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A Study Of Cataract Surgery, Its Complications & Visual Outcome In Diabetics

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Abstract

Background: Diabetes increases the possibility of cataracts and is the next common cause of blindness after diabetic retinopathy. A cataract is a common complication of diabetes indeed it has been estimated that up to 15% of cataract surgery is performed on diabetics.

Aim of the Study: to find the incidence of cataracts about age, sex, the complications of the cataract surgery, (Per-operative and post-operative), and visual outcome after surgery in a diabetic population.

Methods: The study was conducted at the Department of Ophthalmology, Annapoorana medical college, and hospitals in Salem. One hundred patients having diabetes who presented to our department for cataract surgery were included in the study. All the patients were subjected to pre-operative visual acuity testing using a Snellen`s chart. The same was repeated 48 hrs post-operative and refraction was done in the late post-operative visit in 6 weeks. The incidence of complications each in the separate time interval from intraoperative, early postoperative, and late postoperative were noted. The outcome of surgery and patient satisfaction were also noted.

Results: The majority show cortical changes (80%). Hyper mature and mature constitute 26% which is because of the low socioeconomic status of the study group. Nuclear sclerosis was found in 16% and posterior subcapsular cataracts in 3% of which 1% was polychromatic luster and 2% had bread crump appearance. The typical snowflake diabetic cataract was found only in 1%. Hypertension (16%) was found to be the most commonly associated systemic condition in the study group followed by 6% ischemic heart disease. Asthma and obesity had an association of 3% each. Primary open-angle glaucoma was found in 2% of this study group. Other coexisting eye diseases are purely coincidental. Intraoperative miosis was the most commonly occurring intraoperative complication (12%). Posterior capsule rent occurred in 6% of patients. Vitreous loss due to PCR and ZD was 8%. Bleeding was the next common complication, SCH at 1%, and iris bleeding at 1%. Excessive release of iris pigments was found in 3 %. Corneal edema in 19% was the most commonly occurring immediate postoperative complication. Postoperative iritis in 10% occurred in this study group. Raised IOP was found in 4% of patients. Nearly 68% of the cases in this study achieved a V/A of 6/12 or better. The post-operative V/A in the rest 32% was less because of the complications and other eye diseases. ECCE was performed in 36% and SICS in 64% of the patients. Bilateral simultaneous cataract surgery was done in 16% of cases within a week. Only in 2 patients (2%) progression of diabetic retinopathy was observed and progression was responsible for diminished BCVA in 1% only. In 94% of the cases, PCIOL implantation was done. 5% of patients were left aphakic and ACIOL was implanted in 1% of the patients.

Conclusion: sics was associated with better postoperative visual acuity and less post-operative inflammation. Minimal invasion and surgical skills are essential. A large anterior capsulotomy with 6.5mm iol was used.

Silicon iol should be avoided in patients with advanced diabetic retinopathy. The postoperative topical antibiotic steroid was used for 6 weeks and long-term follow-up was done regarding retinopathy status and complications of surgery.

Keywords: Diabetes Mellitus, Pan Retinal Photocoagulation, Posterior Sub-Capsular Cataract, Visual Acuity

Introduction

Diabetes mellitus is a ubiquitous disease with an ancient history. It is common, being present in approximately 3% of the adult population. Diabetes is an important cause of blindness in people of working age.[1] Although we often think of retinal changes, it must not be forgotten that other parts of the visual system are affected in diabetics. Diabetes increases the possibility of cataracts and is the next common cause of blindness after diabetic retinopathy.[2] A cataract is a common complication of diabetes indeed it has been estimated that up to 15% of cataract surgery is performed on diabetics.[3] Superior imaging modalities and modern laser treatments have enhanced the management of diabetic retinopathy. Recommendations for tighter glycaemic and blood pressure control have decreased the risk of diabetic complications.[4] These advances may have improved the potential for good visual outcomes after cataract surgery in individuals with diabetes. However, very few large-scale studies have evaluated the visual outcomes of people with diabetes after cataract surgery. [5]However, this is usually mild and can be adequately treated by photocoagulation. Current surgical techniques Small Incision cataract surgery (SICS) and phacoemulsification have an advantage over previously followed cataract surgeries that they allow quicker recovery of vision and lesser postoperative inflammation.[6] The modern techniques of cataract surgery have improved results. Recent studies have reported favorable visual acuity after cataract surgery in diabetic patients.[7] Cataract surgery in diabetes has good results, with high reliability and a slightly higher rate of complications than in nondiabetic patients. [8]Causes for poor visual acuity after surgery are poor preoperative visual acuity, advanced stages of diabetic retinopathy, and old age. On the measurement of central foveal thickness by OCT after cataract surgery eyes of diabetic patients showed higher macular thickness which led to poorer postoperative visual recovery. However, few studies think that macular edema following cataract surgery in diabetic eyes may take a benign path[9,10]

Methods: The study was conducted at the Department of Ophthalmology, Annapoorana medical college, and hospitals in Salem. One hundred patients having diabetes who presented to our department for cataract surgery were included in the study. All the patients were subjected to pre-operative visual acuity testing using a Snellen`s chart. The same was repeated 48 hrs post-operative and refraction was done in the late post-operative visit in 6 weeks. The incidence of complications each in the separate time interval from intraoperative, early postoperative, and late postoperative were noted. The outcome of surgery and patient satisfaction were also noted. Inclusion criteria: Patients having biochemically proven diabetes mellitus, Complete or partial Opacification of the lens or capsule with visual acuity of less than or equal to 6/24, Good glycemic control preoperatively by either insulin or oral hypoglycemics or diet or in combination, Patients willing to undergo cataract surgery, Age greater than 40 years, Exclusion criteria: Diabetic patients with poorly controlled glycemic status, Partial lens opacification with V/A better than 6/24, Patients not willing to undergo cataract operation, Age less than 40 years. All the patients included in the study were subjected to a detailed preoperative evaluation as follows: Detailed history regarding the duration of diabetes, type, nature of the treatment, associated systemic conditions, and pre-diabetic states was noted. A detailed ophthalmic evaluation was done by oblique examination, slit-lamp examination, and the fundus examination was carried out by using direct and indirect ophthalmoscopy and slit-lamp biomicroscopy using a + 78 D lens. The ocular evaluation was done with special regard to changes in the ocular structures due to diabetes. Diabetics are more prone to develop infective conditions of the lids and adnexa, tear film

Volume 5, Issue 5; September-October 2022; Page No 208-216

abnormalities, keratopathy, keratoepitheliopathy, and motility disorders (cranial nerve palsy). Pupillary responses were checked as RAPD could be due to diabetic papillopathy or other causes. IOP measurement and evaluation for POAG and neovascular glaucoma were done as there is an association between POAG and diabetes. A routine gonioscopy was done in all patients to detect any neovascularisation or other abnormalities. The morphology of the cataract was evaluated using a slit lamp. Fundus examination was done to assess the retina and diabetic retinopathy status if present. In a dense cataract obscuring the media, a B- scan, USG was done to assess the integrity of the retina. Preoperative refraction is useful in planning the IOL power necessary to obtain the postoperative refraction desired by the patient. A-scan biometry was used to calculate the appropriate IOL power. Intraoperative details including the type of surgery, IOL, and the type of IOL, complications during surgery were noted. Postoperative details included immediate postoperative complications, V/A at 48 hours, and late postoperative complications including progression of retinopathy and the final BCVA were noted. Patients with systemic illness were treated appropriately in the respective specialty departments before surgery. All patients underwent cataract operation under local anesthesia. All patients were admitted on the day before surgery and were discharged on the second day unless there was associated post-operative complication deserving inpatient management. Preoperative fasting blood glucose was checked and those with poor glycemic control were referred to the diabetologist for appropriate treatment before embarking on cataract surgery. Patients with associated other ocular comorbidities were dealt with appropriately at the same time as cataract surgery e.g for glaucoma, and pterygium. All the patients who were operated on during the specified period irrespective of the status of the surgeon were included in our study. Both the conventional types of cataract surgery i.e. ECCE and SICS were included in the study since phacoemulsification was not being done in our hospital for technical and financial reasons. A combination of topical antibiotic steroids and cycloplegics was used routinely for 6 weeks during the postoperative period. Tear substitutes and prednisolone acetate were used when necessary. All the patients were subjected to pre-operative visual acuity testing using a Snellen`s chart. The same was repeated 48 hrs post-operative and refraction was done in the late post-operative visit in 6 weeks. The incidence of complications each in the separate time interval from intraoperative, early postoperative, and late postoperative were noted. The outcome of surgery and patient satisfaction were also noted.

Results

In this study, the following are the observations and analyses made:47% of the patients were between 51 – 60 years and hence they constitute the majority in the study group. 29% were between 61-70 years followed by 18% 40-50 years. Among the 100 cases who underwent cataract surgery, 33% were males and 67 % were females.

Table:1 Incidence of Cataract Morphology

Morphology	Percentage	Subtypes
Cortical	80%	54% Immature
		23% Mature
		3% Hypermature
Nuclear	16%	

Volume 5, Issue 5; September-October 2022; Page No 208-216

Posterior subcapsular		1% Polychromatic Lustre	
	3%	2% Bread Crump	
Anterior subcapsular		1% Snowflake cataract	
	1%		

Table :1 The majority shows cortical changes (80%). Hypermature and mature constitute 26% which is because of the low socio-economic status of the study group. Nuclear sclerosis was found in 16% and posterior subcapsular cataracts in 3% of which 1% was polychromatic luster and 2% had bread crump appearance. The typical snowflake diabetic cataract was found only in 1%.

Table 2:Systemic Association – Incidence

Systemic Association	No of patients	Percentage
Hypertension	16	16%
Ischemic heart disease	6	6%
Asthma	3	3%
Obesity	3	3%
Hypothyroid	1	1%

Table:2 Hypertension (16%) was found to be the most commonly associated systemic condition in the study group followed by 6% ischemic heart disease. Asthma and obesity had an association of 3% each. The majority (83%) were treated with OHA and insulin because of the poor compliance of these patients. The rest 11% were treated with insulin. OHA and diet played only a minor role in this study group. Among the 100 diabetic patients, 97% were diagnosed with type 2 DM, 2% with type 1, and 1% with MODY.45 % of the cases were diabetic for 3 – 5 years. 28% were known diabetics for 6-10 years. 25% of this diabetic population were detected < 2 years. Only 2 % of the patients were diabetics for 10 years or more.

Table 3 Ocular Comorbidity

Disease	No. of patients	Percentage
POAG	2	2%
Phacomorphic Glaucoma	2	2%
Uveitis	2	2%

Volume 5, Issue 5; September-October 2022; Page No 208-216

ARMD	2	2%
Corneal opacity	1	1%
Iris coloboma	1	1%
Phacolytic Glaucoma	1	1%
Macular Hole	1	1%
HT Retinopathy	1	1%
Ocular allergy	1	1%

Table :3 Primary open-angle glaucoma was found in 2% of this study group. Other coexisting eye diseases are purely coincidental.

Table:4 Intraoperative Complications

Complication	No. of patients	Percentage
Intra operative Miosis	12	12%
Posterior Capsule Rent	6	6%
Zonulodialysis	2	2%
Vitreous loss	8	8%
Excessive pigment release	3	3%
Bleeding from iris	1	1%
SCH during anesthesia	1	1%
Iris Tear	2	2%
Retained lens material	1	1%
Primary PCO	1	15
Calcified anterior capsule	1	1%

Table:4 Intraoperative miosis was the most commonly occurring intraoperative complication (12%). Posterior capsule rent occurred in 6% of patients. Vitreous loss due to PCR and ZD was 8%. Bleeding was the next common complication, SCH at 1%, and iris bleeding at 1%. Excessive release of iris pigments was found in 3 %.

Table 5: Post operative complications – 48 hours

Complications	No. of patients	Percentage
Corneal edema	19	19%

Volume 5, Issue 5; September-October 2022; Page No 208-216

Postoperative inflammation (Iritis)	10	10%
Retained cortical material	3	3%
Raised IOP	4	4%
Iris Prolapse	2	2%
Hyphaema	1	1%
Wound leak	1	1%
IOL Malposition	1	1%
Vitreous in wound	1	1%
Peri orbital bruise	1	1%
Reactivation choroiditis	1	1%
Suprachoroidal hemorrhage	1	1%

Table:5 Corneal edema in 19% was the most commonly occurring immediate postoperative complication. Postoperative iritis in 10% occurred in this study group. Raised IOP was found in 4% of patients.

Table: 6:Long term complication

Complication	**No. of patients**	**Percentage**
Cystoid macular edema	4	4% - Aphakia 3% - Pseudophakia 1%
Recurrent uveitis	2	2%
Prolonged RIOP	2	2%
Cyst at the wound site	1	1%
PCO	2	2%
Evisceration	1	15

Table:6 Macular edema occurred in 4% and this was the common long term complication in the study out of which 3% were aphakic and 1% pseudophakic. Recurrent uveitis occurred in 2%. PCO incidence could not be calculated exactly because long-term follow-up was not possible.

Table:7 Best-corrected visual acuity BCVA – 6 weeks

Visual Acuity	**No. of patients**	**Percentage**
< 6/60	10	10%

Volume 5, Issue 5; September-October 2022; Page No 208-216

6/60 – 6/36	4	4%
6/24 – 6/18	17	17%
6/12 – 6/6	68	68%
PL/PR negative	1	1%

Table:7 Nearly 68% of the cases in this study achieved a V/A of 6/12 or better. The post-operative V/A in the rest 32% was less because of the complications and other eye diseases.CCE was performed in 36% and SICS in 64% of the patients. Bilateral simultaneous cataract surgery was done in 16% of cases within a week. Only in 2 patients (2%) progression of diabetic retinopathy was observed and progression was responsible for diminished BCVA in 1% only. In 94% of the cases, PCIOL implantation was done. 5% of patients were left aphakic and ACIOL was implanted in 1% of the patients.

Discussion

The incidence of cataracts concerning age was evaluated and this study shows that the early half (47%) of the patients are between the ages of 51 – 60 years. This correlated with the health and nutrition examination surgery (HANES) and the Framingham study that there is an increased risk of age-related cataract development in diabetics less than 65 years old.[11] In the Wisconsin study of diabetic retinopathy, 31 of the younger-onset patients and 76% of older onset patients not taking insulin had visual impairment due to causes other than retinopathy cataracts being the commonest cause. [12]Females constituted the majority 67% in the study. Gender standardized prevalence of diabetes in Chennai showed that it is higher in females.Nearly 80% showed cortical changes. A cataract having a characteristic age-related clinical appearance, especially in terms of cortical and subcapsular changes, is more common in adult diabetes, particularly in women. Nuclear changes occurred in 16%, PSCC in 3%. ASCC is 1%.[13] Central nuclear sclerosis and posterior subcapsular cataracts occur with equal frequency in diabetic and non-diabetic patients, anterior subcapsular cataracts seem to be more frequent in diabetics. Among the PSCs, one was due to co-existing chronic uveitis.The classical 'snowflake' diabetic cataract with an appearance of white subcapsular spots forming a dense band was found only in one patient, who was a forty-year-old female with MODY[14].Hypertension 16% was the most common systemic association in this study group followed by ischemic heart disease 6%. Asthma and obesity had an association of 3% each.Pre-operation glycemic control was achieved by either OHA and diet, insulin, or OHA and insulin. The vast majority were treated with OHA and insulin (85%) because of the poor compliance of these patients as the study group belonged to low socio-economic strata.[15] Regular insulin was used when plasma glucose was more than 300 mg/dl and good glycemic control was achieved by titrating the insulin dosage according to the plasma glucose levels. Among the hundred diabetics, 97% were diagnosed as type 2 DM and 1% as type 1, and 1% as MODY.[16] The prevalence of type – 2 DM in Chennai was 11.6%. the duration of diabetes is a crucial factor in the pathogenesis of diabetic eye disease 45% of the case were diabetics for 3-5 years, 25% were diabetics for less than equal to 2 years and 28% were diabetics for 6-10 years.Co-existing ocular co-morbidities were as follows. 2% were diagnosed to have POAG and combined cataract extraction with trabeculectomy was performed.[17] Most of the kinds of literature are equivocal about the association between diabetes and POAG. 1% had chronic anterior uveitis which was operated under good steroid cover. Another 1% had a reactivation of choroiditis after cataract surgery. The other co-existing ocular conditions like angle-closure glaucoma, macular hole, ARMD, HT retinopathy, corneal opacity, and pterygium were purely coincidental. [18]Local anesthesia was used in all patients who underwent cataract surgery. Cataract surgery under LA provides improved metabolic control for diabetic patients. Its use maintains glucose homeostasis– prevents the increase in cortisol and glucose which are seen under GA and obviates the need for post-operative starvation [19]. Due to ineffective mydriasis, the entire surgical procedure was pronounced as compared to non-diabetics. Out of 12 patients with intraoperative miosis, four ended with a complication like posterior capsule rent in 2%, Zonulodialysis in 1%, and pigment release due to

Volume 5, Issue 5; September-October 2022; Page No 208-216

excessive manipulation while placing the PCIOL.Subconjunctival hemorrhage with chemosis occurred in the lower quadrant during peribulbar anesthesia in one patient. [20]Posterior capsular rent occurred in 6%, zonular dialysis in 2%, and hence vitreous loss occurred in 8% of patients. This is higher compared to the incidence of the complication in non-diabetics when PCR occurred on 3.1% and vitreous loss at 0.8%. Excessive pigment release occurred in 3% and is a common occurrence in diabetics due to the nature of the iris in diabetes. Lamellar changes, cytoplasmic vacuolation, and lipid droplet accumulation were noted in the iris muscles. Nerve fibers are frequently diminished in diabetic patients. [21] Raised IOP also contributes to this increase in the number of postoperative corneal edema. Bleeding in AC had occurred in 1% postoperatively and 1% intraoperatively. Bleeding is a common complication arising in diabetics due to the nature of the diabetic tissue. The rate of postoperative inflammation was 10% in this study when compared to non-diabetics at 1.8%. Retained lens material in 3% especially the superior cortical material was due to inadequate mydriasis.[22] In this study, macular edema was the common long-term post-operative complication in 4% as compared to the other 1.4%. recurrent uveitis occurred in 2% and one among them had an ACIOL implanted. 1% developed a dense exudative membrane which caused gross vision loss. PCO occurrence is 19% in the general population after 1 year. Since patients could not be followed up for a long period, the exact incidence could not be detected. [23]Visual acuity outcome was studied and BCVA after 6 weeks of surgery was such that 68% achieved a V/A of 6/12 or better. The remaining 32% had BCVA less than 6/12 which was due to the complications of surgery and the co-existing ocular co-morbidities.Macular edema was responsible for V/A < 6/60 in 4%. Corneal edema with RIOP in 3%, chronic corneal edema in 3% hyphema in 1% had BCVA of 5/60 and 1% had 6/24.[24] recurrent uveitis was also responsible for diminished vision.ECCE was performed 36% and SICS 64%. Bilateral simultaneous cataract surgery was done in 16 cases within a gap of one week. Single piece biconvex mod.C step vault PCIOL with 6.50mm optic of PMMA material with UV absorbing optic was used in this study. [25]

Conclusion

A thorough ocular evaluation before cataract surgery is mandatory. Preoperative preparation especially mydriasis is a crucial factor in determining the outcome of surgery. LA with peribulbar/retro bulbar is the anesthesia of choice in diabetic patients for cataract surgery. In the study, intraoperative miosis 12% was the most common intraoperative complication followed by posterior capsular rent 6% and vitreous loss at 8%. This is more compared to non-diabetics. Bleeding is one of the complications occurring more in diabetics. Postoperatively corneal edema (19%) was more common than others. Post-operative iritis occurred in 10%. Macular edema was the most common long term complication (4%) and recurrent uveitis in (2%) retinopathy progression was found in only 2% of the patients. BCVA of 6/12 or better was achieved in 68% of the cases. 17% had BCVA of 6/24 – 6/18. 15% had BCVA < 6/36. BCVA of < 6/12 was due to the complications of surgery due to diabetes and another co-existing ocular comorbidity.SICS was associated with better postoperative visual acuity and less post-operative inflammation. Minimal invasion and surgical skills are essential. A large anterior capsulotomy with 6.5mm IOL was used. Silicon IOL should be avoided in patients with advanced diabetic retinopathy. The postoperative topical antibiotic steroid was used for 6 weeks and long-term follow-up was done regarding retinopathy status and complications of surgery

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Volume 5, Issue 5; September-October 2022; Page No 208-216

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Volume 5, Issue 5; September-October 2022; Page No 208-216