Khaw PT. Molecular Therapy in Wound Healing. *Br J Ophthalmol*. 1999. Nov;83(11): 1219-1224
10. Well AP, Crowston JG, Mark J, Kirwan JF, Smith G, Clark JCK, *et al*. A Pilot Study of A System for Grdaing of Drainage Blebs After Glaucoma Surgery. *J Glaucoma* 2004; 13:454-60
11. Leung CK, Yick DW, Kwong YY, Li FC, Leung DY, Mohammed S *et al*. Analysis of Bleb Morphology After Trabeculectomy with Visante AS-OCT. *Br J Ophthalmol*. 2007;91:340-4
12. Smith MF, Doyle JW, Nguyen QH, Sherwood MB. Results of Intraoperative 5-FU or Lower Dose Mitomycin C on Initial Trabeculectomy Surgery. *J Glaucoma*. 1997; 6:104
13. Healey PR, Trope GE. Glaucoma Surgery. Florida: taylor and Francis Group; 2005:159-73

**How to cite this article:**

Masitha Dewi Sari., Faisal Bustami and Aslim D. Sihotang (2018) 'Association Bleb Morphology Features and Intraocular Pressure Following Trabeculectomy in Primary Glaucoma ', *International Journal of Current Advanced Research*, 07(1), pp. 9307-9310. DOI: <http://dx.doi.org/10.24327/ijcar.2018.9310.1533>

\*\*\*\*\*