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Comparison of Trabeculectomy with combined Phaco Trabeculectomy in the treatment of Angle closure Glaucoma

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ABSTRACT

Background: Trabeculectomy has always been a mainstream treatment in reducing intraocular pressure (IOP) for primary angle closure glaucoma (PACG); combined Trabeculectomy and Phacoemulsification surgery was reported to reduce IOP and simultaneously improve vision for patients with coexisting cataract.

Objective: This study was designed to compare the efficacy and safety of combined phacotrabeculectomy with that of trabeculectomy alone in the treatment of PACG with coexisting cataract.

Methods: A hospital based observational prospective study was carried out on 64 eyes of 56 patients with PACG and coexisting cataract were enrolled in the study. Of these, 32 eyes underwent phacotrabeculectomy while the other 32 eyes went trabeculectomy alone. IOP, filtering blebs, complications, visual acuity and number of anti-glaucoma medications use after surgery were compared at the final follow-up. Complete success was defined as IOP less than 16 mmHg or IOP reduction of <30% without IOP lowering medications. All the data's collected were used for the statistical analysis using the Microsoft Excel and SPSS version 21.0

Results: A total of 64 eyes out of 56 patients got operated, of which 32 eyes underwent trabeculectomy alone and the remaining 32 eyes got phacotrabeculectomy done. After 3 months of postoperative period, 2 patients lost to follow-up, the phacotrabeculectomy and trabeculectomy group showed no significant differences in IOP reduction (18.6 ± 15.66 vs 29.13 ± 14.15), complete success rate (86.66% vs 80%), functioning blebs (62.5% (10/15) vs 75% (12/15), and complications (18.75% (3/16) vs 25% (4/16) respectively. IOP lowering medications was not required for most of the patients in both the groups (13.33% (2/15) vs 13.33% (2/15). Additional surgery interventions were needed including opening of the ostium (6.66% (1/15) and bleb needling (13.33% (2/15) were needed in the trabeculectomy group, whereas no surgery was needed postoperatively in the phacotrabeculectomy group except 3 doses of 5 FU in one patient (6.66% (1/15). Improve in best corrected visual acuity was seen in phacotrabeculectomy group (0.40 ± 0.23) preoperatively to (0.20± 0.14) postoperatively (p=0.002).

Conclusion: Phacotrabeculectomy and Trabeculectomy exhibit similar IOP reduction, success rates and complications when it comes to treating angle closure glaucoma patients with coexisting cataracts, although additional surgical intervention may be needed for a few cases with cataract and complications after trabeculectomy. The visual acuity improvement was observed in the post operative period after phacotrabeculectomy.

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Introduction

Glaucoma is the leading cause of irreversible blindness worldwide, with an estimate 5.2-6.7 million individuals thought to be blind from the disease [1,2]. The prevalence of primary-open angle glaucoma (POAG) is roughly equal to that of primary angle-closure glaucoma (PACG) worldwide [3]. In Asia, PACG is a major form of glaucoma, and the risk of blindness from it is estimated to be greater than that from POAG [3-6]. The overall prevalence of glaucoma in Nepalese population is 1.9% of all glaucoma cases, POAG accounts for 68%, PACG accounts for 22.67% and secondary glaucoma accounts for 9.33% [7].

PACG is characterized by aqueous fluid outflow Obstruction in the iridocorneal angle that can lead to elevated intraocular pressure (IOP) and ultimately optic nerve damage. Therefore, IOP reduction is fundamental to the protection of visual function among PACG patients [8]. Conventionally, the management of PACG involves reduction of IOP by medical means, followed by laser iridotomy. However, some eyes are refractory to these treatment and so surgical intervention may be necessary. Among surgical treatment of PACG, trabeculectomy and phacotrabeculectomy has gained popularity since long and each procedure has documented benefits in treating PACG [9].

PACG is one of the leading causes of blindness worldwide as well as in Nepal, but it is unclear whether phacotrabeculectomy is as effective and safe as trabeculectomy in lowering IOP for PACG patients [10]. In recent years, there has been a widespread shift

towards the use of phacotrabeculectomy as the surgical treatment of choice for coexisting cataract and glaucoma. Despite its popularity, the efficacy of this operation compared to trabeculectomy remains unclear [11].

Keeping the background in mind, since PACG is one of the leading causes of blindness worldwide and in Nepal too but very few studies of similar type has been conducted around the world, our study is aimed to compare the outcome of phacotrabeculectomy vs trabeculectomy in the treatment of angle closer glaucoma.

Materials and Methods

This is a hospital based observational prospective study conducted at R.M. Kedia eye hospital and conducted with the declaration of Helsinki. Ethical clearance from the hospital review committee was taken to carry out the study from August 2023 to January 2025.

A non-randomized technique was used to categorize the patients based on visually significant cataract who underwent phacotrabeculectomy while a non-visually significant cataract patients underwent trabeculectomy alone.

Visually significant cataract was defined by Lens Opacification Classification System III (LOCS III) and best corrected visual acuity (BCVA). Any patients having cataract of grade more or equal to 2 according to LOCS III and BCVA less than 20/40 (6/12) were classified as visually significant cataract and were undergone phacotrabeculectomy. Patients selection was done based on the following criteria.

Inclusion Criteria

- IOP not controlled with anti-glaucoma medications and or peripheral iridotomy.
- Patient not able to afford anti-glaucoma medications.
- History of medication incompliance
- Patient willing to give consent for the study and to undergo surgical treatment.

Exclusion Criteria

- Secondary glaucoma
- Phacomorphic and phacolytic glaucoma
- Primary open angle glaucoma
- Patient not willing to give consent for the study.

The data collected were recorded on preformed Performa and analyzed using Microsoft Excel and Statistical Package for Social Sciences (SPSS) version 21.0

Result

Out of 64 eyes, 56 patients got operated, of which 32 eyes underwent trabeculectomy alone and the remaining 32 eyes underwent phacotrabeculectomy. Of the operated 56 patients, 4 eyes of 4 patients lost to follow up (60 eyes completed the study).

Table 1: Age Distribution

Age (Years)	Frequency	Percentage (%)
31-40	6	9.38
41-50	18	28.13
51-60	24	37.50
61-70	14	21.88
71-80	2	3.13
TOTAL	64	100.00

Table 2: Gender Distribution

Gender	Frequency	Percentage
Male	20	31.25
Female	44	68.75
Total	64	100.00

Table 3: Laterality

Study Eye	Frequency	Percentage
RE	38	59.38
LE	26	40.63
Total	64	100.00

Table 4: Type of Surgery

Surgery	Frequency	Percentage
Phacotrabeculectomy	32	50%
Trabeculectomy	32	50%
Total	64	100

Table 5: Pre and Post operative IOP and VA in two groups

Characteristics	Phacotrabeculectomy (n=30 eyes)	Trabeculectomy (n=30 eyes)	P values
Presenting IOP(mmHg)	30.33±14.74	40±15.63	0.955
Post-operative IOP(mmHg)	11.73±2.96	10.86±4.50	0.269
Change in IOP	18.6±15.66	29.13±14.15	0.968
Pre-operative VA(log MAR)	0.40±0.23	0.20±0.14	0.002
Post-operative VA(log MAR)	0.23±0.17	0.24±0.26	0.50

Table 6: Pre and Post Operative IOP between two groups

Characteristics	Presenting IOP(mmHg)	Post-operative IOP(mmHg)	P values
Phacotrabeculectomy	30.33±14.74	11.73±2.96	0.0002
Trabeculectomy	40±15.63	10.86±4.50	0.0001

Table 7: Pre and Post operative VA between two groups

Characteristics	Preoperative BCVA	Postoperative BCVA	P values
Phacotrabeculectomy	0.40±0.23	0.23±0.17	0.02
Trabeculectomy	0.20±0.14	0.24±0.26	0.6

Table 8: Morphology of Bleb

Bleb morphology	Phacotrabeculectomy n (%)	Trabeculectomy n (%)
Diffuse	20 (62.5)	24 (75)
Flat	12 (37.5)	2 (6.25)
Cystic	0(0)	6 (18.75)

Table 9: Postoperative complications between two groups

Complications	Phacotrabeculectomy (%)	Trabeculectomy (%)
Trauma to anterior capsule of lens	0	0

hyphema	4 (6.25)	8 (12.5)
leak	8 (12.5)	0
Choroidal rupture	0	0

Table 10: Anti-Glaucoma Medications after Surgery

	Phacotrabeculectomy (%)	Trabeculectomy (%)
Anti-glaucoma medicine	4 (13.33)	4 (13.33)

Table 11: Intervention post-surgery

Intrevention	Phacotrabeculectomy (%)	Trabeculectomy (%)
Laser suturelysis	1st Week --10	1st Week--8
	2nd Week--12	2nd Week --4
	1st Month --8	1st Month--0
	3rd Month --2	3rd Month --2
Bleb needling	0	4 (13.33)
5-FU	2 (6.66)	0
Opening of internal ostium	0	2 (6.66)

Discussion

Primary ACG accounts for approximately 6% of all the patients with glaucoma and occurs in 0.6% or less of the general population [12]. It is well known that women are affected three times more than men and that the incidence increases significantly in individual older than 55 years of age, this is in accordance with our study where 68.75% of patients are women and the mean age for the surgery was 54.06±8.06 which also coincides with the study done by Paudyal I et al [13].

Even though the conventional treatment modality for medically uncontrolled PACG is trabeculectomy, recent developments in phacoemulsification has prompted combined trabeculectomy and cataract surgery in patients with glaucoma and a coexisting cataract [14,15]. In our study we found that both phacotrabeculectomy and trabeculectomy can reduce IOP effectively in PACG patients during short term follow-up which is similar to the study done by Jia Xie et al which shows similar IOP reduction, success rates and complications when it comes to treating angle closure glaucoma patients with coexisting cataracts [16].

Tsai et al in their study stated that IOP levels (11.9±4.7) mmHg vs. (12.0±2.3) mmHg) and complete success rates (56% vs. 54%) between the combined group (trabeculectomy plus either phacoemulsification or extracapsular cataract extraction) and the trabeculectomy group [17].

Which is similar to our study (11.73±2.96) vs (10.86±4.50) respectively. While Guggenbach et al reported that after 1 year the mean IOP reduction was not significantly different between the two groups which is in contrast to our present study [18].

Kleinmann et al reported that the number of eyes with IOP values of less than 20 mm HG after surgery in the two groups was 95% for the combined group and 97% for the trabeculectomy group [19]. Both groups showed a significant reduction in the number of medications taken after surgery. The number of eyes controlled without medication postoperatively was higher in the trabeculectomy group than in the combined group which was different from our study.

In our study we found that the formation of the functioning bleb was lower in the phacotrabeculectomy group (62.5%) than in the trabeculectomy group (75%), although there was no significant difference which correlates well with the study done by Wang et al in their study documented that phacotrabeculectomy group (65%) and (93%) trabeculectomy group had functioning blebs at the end of the follow-up period but there was no statistical difference between the two groups with respect to the rate of functioning bleb (p=0.094) [20].

Wang et al also reported that logMAR BCVA improved in the phacotrabeculectomy group from 1.14±0.96 preoperatively to 0.65±0.94 at the last follow-up (P=0.009) and logMAR BCVA deteriorated in the trabeculectomy group, from 0.42±0.21 preoperatively to 0.74±0.62 at the final follow-up, although there was no significant difference (P=0.126) which correlates well with our study which shows logMAR BCVA improved in the phacotrabeculectomy group from 0.40±0.23 preoperatively to 0.20±0.14 at the last follow-up (P=0.002) and logMAR BCVA deteriorated in the trabeculectomy group, from 0.23±0.17 preoperatively to 0.24±0.26 at the final follow-up, although there was no significant difference (P=0.50) [20].

In our study we found that the postoperative complications for both groups were hyphema and shallow anterior chamber which was similar to the study done be Tsai et al and Wang et al who reported that the postoperative complication rates were similar between the phaco trabeculectomy and trabeculectomy alone group (41% vs 57%) [17,20]. In contrast to the study done by Kleinmann et al found that bleb leak was found more in trabeculectomy alone, despite the use of MMC in both the groups, whereas it was found more in phacotrabeculectomy group in our study [21].

IOP lowering medications was not required for most of the patients, except 4 eyes in both phacotrabeculectomy and trabeculectomy group which was controlled with prostaglandin analogue and β-blocker respectively in both the groups while Kleinmann et al reported that the IOP of less than 20 mm Hg after surgery was 95% for the combined group and 97% for the trabeculectomy group which is different from our study [21].

In this study we found that 2 patients in the phacotrabeculectomy group required 3 doses of 5 -FU, while 4 patients in the trabeculectomy group underwent bleb needling and opening of the internal ostium was done in 2 patients in the same group following which IOP of less than 20 mm Hg was maintained without anti-glaucoma medications.

The Advanced Glaucoma Intervention Study has shown that the risk of developing cataract increases by 78% in 5 years after trabeculectomy. In our study also patient undergoing trabeculectomy alone had decrease in BCVA at the end of the follow-up period which is similar to the study done by Tsai et al.15 showed that a high proportion of patients undergoing trabeculectomy alone required cataract surgery within 3 years of follow-up period.

Conclusion

Reduction in IOP with phacotrabeculectomy and trabeculectomy alone is a safe and effective and improves visual acuity in PACG and the rate of success and complications accompany side by side with coexisting cataract although additional surgical intervention

is required for few cases with cataract and complications after trabeculectomy.

Limitations

The sample size is relatively small with short follow up period and large prospective trials are needed to validate the use of phacotrabeculectomy in patients with both cataract and PACG.

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