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Review Article

The effect of Phacoemulsification cataract surgery on Intraocular Pressure Control and Topical Medication use in Glaucoma Patients in Al-Zubair hospital 2023/2024

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Abstract

Background: Glaucoma and cataract accustome the headmost two leading causes of blindness all over the world which adversely affect the vision and quality of life. They are oftenly existed as age –related diseases. As both coexist together, their effect on visual function difficult to differentiate. Meantime cataract surgery can have significant effect on the quality of life in glaucoma patients to variable degrees.

Aim: The purpose of this study is to evaluate the changes of intraocular pressure after cataract surgery in glaucomatous patients compared with non-glaucomatous patients.

Material and Methods: Prospective case-control study done for patients with Primary Open Angle Glaucoma (POAG) whom they underwent cataract surgery by phacoemulsification by one surgeon with follow up period of six months in Al-Zubayer General Hospital during the period between Dec.2022 to Mar.2023.The patients were divided in two groups: eyes with glaucoma(G) and eyes without glaucoma (NG). The intraocular pressure (IOP) was measured by Goldman tonometry. The IOP being measured one day preoperatively and postoperatively at one week, one month,3 months and 6 months consequently. We then compared the preoperative values with postoperative one.

Results: A total 123 eyes of 107 patients were enrolled. The mean age was 64_+12 years with follow up duration of 6 months. We observed decrease in the mean IOP after cataract surgery during all postoperative visits except the 1st week post operatively where not statistically changed ($p < 0.05$). Furthermore, we noticed increase in the number of eyes free of medications after cataract surgery.

Conclusion: In this study, cataract surgery can decrease IOP below the baseline more in glaucomatous than non-glaucomatous patients and we observed decrease in the administration of glaucoma medications after the surgery

Keywords: intraocular pressure; glaucoma; cataract surgery; glaucoma medications

Introduction

Glaucoma and cataract accustom the headmost two leading causes of blindness all over the world which adversely affect the vision and quality of life. They are oftenly existed as age-related diseases. As both coexist together, their effect on visual function difficult to differentiate. Meantime cataract surgery can have significant effect on the quality of life in glaucoma patients to variable degrees. Cataract is frequently observed in glaucoma patients and treatment of glaucoma speed up the emergence of cataract, [1]. Both have significant impact on vision and cataract surgery does improve vision in glaucoma patients, also cataract and glaucoma coexist in the same eye when one pathology may lead to the other (resulting in secondary types of cataracts or glaucoma). Conventional treatment of glaucoma is medical, laser and surgical treatment, currently cataract surgery or lens extraction being reviewed as new treatment modality especially those with angle closure variety, and as a primary wherewithal of reducing intraocular pressure (IOP). There is growing evidence that cataract surgery in glaucoma patients resulted in decreased IOP of 1-2mmHg lasting for at least for 3 years. Cataract surgery exhibits special surgical advantages when done before glaucoma-filtering procedure, Early cataract surgery avoids the development of cataract- a common adverse effect of many glaucoma procedures. Within 5 years of trabeculectomy or tube shunt surgery, half of phakic patients develop a visually significant cataract, [2]. In addition, trabeculectomy on pseudophakic eyes have less risk of lens-cornea touch. Phacoemulsification surgery on eyes with previous trabeculectomy could impair the functioning bleb through increased the permeability of blood- aqueous barrier, then facilitating the passage of inflammatory mediators that cause bleb fibrosis. Therefore, it is advisable that cataract surgery offered in glaucoma patients with uncontrollable IOP. This IOP lowering effect of cataract extraction may reduce the applications of Anti-glaucoma medications or even stop them especially in glaucoma with mild elevation of IOP, and even for severe and end stage glaucoma cataract surgery is still advocated at least to improve the quality of life [3,4]. With the advent of advanced phacoemulsification, nowadays cataract extraction has become more safer procedure, Hence, it is applied widely in management of glaucoma for better control of IOP. In addition to its main indication to improve vision, cataract surgery can lower IOP and reduce the need to IOP lowering medications on a variety of primary glaucoma has been documented,

particularly those with narrow angle. As compared to combined phaco trabeculectomy, phaco cataract surgery alone is simple and not needs complex post operative managements and not associated with higher rate of complications [5,6]. It is well known that cataract may progress rapidly after glaucoma filtering surgery regardless the control of IOP, later on cataract surgery could affect the function of the filtering bleb [7]. In addition to improvement in vision, cataract surgery can also improve visualization of optic disc and diagnostic tools results of the optic disc such as OCT scanning of the optic nerve and monitoring the progression in visual field loss. It is reported that cataract surgery can reduce IOP in both glaucoma and non-glaucoma patients and more profound effect on glaucoma patients and this effect vary greatly among those patients. It is unclear which patients and or ocular characteristics that predict the IOP-lowering effect after cataract surgery, However, it's suggested that angle configuration, aqueous humour dynamics, existing ocular diseases, most important pre-IOP. Intrinsic glaucoma anatomical and physiological actors may play a role in this context where lensectomy could have effect on IOP control. After cataract surgery even eyes without glaucoma exhibit anatomical changes in the anterior chamber and other biometrical factors, for example, increase in the anterior chamber depth (ACD), angle opening distance and anterior chamber area. Although, these changes more evident in angle closure glaucoma, still it might occur in open angle glaucoma [8]. Another suggested mechanism for the IOP lowering effect of cataract surgery in patient with open angle glaucoma is the remodelling of the trabecular endothelium in response to stress of the ultrasonic vibrations during phacoemulsification. However, this hypothesis is inadequate for overall explanation, since the initial studies to report IOP-lowering after cataract surgery were on patients undergoing ICCE or ECCE rather than phacoemulsification. A complex relationship appeared between cataract surgery and IOP when the preoperative IOP is in the statistically normal range [9].There is postulated mechanism of increased uveoscleral outflow due to the release of prostaglandin F-2, hyposecretion of aqueous humour caused by traction on the ciliary body due to fibrosis and contraction of the posterior lens capsule after cataract surgery .Sometimes, lens extraction in cataract surgery done not to improve visual acuity as primary goal but, rather to lower intraocular pressure. The clear lens extraction doesn't accept by many ophthalmologists as mean to control intraocular pressure while it is done, somewhat, on wider scale by refractive surgeons [10]. I seem that changes in IOP after cataract surgery in glaucoma patients depend on the type of glaucoma and baseline IOP. Eyes with angle closure glaucoma reveal greater postoperative IOP reduction as compared to the primary open-angle glaucoma (POAG) which show mild education. Although it is variant of POAG, pseudo exfoliative glaucoma is associated marked IOP reduction, it is well-known that deposition of exfoliative material on the trabecular meshwork imped aqueous drainage through this meshwork, it is suggested that during phaco emulsification or generally in cataract surgery this material would be washed out thus, no more obstacle to the aqueous drainage facility [11,12]. This study was designed to evaluate how much does cataract surgery change IOP in both glaucomatous control group, and whether glaucomatous patients stop or decrease Antiglaucoma medications after cataract surgery.

Methods

In this prospective case-control study, we studied the change in IOP in glaucomatous patients whom they underwent cataract surgery by modern phacoemulsification and control group without glaucoma. All patient were assessed by the same ophthalmologist, who was masked to patients' identity.

The study protocol gained approval by the Local Ethics Committee of the AL_Zubayer hospital administration and The Scientific Committee or Research and Development in the Basra Health Directorate, and all participants signed an informed consent. The study was conducted according to the principles of Declaration of Helsinki. 123 eyes of 107 patients whom they have cataract (59 males,64 females) were operated on during the period between Dec. 2023 to March. 2024 and followed for 6 months postoperatively. Full ophthalmological examination was done in the ophthalmic outpatient consultation room, the IOP measured twice by Goldmann Applanation Tonometer attached to slit lamp and the mean was recorded (Haag- Streit tonometer, Haag Streit company, Switzerland) and central corneal thickness (CCT) measured by Ultrasonic Pachymeter (Nidek, Japan). All patients with POAG with age between 45 to 95 years on Antiglaucoma medications with visually significant cataract operated on by one professional surgeon and followed up for 6 months were included in this study ,phaco surgery done with clear corneal incision with White star phaco machine (Johnson and Johnson company, USA) and all with foldable IOL implantation (Rayner monofocal IOL from company and Sensor monofocal IOL from Johnson and Johnson company, USA), glaucoma patients criteria included uncontrollable IOP (22-35mmHg), cup-disc ratio of more0.6,documented visual field defect on Perimetry(Humphery perimetry) and documented RNFL damage by OCT(Carle Ziess). Eyes with trauma or with previous ocular surgery, other types of glaucoma like Pseudo exfoliative glaucoma, angle closure glaucoma, pigmentary glaucoma, eyes with intraoperative and or postoperative complications, and those who are not completed the follow-up visits were excluded. Also, patients who needed another non-glaucoma related surgical or laser procedure such a YAG laser capsulotomy within the 6 months of the surgery excluded. We recorded the number of Antiglaucoma medications before surgery (whether monotherapy or dual therapy and more) and compare it with postoperative status of using these drugs. Data were analysed by software package (SPSS

version 24 program) and differences between preoperative and postoperative mean IOP were assessed by Chi square. A P value of less than 0.05 considered statistically significant.

Results

One hundred twenty-three eyes of 107 patients (59 males,64 females) were enrolled in this study. The mean surgical age was 64+_12 years old. Preoperative mean IOP value was 25.81+-3.49(SD) (range,22-30) mmHg. The mean IOP at 1st week, 1st month, 3rd month and 6th postoperative months were 25.9 +-3.4,18.05 +-2.6,18.6+-3.04 and 19.38+-2.49 mmHg, respectively. The follow up visits where IOP checked at 1st week,1st month,3rd month and 6th months. The mean number of preoperative Antiglaucoma medications were 1.35+-0.8(range,0-3). About 36 (60%) of the operated eyes become drug free after cataract surgery, 18 (30%) of the operated eyes has reduced medications used after surgery, 6 (10%) of the operated eyes remain on the same medications. There was decrease in the IOP values in the 1st, the 3rd and 6th months postoperatively with no significant change in the 1st postoperative week. Preoperative mean CCT value 557+-22.09(SD) (520-595) um. There was no significant increase in the CCT value in the postoperative visits.

Table (1) Summarized the baseline characteristics of the patient involved in this study, here number of females more than males and majority of patients (60.2%) in the age group between 56 to 75 years old.

Table 1: Show Demographic Characteristics.

Variable	No.	%	Mean +SD
Age			64+_12
45-55	32	26.0	
56-65	38	30.9	
66-75	36	29.3	
76-85	13	10.6	
86-95	4	3.3	
Total	123	100.0	
SEX			
Male	59	48.0	
Female	64	52.0	
Total	123	100.0	
Chronic disease			
No	72	58.5	
Yes	51	41.5	
Total	123	100.0	

N.B: Chronic diseases include HT(Hypertension), IHD (ischemic heart diseases), DM (Diabetes mellitus) and COAD (Chronic obstructive airway diseases)

Table 2: show the relationship of preoperative IOP and CCT between glaucoma patients(G) and Non glaucoma (NG)

Preoperative IOP	Glaucoma patients(G)	Non-glaucoma patients (NG)
10-15	0	13
16-20	0	38
21-25	27	12
26-30	28	0
31-35	5	0
Total	60	63
Central corneal thickness (CCT)	557um	552um

In the above table, it's clear that most of the glaucoma patients(G) operated on for cataract surgery have uncontrolled IOP as compared to the non-glaucoma patients (NG). However, there was no significant differences between the two groups regarding central corneal thickness (CCT).

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair	pre op1 week post op	-.084-	38.56	4.98	-10.04393-	9.87726	-.017-	59	.987

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair preop		25.8167	60	3.49087	.45067
	1 week post op	25.9000	60	37.91055	4.89423

Table (3) show the relationship between pre –operative intraocular pressure and first postoperative week.

Pre-operative IOP		IOP one week after surgery			Total
		10-15	16-20	21-25	
	21-25	2	20	5	27
	26-30	2	18	8	28
	31-35	0	2	3	5
Total		4	40	16	60

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pre	25.8167	60	3.49087	.45067
	post2	18.0500	60	2.65805	.34315

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pre - post2	7.76667	4.23211	.54636	6.67340	8.85994	14.215	59	.000

Table (4) show the relationship between pre –operative intraocular pressure and 1-month post-operative

Pre operative IOP		IOP 1 month after surgery			Total
		10-15	16-20	21-25	
	21-25	4	21	2	27
	26-30	3	20	5	28
	31-35	0	5	0	5
Total		7	46	7	60

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pre	25.8167	60	3.49087	.45067
	post3	18.6167	60	3.04259	.39280

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pre - post3	7.20000	3.90480	.50411	6.19128	8.20872	14.283	59	.000

Table (5) show the relationship between pre –operative intraocular pressure and 3months post-operative

Preoperative IOP	Iop 3months after surgery			Total
	10-15	16-20	21-25	
21-25	4	22	1	27
26-30	1	21	6	28
31-35	0	3	2	5
Total	5	46	9	60

Chi-square 7.964 df 4 p-value 0.09

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pre - post4	6.43333	3.53370	.45620	5.52048	7.34618	14.102	59	.000

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	pre		60	3.49087	.45067
	post4	19.3833	60	2.49128	.32162

IOP	No. of Glaucoma eyes with drug free			
	1week postop	1month postop	3moths postop	6 months postop
10-15	3	4	3	2
16-20	24	30	31	33
21-25	9	2	2	1
Total	36	36	36	36
P value	0.003	0.005	0.005	0.001

IOP	No. of Glaucoma eyes with reduced medications			
	1week postop	1 month postop	3 months postop	6 months postop
10-15	1	2	1	0
16-20	12	13	12	8
21-25	5	3	5	10
Total	18	18	18	18
P value	0.4	0.4	0.4	0.05

Discussion

Several studies have showed that IOP decreased after cataract surgery in patients with glaucoma and non-glaucoma. The preoperative baseline IOP is the strongest predictor of the amount of decrease in IOP after cataract surgery [15]. In addition to improvement in vision, our findings in this study provide beneficial effect of cataract surgery in minimizing IOP in patients with POAG, the mean reduction in IOP is 2.2mmHg 1 year after cataract surgery, also there is significant decrease in the number of glaucoma medications. Clinically, IOP control is always the first priority in the management of glaucoma while VA is seldom engaged as assessment index of glaucoma treatment outcome. Nevertheless, VA is high predictor of

quality of life in those patients. [3]. Cataract surgery unlikely to be performed solely to improve vision in severe and end stage glaucoma patients with controlled IOP due to the risk of "wipe out "which is the sudden loss of vision without apparent causes especially in advanced glaucoma after filtering surgery [3]. Some studies have shown that the reduction in IOP was statistically significant for glaucomatous patients and normal patients 6 months after cataract surgery and IOL implantation [15]. Others have demonstrated that phacoemulsification and IOL implantation allow for reduction in the use of postoperative glaucoma medications in POAG patients [15]. It's wise to investigate how much reduction of these medications influence the quality of life of the patients, finance and drug side effects [3]. Chang et al. (Ind.j oph) demonstrated that, in ocular hypertensive and glaucoma patients, uncomplicated phacoemulsification had no significant IOP-lowering effect compared with their phakic fellow eyes for up to 3 years postoperatively and there was no difference between the mean number of postoperative IOP-lowering medications used in the operated and fellow eyes [10], (from Ind.j oph). The proposed mechanisms that have been explain the IOP reduction after cataract surgery include: amelioration of aqueous outflow facility by drainage angle widening and or fibrosis and contraction of the posterior capsule causing traction on the ciliary body, thus decreasing the aqueous humour and increase facility outflow(Indj oph).After cataract surgery IOP reduction more evident in patients with pseudo exfoliative glaucoma where intra operative aspiration of pseudo exfoliative particles deposited on the trabecular meshwork leading to increased outflow facility, there is also increased blood-aqueous barrier permeability which impaired in those patients(4 refer. IND. J, oph). In our study, the reduction in the mean IOP were comparable to that observed in Sophia at el(2020) in USA who studied the results of 7574 eyes underwent cataract surgery, The preoperative mean IOP was 15.2mmHg +-3.4 (SD) decreased to 14.2mmHg +-3(SD) at 12 months of surgery. It is also comparable to another study in our country done in Ibn Al-Haytham Eye Teaching hospital (refer; Iraqi post graduate medical journal. [Zainab basim abood, Alyaa Abood Kareem, IPMJ, vol.22, No.2,192-196,2023] where they evaluated the changes of IOP after uneventful phacoemulsification and reported reduction in mean IOP from preoperative of (18.68+-2.84 mmHg) to postoperative (14.11+-2.61mmHg). Overall, our results are consistent with the findings in previous studies that demonstrate improvement of glaucoma control after phacoemulsification's (refer in copybook). In this respect, for patients with cataract, but mild, well-controlled glaucoma requiring few medications, phacoemulsification alone is reliable option. Cataract surgery in patients with glaucoma could be associated with transient increase in the IOP in the early postoperative period which might endanger optic nerve in patients with advanced glaucoma(refer), In this study, there is significant decrease in the mean IOP in the 1st postoperative week and this is probably underestimated due to corneal oedema altering the biomechanics of the cornea. Cataract surgery alone is as effective as combined procedure in reducing IOP at sustainable level in pseudo exfoliative glaucoma (refer بدفتر). This raises the role of cataract surgery as a way to control IOP in patients with POAG. It's of important to mention that in the early postoperative days IOP value might be elevated due to increased corneal thickness as a result of corneal oedema. Hence, the actual IOP value may be lower. Intraocular pressure reduction after cataract surgery may be attributed partly to changes in the angle and anterior chamber configuration. [13]. The major limitation of this study is the short follow up period, limited sample size, lack of diurnal IOP measurements, we measured the IOP at usual office time from 9 am to 3pm and that the IOP did not measured at the same for all patients or consistently the same patient, this represent inter visit variation, lack of corneal hysteresis measurements, we do not measure the rate of progression of glaucoma before and after the cataract surgery because this is another issue an need further study. Complicated cataract surgery was associated with increased IOP and therefore not included in the database. Anterior chamber biometric factors were not included in this model like anterior chamber angle width, anterior chamber depth. It's mentioned in some studies that the IOP lowering effect of cataract persist for at least 12 months [21 from 15]. Therefore, it's not unusual for glaucomatous patients with controlled IOP after cataract surgery for 12 months to have elevated IOP after this period. In this study, we cannot precisely predict which glaucoma patients are likely to have the benefits of IOP lowering nor reduced medications use after cataract surgery.

Conclusion

Our results suggest that patients with primary open angle glaucoma (POAG) were more likely to achieve sustained IOP reduction after cataract surgery. Patients with higher baseline IOP had increased probability of achieving reduction in IOP. This evidence elucidates the significant benefit of cataract surgery in patients with POAG. We also observed an average decline in the postoperative dependence on glaucoma medications with some patients became medicaions free. Hence, cataract surgery is particularly appealing option for long-term glaucoma management in minimally served areas where access to glaucoma subspeciality care limited. Further studies are needed to evaluate the effect phacoemulsification on different types of glaucoma as this study focused on POAG.

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References

1. Kirti Singh, Sonal Dangda. (2016). Role of cataract extraction in glaucoma. *Del J Ophthalmol,* 26:235-239.
2. Jennifer S. Kung, Daniel Y. Choi, Anjum S. Cheema, Kuldev Singh. (2015). *Middle East Afr J Ophthalmol,* 22:10-17.
3. Lin Fu,Yau Kei Chan, Junhua Li, Li Nie, Weihua Pan. (2020). Long term outcomes of cataract surgery in severe and end stage primary angle closure glaucoma with controlled IO. *BMC Ophthalmol,* 20:160.
4. Yu-Chun Cheng, Ming-Hui Sun, Wei-Chi Wu, Wei-Wen Su. (2021). Cataract extraction slowed the visual field progression rate in patients with angle closure glaucoma. *Taiwan J Ophthalmol,* 11(4):386-388.
5. Jolly L. Tsui, Noel C. Chan, Clement C. (2020). Them. The role of lens extraction in glaucoma management. *Ann Transl Med,* 8(22):1550.
6. Surinder Singh Pandav, Natasha Gautam Seth, Atul Arora, Faisal Thattaruthody, Ajay Jurangal, et al. (2019). Intraocular pressure reduction in a spectrum of angle closure disease following cataract extraction. *Indian J Ophthalmol,* 67(9):1433-1438.
7. Woo Jin Kim, Ju Mi Kim, Kyoung Nam Kim, Chang Sik Kim. (2019). Effect of preoperative factor on intraocular pressure after phaco emulsification in primary open angle glaucoma and primary angle closure glaucoma. *Korean J Ophthalmol,* 33(4):303-314.
8. Diana Melancia, Luis Abegao, Pinto Carlos, Marques Neves. (2015). Cataract Surgery and Intraocular Pressure. *Ophthalmic Res,* 53:141-148.
9. Mark A. Slabaugh, Philip P Chen. (2014). The effect of cataract extraction on intraocular pressure. *Curr Opin Ophthalmol,* 25:122-126.
10. Tarek M Eid. (2011). Primary lens extraction for glaucoma management. *Saudi Journal of Ophthalmology,* 25:337-345.
11. Maria Picoto, Jose Galveia, Ana Almeida, Sara Patricio, Helena Spohr, et al. (2014). Intraocular pressure after cataract surgery. *Rev Bras oftalmol,* 73(4):230-236.
12. Tao V. Tran, Kaweh Mansouri, Andre Mermoud. (2021). Goniowash: a new surgical approach combined with cataract surgery to lower intraocular pressure in pseudo exfoliation syndrome. *Ophthalmol,* 41(5):1563-1571.