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Clinical profile and long term outcomes of eyes with choroidal detachment following trabeculectomy

Sanjana Rao, Devendra Maheshwari, Neelam Pawar[1], Mohideen A. Kadar, Rengappa Ramakrishnan, Mohammed S Uduman[2]

Purpose: To assess the long-term outcomes of choroidal detachments (CDs) in eyes following trabeculectomy. **Methods:** Retrospective comparative case series. Data of patients with CDs following trabeculectomy (5-year period) with or without cataract surgery with a minimum of 3 months of follow-up were included. **Results:** In total, 45 patients with CDs following trabeculectomy were included. The mean age was 63.27 ± 8.68 years, (M:F = 2:1); 29 of 45 eyes (64.4%) had a baseline IOP of >24 mm Hg. Patients had a median follow-up of 22.2 (IQR: 16.2–30.5) months. Further, 10 of 45 eyes (22.2%) had CDs following suture lysis. The median onset of choroidal detachment from the time of surgery was 16.0 (IQR: 11–36) days. The mean BCVA improved from 0.62 ± 0.28 to 0.24 ± 0.27 ($P < 0.001$) and mean IOP increased from 4.07 ± 2.66 to 11.20 ± 5.31 ($P < 0.001$) at last visit. The cumulative success rates were 76.4% (95% CI: 48.4–90.5) in POAG eyes and 79.3% (95% CI: 62.8–89.1) in PACG eyes ($P = 0.547$). Medical management was the mainstay in all patients. Four of 45 (8.88%) patients underwent subsequent choroidal drainage. **Conclusion:** Choroidal detachment following modern-day trabeculectomy has favorable long-term visual acuity and IOP outcomes. There was no difference in the long-term surgical success of trabeculectomy with choroidal detachments in primary angle-closure and open-angle glaucoma eyes. Long-term follow-up is essential to prevent chronic hypotony and trabeculectomy failure.

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Trabeculectomy is still the most routinely performed surgical procedure for glaucoma.[1] Despite having a time-tested intraocular pressure (IOP) lowering profile, it is still associated with a higher rate of short and long-term complications, especially with the increased use of antimetabolites.[1] Post-operative serous or hemorrhagic choroidal effusions are known to occur following glaucoma filtering surgery.[2] Choroidal detachment was initially reported to be a fairly common early complication after trabeculectomy.[3] However, it is relatively rare with modern-day guarded trabeculectomy. The reported rates of serious choroidal effusion are estimated to be 7.9%–18.8% following trabeculectomy.[1,2,4] The high incidence of the same prompts for an increased need to focus on its prevention and treatment.[5] Early postoperative hypotony and choroidal detachment have been shown to cause anterior chamber inflammation and surgical failure following trabeculectomy.[6] Choroidal effusion has also been reported to lead to a permanent reduction in long-term visual acuity.[1,7] Pseudoexfoliation glaucoma, increased IOP reduction, thick corneas, elderly age group, lower postoperative IOP, and higher preoperative IOP are reported risk factors for choroidal detachment.[4,8]

Evidence of choroidal detachments affecting the long-term success rates of trabeculectomy has been previously documented.[5,9] Although the literature mentions about risk factors for choroidal detachment, there remains a lacuna for its long-term outcomes. Thus, the purpose of this study was to report the long-term outcomes of choroidal detachments in eyes that have undergone trabeculectomy.

Methods

We performed a retrospective chart review of 52 consecutive patients who developed choroidal detachment (CD) post primary trabeculectomy with mitomycin C with or without cataract surgery performed by multiple experienced surgeons at Aravind Eye Hospital, Tirunelveli between January 2014 and December 2019. Of the 52, seven patients with less than 3 months of follow-up were excluded. Thus, we included 45 eyes for the study.

The study was approved by our institutional review board and adhered to the tenets of the declaration of Helsinki. The data noted were age at presentation, gender, glaucoma subtype, systemic comorbidities, number of antiglaucoma medication before trabeculectomy, refractive error before surgery, preoperative slit-lamp parameters such as IOP,

Departments of Glaucoma, [1]Paediatric Ophthalmology and Strabismus and [2]Biostatistics, Aravind Eye Hospital and Post-Graduate Institute of Ophthalmology, Tirunelveli, Tamil Nadu, India

Correspondence to: Dr. Devendra Maheshwari, Department of Glaucoma, Aravind Eye Hospital and Post-Graduate Institute of Ophthalmology, Tirunelveli - 627 001, Tamil Nadu, India. E-mail: drdevmaheshwari@gmail.com

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4-mirror gonioscopy, preoperative anterior chamber depth, phakic status, peripheral iridotomy status and stereoscopic disc status. Intraoperative details of the block, combined cataract surgery with trabeculectomy, concentration of mitomycin C (MMC) and application of the same, number of scleral flap sutures, and number of releasable sutures were noted. Postoperative visits on day 15 1, 3, and 6 months; and 1 year were included. Details of the visual acuity, bleb morphology and IOP were noted during each follow-up visit. Time of onset of choroidal detachment, IOP at time of detachment, bleb morphology, ultrasound parameters when performed, and management details were included. Further surgeries or repeat procedures were mentioned when performed. Patient's follow-up visits until their final visit included visual acuity, IOP, bleb morphology, and bleb failure if present.

Outcomes were classified as IOP, visual acuity, and trabeculectomy outcomes, which were compared between primary open-angle glaucoma (POAG) and primary angle-closure glaucoma (PACG) eyes within the CD patient data.

We defined glaucoma based on the following criteria:[10]

(a) IOP >21 mm Hg (or IOP <= 21 mm Hg on antiglaucoma medications or history of glaucoma filtering surgery)
(b) Glaucomatous optic nerve damage in the form of rim thinning, notching, asymmetric disc cupping (difference in cup disc ratio > 0.2 between two eyes) in the absence of inter-eye asymmetry in the size of the optic disc, disc hemorrhage, or nerve fiber layer defect.
c) Glaucomatous visual field defect corresponding to Anderson criteria[11]

PACG was defined as per standard criteria.[10]

Pseudoexfoliation glaucoma was defined by the presence of pseudoexfoliative material on the pupil, anterior lens capsule along with the criteria for glaucomatous optic neuropathy as mentioned above.[12]

Patients with uncontrolled glaucoma on maximum tolerated medical therapy underwent trabeculectomy alone or cataract surgery with trabeculectomy (phacoemulsification or small-incision cataract surgery)

Criteria for success and failure of trabeculectomy following choroidal detachment were as follows:[13]

Surgical success was defined based on two criteria.

1. Complete success: IOP >5 or <21 mm Hg and more than 20% reduction from the baseline without the use of antiglaucoma medication
2. Qualified success: IOP >5 or <21 mm Hg and more than 20% reduction from the baseline with the use of antiglaucoma medication

Failures were defined as IOP >21 mm Hg and <20% reduction from the baseline or < = 5 on two consecutive follow-up visits after 3 months accompanied by loss of 2 lines of Snellen visual acuity attributed to hypotony, reoperation for further IOP lowering (laser/surgery), or loss of light perception or endophthalmitis.

Hypotony was defined as IOP <= 5 mm Hg on more than 2 weeks.[14]

Statistical analysis

Data was evaluated for normality by using Box–Whisker's plot and Shapiro–Wilk test and summarized as mean (SD) or median (IQR) for continuous variables and frequency (%) for categorical variables. Analysis of demographics and baseline characteristics included age, gender, systemic illness, family history, intraocular pressure, cup-to-disc ratio, and corneal thickness between PACG and POAG. Chi-square test or Fisher's exact test was used to determine the association of these variables between PACG and POAG groups. Snellen's visual acuity were converted into logarithm of minimal angle of resolution (logMAR) for statistical analysis. Continuous variables were assessed between the groups by using independent *t* test or Mann–Whitney U test. Post-operative intraocular pressure and logMAR visual acuity were compared with baseline using paired *t* test or Wilcoxon signed rank test as appropriate. To estimate the cumulative probability of success, Kaplan–Meier survival analysis was used based on the definition of success of trabeculectomy. All statistical analyses were done in STATA, version 14.0 (StataCorp, TEXAS, USA), and $P < 0.05$ denoted statistical significance.

Results

Data of 45 patients who had choroidal detachment post trabeculectomy with mitomycin C during the given period were analyzed.

Demographic parameters [Table 1]

Of the 45 patients, 30 were male (66.7%) and 15 were female (33.3%). The overall mean age was 63.27 ± 8.7 years (range: 38–88 years). The mean age of the patients in the PACG and POAG groups was 60.61 ± 8.6 and 65.58 ± 8.3 years, respectively ($P = 0.06$). On comparison, there was a significant difference in gender and refractive error between the groups ($P = 0.028$ and $P = 0.016$, respectively). The mean IOP at presentation was 31.74 ± 9.4 mm Hg in the PACG group, which differed significantly from the mean IOP of 25.00 ± 6.8 mm Hg among POAG eyes ($P = 0.013$). Patients had a median follow-up of 22.2 (IQR: 16.2–30.5) months. There was no significant difference in the median follow-up duration between the groups ($P = 0.077$). The etiology of glaucoma was as shown in Table 1. There were 23 eyes with PACG and 19 eyes with POAG. At baseline, the two groups were similar in terms of glaucoma medication ($P = 0.26$) with a mean of 2.26 ± 0.9 overall.

Preoperative and intraoperative parameters were as listed in Tables 2 and 3. There were no intraoperative complications in all 45 eyes. There was no significant difference noted in these parameters between PACG and POAG groups.

Clinical profile of eyes with choroidal detachment

Of the 45 eyes that had post-operative choroidal detachment (CD), the median duration of detection of CD from the time of surgery was 16.0 (IQR: 11–36) days. Among the 45 eyes that presented with CD, 39 (86.6%) had a diffuse bleb, 4 of 45 (8.8%) had a flat bleb, and 2 of 45 (4.44%) had a cystic bleb.

There were no bleb leaks noted at the time of CD in any of the patients. Median visual acuity at the time of CD was logMAR 0.60 (IQR: 0.48–0.78). Among all the 6 eyes (13.3%) needing one releasable suture removal, 4 of 6 (66.6%) eyes developed CD post releasable suture removal. Of the 13 (28.8%) eyes needing laser suture lysis (LSL), 10 of 13 eyes (77%) developed CD after LSL. The mean IOP at the time of CD was 4.07 ± 2.7 mm Hg overall (range: 1–14). There was no significant difference between the mean IOP at the point of detection of CD between the groups ($P = 0.671$). The two groups also did not differ with regard to the visual acuity at the time of CD ($P = 0.847$) [Table 4].

Table 1: Demographic characteristics of CD eyes at presentation

Parameter	PACG group (*n*=23)	POAG group (*n*=19)	Total patients with CD (*n*=45)	*P*
Age, years				
Mean (SD)	60.61±8.6	65.58±8.3	62.86±8.8	0.066
Min-Max	38-75	53-88	38-88	
Gender, *n* (%)				
Male	12 (52.2)	16 (84.2)	28 (66.7)	0.028
Female	11 (47.8)	3 (15.8)	14 (33.3)	
Laterality *n* (%)				
OD	13 (56.5)	8 (42.1)	21 (50.0)	
OS	10 (43.5)	11 (57.9)	21 (50.0)	
DM, *n* (%)	11 (47.8)	7 (36.8)	18 (42.9)	0.474
HTN, *n* (%)	10 (43.5)	7 (36.8)	17 (40.5)	0.663
Family history, *n* (%)	1 (4.3)	1 (5.3)	2 (4.8)	>0.99
AGM before trabeculectomy				
Mean (SD)	2.39±0.7)	2.11±1.0	2.26±0.9	0.268
Min-Max	1.0-4.0	1.0-4.0	1.0-4.0	
IOP at presentation (mm Hg)				
Mean (SD)	31.74±9.4	25.00±6.8	28.69±8.9	0.013
Min-Max	18-52	16-38	16-52	
CCT (microns)				
Mean±SD	524.91±36.2	529.95±28.0	527.19±32.5	0.623
VC: DR				
Mean±SD	0.79±0.1	0.80±0.1	0.80±0.1	0.738
Refractive error before surgery, *n* (%)				
Mild myopia	3 (13.0)	9 (47.4)	12 (28.6)	0.016
Moderate myopia	0 (0)	1 (5.3)	1 (2.4)	
Hyperopia	14 (60.9)	4 (21.0)	18 (42.9)	
Astigmatism	6 (26.1)	5 (26.3)	11 (26.2)	

CD: Choroidal detachment; POAG: Primary open-angle glaucoma; PACG: Primary angle-closure glaucoma; DM: Diabetes Mellitus; HTN: Hypertension; AGM: Antiglaucoma medication; IOP: Intraocular pressure; CCT: Central corneal thickness; VC: DR: Vertical cup: disc ratio

Thirty-five of 45 eyes (77.7%) had CD in all quadrants, whereas, 7 of 45 (15.5%) had CD limited to the superior and inferior quadrants. Three of 45 (6.6%) had CDs limited to only one quadrant (inferior).

All 45 eyes with CD were managed conservatively with topical steroids, cycloplegic agents, and oral steroids. Intramuscular dexamethasone was additionally given in 8 of the 45 patients (17.7%).

Interventions for CD

Four of 45 (8.88%) patients who did not respond to conservative management underwent an ultrasound B-scan and had kissing choroidals [Fig. 3]. The mean duration of follow-up after trabeculectomy in these eyes was 15.50 ± 8.9 months. All 4 eyes later underwent drainage of the CD with anterior chamber reformation. IOP significantly increased from a mean of 3.25 ± 0.95 mm Hg to 13.75 ± 8.09 mm Hg (P = 0.04) at the final visit in these 4 eyes. Visual acuity of 2 of 4 (50%) of these patients remained unchanged at the final visit.

The number and type of further anterior segment procedures following CD were as listed in Tables 5 and 6 and did not differ significantly between the two groups (P = 0.447).

Cataract surgery post choroidal detachment

Twelve of 45 eyes (26.6%) that developed CD subsequently needed cataract surgery. The median duration of cataract surgery from choroidal detachment overall was 9.70 (IQR: 6.8–12.1) months and 8.73 (IQR: 6.6–10.4) and 19.22 (IQR: 11.5–27.0) months in PACG and POAG groups, respectively. Although 10 of 23 (43.4%) eyes in the PACG group had further cataract surgical procedures as opposed to 2 of 19 (10.5%) eyes in the POAG group, the number of further cataract surgical procedures did not differ between the two (P = 0.105) [Table 6].

Profile of eyes with hypotony at the final visit

Eight of 45 (17.7%) patients had hypotony at the final visit with 2 of 8 (22.2%) developing hypotony maculopathy. The mean IOP of these 8 eyes was 4.11 ± 1.85 mm Hg. Four of 8 (50%) had angle-closure glaucoma, 3 of 8 (37.5%) had open-angle glaucoma, and 1 (12.5%) had pseudoexfoliation glaucoma. Five of 8 (62.5%) underwent phaco trabeculectomy, 2 of 8 (25%) underwent trabeculectomy with mitomycin C, and 1 of 8 (12.5%) underwent SICS trabeculectomy.

Seven of 8 (87.5%) eyes had 0.2 mg/mL concentration of mitomycin C, and 1 of 8 (12.5%) had 0.4 mg/mL mitomycin C. Three of 8 (37.5%) had mitomycin C injected subconjunctivally, and 5 of 8 (62.5%) had sponge application of mitomycin C. Seven of 8 (87.5%) had all quadrants CD, and none of these patients had choroidal drainage. One of 8 (12.5%) patients each underwent amniotic membrane patch graft and anterior chamber reformation and bleb revision with patch graft.

Outcomes

Outcomes at the final visit [Table 7]. IOP: There was no significant difference between the mean IOP at final visits between the groups (P = 0.085).

Table 2: Preoperative parameters of CD eyes prior to trabeculectomy

Parameter	PACG group (*n*=23)	POAG group (*n*=19)	Total patients with CD (*n*=45)	*P*
Preoperative IOP				
Mean±SD (mm Hg)	24.96±9.7	20.63±7.4	23.00±8.9	0.120
AC depth, *n* (%)				
Shallow	12 (52.2)	5 (26.3)	17 (40.5)	0.089
Normal	11 (47.8)	14 (73.7)	25 (59.5)	
Phakic status, *n* (%)				
Phakic	23 (100.0)	18 (94.7)	41 (97.6)	0.452
Pseudo phakic	0	1 (5.3)	1 (2.4)	
Previous PI, *n* (%)	23 (100.0)	0	23 (54.8)	<0.001
Gonioscopy				
Open angle	0	19 (100.0)	19 (45.2)	<0.001
Close angle - no PAS	14 (60.9)	0	14 (33.3)	
Close angle - PAS	9 (39.1)	0	9 (21.4)	

CD: Choroidal detachment; POAG: Primary open-angle glaucoma; PACG: Primary angle-closure glaucoma; AC: Anterior chamber; PI: peripheral iridotomy; PAS: peripheral anterior synechiae; SD: Standard deviation

Table 3: Intraoperative parameters of trabeculectomy eyes which developed CD subsequently

Parameter	PACG (*n*=23)	POAG (*n*=19)	Total (*n*=45)	*P*
Type of block, *n* (%)				
Peribulbar	8 (34.8)	12 (63.2)	20 (47.6)	0.156
Retrobulbar	13 (56.5)	7 (36.8)	20 (47.6)	
Sub tenons	2 (8.7)	0	2 (4.8)	
Type of glaucoma surgery, *n* (%)				
PHACO trabeculectomy	10 (43.5)	10 (52.6)	20 (47.6)	0.698
SICS trabeculectomy	3 (13.0)	3 (15.8)	6 (14.3)	
TRAB + MMC	10 (43.5)	6 (31.6)	16 (38.1)	
Concentration of MMC, *n* (%)				
0.2 for 2 min	18 (78.3)	14 (73.7)	32 (76.2)	0.384
0.4 for 1 min	3 (13.0)	5 (26.3)	8 (19.0)	
0.2 for 4 min	2 (8.7)	0	2 (4.8)	
Number of scleral flap sutures				
2	1 (4.3)	0	1 (2.4)	0.846
3	21 (91.3)	18 (94.7)	39 (92.8)	
4	0	1 (5.3)	1 (2.4)	
5	1 (4.3)	0	1 (2.4)	
Number of releasable sutures				
0	12 (52.2)	11 (57.9)	23 (54.8)	0.901
1	9 (39.1)	6 (31.6)	15 (35.7)	
2	2 (8.7)	2 (10.5)	4 (9.5)	
Method of MMC application				
Injection	10 (43.5)	8 (42.1)	18 (42.9)	0.929
Sponge	13 (56.5)	11 (57.9)	24 (57.1)	

CD: Choroidal detachment; POAG: Primary open-angle glaucoma; PACG: Primary angle-closure glaucoma; PHACO: Phacoemulsification; SICS: Small incision cataract surgery; TRAB + MMC: Trabeculectomy with mitomycin C

Table 4: IOP and BCVA at the onset of CD

	POAG (*n*=19)	PACG (*n*=23)	Overall (*n*=45)	*P*
Mean IOP at CD visit IOP (mmHg) ±S.D.	3.89±2.	4.26±2.9	4.07±2.7	0.671
Median BCVA at CD (IQR)	0.60 (0.48-1.00)	0.60 (0.48-0.78)	0.60 (0.48-0.78)	0.847

POAG: Primary open-angle glaucoma; PACG: Primary angle-closure glaucoma; BCVA: Best-corrected visual acuity; IOP: intraocular pressure; SD: Standard deviation; CD: Choroidal detachment; IQR: Interquartile range

Visual acuity: There was no significant difference in final VA between POAG and PACG eyes ($P = 0.013$).

Trabeculectomy outcomes: Considering the success definitions, the two groups were comparable in terms of success ($P = 0.415$) [Table 6]. There was no significant difference in the mean estimated duration of survival between POAG and POAG eyes at all time points. (Log Rank $P = 0.547$) [Fig. 1]. The cumulative probability of overall

Table 5: Number and types of additional anterior segment procedures post CD (except cataract surgery)

Additional anterior segment procedures	PACG eyes with CD *n*=23 (%)	POAG eyes with CD *n*=19 (%)	Total eyes with CD *n*=45 (%)
AADI tube implantation	1 (4.3)	0	1 (2.4)
Synechiae release with surgical iridectomy	1 (4.3)	0	1 (2.4)
Anterior chamber reformation with synechiae release	2 (8.7)	0	2 (4.8)
Anterior chamber reformation with amniotic membrane patch graft	1 (4.3)	0	1 (2.4)
Bleb revision with patch graft	0	1 (5.3)	1 (2.4)
IOL redialing with anterior chamber reformation	1 (4.3)	1 (5.3)	2 (4.8)
Anterior chamber wash with conjunctival resuturing	0	1 (5.3)	1 (2.4)
Total procedures	6	3	9

CD: Choroidal detachment; POAG: Primary open-angle glaucoma; PACG: Primary angle-closure glaucoma; AADI: Aurolab aqueous drainage implant; IOL: Intraocular lens

Table 6: No of patients needing subsequent anterior segment surgeries and cataract surgeries following CD (POAG vs. PACG eyes)

No: patients	POAG *n*=19	PACG *n*=23	*P*
Anterior segment procedures, *n* (%)	3 (15.7%)	6 (26%)	0.447
Subsequent cataract surgeries, *n* (%)	1 (5.26%)	6 (26%)	0.105

CD: Choroidal detachment; POAG: Primary open-angle glaucoma; PACG: Primary angle-closure glaucoma

success was 97.6%, 95.2%, 95.2%, and 79.3% at months 1, 3, 6, and 12, respectively [Fig. 2].

Discussion

We evaluated 45 eyes that developed CD post trabeculectomy in our study with a median follow-up of 22.2 (IQR: 16.2–30.5) months. Among the demographic parameters, we found that CD occurred more among male subjects at a mean age ± SD of 63.27 ± 8.7 years and during the early postoperative period. Among these 45 eyes with CD, most (97.8%) were phakic at the time of glaucoma surgery, and close to half (40%) had a shallow anterior chamber preoperatively despite laser peripheral iridotomy prior to surgery. The most common surgery performed was phaco trabeculectomy. An almost equal number of eyes underwent peribulbar and retrobulbar anesthesia. Most eyes had 0.2 mg/mL Mitomycin C (MMC) for 2 minutes. Sponge application and injection of MMC were equally performed. The median time of detection of CD from the time of surgery was 16.0 (IQR: 11–36) days, and most eyes had a large diffuse bleb. Further, 41 eyes responded to conservative management alone, although 4 required surgical intervention. The IOP significantly increased, and there was visual acuity improvement in all patients at the final visit. There was no statistically significant difference in the long-term IOP and visual outcomes between those eyes with POAG and PACG. There was no overall difference in long-term trabeculectomy outcomes following CD in POAG and PACG eyes. Further, 17.7% of eyes had hypotony at final visit despite routine medical and surgical procedures, and close to one-fourth (22.2%) developed hypotony maculopathy.

Choroidal detachment is seen in hypotonic eyes after intraocular surgeries, including trabeculectomy.[15,16] Predisposing conditions for choroidal effusion include nanophthalmos, diffuse choroidal hemangioma, Sturge–Weber syndrome, dural sinus shunts, carotid-cavernous fistulas, and idiopathic increased episcleral venous pressure.[17]

Choroidal effusions tend to occur owing to a difference in the transmural pressure between choroidal capillaries, resulting in the exudation of fluid and subsequent accumulation in the suprachoroidal space.[18]

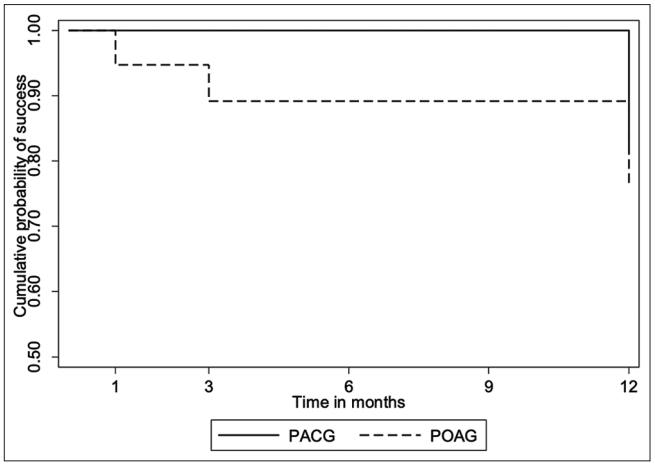

Figure 1: Kaplan–Meier survival probability of success of trabeculectomy with choroidal detachments between PACG and POAG groups

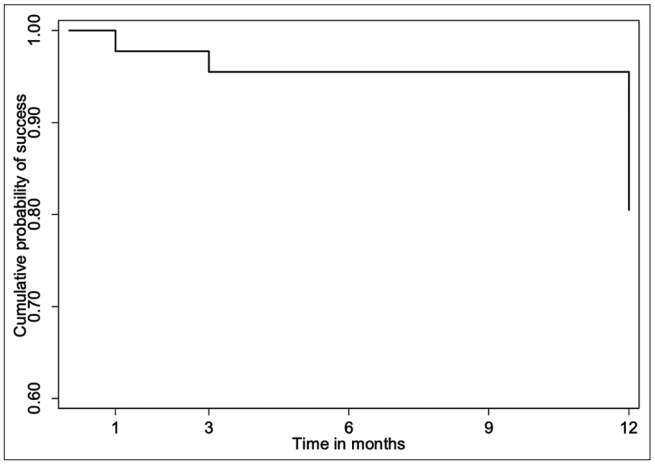

Figure 2: Kaplan–Meier survival probability of overall success of trabeculectomy with choroidal detachments

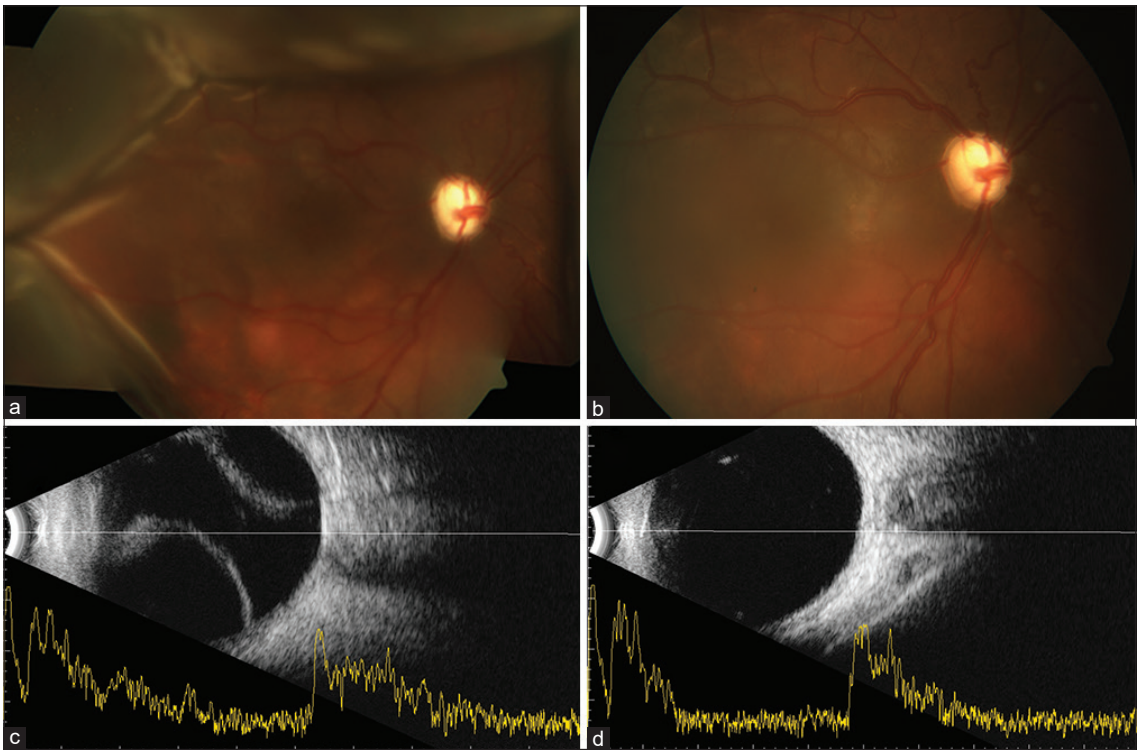

Figure 3: Images of choroidal detachments following trabeculectomy pre and post resolution: (a) Montage color fundus image showing choroidal detachments in all quadrants.(b) Color fundus image following resolution of choroidal detachment (c) Ultrasound B-scan image of an eye with choroidal detachments. (d) Ultrasound B-scan image of the eye following resolution of choroidal detachment

Table 7: Outcomes at the final visit

Outcome	PACG (*n*=23)	POAG (*n*=19)	Total (*n*=45)	*P*
Visual acuity				
Median BCVA (interquartile range)	0.18 (0-0.18)	0.18 (0.18-0.60)	0.18 (0-0.30)	0.103
IOP				
Mean IOP (mm Hg) ± S.D.	12.57±5.8	9.68±4.6	11.26±5.4	0.085
Trabeculectomy outcome				
Complete success *n* (%)	11 (47.8)	12 (63.2)	23 (54.8)	0.415
Qualified success *n* (%)	8 (34.8)	3 (15.8)	11 (26.2)	
Failures *n* (%)	4 (17.4)	4 (21.1)	8 (19.0)	

POAG: Primary open-angle glaucoma; PACG: Primary angle-closure glaucoma; BCVA: Best-corrected visual acuity; IOP: intraocular pressure; SD: Standard deviation

Choroidal detachments have been studied in eyes with POAG and exfoliation glaucoma.[8] Certain studies[4] also included secondary glaucomas. While these studies[4,8] mainly reported the results for trabeculectomy alone, we also included the results of cataract surgery combined with trabeculectomy.

The mean age reported by these studies was 69.9 ± 13.2[4] and 75.1 ± 10.3[8] years, which was slightly older as compared to ours (63.27 ± 8.7 years). There were more males than females,[4,8] similar to our study. Further, 97.8% of our patients were phakic preoperatively as some of them also underwent combined cataract and glaucoma surgery. In contrast, around 50%–57% of patients were phakic in the other studies.[4,8] The mean preoperative IOP in these studies[8] ranging from 30.7 ± 9.3 to 30.7 ± 13.1 mm Hg was considerably higher as compared to ours (22.60 ± 8.8 mm Hg). The number of preoperative antiglaucoma medications was slightly lower in our series (2.22 ± 0.9) as compared to that in others (2.8 ± 0.8).[8]

The overall LSL rates noted in the published literature[4,8] ranged from 24.1% to 56% compared to 28.8% as seen in ours. The mean number of days of onset of CD was shorter (6.1 ± 3.6 to 7.9 ± 5.7) days in these studies[4,8] as compared to our duration of 16.0 (IQR: 11–36) days. The IOP at the time of CD in our study was lower (4.26 ± 2.9) compared to other studies (6.1 ± 3.0[4] and 5.5 ± 3.6[8]). However, in both studies,[4,8] the mitomycin C concentration used was 0.4 mg/mL for 4 min, while we used a composition of 0.2 and 0.4 mg/mL for 2 min and 1 min, respectively.

The medical management of CD broadly includes topical steroids and cycloplegic agents that prevent postoperative intraocular inflammation and subsequent irido corneal or lens corneal touch.[19] Systemic steroids may be used for severe or persistent choroidal effusions not responding to topical treatment.[19] All the patients in our series were initially managed conservatively with topical and systemic steroids

with cycloplegics. Some patients also received intramuscular dexamethasone, which was decided on a case-by-case basis. Four patients later underwent choroidal drainage due to non-responsiveness to medical treatment.

Long-term follow-up revealed an overall stabilization of IOP and an improvement in vision until the last visit. We attribute this to the cause of hypotony in our series being mainly due to over-filtration, no cases of bleb leak, and close follow-up for a long duration. CD following phaco trabeculectomy procedure, being most performed in this series, could have been potentially attributed to more inflammation, increasing the chances of hypotony and choroidal effusion.

Although not significant, there were slightly a greater number of subsequent anterior segment procedures as well as cataract surgery in PACG eyes. This provides an insight into the need for close follow-up of PACG eyes post trabeculectomy with CDs.

Hypotony was seen in 87.5% of eyes with 0.2 mg/mL MMC as compared to 0.4 mg/mL MMC (12.5%) owing to the overall increased use of the former concentration of more than three-fourths of the patients (76.2%). Rather than the concentration of MMC, we presume earlier suture removal during the crucial period of wound modulation to be a potential contributing factor to its onset as more than half the patients who underwent suture removal developed CD.

Our study showed no significant difference in long-term trabeculectomy outcomes following CD between the two groups. Yadgari *et al*.[5] in their case-control study of 17 patients who developed choroidal detachment post trabeculectomy found a slightly lower cumulative success probability of 76.5% at 1 year as compared to ours (79.3%). It is also worth noting that they used a limbal-based approach as compared to our fornix-based approach with a slightly lower concentration of mitomycin C.

Although the preoperative IOP was significantly higher in the PACG group, the IOP and the visual acuity at follow-up visits failed to differ between the groups at each visit.

To the best of our knowledge, this is the first study reporting the long-term effect of choroidal detachments following trabeculectomy in Indian eyes.

The limitations of this study include its retrospective nature, multiple surgeons performing trabeculectomy, small sample size, and absence of an age- and gender-matched control group to evaluate risk factors.

Conclusion

In conclusion, choroidal detachment is a relatively rare early complication following modern-day trabeculectomy with good long-term visual acuity and IOP outcomes. There was no difference in the long-term surgical success of trabeculectomy with choroidal detachment in primary angle-closure and open-angle glaucoma eyes. Long-term follow-up is essential to prevent chronic hypotony and trabeculectomy failure.

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Conflicts of interest

There are no conflicts of interest.

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