Published in final edited form as:
Retina. 2011 February ; 31(2): 275–283. doi:10.1097/IAE.0b013e3181ea48d3.

Long-term Results of Combined Endoscope-assisted Pars Plana Vitrectomy and Glaucoma Tube Shunt Surgery

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Abstract

Purpose—To assess outcomes following endoscope-assisted pars plana vitrectomy with concurrent pars plana tube shunt placement.

Methods—Records of 18 adult patients (19 eyes) at one institution with uncontrolled chronic angle closure glaucoma (CACG) associated with corneal opacification or fibrosed pupils were retrospectively reviewed. All eyes underwent endoscope-assisted pars plana vitrectomy with Baerveldt tube shunt placement into the vitreous cavity between 1997 and 2005. Intraocular pressure (IOP) reduction, glaucoma medication reduction, complications, and visual acuity were analyzed.

Results—Mean follow-up duration was 62 months (range, 10–106 months). Mean preoperative IOP was 31.3±10.5 (SD) mmHg on 3.4±1.0 (SD) glaucoma medications. IOP was significantly reduced at each postoperative time point examined. In the 17 eyes without phthisis, IOP was significantly reduced at the final follow-up examination to a mean of 11.4±2.9 (SD) mmHg ($P<0.0001$) on 1.3±1.2 (SD) medications ($P<0.0001$). No complications occurred in 14 of 19 eyes. Postoperatively, best attained visual acuity improved in 14/19 eyes, remained unchanged in 4/19 eyes, and was reduced in 1/19 eye.

Conclusion—Combined endoscope-assisted pars plana vitrectomy with placement of a Baerveldt tube shunt into the vitreous cavity is a useful intervention in patients with uncontrolled CACG, media opacities, and limited surgical options.

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This material was presented in part as a paper at the American Society of Retinal Specialists Annual Meeting, Maui, Hawaii, October 15, 2008, and a poster at the Association for Research in Vision and Ophthalmology Annual Meeting, Ft. Lauderdale, FL, May 3, 2009.

None of the authors has any financial/conflicting interests to disclose

Summary Statement:
This retrospective interventional case series assessed outcomes following endoscope-assisted PPV with pars plana tube shunt placement. In eyes that have undergone prior procedures on maximal tolerated medical therapy, this procedure resulted in a significant reduction in intraocular pressure and decreased the number of glaucoma medications required over long-term follow-up.

Keywords

chronic angle closure glaucoma; complications; endoscope; IOP; outcomes; tube shunt; visual acuity; vitrectomy

Introduction

Glaucoma drainage tube shunts are typically used following failure of medical, laser, and conventional filtering surgery to adequately control intraocular pressure (IOP). They have been used to effectively manage patients with complicated glaucomas and have been shown to significantly reduce IOP.[1–21] Reported indications for tube shunt placement include excessive conjunctival scarring diminishing the likely success of repeat trabeculectomy,[4,6] abnormalities of the iridocorneal angle,[2,6] neovascular glaucoma,[1,5] the presence of a corneal graft,[2,3,7] and inflammatory glaucoma.[1] Despite a high incidence of success, tube shunts placed in the anterior segment can result in multiple complications. The rate of endothelial failure following anterior chamber tube shunt placement has been reported to be 17% to 35%,[4,9,16] and tube-corneal endothelium touch has been observed in 5% to 23% of patients.[1,4,6,8,16] The incidence of corneal graft failure, both immunologic and non-immunologic has been reported to be 8% to 46% in patients with a corneal graft and an anterior chamber tube shunt.[2,3,6,7,10–12,16] Abnormalities of the iridocorneal angle in some cases of CACG, aphakia, or pseudophakia may make insertion of a tube into the anterior chamber difficult.[14,17] Erosion of the tube portion of the shunt can result in poor vision and phthisis.[1,9,16]

Various solutions have been proposed to address complications related to anterior chamber tube shunt placement. Placement of the tube in the vitreous cavity with simultaneous pars plana vitrectomy (PPV) has been advocated in selected cases.[5,9,13,14,18–21] While this is often an effective strategy, incomplete vitreous removal can result in subsequent tube obstruction and failure to adequately reduce IOP. Visualization of the peripheral vitreous with conventional viewing systems during PPV can be particularly difficult in the presence of corneal opacification or a fibrosed pupil that may be present in patients with advanced glaucoma who have undergone multiple prior surgeries (Figure 1). Placing the tube in the sulcus is an option, however; a vitrectomy is still necessary in aphakic eyes and eyes with an anterior chamber intraocular lens (IOL).[17]

The ocular endoscope has been reported to be a useful tool in ophthalmic surgery.[22–38] It has been effectively used in the removal of peripheral vitreoretinal membranes,[27,28] ciliary body photocoagulation,[29,30] subretinal surgery,[31] fluorescein angiography of the peripheral retina,[32] visualization of intravitreal implants,[33] removal of dislocated nuclear material,[34] sulcus fixation of IOLs,[35] removal of intraocular foreign bodies,[36] retinal detachment repair,[37] and endophthalmitis.[38] Here we describe a new indication for the use of the ocular endoscope. We report a series of 19 consecutive eyes encountered over a 9-year period with corneal opacities or fibrosed pupils that underwent combined endoscope-assisted PPV and tube shunt placement in the vitreous cavity. All eyes had CACG and a failed corneal graft, corneal scarring, or a fibrosed pupil. The lens status was either aphakia or an anterior chamber, sulcus, or sutured posterior chamber IOL.

Materials and Methods

This study included all adult subjects who underwent endoscope-assisted PPV for poor visualization (Figure 1) with concurrent Baerveldt-350mm^2 glaucoma implant (Advanced Medical Optics, Irvine, California, USA) placement in the vitreous cavity between January

1, 1997 and December 30, 2005 at Vanderbilt Eye Institute. Surgeries were performed by a single glaucoma surgeon (KMJ) and a single vitreoretinal surgeon (AA). A retrospective chart review was performed. Data recorded included age, gender, number of prior surgeries, indication for tube shunt placement, indication for endoscope use, lens status, initial and final best corrected visual acuity (BCVA), best post-operative BCVA, initial and final IOP, initial and final number of glaucoma medications, and the occurrence of postoperative complications. The preoperative IOP, number of glaucoma medications, and BCVA were the last recorded values prior to surgery. Intraocular pressures at all postoperative examinations were measured by Goldmann applanation.

Patients did not have standardized follow-up, so for the purposes of this study the following postoperative ranges were used in IOP analysis: 1 month (30 days ± 15 days), 3 month (90 days ± 30 days), 6 month (180 days ± 60 days), 12 month (365 days ± 90 days), 24 month (24 months ± 120 days), 36 month (36 months ± 150 days), 48 month (48 months ± 150 days), and 60 month (60 months ± 150 days). Due to variable follow-up, particularly in patients with stable IOP several years following surgery, all patients did not have an examination in each time range. If patients had multiple IOP measurements in a given range, the mean value of these measurements was used in data analysis. Visual acuity was noted prior to surgery and at the most recent follow-up visit and was classified as stable (≤ 3 line loss or gain), improved (> 3 line gain), or significantly reduced (> 3 line loss). All patients included in the study had a postoperative follow-up duration of at least 10 months. All subjects underwent complete ocular examinations by the operating surgeons preoperatively and postoperatively at variable intervals. Medications were discontinued as IOP declined during postoperative examinations. Eleven patients agreed to undergo subsequent penetrating keratoplasty or keratoprosthesis placement.

Surgical Technique

A 270° conjunctival peritomy was made and a standard 20-gauge PPV was performed with removal of all vitreous and residual lens matter that could be safely removed with a conventional viewing system. The sclerostomies were then enlarged to accommodate the 19-gauge ocular endoscope (Endo-Optiks Inc. Little Silver, NJ). Prior to insertion, the orientation of the 12 o'clock position of the endoscope was determined by focusing on the text on a suture packet. Once oriented, the endoscope was inserted into the vitreous cavity through each sclerostomy. Any residual vitreous material, peripheral retinal tears, or bleeding was identified and the vitreous base was trimmed 360°, particularly in the superotemporal quadrant. A Baerveldt-350 mm^2 glaucoma drainage implant was placed and secured to the patient's sclera with two interrupted 9-0 nylon sutures. The tube was ligated with a 7-0 Vicryl suture and inserted into the vitreous cavity through a 23-gauge ostomy placed 2.5 to 3 mm posterior to the limbus. A separate location from the superotemporal vitrectomy sclerostomy was chosen to avoid a leak and to decrease the risk of incarceration of residual vitreous strands at a port. The internal position of the tube was confirmed with the endoscope prior to closing the eye. Postoperative medications included topical antibiotics, cycloplegic, and steroids that were tapered based on the degree of intraocular inflammation. All subjects subsequently underwent complete postoperative ocular examinations by the glaucoma and vitreoretinal surgeons at variable intervals.

Statistical Analysis

A paired t-test (SigmaStat, SPSS, Inc., Chicago, IL) was used to compare the preoperative and postoperative IOP and number of glaucoma medications.

Outcomes

For the purpose of this report, the IOP success outcome measures of previous studies were used.[5,6,9,10,18] A complete success was defined as a final IOP of ≤ 21 mmHg without medications; qualified success as a final IOP of ≤ 21mmHg with medications; qualified failure as a final IOP > 21mmHg with or without glaucoma medications; and failure as phthisis, loss of light perception, or the requirement for additional glaucoma surgery to control the IOP. Patient outcome determination was based on the subject's last documented office visit.

Results

Included in this study were 19 eyes of 18 patients. Patient data characteristics are summarized in Table 1. Mean follow-up duration was 62 months (range 10–106 months). Indications for the procedure included uncontrolled angle-closure glaucoma in all eyes. Uveitic glaucoma with peripheral anterior synechiae (PAS) was present in 3/19 eyes, and traumatic glaucoma with PAS was present in 2/19 eyes. Indications for use of the endoscope during PPV included failed corneal graft in 13/19 eyes, corneal edema or scar in 4/19 eyes, band keratopathy in 1/19 eyes, and a fibrosed pupil in 1/19 eyes. Thirteen eyes were pseudophakic (anterior chamber IOL, sulcus IOL, sutured posterior chamber IOL) and 6 were aphakic. The mean number of prior surgical procedures was 3 ± 1.3 (SD, range 1–6). Two eyes had prior anterior chamber tube shunts that were repositioned into the posterior chamber due to anterior chamber shallowing.

Preoperative IOP averaged 31.3 ± 10.5 mmHg (SD, range 21–54) on 3.4 ± 1.0 (SD, range 1–5) glaucoma medications. Analysis was performed on IOP preoperatively and at several postoperative time points. Mean and standard deviation measurements at each time point are displayed in Figure 2. At each postoperative time point examined, there was a statistically significant reduction in IOP ($P<0.0001$, paired t-test). Intraocular pressure ± standard deviation and the number of patients with an IOP measurement at each time point in the 19 eyes were as follows: preoperative (31.3 mmHg ± 10.5, n=19), 1 month (18.3 mmHg ± 4.8, n=19), 3 month (14.8 mmHg ± 4.3, n=15), 6 month (14.4 mmHg ± 5.0, n=18), 12 month (12.6 mmHg ± 3.6, n=17), 24 month (11.6 mmHg ± 2.6, n=15), 36 month (13.0 mmHg ± 4.8, n=16), 48 month (11.6 mmHg ± 2.4, n=9), and 60 month (11.0 mmHg ± 2.3, n=10). In the 17 eyes that did not undergo phthisis, IOP was significantly reduced at final follow up with a mean of 11.4 ± 2.9 mmHg (SD, range 7–16) ($P<0.0001$, paired t-test). The number of glaucoma medications required in these eyes at final follow up examination was also significantly reduced with a mean of 1.3 ± 1.2 (SD, range 0–3) ($P<0.0001$, paired t-test). Based on the previously described outcome measures, 5/19 eyes were classified as a complete success with final IOP ≤ 21 on no glaucoma medications, 9/19 were classified as a qualified success with final IOP ≤ 21 on 1 or more glaucoma medications, 0/19 were classified as a qualified failure with final IOP ≥ 21mmHg with or without glaucoma medications, and 5/19 were classified as a failure with phthisis, loss of light perception, or the requirement for additional glaucoma surgery to control the IOP. A Kaplan-Meier cumulative probability curve of complete or qualified success is illustrated in Figure 3.

Five of 19 eyes had complications related to this procedure. All 5 required repeat surgical intervention. Four of these eye required tube shunt revision. Two of these 4 eyes (eye # 8 and 15) developed a swollen Soemmering's ring blocking the tube, 1 eye (eye #12) had retained vitreous blocking the tube, and 1 eye (eye #3) developed shunt retraction into the suprachoroidal space. Even though patients (eye #3, 8, 12,and 15) required subsequent surgery within the postoperative period to permit their drainage tube to function, that event was not considered as a qualifying additional glaucoma surgery criterion for 'failure' in this study. One eye (eye #11) developed a hemorrhagic choroidal detachment that required

surgical drainage. This eye regained 20/40 visual acuity following a penetrating keratoplasty that eventually failed and resulted in significantly decreased vision. This patient declined a repeat penetrating keratoplasty.

Of the 5 eyes classified as failures, 3 eyes (eye #4, 7, and 16) required supplemental transscleral diode cyclophotocoagulation for additional IOP control 2–3 years following surgery. Two eyes (eye # 12 and 14) developed phthisis following subsequent corneal surgery due to a sclera melt around a keratoprosthesis placed in eye #12 and following a penetrating keratoplasty in eye #14.

Postoperatively, best attained visual acuity improved in 14/19 eyes, remained unchanged in 4/19 eyes, and was reduced in 1/19 eye. All 17 eyes that did not undergo phthisis retained vision at the most recent follow-up examination. Final visual acuity remained stable (≤ 3 line loss or gain) in 9/17 eyes, improved (> 3 line gain) in 3/17 eyes, and was reduced (> 3 line loss) in 5/17 eyes.

Discussion

The surgical management of advanced, uncontrolled angle-closure glaucomas in patients with corneal opacification or a fibrosed pupil is complex, especially if aphakia or an anterior chamber intraocular lens is present. These patients are typically on maximal medical therapy, have undergone several prior procedures without adequate IOP reduction, and have scarred conjunctiva. Vitrectomy with concurrent pars plana tube shunt placement is often a final surgical option for IOP control. A thorough peripheral vitrectomy is critical for long-term success of shunts placed in the vitreous cavity and can be particularly difficult to achieve in eyes with significant media opacities. Residual vitreous can occlude the tube with subsequent IOP increase or exert traction on the retina resulting in a tear. The ocular endoscope was used to aid visualization during peripheral vitreous removal and tube shunt placement to reduce the risk of tube obstruction with residual vitreous. This series describes our experience using the ocular endoscope to complete PPV prior to tube shunt placement in the vitreous cavity in 19 consecutive eyes with advanced, uncontrolled angle-closure glaucoma and corneal opacities or a fibrosed pupil. Long-term IOP was significantly reduced from a preoperative mean of 31.3 mmHg on 3.4 glaucoma medications to a final postoperative mean of 11.4 mmHg on 1.3 glaucoma medications. During follow-up, IOP was significantly reduced at all postoperative time intervals examined. Postoperative complications related to this procedure occurred in 5 of 19 eyes. Only one of these 5 eyes had a significant decrease in final visual acuity. Two eyes developed phthisis, but this appeared to be secondary to subsequent corneal surgeries. Only one eye developed postoperative tube obstruction with residual vitreous despite all eyes having media opacities making complete removal of peripheral vitreous impossible with a convention viewing system. Obstruction of 2 tubes occurred following partial removal of a Sommering's ring and postoperative hydration of residual lens material. In subsequent surgeries, if lens material was not easily accessible for complete removal and was not felt to be visually significant, it was left in place. Final visual acuity over long-term follow up remained stable in 10/17 eyes, improved in 2/17 eyes, and was reduced in 5/17 eyes.

Numerous prior studies have described outcomes following combined PPV and glaucoma drainage implant placement in the vitreous cavity in patients with complicated glaucomas and poorly controlled IOP. [5,13,14,18–21] In these studies, patients did not have media opacities and PPV was performed with a conventional viewing system. Lloyd, *et al* first described 10 patients that underwent combined PPV and Molteno implant into the vitreous cavity for treatment of neovascular glaucoma.[5] Average follow-up duration was 18 months. Six patients achieved final intraocular pressures less than 22 mmHg. Tube blockage with

residual vitreous occurred in 1 patient. Sheppard, *et al* reported 7 patients with inflammatory glaucoma who underwent PPV and Molteno implant into the vitreous cavity.[13] Follow-up ranged from 3 to 18 months. Mean intraocular pressure decreased from 41 mm Hg preoperatively to 12 mm Hg postoperatively. Varma, *et al* reported 13 patients who underwent PPV and glaucoma drainage implant placement in the vitreous cavity for glaucoma associated with shallow anterior chamber or vitreous prolapse and pseudophakia or aphakia.[14] Mean follow-up duration was 18 months. Mean IOP decreased from 35 mm Hg preoperatively to 14 mm Hg postoperatively. Luttrull, *et al* reported 50 eyes that underwent pneumatically stented Baerveldt drainage device implantation modified for pars plana insertion as treatment of complicated glaucomas.[18] Mean follow-up duration was 18 months. The mean preoperative IOP was 44 mmHg on 3.2 glaucoma medications. The mean final postoperative IOP was 14 mmHg on 0.6 glaucoma medications with a final IOP ≤ 22 in 47/50 eyes. They reported one eye with a semi-opaque failed corneal graft and impaired visualization at the time of pars plana vitrectomy with subsequent tube blockage with residual vitreous postoperatively. Scott, *et al* reported 40 eyes that underwent PPV and glaucoma drainage implant placement in the vitreous cavity.[19] The tube was placed through the pars plana in 26/40 eyes. Follow up ranged from 7 to 86 months with a median of 16 months. Mean preoperative IOP was 34 mmHg and the median number of glaucoma medications was 2. At 1 year postoperatively, mean IOP was 13 mmHg and the median number of glaucoma medications was 0. No case of tube obstruction was reported. Joos, *et al* reported 9 eyes that underwent repositioning of Baerveldt aqueous implants from the anterior chamber into the vitreous cavity as management of anterior chamber tube-related complications.[20] Mean follow-up duration was 17 months. IOP remained controlled in all eyes with a mean of 14.3 mmHg. Progression of the anterior segment problem, which prompted the revision, was halted in 3 of 5 eyes with corneal decompensation and shallow anterior chambers and in all 4 eyes with recurrent tube erosion. deGuzman, *et al* reported 33 eyes that underwent PPV and glaucoma drainage implant placement in the vitreous cavity.[21] Mean follow-up duration was 32 months. Mean preoperative IOP was 33 mmHg on 3.6 glaucoma medications and was reduced to a mean of 13.4 on 0.6 glaucoma medications. Three cases of tube blockage (2 vitreous, 1 iris) requiring surgical correction occurred. Most cases in the above series were without significant media opacities.

In patients with advanced glaucoma and coexisting corneal disease, an alternate technique to achieve IOP control is to perform a penetrating keratoplasty (PK) at the time of vitrectomy and pars plana tube shunt placement.[39–41] Three prior studies have examined patients that have undergone combined PPV using a temporary corneal prosthesis, placement of a tube shunt in the vitreous cavity, and PK. In the largest study by Ritterband, *et al*, 26/82 eyes (31.7%) at 1 month, 19/80 eyes (23.8%) at 3 months, and 3/62 eyes (4.8%) at 12 months following surgery had an IOP ≥ 22.[41] Sustained elevated IOP and surgical trauma at the time of PK are known risk factors for graft failure.[42–44] In order to optimize graft survival, IOP could be controlled prior to performing PK. In our series, only 3/19 at 1 month, 1/15 at 3 months, and 0/17 at 12 months had an IOP ≥ 22. In eyes with visual potential, waiting to perform PK until IOP is well controlled may delay visual recovery, but a staged approach may provide adequate IOP control and minimize the inflammatory response following a subsequent corneal graft. A potential advantage of using a surgical corneal prosthesis during PPV and performing a PK at the time of pars plana tube shunt placement is improved visualization during vitrectomy allowing more complete removal of peripheral vitreous. A disadvantage is the additional operating room time to place the surgical keratoprosthesis not typically used in a PK alone. The use of the ocular endoscope in our study was aimed at enhancing visualization of the peripheral vitreous allowing adequate removal and ensuring proper tube placement at the conclusion of the case. In our series, 1/19 eyes had postoperative vitreous obstruction of the tube. This patient underwent repeat pars plana

vitrectomy and achieved IOP control for 3.5 years before developing phthisis following keratoprosthesis placement.

This study supports prior evidence that pars plana tube shunt placement is a useful option when managing patients with uncontrolled angle-closure glaucoma on maximal tolerated medical therapy with scarred conjunctiva. In addition, this study describes a new surgical technique to utilize the ocular endoscope to assist removal of vitreous in patients when visualization is compromised by media opacities to permit placement of a pars plana shunt without a concurrent corneal surgical prosthesis or corneal graft procedure.

Acknowledgments

This study was supported by the Joseph Ellis Family Glaucoma Research Fund, and an unrestricted departmental grant from Research to Prevent Blindness Inc., NY. A NIH/NEI travel grant was awarded to Dr. Tarantola for ARVO presentation. The authors acknowledge the statistical analysis consultation provided by Chun Li, Ph.D.

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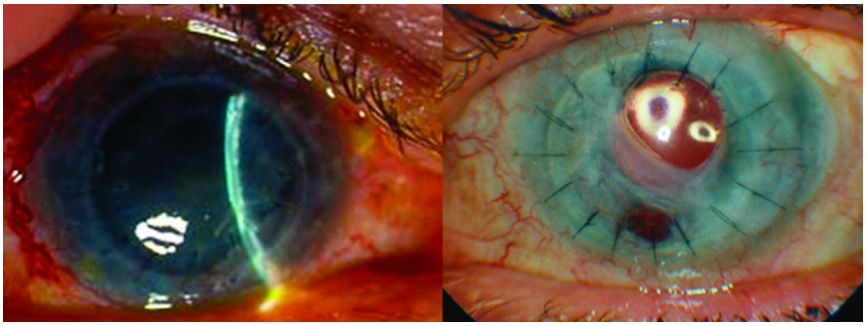

Figure 1.
Patient #6 demonstrating an edematous, failed corneal graft (left) and patient # 9 demonstrating a fibrosed pupil (right).

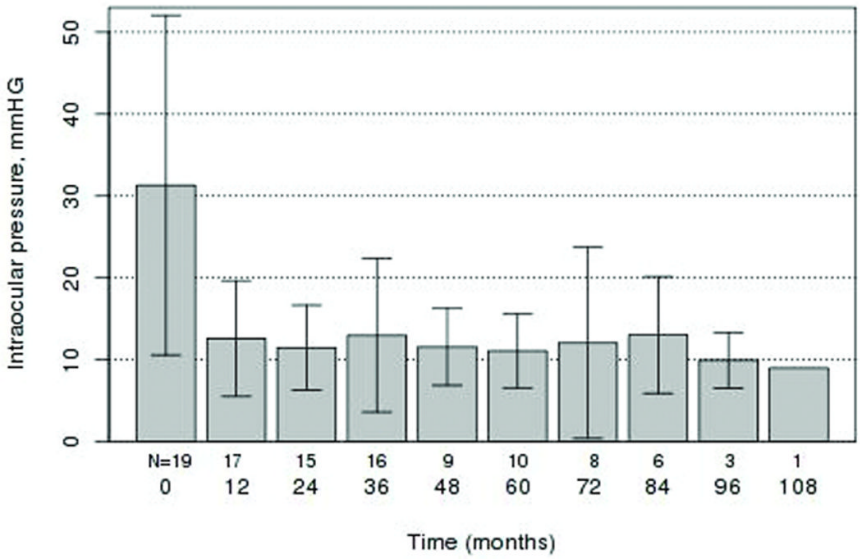

Figure 2.
Mean intraocular pressure (mmHg) values with standard deviation at baseline and at postoperative follow-up intervals.

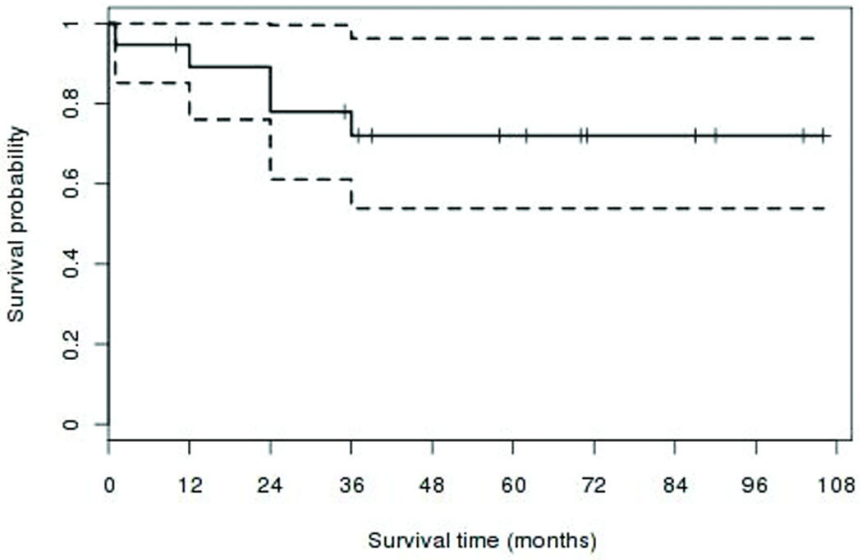

Figure 3.
Kaplan-Meier cumulative probability curve of success (with or without medications) for intraocular pressure (IOP) ≤21 mmHg.

Retina. Author manuscript; available in PMC 2012 February 1.

Patient Data Characteristics

Eye	Age	Sex	# of Prior Surg	Surgery Indication	Endoscope Indication	Lens Status	Initial BCVA, IOP, # Meds	Final BCVA, IOP, # Meds	Best BCVA	Follow-up Duration (months)	Postoperative Complications and Timing	IOP Outcome
1	64	F	2	CACG	Failed graft	Aphakic	1/200 30 3	2/200 10 0	20/300	36	None	Success
2	78	M	3	Mixed Mech Glaucoma	Failed graft	Pseudo	20/400 24 5	3/200 9 2	20/100	106	None	Qualified Success
3	79	M	5	Mixed Mech Glaucoma	Failed graft	Pseudo	20/100 54 4	20/200 11 2	20/100	103	Shunt retraction into suprachoroidal space requiring revision 2 months post-op	Qualified Success
4	45	F	4	Uveitic Glaucoma	Failed graft	Pseudo	20/400 27 4	2/200 14 3	20/200	40	Required CPC 3 years post-op	Failure
5	48	F	2	Uveitic Glaucoma	Rejecting graft	Pseudo	20/80 21 4	20/25 8 1	20/20	90	None	Qualified Success
6	80	F	2	CACG	Failed graft	Pseudo	20/400 38 3	20/400 7 2	20/80	70	None	Qualified Success
7	42	F	5	CACG	Failed graft	Aphakic	HM 50 4	HM 8 0	2/200	93	Required CPC 2 yrs post-surgery Retinal Detachment requiring repair 6 years post-op	Failure
8	32	F	2	CACG	Band Keratopathy	Pseudo	20/70 29 1	20/40 16 3	20/30	10	Swollen lens matter blocked shunt requiring revision 2 months post-op	Qualified Success
9	46	F	3	Juvenile CACG	Fibrosed Pupil	Aphakic	20/200 21 3	20/150 12 2	20/150	87	None	Qualified Success
10	51	M	2	Traumatic	Failed graft	Pseudo	20/200	1/200	20/70	87	None	Success

Eye	Age	Sex	# of Prior Surg	Surgery Indication	Endoscope Indication	Lens Status	Initial BCVA, IOP, # Meds	Final BCVA, IOP, # Meds	Best BCVA	Follow-up Duration (months)	Postoperative Complications and Timing	IOP Outcome
				Glaucoma			27	15				
							4	0				
11	72	F	2	CACG	Corneal edema/scar	Aphakic	20/30	HM	20/40	62	Choroidal hemorrhage requiring drainage 10 days post-op	Success
							36	11			Band keratopathy after transplant	
							4	0				
12	60	F	3	CACG/	Failed graft	Pseudo	1/200	HM	20/400	71	Shunt blocked by vitreous requiring revision 1 month post-op	Failure
				Uveitic			52	Phthisis			Keratoprosthesis causing phthisis 5 years post-op	
				Glaucoma			3					
13	75	F	3	CACG	Corneal edema/scar	Pseudo	20/400	1/200	20/400	71	None	Success
							26	12				
							3	0				
14	35	F	6	Traumatic	Failed graft	Aphakic	HM	NLP	4/200	17	Corneal transplant x 2 causing phthisis 1 year post-op	Failure
				Glaucoma			38	Phthisis				
							4					
15	74	M	3	CACG	Failed graft	Pseudo	20/70	20/30	20/30	58	Swollen lens matter blocked shunt requiring revision 3 months post-op	Qualified
							22	12				Success
							4	1				
16	70	F	4	CACG	Failed graft	Pseudo	20/200	20/150	20/40	57	Required CPC 2 years post-op	Failure
							25	8				
							3	2				
17	21	F	1	CACG	Corneal edema/ scar	Aphakic	20/400	20/400	20/200	37	None	Qualified
							28	15				Success
							4	3				
18	65	F	2	CACG	Corneal edema/ scar	Pseudo	HM	20/40	20/40	39	None	Qualified
							26	15				Success
							1	1				
19	48	F	3	CACG	Failed graft	Pseudo	20/400	20/400	20/400	35	None	Success
							21	10				
							3	0				

BCVA: Best Corrected Visual Acuity; **CACG:** Chronic Angle Closure Glaucoma; **CPC**: Cyclophotocoagulation; **F**: Female; **HM:** Hand Motion; **IOP**: Intraocular Pressure **LP:** Light Perception; **M**: Male; **NLP:** No Light Perception **OD**: Right eye; **OS**: Left eye; **POAG:** Primary Open Angle Glaucoma; **Surg:** Surgeries