

# Trabeculectomy Efficacy in a Latin American Ophthalmology Training Institution

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## ABSTRACT

**Aim:** To report trabeculectomy efficacy in a Latin American Ophthalmology Training Institution.

**Materials and methods:** Retrospective study between March 2015 and March 2019, Medical records of 77 patients (96 eyes) that underwent trabeculectomy were reviewed. Collected data included glaucoma type, pre- and post-trabeculectomy intraocular pressure (IOP) and glaucoma therapy and assigned surgeon. Data analysis included descriptive statistics, Paired T student double tailed, and Welch-Satterthwaite test.

**Results:** Ninety-six eyes (77 patients) that underwent trabeculectomy were included in the analysis. 44.79% were male and 55.20% female. Median age was  $54.04 \pm 18.92$  years. Median IOP pretrabeculectomy was  $27.86 \pm 10$  mm Hg. More commonly found diagnoses were narrow angle glaucoma (36.46%), primary open-angle glaucoma (18.75%), and secondary to chronic steroid use glaucoma (14.58%). Median IOP reduction from basal IOP at 6 weeks, 6 months, and 12 months after trabeculectomy was 15.87 mm Hg, 14.42 mm Hg and 14.55 mm Hg, respectively,  $p < 0.05$ . Cumulative success was 66.66% at 12 months follow-up. General decrease of antiglaucomatous topical therapy was  $1.9 \pm 1.09$  ( $p > 0.05$ ) eye drops. Trabeculectomy success rate was 69.23% for attendants and 65.71% for residents ( $p = 0.85$ ).

**Conclusion:** Trabeculectomy continues to be a successful and effective therapy to obtain significant and stable IOP decrease. Success trabeculectomy rates are comparable between residents and attendants.

**Keywords:** Glaucoma therapy, Latin America, Residents, Trabeculectomy efficacy.

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## INTRODUCTION

Glaucoma is a multifactorial irreversible disease that manifests with structural and functional damage to the optic nerve (ON). It is globally considered to be the first cause of irreversible blindness, so an early and effective diagnosis is required.<sup>1,2</sup>

Glaucoma is defined as an intraocular pressure (IOP) rise above 21 mm Hg associated with progressive structural glaucomatous damage to the ON and characteristic visual field defects.<sup>3</sup>

Initial glaucoma management consists of topical medical therapy and is aimed to achieving a sustained and stable decrease in IOP. Management and target IOP should be individualized for each patient, a 20–30% decrease from basal IOP is sometimes required. Target IOP depends on various factors like disease stage, basal IOP, life expectancy, risk factors, and progression rate, being necessary to constantly monitor the amount of IOP decrease searched for.<sup>3,4</sup>

Trabeculectomy is the gold standard surgical management for glaucoma, which consists in decreasing IOP by the creation of a drainage route for aqueous flow redirection. Trabeculectomy can be considered the first line therapy to stop disease progression in advanced glaucoma with significant visual field loss. Trabeculectomy is more effective in nontreated eyes.<sup>1,2,4</sup>

The aim of this study is to report trabeculectomy efficacy in a Latin American (Guatemalan) Ophthalmology Training Institution which is a national reference center for glaucoma management.

## MATERIALS AND METHODS

A retrospective study was conducted in the glaucoma unit of a Latin American Training Institution between March 2015 and March 2019.

The study was approved by the institutional review board and a written informed consent was signed by each patient. All participants were treated according to Helsinki Declaration.

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Medical records of 77 patients (96 eyes) that underwent trabeculectomy were reviewed. Demographic data such as sex and age were collected. Further collected data included glaucoma type, preoperative IOP, postoperative IOP, preoperative number of topical medications, postoperative number of topical medications and healthcare provider who performed the surgery (resident/attendant), central corneal thickness, 30° visual field mean deviation, and cup/disk ratio. Two patients that failed to follow-up were excluded.

**Trabeculectomy success was defined as:**

- Basal IOP reduction  $\geq 30\%$  at 12 months follow-up without topical glaucoma therapy (total success)
- Basal IOP reduction  $\geq 30\%$  at 12 months with 1 or 2 topical glaucoma medications (partial success).

## Surgical Technique

When surgery was performed by residents, they did it under the supervision of experienced glaucoma attending:

- IOP measurement with applanation tonometer (Schiötz)
- General anesthesia
- Asepsis and antisepsis
- A 5% povidone iodine in lower fornix (1 minute)
- Balanced saline solution irrigation
- Sterile surgical drapes
- Sterile lid speculum
- Superior corneal tractor suture, 7–0 silk
- Superior fornix-based conjunctival incision
- Tenon's capsule dissection
- Episcleral vessels cauterization
- Limbus-based triangular scleral flap measurement and marking with caliper (3x3x3 mm)
- A 2/3 thickness triangular scleral flap creation with #15 blade
- Decompressive paracentesis with 27G needle
- Paracentesis ampliation with #11 blade
- Micro punch trabeculectomy
- Peripheral iridectomy with Vannas scissors
- Filtration verification
- Scleral flap closure with a simple suture (10–0 nylon) at triangle apex
- Conjunctival closure with two simple sutures (10–0 nylon)
- Peribulbar gentamicin (40 mg) and dexamethasone (4 mg)
- Antibiotic and steroid ointment in lower fornix (1% chloramphenicol + 0.1% dexamethasone)
- Sterile dressing.

**Statistical Analysis**

A Microsoft Excel 16.28 version (190,81202) data base was made. Paired T student double tailed was used for pre- and post-procedure IOP and pre- and post-topical antiglaucomatous medication comparison. An IBMSPSS Statistics 2019 data base was made to execute a Welch-Satterthwaite test used for comparison between residents and attendants' groups. *p* value <0.05 was considered statistically significant. Descriptive statistic measures were also taken.

**RESULTS**

Ninety-six eyes (77 patients) that underwent trabeculectomy were included in the analysis. 44.79% were male. Median age was 54.04 ± 18.92 years (range 1–86). Trabeculectomy was performed unilaterally in 75.32% patients and bilaterally in 24.67%. Preoperative mean IOP was 27.86 ± 10 mm Hg.

Basal (preoperative) characteristics of patients are summarized in Table 1 and their diagnosis (glaucoma type) in Table 2. Significant differences among resident and attendant groups were only found in central corneal thickness and 30° visual field mean deviation.

Mean basal IOP reduction at 6 weeks, 6 months, and 12 months after trabeculectomy was 15.87 mm Hg (56.96%), 14.42 mm Hg (51.75%), and 14.55 mm Hg (52.22%), respectively, *p* <0.05.

**Table 1:** Patients-basal characteristics

Parameter	Residents	Attendants	<i>p</i> -value
Age (years)	53.56 ± 16.81	55.35 ± 23.64	0.73
Central corneal thickness (µm)	514.93 ± 17.21	525.46 ± 17.62	0.01
Preoperative intraocular pressure (mm Hg)	27.86 ± 8.89	27.88 ± 12.50	1
Preoperative topical antiglaucomatous therapy (number of medications)	2.84 ± 0.48	2.69 ± 0.60	0.27
Cup/disk ratio	0.81 ± 0.19	0.82 ± 0.16	0.79
30°perimetry mean deviation (decibels)	-21.12 ± 8.30	-16.06 ± 7.47	0.008

Table 3 summarizes mean IOP at different follow-up periods post-trabeculectomy among groups.

An increase of 1.45 mm Hg (12.18%) in mean IOP occurred between 6 weeks and 6 months follow-up (*p* = 0.01). Mean IOP decreased 0.13 mm Hg (0.96%) from 6–12 months follow-up (*p* = 0.79). When median IOP at 6 weeks and 12 months was compared there was an increase of 1.24 mm Hg (11%) (*p* = 0.071).

Cumulative success was 66.66% (30% decrease from basal IOP at 12 months follow-up). Total success was reached in 45.83% (*n* = 44) eyes and partial success in 20.83% (*n* = 20) eyes. Success was not achieved at all in 33.33% (*n* = 32) eyes in which an IOP decrease of at least 30% from basal after 12 months follow-up was not achieved, even with topical antiglaucomatous therapy. Out of 32 eyes, 27 required triple therapy (brimonidine tartrate 0.2% + timolol maleate 0.5% + dorzolamide chloride 2%) and five required triple therapy and cyclocryotherapy for IOP control.

In 26 eyes, surgery was performed by attendants and a success rate of 69.23% (46.15% total success) was obtained in this group. Seventy eyes whose surgeries were performed by residents had a success rate of 65.71% (45.71% total success) (*p* = 0.86).

Out of 96 eyes, 51 did not need any topical antiglaucomatous therapy for IOP maintenance after 12 months follow-up. An average of 2.79 ± 0.52 topical antiglaucomatous medications were used preoperative and 12 months after trabeculectomy it decreased to an average of 0.89 ± 1.10 (*p* <0.05).

**DISCUSSION**

Trabeculectomy effectiveness for IOP decrease is well documented. In this study, a median IOP decrease of 13.31 ± 5.02 mm Hg was obtained, similar to reports by Gedde et al.<sup>5</sup> (12.6 ± 5.9 mm Hg) and Chan et al.<sup>6</sup> (11.3 ± 4.4 mm Hg). Percentual decrease from basal IOP has been reported of 51.6%<sup>6</sup> and in this study it was 52.22%.

Nilforushan et al.,<sup>1</sup> Gedde et al.,<sup>5</sup> and Kwong et al.<sup>7</sup> reported trabeculectomy success of 85.3%, 63.5%, and 69%, respectively, these data coincide with the present study in which cumulative success was 66.66%. Differences exist in success definition among authors, Nilforushan et al.<sup>1</sup> considered a successful trabeculectomy if IOP was 5–10 mm Hg with a decrease of at least 20% from basal IOP with or without topical antiglaucomatous therapy and Gedde et al.<sup>5</sup> determined a successful procedure when IOP was <21 mm Hg or a 20% IOP decrease from basal and in this study, success was considered as 30% IOP decrease from basal with or without topical antiglaucomatous therapy use (total and partial success).

Chan et al.<sup>6</sup> reported that 50% of their patients required topical antiglaucomatous therapy for IOP control after trabeculectomy (1.2 ± 1.5 eye drops), in this study 46.88% required topical therapy (0.89± eye drops). Gedde et al.<sup>5</sup> reported a topical antiglaucomatous decrease of 1.7 ± 2 eye drops, in this study, general decrease of medication was 1.9 ± 0.6 eye drops.



**Table 2:** Patients diagnosis

<i>Glaucoma type</i>	<i>Residents n (%)</i>	<i>Attendants n (%)</i>
Narrow angle glaucoma	25 (35.71)	10 (38.46)
Primary open-angle glaucoma	13 (18.57)	5 (19.23)
Secondary to chronic steroid use glaucoma	12 (17.14)	2 (7.69)
Pupillary block glaucoma	4 (5.71)	1 (3.85)
Pseudoexfoliative glaucoma	3 (4.28)	2 (7.69)
Juvenil glaucoma	3 (4.28)	0
Traumatic glaucoma	2 (2.85)	1 (3.85)
Congenital glaucoma	0	3 (11.54)
Uveitic glaucoma	3 (4.28)	0
Acute angle closure glaucoma	1 (1.43)	1 (3.85)
Normal tension glaucoma	2 (2.85)	0
Neovascular glaucoma	1 (1.43)	1 (3.85)
Pseudophakic glaucoma	1 (1.43)	0

Previous studies suggest that resident performed trabeculectomies may have outcomes comparable to those in the overall literature, Nilforushan et al.<sup>1</sup> reported a trabeculectomy success of 87.8% when performed by residents and 85.3% by attendants, and Biggerstaff et al.<sup>8</sup> reported a success rate of 51.6% and 33.1%, respectively. In this study, effectiveness between the two groups showed no significant differences (69.23% for attendants and 65.71% for residents,  $p = 0.86$ ).

**CONCLUSION**

Our data demonstrate that trabeculectomy continues to be a successful and effective therapy to obtain a significant and stable IOP decrease. Another advantage is topical antiglaucomatous therapy decrease that improves patient quality of life. In our training institution, success rates comparing resident performed trabeculectomy to attending performed were similar, so successful

**Table 3:** Median IOP among different follow-up periods

<i>Median IOP (mm Hg)/ follow-up period (resident)</i>	<i>Median IOP (mm Hg)/ follow-up period (attendant)</i>	<i>p- value</i>
9.48 ± 6.93 / 24 hours	8.23 ± 7.38 / 24 hours	0.46
9.16 ± 4.53 / 72 hours	9.42 ± 3.52 / 72 hours	0.77
11.97 ± 6.25 / 6 weeks	12.07 ± 6.27 / 6 weeks	0.94
13.62 ± 5.10 / 6 months	12.96 ± 3.86 / 6 months	0.50
13.53 ± 5.64 / 12 months	12.73 ± 2.65 / 12 months	0.36

trabeculectomies can be performed with proper technique usage and direction and supervision of residents in training.

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