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Original research article

Assessment of intra-operative and post-operative complications, as well as visual acuity, in diabetics and non-diabetics undergoing cataract surgery.

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Abstract

Aim: The aim of this study comparison of outcomes after cataract surgery in diabetic and non-diabetic patients.

Methods: A prospective study was done to comparison outcome of cataract surgery in 120 diabetics as compared to 120 nondiabetics Within 15 days of Cataract surgery, all the patients underwent fasting blood glucose analysis. Recording of the complete intra-surgical and post-surgical complications along with visual acuity was done at 15 days, three month and six months' time in all the subjects.

Results: In diabetic group 53(44.17%) were females and 67(55.83%) were males. Among the non-diabetics, 70 (58.33%) were males & 50(41.67%) were females. At 15 days time, the occurrence of Post- surgical visual acuity in diabetic group and non-diabetic group was found to be 0.19 and 0.27 respectively. At three month's time, the occurrence of Post- surgical visual acuity in the diabetic group and the non-diabetic group was found to be 0.27 and 0.38 respectively (table 2). Glycemic control was assessed using fasting blood sugar levels at the time of admission. Of the 120 patients in the diabetic group, 45(37.5%) had high blood glucose level (FBS: >100mg/dl). Their blood sugar was controlled and they were operated. 75(62.5%) patients had normal blood sugar levels at the time of examination (70-100mg/dl). Non-significant results were obtained while comparing the mean. Post- surgical visual acuity in between the two study groups at different time intervals (p value > 0.05). Striate keratopathy Was most commonly encountered post- surgical complication in the diabetic group n=17 (14.17**%**) and the non-diabetic group n=11(9.17**%**).and followed by Posterior capsular opacity n=15(12.5**%**) and n=9(7.5**%**) and Posterior capsular rent 11.67**%** and 6.67**%** in diabetic and non-diabetic, Pigment dispersion 10.83**%** and 7.5**%** per in diabetic and non-diabetic patatients respectively

Conclusion: Small incision cataract surgery in diabetics without diabetic retinopathy yields similar visual outcomes as non-diabetics. There is a higher incidence of post-operative complications among diabetics, which can be managed conservatively.

Introduction

Diabetic retinopathy (DR) represents a leading cause of moderate and severe vision loss within the working-age population in developed countries.[1] Advanced proliferative DR complicated by vitreous hemorrhage or tractional retinal detachment is responsible for most cases of severe loss of vision, but diabetic macular edema (DME) is the most prevalent cause of moderate vision loss.[2] It is known that hyperglycemia causes damage to the retinal vascular endothelium, resulting in increased vascular permeability, exudation, and accumulation of extracellular fluid

and proteins within the macula, haemorrhages micro aneurysm formation, and capillary closure.[3] Hypoxia has been linked to retinal neovascularization but has also been associated with DME.[3] According to Kim SJ et al., diabetic eyes have a high incidence of central foveal thickness after cataract surgery.[4] According to some studies, clinicians should continue to sustain vigilance in diabetic patients after cataract extraction even when central macular oedema is not present immediately prior to cataract surgery, particularly in eyes with prior Diabetic Macular Edema (DME) treatment or non-central involved DME that may be at a predominantly high risk for development of central-involved Macular Oedema (ME) after cataract surgery.[5,6] 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 post-operative inflammation. The modern techniques of cataract surgery have improved results.[7,8] Recent studies have reported favourable visual acuity after cataract surgery in diabetic patients.[9-11] Cataract surgery in diabetes has good results, with high reliability and a slightly higher rate of complications than non-diabetic patients. Causes for poor visual acuity after surgery are poor preoperative visual acuity, advanced stages of diabetic retinopathy and old age.[12] on measurement of central foveal thickness by OCT after cataract surgery eyes of diabetic patients showed higher macular thickness which led to poorer post-operative visual recovery. However, few studies are of the opinion that macular oedema following cataract surgery in diabetic eyes may take a benign path.[4,13,14] we planned the present study to compare the outcome of cataract surgeries in diabetic and non-diabetic patients.

Material and methods

The present study was conducted in the Department of Ophthalmology, Madhubani Medical College and Hospital, Madhubani, Bihar, India from India for 13 months, after taking the approval of the protocol review committee and institutional ethics committee.

We analyzed a total of 120 diabetic and 120 age-matched non- diabetic subjects. All those diabetic cases that underwent cataract surgery were included in the present study.

Inclusion criteria

- Patients history of diabetes
- Patients within the age group of 30 to 65 years
- Patients without any known drug allergy
- Patients without any other systemic illness

Non-diabetic group subjects included subjects with comparable age and sex, who had cataract extraction during the same period. Based on the fasting sugar levels of more than 120 mg/dl, diagnosis of diabetes was made.

Exclusion criteria

- Patients with traumatic cataracts,
- Patients with uveitic or complicated cataracts.

Within one week of surgery, all the patients underwent fasting blood glucose analysis. Glycemic control in the subjects was divided as follows[9]

- Good (<70mg/dl),
- Moderate (70-100mg/dl) or
- Poor (>100mg/dl)

Under the administration of peri-bulbar anaesthesia, extra capsular cataract extraction with posterior chamber intraocular lens implantation was done in all the subjects. Recording of the complete demographic details of all the subjects along with clinical details was done separately.

Recording of the complete intra- surgical and post-surgical complications along with visual acuity was done at 15 days, three month and six months' time in all the subjects. Recording of the mean Snellen acuity was done in all the subjects.[15]

Results

Table 1: distribution of diabetic male and female

Diabetic patients	**Diabetic**	**Non Diabetic**
Male	**53(44.17)**	**70 (58.33)**
Female	**67(55.83)**	**50(41.67)**
	120	**100**

Table 2: Distribution of cases according to FBS

FBS	**N**	**%**
Normal (70-100)	75	62.5
High(>100)	45	37.5
Total	120	100

Table 3: Post- surgical visual acuity in subjects of diabetic and control group

Post- surgical period	Diabetic patients	Non-diabetic patients	p- value
15 days	0.19	0.27	>0.05
Three month	0.27	0.38	>0.05
Six months	0.39	0.55	>0.05

Table 4: Complications occurring both study groups

Complications		**Diabetic patients (N)**	**%**	**Non-diabetic patients (N)**	**%**
Intra- surgical	**Hyphema**	4	3.33	4	3.33
	Vitreous loss	7	5.83	7	5.83
	Posterior capsular rent	14	11.67	8	6.67
Post-operative complications	**Striate keratopathy**	17	14.17	11	9.17
	Pigment dispersion	13	10.83	9	7.5
	Raised intra-ocular pressure	3	2.5	2	1.67
	Posterior capsular opacity	15	12.5	9	7.5
	Wound dehiscence	4	3.33	0	0
	Intra-ocular lens displacement	4	3.33	0	0

A total of 120 diabetic patients were included in the study group while another 120 non-diabetic patients comprised of control group. Mean age of subjects in the study group and control group was 49.3 and 52.7 years respectively. In diabetic group 53(44.17%) were females and 67(55.83%) were males. Among the non-diabetics, 70 (58.33)%) were males & 50(41.67%) were females. At 15 days time, the occurrence of Post- surgical visual acuity in diabetic group and non-diabetic group was found to be 0.19 and 0.27 respectively. At three month's time, the occurrence of Post- surgical visual acuity in the diabetic group and the non-diabetic group was found to be 0.27 and 0.38 respectively (table 2). Glycemic control was assessed using fasting bloodsugar levels at the time of admission. Of the 120 patients in the diabetic group, 45(37.5%) had high blood glucose level (FBS: >100mg/dl). Their blood sugar was controlled and they were operated. 75(62.5%) patients had normal blood sugar levels at the time of examination (70-100mg/dl). Non- significant results were obtained while comparing the mean. Post-surgical visual acuity in between the two study groups at different time intervals (p value > 0.05). Striate keratopathy Was most commonly encountered post- surgical complication in the diabetic group n=17 (14.17%) and the non-diabetic group n=11(9.17**%**).and followed by Posterior capsular opacity n=15(12.5**%**) and n=9(7.5**%**) and Posterior capsular rent 11.67**%** and 6.67**%** in diabetic and non-diabetic, Pigment dispersion 10.83**%** and 7.5**%** per in diabetic and non-diabetic patatients respectively

Discussion

Diabetes mellitus (DM) is one of the most prevalent non-communicable disease in the world and threat to public health. The chronic hyperglycemia of diabetics is associated with long term damage, dysfunction and failure of various organs kidneys, nerves, heart, blood vessels and eyes. In diabetic patients, cataract is one of the major causes of blindness in developing countries. However, the exact pathogenesis of diabetic cataract development is not known. There is associated higher risk of development of complications in diabetic patients undergoing cataract surgery. However, exact incidence of these complications is still unknown.[16-18] Hence; under the light of above evidence, we planned the present study to evaluate and compare the prognosis of cataract surgeries in diabetic and non-diabetic patients.

In this study, In diabetic group 53(44.17%) were females and 67(55.83%) were males. Among the non-diabetics, 70(58.33%) were males & 50(41.67%) were females. Various studies have proven the prevalence of cataract itself is more common in females than males. In the Framingham eye study also senile lens changes were more common in women. Age related cataract is a bilateral condition, one eye affected earlier than the other.[19]

In the present study, we observed non- significant results while comparing the mean post-surgical visual acuity in between the study group and the control group (*p* value > 0.05). At 15 days time, the occurrence of Post- surgical visual acuity in diabetic group and non-diabetic group was found to be 0.19 and 0.27 respectively. At three month's time, the occurrence of Post- surgical visual acuity in the diabetic group and the non-diabetic group was found to be 0.27 and 0.38 respectively. Onakpoya OH et al determined the visual outcome of cataract surgery in diabetes mellitus with advanced cataract in a tertiary institution in Nigeria. Twenty three consecutive patients with diabetes and 23 age and sex matched non-diabetic control patients who had extra capsular cataract extraction for advanced cataract. Twenty three patients with diabetes mellitus and 23 non diabetic controls were studied; mean duration of diabetes was 8.1 ± 7.2 years. The mean post-operative visual acuity in diabetics was 0.11±0.38, 0.33±0.57 and 0.38±0.49 at one week, two months and six months compared with 0.23±0.19, 0.46±0.37 and 0.48±0.31 in non-diabetics. (p=0.207, 0.403 and 0.465 respectively). Improvement in preoperative visual acuity was noted in 84% and 91% in diabetics and non-

diabetics respectively. Poor visual outcome in diabetics was mainly due to diabetic retinopathy, maculopathy or diabetes related surgical complications. Visual improvement was seen following surgery for advanced cataract in diabetics in this study population. Post-operative monitoring for treatment of diabetic retinopathy may enhance visual outcome.[15]

Lara-Smalling A et al described preoperative risk factors associated with visual outcomes for diabetic patients undergoing cataract surgery and appropriate nursing interventions for these patients. Literature review of risk factors and cataract surgery outcomes in terms of complications, visual acuity, and visual functioning of diabetic patients was undertaken. Preoperative risk factors and postoperative complications, including inflammation and cystoid macular edema (CME), were also examined. To emphasize evidence of best practices, the role of the nurse as educator and advocate was further explored in terms of their impact on diabetes management of the patient to improve visual results. Diabetic patients of advanced age, with a history of diabetic retinopathy who are taking insulin and have elevated Hb A1C levels, may have an increased risk of intraoperative and postoperative complications and decreased postoperative visual acuity and visual functions that may affect their quality of life. High-risk factors should be identified in diabetic patients when developing a perioperative patient education plan to help reduce their risk of cataract complications and improve their visual outcomes.[20]

Glycemic control was assessed using fasting blood sugar levels at the time of admission. Of the 120 patients in the diabetic group, 45(37.5%) had high blood glucose level (FBS: >100mg/dl). Their blood sugar was controlled and they were operated. 75(62.5%) patients had normal blood sugar levels at the time of examination (70-100mg/dl. All 120 diabetic patients were on treatment for type 2 diabetes mellitus with either injection insulin or oral hypo-glycemic agents.

In this study the development of PCO in diabetics was n=15(12.5**%**) compared to n=9(7.5**%**) in non- diabetics, at the end of 4 weeks, confirming the finding of increase in incidence of PCO in diabetics as shown in previous studies. Study by Ebihara Y et al.[21] also showed significant increase in PCO in diabetic compared to non- diabetic patients. A study by Hyashi K et al. also showed significant increase in PCO in diabetics after cataract extraction compared to nondiabetics.

Pigments over IOL were seen in 4(3.33%) of the cases in diabetics as compared to 0 % in the Non- diabetic group. Previous studies it has been shown that, there is increased pigment dispersion in diabetic patients undergoing cataract extraction and IOL implantation. This may be comparable with: Onakpoya H Oluwatoyin et al[15] showed increase amount of Pigment dispersion 10.83**%** and 7.5**%** per in diabetic and non-diabetic patatients respectively.
Longer duration of surgery is associated with increased post-operative inflammation. Fibrinous exudates & poste- rior synaechiae was not found in our study compared to previous study. None of the patients in our study had anterior segment neovascularization, as reported in previous studies. Smiddy WE et al determined the frequency of visually significant cataracts after vitrectomy for complications of diabetic retinopathy. They studied 40 patients and 56 concurrent control patients in a retrospective, consecutive, comparative case series in an institutional setting. The rate of cataract extraction after vitrectomy in patients with diabetes is lower than in patients without diabetes undergoing vitrectomy and suggests a lower rate of cataract formation. This inference should be considered when attributing subnormal vision in a patient who has had a diabetic vitrectomy to a cataract. This is especially significant because the risk ratio in patients with diabetes in general and in patients with a previous vitrectomy is likely less favorable compared with the general population.[22]

Kim SJ et al assessed the incidence or progression of macular edema (ME) after cataract surgery in diabetic patients using optical coherence tomography (OCT) and correlating this with degree of diabetic retinopathy or other risk factors. Fifty diabetic eyes undergoing cataract surgery were analyzed. From the results, they concluded that diabetic eyes have a high incidence of increased center point thickness on OCT after cataract surgery, associated with a loss of vision at 1 month, with limited visual recovery at 3 months. Treatment to prevent this might improve outcomes in similar individuals after surgery.[4]

Conclusion

Diabetics without diabetic retinopathy had similar visual results to non-diabetics after cataract surgery with a small incision. Diabetics have a greater risk of post-operative complications, which can be treated conservatively. As a result, extra caution should be exercised both during surgery and during post-operative follow-up.

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