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STUDY OF OUTCOME OF CATARACT SURGERY IN DIABETIC AND NON-DIABETIC PATIENTS-CASE CONTROL STUDY

Ophthalmology

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ABSTRACT

Aims & Objectives: To compare the visual outcome following cataract surgery in diabetics and non-diabetics

Method: A prospective case series descriptive study of 50 eyes in the diabetic group and 50 eyes in the non - diabetic group that underwent small incision cataract surgery with posterior chamber intraocular lens implantation. Age, sex, surgical technique, follow up and pre- and postoperative best corrected visual acuity (BCVA) were evaluated.

Results: Overall 100 patients (50 diabetic and 50 non diabetics), of which 61 were males and 39 females. The mean age group of the patients in diabetic group was 59.62 ± 6.74 years and 56 ± 7.20 years in control group. Of the diabetics 86% patients were on treatment and 64% patients had good glycaemic control prior to surgery. All patients underwent small incision cataract surgery. Follow up duration was 6 weeks. Mean pre-operative best corrected visual acuity in the diabetic group was 1.31 +0.45 and that in the control (non-diabetic) group was 1.35 +0.50. Mean post-operative best corrected visual acuity in logMAR units in the diabetic group was 0.32 + 0.4 and in the control group was 0.29 +0.5. The difference in pre and post op visual outcome was statistically significant (p=0.01). Post-operative visual acuity of 6/12 or better was achieved in 68% eyes in diabetics and 78% among non-diabetics. Post-operative complications included: corneal edema, striate keratopathy, anterior chamber reaction, pigment dispersion, cystoids macular edema and posterior capsular opacification. The incidence was significantly higher in the diabetic group ($p<0.01$).

Conclusion: Cataract surgery in diabetic patients without retinopathy led to favourable and comparable visual outcomes to that of non-diabetics. The incidence of postoperative complication was more in the diabetic group.

KEYWORDS

INTRODUCTION

Population growth, ageing, urbanization, sedentary lifestyles and an increasing prevalence of obesity are increasing the number of people with diabetes mellitus. Worldwide more than 285 million people are affected by diabetes mellitus. This number is expected to increase to 439 million by 2030 according to the International Diabetes Federation. Globally, cataracts remain the leading cause of blindness, affecting approximately 18 million people. Cataracts occur at an early age and 2-5 times more frequently in patients with diabetes, thus visual loss has a significant impact on the working population. Overall, upto 20% of all cataract procedures are estimated to be performed for diabetic patients[(1)].

The association between diabetes and cataract formation has been shown in clinical epidemiological and basic research studies. Due to increasing numbers of type 1 and type 2 diabetics worldwide, the incidence of diabetic cataracts steadily rises. Even though cataract surgery, the most common surgical ophthalmic procedure worldwide, is an effective cure, the elucidation of patho-mechanisms to delay or prevent the development of cataract in diabetic patients remains a challenge.Advances in cataract surgery have generally improved the outcomes, however diabetic individuals do not always share the same favourable outcomes. Patients with diabetes mellitus have higher complication rates from cataract surgery. Furthermore some studies have reported that cataract surgery may have adverse effects, including, progression of retinopathy, vitreous hemorrhage, iris neovascularisation and decrease or loss of vision. Both diabetes and cataract pose an enormous health and economic burden, particularly in developing countries, where diabetes treatment is insufficient and cataract surgery often inaccessible[(2)].

MATERIALS AND METHODOLOGY :-This is a prospective study conducted between November 2011 - May 2013 at Minto Ophthalmic Hospital, Regional Institute of Ophthalmology, attached to Bangalore Medical College and Research Centre. During this period, 50 diabetics and 50 non-diabetics who underwent small incision cataract surgery with intraocular lens implantation, were prospectively examined. The patients had good glycaemic control prior to surgery, without any diabetic retinopathy on fundus examination and all had a minimum follow up of 1 month. 50 cases (diabetics) and 50 controls (non- diabetics) fulfilling the selection criteria were included into the study and informed written consent was taken.

Inclusion criteria:

1. Patients who have given informed consent.
2. Patients with type 2 diabetes mellitus.
3. Age group 18- 65 years

Exclusion criteria:

1. Patients with traumatic or complicated cataract.
2. Neovascularisation of iris
3. Secondary glaucoma
4. Iridocyclitis
5. Uncontrolled diabetes
6. Posterior segment causes of visual loss in diabetics

Pre-operative evaluation: All patients were admitted to the hospital one day prior to surgery. All these patients underwent pre-operative evaluation and complete ophthalmic examination, including a thorough history with required demographic data. Systemic evaluation was also carried out.

Ophthalmic examination included:

1. Visual acuity was recorded using Snellens E chart and Jaegers near vision chart.
2. Slit lamp Examination.
3. Applanation tonometry using GoldmannApplanation Tonometer.
4. Gonioscopy using Goldmann three-mirror goniolens.
5. Keratometry using Bausch and Lomb keratometer.
6. Axial length measurement using A-Scan.
7. IOL power calculation using SRK formula (A constant 118.2)
8. Posterior segment evaluation by Indirect Ophthalmoscope.
9. Ultrasound scan of the posterior segment (B-scan).

Pre-operative preparation: The day before surgery and hours before surgery one drop of ciprofloxacin eye drops was instilled in the inferior fornix at hourly intervals. Pre op pupillary dilatation was obtained using Tropicamide and phenylephrine 2.5% eye drops instilled thrice an hour prior to surgery.

Procedure: Anaesthesia and akinesia of the globe was achieved with peribulbar block of 4 ml mixture of 2% xylocaine with adrenaline.

SURGERY: All patients underwent small incision cataract surgery with posterior chamber intraocular lens implantation under peribulbar anaesthesia. Post-operative evaluation: On the first post-operative day,

all the patients were submitted to detailed slit lamp examination and fundus examination. Visual acuity was recorded. The patients were discharged on the second or third post operative day, Assessment of anterior chamber inflammation: Aqueous flare and cells measured by counting within the field visible with a slit lamp keeping the beam at maximum intensity. Describe by The SUN Working Group Grading Scheme for Anterior Chamber Cells & Flare.

RESULTS

The study group consists of 50 eyes of diabetics and 50 eyes of non-diabetics that underwent small incision cataract surgery with intraocular lens implantation. The age and sex wise distribution, glycaemic control, preoperative visual acuity, coexistent morbidities, complications of the procedure and final visual outcome were analyzed.

Table 1: Age Analysis

AGE GROUP(YEARS)	DIABETICS	NON DIABETICS
18-29	0	0
30-39	2	1
40-49	6	10
50-59	16	17
60-65	26	22
TOTAL	50	50

In this study highest number of patients were in the age group of 60-65 years that is 26(52%) in diabetics & 22 (44%) in control group. In this study patients above 65 years of age were excluded. Remaining 42(48%) of the patients in diabetics & 28 (56%) of the patients in control group were below 60 years(Table 1)

The mean age group of the patients in diabetic group was 59.62±6.74 yrs and 56±7.20 yrs in control groups.

In this study, in diabetic group 17(34%) were females and 33(66%) were males.

Among the controls ,28(56%) were males & 22(44%) wer

Table 2: Pre Operative Gaycaemic Control

FASTING BLOOD SUGER (mg/dl)	NO. OF PATIENTS	PERCENTAGE
LOW (<70)	2	4%
NORMAL (70-110)	32	64%
HIGH (>110)	16	32%
TOTAL	50	100%

Of the fifty patients in the diabetic group, majority of patients 32 (64%) had good glycaemic control (FBS: 70 – 110 mg/dl). Two (4%) patients had low blood sugar levels at the time of examination (<70 mg/dl). Their blood sugar normalized eventually and they were operated. More importantly, 16 (32%) patients had high fasting blood sugar levels (FBS> 110 mg/dl). The highest fasting blood glucose value recorded was 143 mg/dl. This included patients without treatment.(Table 2)

In the present study, 43 (86%) of the patients were on treatment for type 2 diabetes mellitus with either injection insulin or oral hypo-glycaemic agents while the remainder 7 (14%) were not on any medication for the same

Table 3: Co-existing Ocular Diseases

OCULAR DISEASES	DIABETICS	% AGE	NON DIABETICS	% AGE
PSUEDOEXFOLIATION	5	10%	6	12%
MYOPLA	3	6%	3	6%
TOTAL	8	16%	9	18%

The two main co-existing pathologies were psuedoexfoliation and myopia. There were 5 (10%) patients in diabetic group and 6 (12%) patients in the non-diabetic group that had psuedoexfoliation. Among the myopes, there were 3 cases each (6%) in both the group.(Table 3)

Systemic hypertension though the most frequent co-morbid disease in both the groups, was more frequent amongst diabetics as seen in this study, that is 12 (24%) compared with 10 (20%) of the non-diabetic counter parts. The other systemic co-morbidities in our study were ischaemic heart disease in 2 (4%) of cases in diabetics and 4 (8%) cases in the non-diabetic group. The difference was not statistically significant 3 (6%) patients in the diabetic group and 2 (4%) patients in the non-diabetic group had bronchial asthma. (Figure 1)

Figure 1: Co-existing Systemic Morbidities

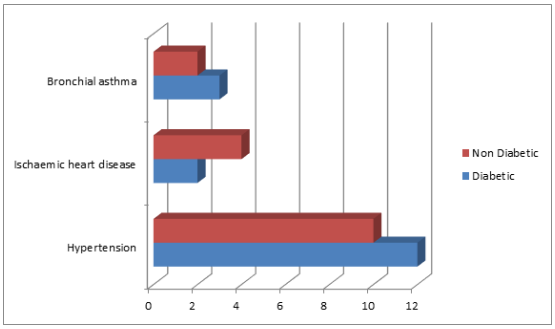
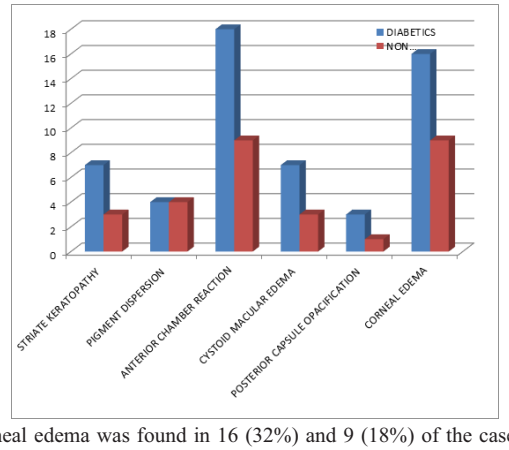


Table 4: Final Visual Outcome

VISUAL ACUITY	DIABETICS	% AGE	NON DIABETICS	% AGE
<6/60	3	6%	2	4%
6/60 – 6/36	5	10%	3	6%
6/24 – 6/18	8	16%	6	12%
≥ 6/12	34	68%	39	78%
TOTAL	50	100%	50	100%

The final visual outcome was recorded using Snellens visual acuity chart and the values were converted to logMAR units for statistical analysis. Majority of the patients, 34 (68%) in the diabetic group and 39 (78%) in the non-diabetic group had visual acuity of 6/12 or better at the end of 6 weeks of follow up. Only 3 patients in the diabetic group and 2 patients in the non-diabetic group had visual acuity less than 6/60. The mean post-operative best corrected visual acuity in logMAR units in the diabetic group was 0.32 + 0.4 and in the control group was 0.29 +0.5. On comparing the post op values in both the groups the p value was (<0.2) which was not statistically significant. On comparing the pre-operative and post-operative visual acuity in both the groups the p value (0.01) was statistically significant.(Table 4)

Figurle 2: Post Operative Complications Complication Diabetics Non Diabetics



Corneal edema was found in 16 (32%) and 9 (18%) of the cases in diabetic and non diabetic groups respectively which was considerably higher in diabetics compared to non-diabetics. Striate keratopathy was found in 7 (14%) of the diabetics compared to 3 (9%) in non-diabetics. Pigments over IOL were seen in 4 (8%) of the cases in diabetics as compared to 4 (8%) in the control group. It was similar in both the groups in our study. In this study, total 18 (32%) eyes in the diabetic group and 9 (18%) eyes in the non diabetic group had anterior chamber reaction. Cystoid macular edema was noted in 7(14%) of diabetic and 3 (6%) of non-diabetic eyes post operatively. In this study the development of PCO in diabetics was 3 eyes (6%) compared to 1 eye (2%) in non-diabetics, at the end of 6 weeks.(Figure 2)

DISCUSSION

The study includes cases consisting of 50 diabetic & 50 non diabetic patients (control). They were compared for their visual outcome. In this study, highest number of patients were in the age group of 60-65

years that is 26 (52%) in diabetics & 22 (44%) in control group. The mean age group of the patients in diabetic group was 59.62 ± 6.74 yrs and 56 ± 7.20 yrs in control group.

The Framingham and other eye studies indicate a 3-4 fold increased prevalence of cataract in patients with diabetes under 65 and upto a twofold excess prevalence in patients above 65[3,4]

Systemic hypertension though the most frequent co-morbid disease in both the groups, was more frequent amongst diabetics as seen in this study, that is 12 (24%)

compared with 10(20%) of the non-diabetic counter parts.
A similar high incidence was seen in study by Onakpoya H Oluwatoyin et al118, in which hypertension was seen in 60.9% compared with 26.1% in non-diabetic group[5].

Among the myopes, there were 3 cases each (6%) in both the groups. There have been very few studies describing association of diabetes and myopia. There is one done by Fledelius et al on myopia and diabetes mellitus with special reference to adult onset myopia.

In our study, we found that the prevalence of mixed cataract was higher (56%), more than twice that of monotype cataract (24%). The prevalence of Cortical cataract is more in diabetics compare to normal population. The Framingham Study also noted that CC was more common in individuals with diabetes.

All patients underwent cataract extraction by SICS with PCIOL implantation, and all the procedures were done by the same surgeon. On examination of the patients on post-operative day one, corneal edema was found in 16 (32%) and 9 (18%) of the cases in diabetic and non-diabetic groups respectively which was considerably higher in diabetics compared to non-diabetics. Striate keratopathy was found in 7 (14%) of the diabetics compared to 3 (9%) in non-diabetics. Other studies shows similar results Onakpoya H Oluwatoyin et al118 30% in diabetic compared to 13% in control group[5]. The cornea has been reported to be thicker in eyes of diabetic patients than in eyes of non-diabetic subjects.

Study by Morikuba S et al120 has shown increase in the corneal thickness was greater on post-op day one among diabetic patients[6].Pigments over IOL were seen in 4 (8%) of the cases in diabetics as compared to 4 (8%) in the control group. It was similar in both the groups in our study. But in Onakpoya H Oluwatoyin et al120 showed increase amount of pigment dispersion occurring in diabetic patients compared to control, 6 in diabetics and 1 in control.

In this study, total 18 (32%) eyes in the diabetic group and 9 (18%) eyes in the non diabetic group had anterior chamber reaction.Onakpoya H Oluwatoyin et al119, N D George et al and Mechini et al also reported similar result.

Liu et al. showed that phacoemulsification surgery affects the blood-aqueous barrier more severely in diabetic patients with proliferative diabetic retinopathy than in patients with non-proliferative diabetic retinopathy or non-diabetic patients.

In this study the development of PCO in diabetics was 3 eyes (6%) compared to 1 eye (2%) in non-diabetics, at the end of 6 weeks, confirming the finding of increase in incidence of PCO in diabetics as shown in previous studies.

Study by Ebihara Y et al[7], also showed significant increase in PCO in diabetic compared to non-diabetic patients.

The mean post-operative best corrected visual acuity in logMAR units in the diabetic group was 0.32 + 0.4 and in the control group was 0.29 +0.5. On comparing the post op values in both the groups the p value was (<0.2) which was not statistically significant. On comparing the pre-operative and post-operative visual acuity in both the groups the p value (0.01) was statistically significant indicating that both the groups had good visual outcomes following surgery. This meant that cataract surgery in diabetic patients without retinopathy led to favourable and comparable visual outcomes to that of non-diabetics.

CONCLUSION

This is a prospective study of comparison of visual outcomes following small incision cataract surgery with intraocular lens implantation in diabetics and non-diabetics. There were 50 eyes each in the diabetic and non-diabetic group. The pre-operative best corrected visual acuity was compared to the post-operative best corrected visual acuity in both the groups and the P value was statistically significant (p=0.01). The post-operative complications that were observed during the period of this study were corneal edema, striate keratopathy, anterior chamber reaction, pigment dispersion over IOL, cystoid macular edema and posterior capsular opacification. These were significantly more in the diabetic group when compared to the non-diabetics. None of them were visually disabling and resolved during the course of follow up without any surgical intervention. Therefore, we concluded that small incision cataract surgery in diabetics without diabetic retinopathy yields similar visual outcomes as non-diabetics. There definitely is a higher incidence of post-operative complications among diabetics which can be conservatively managed. The drawbacks of this study were small sample size and shorter duration of follow up.

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