

# TRABECULECTOMY - SUCCESS RATES IN A SINGAPORE HOSPITAL

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## ABSTRACT

*Previously published papers on the success of trabeculectomy as a treatment for glaucoma show success rates between 67% and 84%. The success rate of trabeculectomy in Afro-Caribbean patients was observed to be lower than in Caucasian patients. It has been commonly believed that the success rate of trabeculectomy in Oriental/Asian eyes would lie somewhere between these. We reviewed the records of 51 consecutive trabeculectomies performed in the National University Hospital, Singapore and found that our success rate was lower - 43.1% overall and 48.7% for primary glaucomas.*

**Keywords:** trabeculectomy, glaucoma, success rate, Oriental

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## INTRODUCTION

Trabeculectomy is the mainstay of surgical treatment for glaucoma. A number of studies have been published over the years describing the success rate of this procedure. Most of the studies were conducted on trabeculectomy performed on Caucasian and Afro-Caribbean eyes. No studies describing the success of surgery in Oriental eyes were found in our literature search. The published rate of success for trabeculectomies has ranged between 67% and 84%<sup>(1-6)</sup>.

## MATERIALS AND METHODS

The case records of 51 consecutive trabeculectomies performed at the National University Hospital, Singapore over a 3-year period from 1990 to 1992 inclusive were studied. A total of 51 eyes of 44 patients were included in this study. Only the first trabeculectomy performed on each eye was included.

The technique used was similar in all cases. This involved a fornix based conjunctival flap, a rectangular scleral trap door, trabeculectomy, iridectomy, and in aphakic cases, an anterior vitrectomy. The sclera and conjunctiva were sutured with 10/0 nylon and 8/0 vicryl respectively. 19.6% of the cases had previous ocular surgery.

Patients were followed up at one week and one month post-operatively, and thereafter at 4-6 monthly intervals.

Failure of the trabeculectomy was defined as the occurrence of intraocular pressure (IOP) 21 mmHg or greater requiring further treatment either with topical pressure lowering medication or with surgery.

Survival was analysed using the Kaplan-Meier product limit method and the differences in proportions were analysed using the chi-squared test for independence.

## RESULTS

Of the 51 cases, 17 (33.3%) were performed on the eyes of female patients and 34 (66.7%) were performed on the eyes of male patients.

There were 39 Chinese eyes (76.5%); 3 Malay eyes (5.9%), 7 Indian eyes (13.7%) and 2 Caucasian eyes (3.9%) in our group of cases.

The different types of glaucoma encountered in our study are shown in Table I. Patients with primary open angle glaucoma (POAG) and chronic angle closure glaucoma (CACG) constituted the majority of cases (56.9%) for which trabeculectomy was performed. There were no cases of uveitic glaucoma.

The success rates of trabeculectomy for the various glaucomas are shown in Table II.

The overall success rate for all trabeculectomies performed between 1990 and 1992 inclusive was 43.1% at last follow-up. The success rate of trabeculectomy for primary glaucomas; POAG, CACG, low tension glaucoma (LTG), congenital glaucoma, and acute angle closure glaucoma (AACG), was 48.7%. In comparison, the success rate for secondary glaucomas was 25.0%. This difference was, however, not statistically significant. Patients with primary open angle glaucoma and chronic angle closure glaucoma made up the majority of cases for which trabeculectomy was performed and the success rates for these were 53.3% and 57.1% respectively.

The success rate for eyes with no previous ocular surgery was 51.2%. Trabeculectomy was only successful in 10.0% of cases that had undergone previous surgery. The difference between the two groups was statistically significant ( $p < 0.05$ ).

The success rate with relation to age is shown in Table III. The success rate for patients under the age of 50 is 45%; for those between 51 and 70, 54.2%; and all trabeculectomies performed on the eyes of patients older than 70 years of age failed. This high failure rate may be explained by the higher proportion of secondary glaucomas and eyes with previous surgery in this age group (Table III).

Surgery appeared to be more successful in females as compared to males (Table IV) but this difference was not shown to be statistically significant.

The mean follow-up time was 29.2 months (range 1-57 months). Some patients had further surgery, for example cataract extraction, after the trabeculectomy was performed.

The mean time to failure was 7.2 months (range 1 to 40 months). The main cause of failure was subconjunctival fibrosis (75.9%).

Survival was plotted by the Kaplan-Meier method (Fig 1). Most of the failures occurred in the first 7 months after surgery. With the exception of one failure occurring at 40 months, cases

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**Table I – Distribution by diagnosis**

Diagnosis	No. of cases	%
Primary open angle glaucoma	15	29.4
Chronic angle closure glaucoma	14	27.5
Acute angle closure glaucoma	5	9.8
Aphakic glaucoma	2	3.9
Congenital glaucoma	2	3.9
Low tension glaucoma	3	5.9
Neovascular glaucoma	2	3.9
Secondary glaucoma	4	7.8
Posner schlossman syndrome	2	3.9
Pseudoexfoliation glaucoma	1	2.0
Iridocornealendothelial syndrome	1	2.0

**Table II – Success rate broken down by diagnosis**

Diagnosis	Number of Cases	Successes	Failures
Primary open angle glaucoma	15	8	7
Chronic angle closure glaucoma	14	8	6
Acute angle closure glaucoma	5	1	4
Aphakic glaucoma	2	1	1
Congenital glaucoma	2	2	0
Low tension glaucoma	3	0	3
Neovascular glaucoma	2	0	2
Secondary glaucoma	4	0	4
Posner schlossman syndrome	2	1	1
Pseudoexfoliation glaucoma	1	1	0
Iridocornealendothelial syndrome	1	0	1
<b>Total</b>	<b>51</b>	<b>22</b>	<b>29</b>

**Table IIa – Success rates of trabeculectomy for primary and secondary glaucomas**

	Number of Cases	Successes	Failures	Success Rate
Primary glaucomas	39	19	20	48.7%
Secondary glaucomas	12	3	9	25.0%

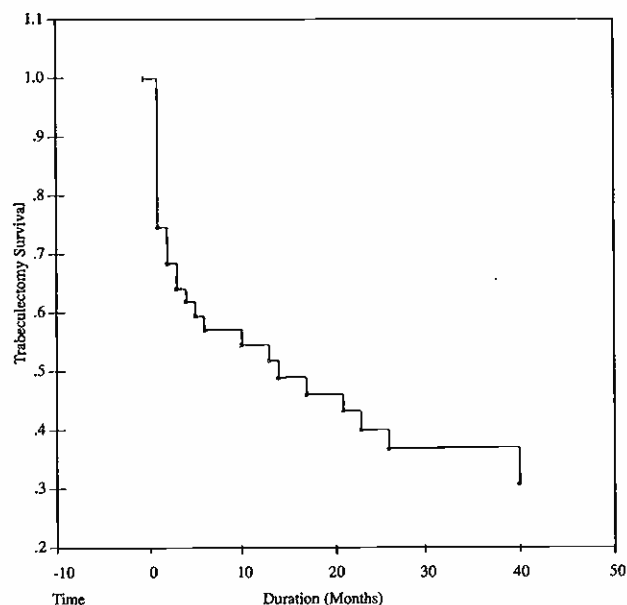
**Table III – Numbers of successes and failures, percentage of secondary glaucoma and percentage of previous surgery in relation to age group**

Age group (years)	Successes	Failures	% Secondary glaucomas	% Previous surgery
< 40	4	4	25.0	0.0
41-50	5	7	25.0	16.7
51-60	4	4	12.5	12.5
61-70	9	7	18.8	18.8
> 70	0	7	42.9	57.1

**Table IV – Success and failure by sex distribution**

Sex	Successes	Failures	Success rate %
Female	9	8	52.9
Male	13	21	38.2

**Fig 1 – Kaplan-Meier Survival Function**



appear to continue to survive (patients not requiring further treatment for glaucoma in that eye) if failure has not occurred by 30 months.

**DISCUSSION**

The results of our study show a lower success rate for trabeculectomy compared with the published success rates of other major papers (67%-84%). This may be due to: (1) small sample size, (2) variable and sometimes short follow-up in some cases, (3) high risk population, and (4) surgical technique.

Broadway et al<sup>(7)</sup> studied the racial differences between black and white patients with respect to glaucoma filtration surgery and showed (in agreement with many authors) that trabeculectomy was less successful in Afro-Carribeans than in Caucasians (67% compared with 80%) although this finding was not statistically significant. One of the reasons proposed to explain the difference is that Afro-Carribeans have a more aggressive wound healing response. Broadway et al suggested in the same paper that the difference in success could be related to the greater number of conjunctival macrophages and fibroblasts found in the conjunctival biopsies of black patients.

The prevailing opinion among local ophthalmologists is that the success rate of trabeculectomy in Oriental eyes would lie somewhere between that of Caucasian and Afro-Carribean eyes. We have found that contrary to this, our success rates are surprisingly worse, even lower than those for Afro-Carribean eyes.

The main cause of failure of a trabeculectomy is subconjunctival fibrosis. Given that differences have been shown in the macrophage/fibroblast population in the eyes of the Afro-Carribeans and Caucasians studied by Broadway, we think it is not improbable that there are also differences in the way wound healing occurs in Orientals as compared to other racial groups. While this may or may not explain the observed difference in success of trabeculectomy, we think it may be worthwhile to study this aspect further.

In addition, we attempted to identify certain risk factors that may adversely influence surgical outcome, though the observed differences were not always shown to be statistically significant. These are: secondary glaucoma, previous ocular surgery, male sex, age more than 50 years. These factors are similar to those observed in other centres.

The results of this study should also be considered in the

light of the question: "What constitutes normal intra-ocular pressure?" A major review article by Shiose in 1990<sup>(8)</sup> demonstrated that the normal IOP found in Japanese eyes tends to fall with increasing age (after age 40) compared with Caucasian and Afro-Caribbean eyes where it tends to rise with increasing age. No data is available as to the normal distribution of intra-ocular pressure in the local population. We will require this data to determine if we are at present sufficiently fastidious in our diagnosis of glaucoma. This will influence the target intra-ocular pressure we should aim to attain post-operatively.

Currently, better surgical techniques and the use of single touch intra-operative 5-fluorouracil are being employed in trabeculectomy in an attempt to increase the success rate. Recent work published has suggested that there is indeed an improved success rate of this modification<sup>(9)</sup>, with a 1-year follow-up result of 65.2% and a combined rate for complete success and qualified success of 95.6%. It is important for us to obtain a longer follow-up for such a promising adjunct to the surgery.

This is pilot study, but we feel that it indicates a need for further study into the disease process and management of glaucoma among Oriental patients. Studies involving larger numbers of patients and studies involving the way fibrosis occurs among our patients are needed before we have a better understanding of glaucoma among Asians.

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