

Outcome of Trabeculectomy Surgery in Primary Open Angle Glaucoma

Jagdish Bhatia

Abstract

Objectives: Retrospective study to evaluate the short term outcome and contributing prognostic factors of trabeculectomy in terms of intraocular pressure in Omani patients of South Batinah region with primary open-angle glaucoma.

Methods: This study involved retrospective evaluation of 18 patients (22 eyes) with primary open angle glaucoma who underwent primary trabeculectomy between February 2005 and February 2008. All patients were aged over 40 years and were Omani. Follow-up for all subjects lasted at least 6 months or more [Average follow up 388 days with standard deviation of 182]. Successful control of Intraocular pressure (IOP) was defined as achieving IOP of 21 mmHg or less without medication (complete success).

Results: The results are presented with particular emphasis being placed only on intraocular pressure (IOP) control. The tonometric success rate of trabeculectomy in controlling the IOP at 21mmHg or less without any medication was 46% [complete successes], 18% had qualified success [Post operative

IOP 21 mm Hg or less with one topical medication], while 36% trabeculectomies failed to show desired results.

Conclusion: The results of this retrospective study underline that the procedure of trabeculectomy has moderate success in controlling the intra ocular pressure in the study population. The procedure failed to show the desired result in almost one third of the patients (36%) and topical medical treatment was reinstated in these patients with either two or three drugs. However these results lead to the following question: Should trabeculectomy be the therapy of first choice in the early stage of glaucoma?

Keywords: Primary Open Angle Glaucoma [POAG]; trabeculectomy; Intraocular Pressure [IOP]

Received: 29 October 2007

Accepted: 9 February 2008

From the Department of Ophthalmology, Rustaq Hospital, Rustaq, Oman.

Address correspondence and reprint request to: Dr. Jagdish Bhatia, MS., FRCS, Ophthalmologist, Rustaq Hospital, P.O. Box 421, P.C. 329, Sultanate of Oman.

E-mail: imbhatia@gmail.com

Introduction

Since the late 1960s, trabeculectomy has been the operation of choice for improving aqueous outflow in glaucomatous eyes and is still regarded as the gold standard to which the newer operations are compared. The long-term successful control of Intraocular pressure in eyes that have undergone primary trabeculectomy has ranged from 48 to 98%, depending on follow-up time and the criteria used to define successful outcome.¹⁻⁸ In most studies, post operative complete success in terms of IOP has been described as an IOP of 21 mmHg or less, without medication. In 1993, Vesti reported a success rate of 74% without glaucoma medication after a mean follow-up period of 3 years in a selected group of Finnish patients.⁹ The definition 'long-term' has been used for follow-up times from 1 year and longer. Usually, complete success in terms of IOP control has been described as achievement of IOP 21 mmHg or less without medication.

This study was designed to evaluate the short term outcome of trabeculectomy retrospectively in a series of cases of Primary Open Angle Glaucoma (PAOG) that had undergone successful primary trabeculectomy by a conventional technique without antimetabolites in South Batinah region. The aim was to obtain information on short-term IOP control and to review and correlate the possible factors related to these outcome measures.

Methods

All primary trabeculectomies performed by five experienced surgeons at Rustaq General Hospital between February 2005 and February 2008 were studied retrospectively (22 eyes). Patients were excluded from the study if they are below 40 years of age at the time of the operation, trabeculectomies done with antimetabolites, trabeculectomies done on eyes diagnosed with any other form of glaucoma than primary open angle glaucoma, eyes with past history of any eye surgery or trauma, and were a minimum follow up of 180 days was not available. Patients included in the study were those who had only primary open angle glaucoma. In all cases, information for follow-up was obtained from the patient's out patient chart. All patients were Omani. The term primary trabeculectomy designates the first trabeculectomy operation in our study.

Preoperative data included age, gender, type of glaucoma, preoperative medication and its duration, dates of all surgical interventions, IOP. The diagnoses of POAG were based on preoperative definitions at the glaucoma unit of Rustaq General Hospital. Before making a final diagnosis of POAG, gonioscopy was performed to differentiate these cases from primary narrow angle glaucoma. Other standard protocol followed up in making the final diagnosis

was Visual acuity, IOP measurement with applanation tonometer, pupillary reaction, fundus examination etc. Preoperative and post operative IOP was expressed as the value measured by Goldmann applanation tonometry.

Indications for trabeculectomy were uncontrolled IOP despite maximum tolerated medication, and disease progression. All operations were performed by using conventional trabeculectomy technique. A limbus-based conjunctival flap was prepared, beginning about 5 mm posterior to the limbus. A rectangular or triangular half thickness scleral flap measuring 3 x 4 mm was dissected, extending into the clear cornea. Trabeculectomy was performed with a 1mm Kelly's punch. After peripheral iridectomy, the flap was closed with 10/0 burried sutures. Tenon and conjunctiva were reapproximated with water tight 8-0 Vicryl sutures, and sub conjunctival injections of Gentamicin and dexamethasone were given at the end of the operation. Postoperatively, topical mydriatic, antibiotics and steroids were given for up to 4 to 6 weeks.

Trabeculectomy was considered a complete success when IOP of 21 mmHg or less was achieved without additional therapy after a minimum follow up of 6 months. A qualified success was defined as IOP 21 mmHg or less achieved with a single topical medication. Failure was defined by IOP of 21 mmHg or more where patient required two or more topical medication to control the IOP.

Data were collected and analysed using standard statistical methods.

Results

Follow-up information was available for all 22 eyes. Of the study population 13 eyes (59%) were of female patients and 9 eyes were of male patients (41%). The mean age of the patients at the time of surgery was 53.27 years (range 42-74 years, SD 7.31) (Figure 1). Mean follow-up was 388 days [SD 182]. (Figure 2)

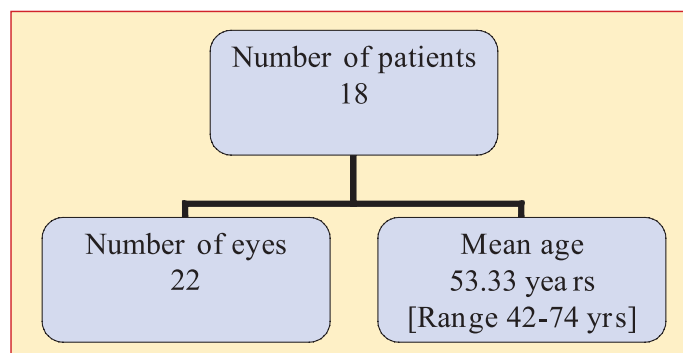


Figure 1: Demographic data of the study population.

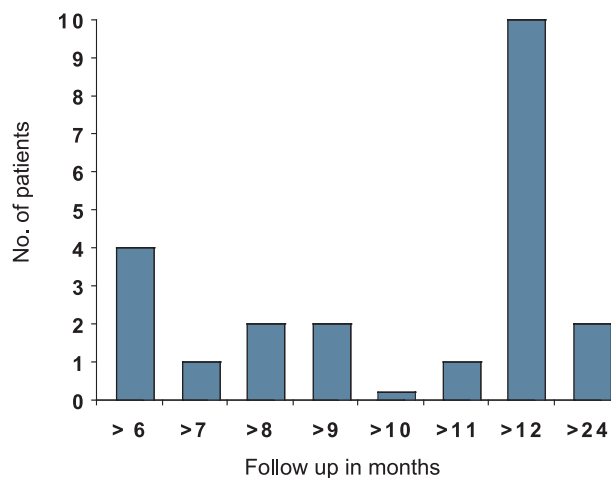


Figure 2: Bar diagram showing number of patients and duration of their follow up in months.

All the eyes in study population were on topical antiglaucoma medications before surgery for a long time [1-3 years], with 84% of eyes receiving two or more medications.

The results are presented with particular emphasis being placed only on intraocular pressure (IOP) control. The tonometric success rate of trabeculectomy in controlling the IOP at 21mmHg or less was achieved in 46% patients who did not require any topical medication till their last follow up [complete successes], 18% had qualified success [IOP 21 mm Hg or less with one topical medication] while 36% trabeculectomies failed to show desired results and medical treatment was reinstated in these patients with either two or three topical antiglaucoma drugs. (Figure 3)

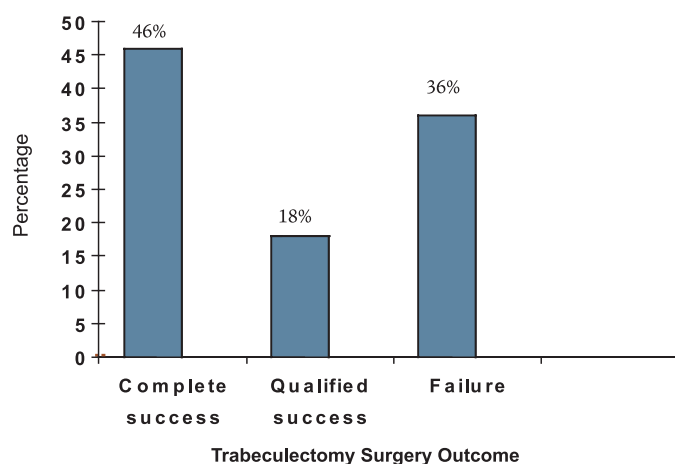


Figure 3: Out come of trabeculectomy surgeries in terms of IOP [In percentage] [Present study]

Discussion

In the early days of trabeculectomy, several authors focused on the favorable pressure-reducing effect of the operation. For example, in their 10-year study of 424 eyes, Watson and Grierson reported success in 86% of eyes with surgery alone and in 98% with the use of additional medical therapy and/or surgery after the minimum follow-up period of 2 years.⁴ D'Ermo et al. reported success in 71% of eyes without medication and in 80% of those with medication after 1 year of follow-up, and noted that after this period the percentage of well-controlled eyes was substantially constant up to 5 years.² Clinical experience and other studies have, however, shown lower success figures and have suggested that the success rate of trabeculectomy decreases with time. Jerndal and Lundstrom reported IOP \leq 21 mmHg without medication in 58% of eyes after a follow-up period of 1.5–3 years.¹ Even lower control rates have been reported recently. Nouri-Mahdavi et al. identified success rates of 48% and 40% at 3 and 5 years, respectively, although it should be noted that their study defined success by the achievement of either IOP \leq 20 mmHg or a pressure reduction of 20%.⁶ Similar success rates are found in our study, where the success rate, defined as IOP \leq 21 mmHg without medication was 46% and qualified success of 18% at the end of last follow up. While the failure rate in our study was 36% at the end of last follow up.

Previous studies have suggested inadequate long-term control of IOP after trabeculectomy may relate to various factors, such the type and/or length of preoperative medication (Watson & Grierson;⁴ Lavin et al.¹⁰) and preoperative ALT (Schwartz et al.¹¹). Further, in POAG, early trabeculectomy has been reported to be more successful than delayed trabeculectomy (Lavin et al.¹⁰ Broadway et al.¹²). In light of this, earlier surgery, particularly in eyes with POAG, may have improved the results of some of these studies.

The reasons for the substantial failure rate of 36% in our study are not clear. All the patients underwent uneventful surgical procedure under experienced hands. All the eyes in the study population were on topical antiglaucoma medications before surgery for a long time (1-3 years), with 84% of eyes receiving two or more medications. After reviewing the literature and analyzing the study population, the probable factor found to be related to poor long-term control of IOP after trabeculectomy is the longer length of duration of preoperative anti-glaucoma medication.

The morphologic effects of long-term glaucoma drug treatment on the conjunctiva and Tenon's capsule in open-angle glaucoma patients have been studied.^{13, 14} The results of these studies indicate that long-term medical therapy, administered before trabeculectomy surgery is performed, increases the number of tissue inflammatory cells. These histologic observations suggest that extensive medical

treatment induces a sub clinical inflammation that may enhance the risk of external bleb scarring and filtration surgery failure. This clinical speculation encouraged investigators to study the influence of prior medical therapy on the success of trabeculectomy performed in open-angle glaucoma patients in an attempt to link the histologic laboratory observations with an undesirable surgical outcome.^{10, 12, 15}

Specimen taken from the patients who received long-term glaucoma medication demonstrated increased numbers of macrophages, fibroblasts, lymphocytes, and mast cells within conjunctiva and Tenon's capsule as compared to specimens from patients receiving minimal treatment. In addition, there appeared to be a decrease in goblet cells in patients who received long term glaucoma medication. Subsequently, the results of a more extensive histologic study of 126 patients comparing various medical treatment regimens and their influence inducing sub clinical inflammation within the conjunctiva prior to filtration surgery supported this observation.¹⁴ These histologic results have encouraged speculation that the sub clinical inflammation induced by long-term medical therapy may increase the chance of bleb failure after filtration surgery.

The investigators conclude that long-term use (>1 year) of topically applied glaucoma medications can adversely affect the results of trabeculectomy surgery. This speculation suggests that early trabeculectomy may be a more conservative and less risky alternative to long-term medical treatment of open-angle glaucoma patients.

Finally, investigators have reported that exposure to topical antiglaucoma medications for more than 3 years is associated with a significant foreshortening of the inferior fornix secondary to conjunctival fibrosis.¹⁶ These clinical observations suggest that a possibility for enhanced postoperative scarring of surgically created filtering blebs might be more likely in patients receiving long-term antiglaucoma medications. In fact, many believe that the continuing use of miotics prior to filtering surgery increases the likelihood of surgical failure.¹⁷ In spite of these reports and studies, there has been general agreement that surgical treatment of open-angle glaucoma is indicated only after maximally tolerated medical treatment has failed.

Conclusion

This retrospective study was planned to evaluate the short term outcome of conventional trabeculectomy in POAG in Omani population of South Batinah region. The success of trabeculectomy cannot be judged by the single criteria of IOP alone, however, we feel that the aim of trabeculectomy is a constant maintenance of reduction of IOP in order to prevent further damage to visual function with the main goal to improve or at least- preserve the patients' quality of life. The results of this retrospective study

underline that the procedure of trabeculectomy has moderate success in controlling the IOP in the study population with only 46% of patients having complete success. In almost one third of the patients (36%) in whom the procedure failed to show the desired result and topical medical treatment was reinstated in these patients with either two or three drugs. The role of early trabeculectomy in the management of POAG is under debate, but the results in this study lead to the following question: Should trabeculectomy be the therapy of first choice in the early stage of glaucoma?

References

1. Jerndal T, Lundström M. 330 trabeculectomies—a follow-up study through 1/2-3 years. *Acta Ophthalmol (Copenh)* 1977 Feb;55(1):52-62.
2. D'Ermo F, Bonomi L, Doro D. A critical analysis of the long-term results of trabeculectomy. *Am J Ophthalmol* 1979 Nov;88(5):829-835.
3. Mills KB. Trabeculectomy: a retrospective long-term follow-up of 444 cases. *Br J Ophthalmol* 1981 Nov;65(11):790-795.
4. Watson PG, Grierson I. The place of trabeculectomy in the treatment of glaucoma. *Ophthalmology* 1981 Mar;88(3):175-196.
5. Akafo SK, Goulstine DB, Rosenthal AR. Long-term post trabeculectomy intraocular pressures. *Acta Ophthalmol (Copenh)* 1992 Jun;70(3):312-316.
6. Nouri-Mahdavi K, Brigatti L, Weitzman M, Caprioli J. Outcomes of trabeculectomy for primary open-angle glaucoma. *Ophthalmology* 1995 Dec;102(12):1760-1769.
7. Vesti E, Raitta C. A review of the outcome of trabeculectomy in open-angle glaucoma. *Ophthalmic Surg Lasers* 1997 Feb;28(2):128-132.
8. Jacobi PC, Dietlein TS, Krieglstein GK. Primary trabeculectomy in young adults: long-term clinical results and factors influencing the outcome. *Ophthalmic Surg Lasers* 1999 Sep-Oct;30(8):637-646.
9. Vesti E. Filtering blebs: follow up of trabeculectomy. *Ophthalmic Surg* 1993 Apr;24(4):249-255.
10. Lavin MJ, Wormald RP, Migdal CS, Hitchings RA. The influence of prior therapy on the success of trabeculectomy. *Arch Ophthalmol* 1990 Nov;108(11):1543-1548.
11. Schwartz AL, Van Veldhuisen PC, Gaasterland DE, Ederer F, Sullivan EK, Cyrlin MN. The Advanced Glaucoma Intervention Study (AGIS): 5. Encapsulated bleb after initial trabeculectomy. *Am J Ophthalmol* 1999 Jan;127(1):8-19.
12. Broadway DC, Grierson I, O'Brien C, Hitchings RA. Adverse effects of topical antiglaucoma medication. II. The outcome of filtration surgery. *Arch Ophthalmol* 1994 Nov;112(11):1446-1454.
13. Sherwood MB, Grierson I, Millar L, Hitchings RA. Long-term morphologic effects of antiglaucoma drugs on the conjunctiva and Tenon's capsule in glaucomatous patients. *Ophthalmology* 1989 Mar;96(3):327-335.
14. Broadway DC, Grierson I, O'Brien C, Hitchings RA. Adverse effects of topical antiglaucoma medication. I. The conjunctival cell profile. *Arch Ophthalmol* 1994 Nov;112(11):1437-1445.
15. Migdal CS, Hitchings RA. Control of chronic simple glaucoma with primary medical, surgical and laser treatment. *Trans Ophthalmol Soc U K* 1986;105(Pt 6):653-656.
16. Schwab IR, Linberg JV, Giola VM, Benson WH, Chao GM. Foreshortening of the inferior conjunctival fornix associated with chronic glaucoma medications. 1992; 99:197-202.
17. Abraham SV. Miotic iridocyclitis: its role in the surgical treatment of glaucoma. *Am J Ophthalmol* 1959 Nov;48:634-643.