Phacotrabeculectomy Versus Conventional Combined Technique in Coexisting Glaucoma and Cataract

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Abstract

Background: To evaluate and compare efficacy and outcome after single site phacotrabeculectomy and conventional combined surgery in cases of coexisting primary open angle glaucoma and cataract.

Methods: This prospective study on fifty patients of concurrent primary open angle glaucoma and cataract, who had undergone combined surgery as single site phacotrabeculectomy or conventional single site trabeculectomy with extracapsular lens extraction with IOL implantation in 25 cases each. Evaluation was based on operative and postoperative complications, control of IOP and visual outcome. The follow up period ranged between twelve months to eighteen months.

Results: The mean medically controlled preoperative intraocular pressure was 22 mm of Hg (Range 18 to 35 mm of Hg) by applanation method of tonometry. The range of postoperative intra-ocular pressure after one year was 11 to 22 mm of Hg in first and 14 to 26 mm Hg in second group. Failure to maintain optimum postoperative IOP without Beta-blocker was more frequent after conventional combined procedure. There was no significant difference in incidence and pattern of postoperative complications.

Conclusion: Phacotrabeculectomy provides effective and sustained visual recovery and adequate control of intraocular pressure as compare to conventional combined procedure.

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Key Words: Phacotrabeculectomy; Comparison with conventional combined procedure

Introduction

With the advent of microsurgical procedures, there has been rapid advancement in the management profile of coexisting cataract and primary open angle glaucoma [1-3]. This has resulted in effective application of combined surgical intervention to tackle both glaucoma and cataract simultaneously in one sitting, often through a single incision entry into the anterior chamber, namely intraocular lens implantation and trabeculectomy [1-3]. However, in such a procedure serious complications like preoperative expulsive choroidal haemorrhage and postoperative hyphaema and shallow anterior chamber can occur. Since small incision phacoemulsification surgery has emerged as the most ideal and widely accepted technique in the management of cataract and considering the safety and efficacy of a valve incision for a closed chamber surgery for cataract [4], it is very much justified to apply this qualitatively superior technique to patients with coexisting cataract and glaucoma as well. However, the fact of combining an

operation for external filtration with small incision phacoemulsification that requires tight wound closure by self-sealing incision is very much debatable [5]. An attempt is made in this study to evaluate and compare the efficacy of single site small incision phacoemulsification with trabeculectomy in terms of control of glaucoma, visual rehabilitation as satisfactory sight restoration technique.

Material and Methods

This study includes fifty patients of Primary open angle glaucoma with coexisting cataract and those found suitable for combined surgical management. The mean age of 21 male and 29 female patients was 54 years. Postoperative follow-up in all these cases ranged from 12 to 18 months. Exclusion criteria included monocular patients and those with associated ocular pathology like corneal dystrophy, ocular inflammatory conditions or previous ocular surgery in the study eye. Patients with systemic diseases like diabetes, connective tissue disorder or those receiving systemic steroids or immunosuppressive therapy were also excluded. All patients were subjected to extensive ocular and systemic evaluation

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prior to surgery. The ophthalmic evaluation included recording of visual acuity, anterior segment biomicroscopy, gonioscopy visual field recording and fundus examination wherever possible. Intraocular pressure was recorded with and without administration of anti glaucoma drugs. All eyes had an undisputed diagnosis of cataract and glaucoma in the concerned eye. The decision to perform trabeculectomy with cataract extraction was based on, either inadequate control of intraocular pressure medically or a cataract surgery being indicated from the point of significant reduction of visual acuity. Patients were also subjected to combined procedure if in the presence of significant cataract they required multiple anti-glaucoma medications for control of IOP. The choice of using single site phacotrabeculectomy (Phacotrab) or combined extracapsular lens extraction with trabeculectomy (EC-trab) was randomized. Surgery was performed under 10 ml infiltrative local anaesthesia administered by peribulbar technique using 2% lignocaine and 0.5% bupivacaine in equal amounts. The surgical procedure, including wound construction (length & location), post-operative medications and examination procedures were standardized separately for both the techniques of EC-trab and Phaco-trab respectively. However, for maintaining the maximum uniformity in the procedures, a 5.25 mm optic, all PMMA lens was implanted in all cases of both the groups. For the technique of EC-trab, a fornix based conjunctival flap is fashioned superiorly. A partial thickness limbal based scleral flap of 5x5 mm dimensions is made posterior to the surgical limbus and is extended about 1.5 mm into clear cornea. As such incision was extended internally to accommodate molding of the nucleus. External corneo-scleral incision was extended for 1 mm on either side of the trab incision without compromising the trabeculectomy procedure. A paracentesis is created and the anterior chamber filled with 2% hydroxy propyl methylcellulose. Central, circular, curvilinear capsulorrhexis of 5 to 5.5 mm diameter is made with the help of cystitome made by bending a 26-gauge hypodermic needle. Hydro dissection is performed. The anterior subscleral portion of the flap is opened to the minimal length necessary for the nuclear expression. However, before the nuclear expression, two relaxing incisions are given in capsulorrhexis to avoid undue pressure on capsular bag while expressing the nucleus out of it. Residual cortical matter is removed with the help of manual irrigation-aspiration method using the conventional Simcoe cannula. A 5.25 mm all PMMA IOL is implanted in the bag. The viscoelastic is removed and intracameral 2% pilocarpine is irrigated. Trabeculectomy is completed by making two incisions at the limbus perpendicular to the initial incisions approximately 4 mm apart. A peripheral iridectomy is performed at 12'O clock meridian. The superficial scleral flap is closed using two stitches of 10'O monofilament nylon sutures. The conjunctiva is closed with the help of two stitches of 10'O monofilament nylon sutures.

For the technique of single port phacotrabeculectomy, a 5.25 mm wide self-sealing, short sclero-corneal tunnel with a 3 mm shelving valve incision placed 1.5 mm posterior to the limbus is made. 1 mm side port incision is made about 4 mm to the left of the main tunnel. Hydroxy propyl methylcellulose

2% solution is injected into the anterior chamber to make the anterior chamber deep and to protect corneal endothelium throughout the surgical procedure. Capsulorrhexis and hydro procedures are performed as per the standard technique. Phaco-chop technique and breaking it into multiple pieces before removing it in Toto, performed phacoemulsification. Residual cortex is removed with the help of irrigation and aspiration technique. A 5.25 mm optic Phacoprofile, PMMA Intraocular lens was implanted in the capsular bag. The pupil is constricted using dilute intracameral pilocarpine solution. A sub-scleral piece of 1.5 mm X 3.5 mm size tissue which included the trabecular meshwork and the outer layer of corneo scleral lip was excised from the corneo-scleral tunnel incision, covering either side of the incision thus leaving intact the anterior corneal self sealing lip. Length of the scleral tunnel was kept to the minimum and having 1 mm internal pocket in continuity to either end of the tunnel. This had facilitated excision of deep inner block comprising trabecular meshwork. Trabeculectomy punch was used to complete excision of the trabecular meshwork. A peripheral buttonhole iridectomy was fashioned at about 11 or 1 O' clock meridian. The anterior chamber is reformed with the help of balanced salt solution. Corneo-scleral tunnel incision is hydrated by intra stromal infiltration of balanced salt solution and a releasable suture is used for closing the incision. Then the, conjunctival flap is approximated up to the limbus and fixed by application of 10 'O' suture.

Periodic regular follow up was done up to 12 to 18 months. Postoperative medication included topical steroids and antibiotic combinations for the period of 4 weeks in the form of Dexamethasone 0.01% initially four times in a day for the period of one week followed by gradual tapering to continue up to four weeks. Topical Norfloxacin 0.3% was given for the period of one week only. Tropicamide 1% once at nighttime was also given for the period of one week only except in cases with postoperative uveitis where intensive medication was instituted. Post-operative evaluation of both the groups was based on status of visual acuity corrected and uncorrected, intra ocular pressure, optic disc and fundus changes as well as presence of any post-operative complications.

Results

In our series, average medically controlled preoperative intraocular pressure was 22 mm of Hg (range 17 to 35 mm of Hg) in both the groups. Preoperative, corrected visual acuity was ranging from counting finger close to the face to 6/24. Gonioscopic examination had confirmed grade three to four angle of anterior chamber in all cases. Intraoperative complications were Hyphaema in two cases (8%) following EC-trab (group B) and Iris chaffing in one case (4%) of Phacotrabeculectomy (group A). Phacoemulsification time ranged between 90 seconds to two minutes in all but one case of supra hard nucleus where it extended up to three minutes. Initial post-operative pressure was as low as seven to ten mm of Hg in twenty one (86%) eyes in phacotrab group (group A) as compared to sixteen (64%) eyes in EC-trab (group B) cases (Table 1). The average decrease in IOP was

Table 1**Comparative evaluation of sequential changes in post-operative IOP**

Duration	7-10mm		11-14 mm		IOP 15-20 mm		21-25 mm		26-35 mm	
	PET	ECT	PET	ECT	PET	ECT	PET	ECT	PET	ECT
One week	21 (84%)	16 (64%)	3 (12%)	7 (28%)	1 (4%)	1 (4%)	—	1 (4%)	—	—
1-2 weeks	15 (60%)	15 (60%)	8 (32%)	9 (36%)	2 (8%)	1 (4%)	—	—	—	—
3-4 weeks	9 (36%)	4 (16%)	13 (52%)	18 (72%)	3 (12%)	2 (8%)	—	1 (4%)	—	—
3-6 mths	—	—	17 (68%)	14 (56%)	8 (32%)	9 (36%)	—	1 (4%)	—	1 (4%)
6-12 mths	—	—	14 (56%)	7 (28%)	9 (36%)	14 (56%)	2 (8%)	1 (4%)	—	3 (12%)
12-18 mths	—	—	13 (52%)	1 (4%)	9 (36%)	19 (76%)	3 (12%)	1 (4%)	—	4 (16%)

(*PET = Phacotrabeculectomy; **ECT = ECCE + Trabeculectomy)

Table 2**Comparative evaluation of visual fields & fundus status**

Post Op duration	Static		Progressive changes	
	PET	ECT	PET	ECT
1 month	25 (100%)	25 (100%)	Nil	Nil
1-2 months	25 (100%)	25 (100%)	Nil	Nil
3-6 months	24 (96%)	25 (100%)	01 (4%)	Nil
Up to 9 months	22 (88%)	22 (88%)	03 (12%)	03 (12%)
12-18 months	21 (84%)	21 (84%)	04 (16%)	04 (16%)

seventeen and twelve mm of Hg in the first and second group respectively. Subsequently all the eyes exhibited gradual rise in IOP, which finally stabilized well within acceptable limit of the normal value, that is less than twenty mm of Hg in majority of cases in both the groups (Table 1). Visual field changes were commensurate with glaucomatous cupping of the optic disc and other fundus changes. Such changes were compatible in both the groups after the period of 12 to 18 months (Table 2). Noted early postoperative complications were hyphaema, significant striate keratitis and shallow anterior chamber ranging between four to eight percent cases in each group. Shallow anterior chamber was due to failure to maintain sustained AC depth during immediate postoperative period. This was managed by air injection and application of additional suture that in one case of conventional combined procedure. Only one case of phacotrabeculectomy group had shallow AC due to excessive filtration that responded after adjustment of releasable suture.

Remaining cases in both the groups did not reveal any evidence of such complications. Another noted feature was moderate anterior uveitis in 12 percent cases in each group (Table 3). Delayed post-operative complications included a relatively higher incidence of significant opacification of posterior capsule in 7 (28%) cases of conventional combined procedure as compared to 5 (20%) cases of phacotrabeculectomy group (Table 3), which was managed by YAG laser capsulotomy. Best corrected visual acuity of 6/12 or better was attained by 15 (60%) cases of phacotrabeculectomy group as compared to 14 (56%) cases

Table 3**Comparative evaluation of post-op complications**

Complications	Onset/ duration	PET (Phacotrab) 25 cases	ECT (Conventional) 25 cases
Hyphaema	2 days	Nil	2 (8%)
Significant striate	2-7 days	2 (8%)	2 (8%)
Shallow AC	1-7 days	1 (4%)	2 (8%)
Uveitis	2-14 days	3 (12%)	3 (12%)
Uncontrolled glaucoma (without medication)	4-6 mths	Nil	2 (8%)
	06-12 mths	2 (8%)	3 (12%)
	12-18 mths	2 (8%)	4 (16%)
Posterior capsule opacification	12 mths	5 (20%)	7 (28%)

Table 4**Visual acuity (after 12 months)**

Visual acuity	PET		ECT	
	Uncorrected	Corrected	Uncorrected	Corrected
6/12 or better	12 (48%)	15 (60%)	5 (20%)	14 (56%)
6/12-6/18	7 (28%)	5 (20%)	7 (28%)	4 (16%)
6/18-6/24	3 (12%)	2 (8%)	8 (32%)	3 (12%)
Less than 6/36	3 (12%)	3 (12%)	5 (20%)	4 (16%)

of conventional EC-Trab group. Very poor visual outcome of less than 6/36 was seen in twelve and sixteen percent cases of both the groups respectively. Preexisting advanced glaucomatous changes or failure to maintain effective control of glaucoma postoperatively was mainly attributable to it (Table 4). Pattern of stabilization of astigmatism and visual rehabilitation period was far superior in phacotrabeculectomy group as compared to conventional (EC-trab) group. The mean surgically induced astigmatism following EC-trab was ± 2.25 D after one week to 1.5 D after 4 weeks post-operatively, whereas phacotrabeculectomy group had revealed ± 0.75 D to ± 0.5 D after the lapse of same period.

Discussion

Combined procedure for Glaucoma and Cataract have been found effective in terms of control of intra-ocular pressure, arrest of progressive glaucomatous changes and to some extent useful visual rehabilitation [1-3]. However a large incision for EC-trab is invariably associated with significant astigmatism with its annoying and very prolonged stabilization curve, resulting in adverse influence on the pattern of visual rehabilitation in initial studies [2], [6-8]. In our series, a miotic pupil due to prolonged anti glaucoma regimen posed considerable difficulty in most of the cases to maintain sustained and adequate pupillary dilation of more than 5 mm during the surgery. Despite these constraints, operative procedures remained uneventful in all the eyes of both groups. Both conventional (EC-trab) and Phacotrab were found to be effective and comparable in terms of ease of operative maneuver and the incidence of intra-operative complications. Phacotrabeculectomy has provided superior qualitative and quantitative control of IOP in terms of effective range and duration of IOP control. This trend was more evident in cases of moderately severe glaucoma, especially those having preoperative IOP of more than 35 mm Hg or so, even after the period of 12 to 18 months post-operatively. It was evident from the fact that intraocular pressure remained consistently between 7 to 10 mm of Hg one month after phacotrabeculectomy as compared to 11 to 14 mm of Hg in EC-trab group after the same period. THE same pattern was maintained even after 12 to 18 months post-operatively. Over and above, incidence and severity of uncontrolled glaucoma was also less in cases of Phacotrabeculectomy where maximum uncontrolled IOP was less than 25 mm of Hg and could be managed with topical beta-blockers like Timolol maleate 0.5% and not a single case required surgical re-intervention. Where as uncontrolled IOP was ranging between 26 to 35 Hg in four (16%) eyes those undergone conventional combined procedures. These eyes had to be subjected to surgical re-intervention as mitomycin -C modulated trabeculectomy. Hence prolonged and further follow up of 3 to 5 years duration may reveal better long term efficacy of Phacotrabeculectomy over conventional combined procedures. We believe, less disruption of the conjunctiva along with minimal surgical trauma resulted

in minimizing the surgery induced subconjunctival fibrosis thus helping in an effective bleb formation, and adequate and prolonged control of IOP at the optimal level. Our results are quite satisfying since we could achieve good functional outcome after phacotrabeculectomy in deep brown-pigmented Indian eyes, contrary to observations of western studies in the same type or in dark coloured races [7,8]. Visual recovery was also superior in terms of qualitative and quantitative gain after phacotrabeculectomy mainly due to least surgical trauma, minimal induced astigmatism with its rapid stabilization [9,10].

With a wholesome consideration to the above facts, single site phacotrabeculectomy appears to be a better choice as compared to conventional combined glaucoma and cataract surgery.

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