Original Article

Management of cataract with macular oedema due to diabetes mellitus Type-II and hypertension with grid laser prior to surgery and intra-vitreal bevacizumab (Avastin) Peroperatively

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Abstract

Objective: To study the visual outcome in patients subjected to cataract extraction with prior grid laser and intra-operative intravitreal bevacizumab injection.

Methods: This prospective case series comprised of 38 patients subjected to phacoemulsification and in the bag intraocular lens implantation at Al-Noor Eye Hospital and Sindh Govt Lyari General Hospital Karachi from January 2007 to December 2008. All the patients had prior macular grid treatment and intra-operative injection of intra-vitreal Avastin. Diabetes mellitus duration, preoperative glycosylated haemoglobin (HbA1c) level and other systemic and local complications of diabetes were recorded. The patients were clinically assessed with biomicroscopic examination preoperatively, and postoperatively on day 1, week 1, and in months 1, 2, 3 and 6 respectively. Visual acuity and state of macular oedema was clinically assessed and documented.

Results: Out of thirty-eight patients, eighteen were males and 20 were females. Mean duration of diabetes was 9.92 ± 5.5 years (Range 4-16) while that of hypertension was 7.87 ± 3.66 years (Range = 2-15). HbA1c level was 8.36% ± 1.93% (range 6.3 - 12.3). Thirty-one (81.5%) patients had HbA1c level 8.0% or above indicating a poor control. At 6 months of follow up best corrected distant visual acuity of 6/6 to 6/9 was achieved in 23(60.5 %), 6/12 in 11(28.9%) and 6/24 in 4(10.5%) cases while best corrected near acuity of N/6 was achieved in 22(57.8%) N/8 in 12(31.4%) and N/12 in 4(10.5%) cases. At 6 months follow up visual acuity declined in two cases because of uncontrolled diabetes and hypertension.

Conclusion: Cataract surgery in diabetic patients with macular oedema and hypertension has a good visual outcome if prior macular grid laser is performed and intra-vitreal anti VEGF is injected during surgery (JPMA 60:836; 2010).

Introduction

Diabetic Retinopathy is directly correlated with the duration of diabetes.[1] Majority of the diabetic patients in Pakistan have uncontrolled diabetes.[2]

Diabetes causes early senile cataract.[3] Diabetes and Hypertension are closely linked and both cause macular oedema.[4] Longstanding macular oedema leads to irreversible damage to vision.[5] It has been established that cataract surgery worsens the macular oedema and cystoid macular oedema is a complication of cataract surgery in normal population.[6] In a recent report, the grade of diabetic macular oedema progressed in 24% of eyes with Diabetic retinopathy, but in only 3% of eyes with no Diabetic retionopathy.[7] Hypertension is twice as common in persons with diabetes as it is in others.[8] Cataract surgery in diabetic patients is challenging due to poor results attributed to macular oedema due to diabetes, hypertension, pseudophakia after surgery and surgical trauma. Macular grid laser in diffuse macular oedema is an established method of treatment.[9] Various treatments are in practice to manage macular oedema. These include intra-vitreal triamcinolone injection.[10]

Intra-vitreal Anti-VEGF,[11] subtenon triamcinolone[12] and vitrectomy.[13] This study was performed to assess the visual outcome after prior macular grid laser and intraoperative bevacizumab injections in patients subjected to phacoemulsification and intraocular lens implantation.

Patients and Methods

Patients were selected from the out patient's department of Sindh Government Lyari General Hospital Karachi and Al- Noor Eye Clinic Karachi from January 2007 to December 2008.

All patients above 40 years of age, having cataract Grade III or less on LOCS III classification system with clinically significant macular oedema, hypertension and diabetes (type II) were included in the study. Blood pressure and blood glucose was stabilized before surgery. All patients with eye diseases other than cataract, higher grade of cataract, previous ocular surgery, pre-proliferative diabetic retinopathy, proliferative diabetic retinopathy and uncontrolled hypertension were excluded. Socio-demographic data was recorded and patients were asked about duration of diabetes and hypertension. Informed consent was taken from all the patients. The best corrected distant and near visual acuity was recorded by using Snellen's charts. All the patients underwent complete ophthalmic examination on a biomicroscope including type of cataract, and stage of retinopathy. Intra-ocular pressure was recorded by Goldman applanation tonometer. Posterior segment was examined by indirect ophthalmoscope and 90 D non contact lens to exclude posterior segment pathologies in patients where media was clear to allow this. As only cases with clinically significant macular oedema (CSMO) were included, Fundus fluorecscein angiography was performed in cases where oedema was not clear.

In all patients diode laser (infrared diode 810 nm. Keeler UK) was used for macular grid two weeks before phacoemulsification. Phacoemulsification was done within the bag posterior chamber intraocular lens. Intra-vitreal bevacizumab (Avastin) 1.25 mg was given immediately after surgery on the operating table before applying the dressing. After the procedure, patients were kept on topical broad-spectrum antibiotics Ciprofloxacin four hourly for two days and topical Dexamethasone three hourly for three days. Patients were followed on day 1, week 1, and in months 1, 2, 3 and 6 respectively.

Data was entered and analyzed on SPSS version 15 for windows. Decimal notation of Snellen's visual acuity was used for statistical analysis. Frequency distribution tables were used to present the data. Mean and standard deviation were used for continuous variables. Categorical variables were presented as proportions and percentages.

Results

Mean age was 50.21 ± 5.5 years (range 42-60). Eighteen patients were male and 20 were female. Mean duration of diabetes was 9.92 ± 3.05 years (Range 4-16) while that of hypertension was 7.87 years (Range = 2-15). Glycosylated haemoglobin level was 8.36% (range 6.3 - 12.3). Thirty-one (81.5%) patients had HbA1c level 8.0% or above indicating a poor control. Mean Preoperative distant visual acuity was 6/18 (Range = 6/12 -6/36) while near visual acuity was N/12 (Range = N/8- N/18) Post operatively on the first postoperative day distant visual acuity was found to be 6/6 in 18(47.4 %), 6/9 in 8(21.1%) 6/12 in 6(15.7%)and 6/24 in 4(10.5%)cases while Near visual acuity was N/6 in 16(42.2%), N/8 in 10(26.3%), N/10 in 4(10.5%) and N/12 in 6(15.7%) cases. At one month follow up, distant visual acuity was 6/6 in 25 (65.7%), 6/9 in 8(21.1%), 6/12 in 3 (7.8%) and 6/24 in 2(5.2%) cases while near visual acuity was N/6 in 24(62.8%), N/8 in 10 (26.3%) and N/10 in 2(5.2%) and N/12 in 2(5.2%). At 3 months follow up visual acuity remained stable in all theses cases. At 6 months follow up, distant visual acuity of 6/6 to 6/9 was achieved in 23(60.5 %), 6/12 in 11(28.9%) and 6/24 in 4(10.5%) cases while near acuity of N/6 was achieved in 22(57.8%) N/8 in 12(31.4%) and N/12 in 4(10.5%) cases. At 6 months follow up visual acuity declined in two cases because of uncontrolled diabetes and hypertension. It was observed that longer duration of diabetes mellitus (Table-1) and poor control over diabetes as indicated by an increased level of HbA1c (Table-2) was associated with poor visual results.

Table-1: Duration of diabetes and visual outcome.

Gender	Duration (years)	No. of Patients	Visual outcome		Percent	
			Distant	Near	Distant	Near
Males (18)	5 years or less	4	6/6 - 6/9 (4)	N/5- N/6(4)	100	100
	10-May	6	6/6 -6/9 (4)	N/5- N/6(4)	66.6	66.6
			6/12 (2)	N/8 (2)	33.3	33.3
	15-Oct	4	6/6-6/9 (2)	N/5- N/6(2)	50	50
			6/12 (2)	N/8 (2)	50	50
	15-20	2				
			6/12(2)	N/8 (2)	100	100
	20 or more	2				
			6/24(2)	N/12 (2)	100	100
Females (20)	5 years or less	4	6/6(4)	N/5- N/6(4)	100	100
	10-May	8	6/6-6/9(7)	N/5- N/6(7)	87.5	87.5
			6/12 (1)	N/10 (1)	12.5	12.5
	15-Oct	4	6/9(2)	N/8 (2)	50	50
			6/12(2)	N/10 (2)	50	50
	15-20	2	6/12 (2)	N/10(2)	100	100
	20 or more	2	6/24 (2)	N/12(2)	100	100

Table-2: Level of glycosylated haemoglobin and visual outcome.

Gender	Level of HbA1c	No.of Patients	Visual outcome		Percent	
			Distant	Near	Distant	Near
Males (18)	7-8 %	4	6/6 - 6/9 (4)	N/5- N/6(4)	100	100
			6/12 (1)	N/10 (1)		
	8-9 %	4	6/6 -6/9 (3)	N/5- N/6(3)	75	75
			6/12 (1)	N/10 (1)	25	25
	9-10 %	4	6/6-6/9 (2)	N/5- N/6(2)	50	50
			6/12 (2)	N/10(2)	50	50
	10-11 %	4	6/6 6/9(3)	N/5- N/6(3)	75	75
			6/24 (1)	N/12(1)	25	25
	11-12 %	2	6/12 (1)	N/10 (1)	50	50
			6/24 (1)	N/12(1)	50	50
Females (20)	7-8 %	3	6/6-6/9 (3)	N/5- N/6(3)	100	100
	8-9 %	6	66/6-6/9 (5)	N/5- N/6(5)	83.3	83.3
			6/12 (1)	N/10(1)	16.7	16.7
	9-10 %	6	66/6-6/9 (3)	N/5- N/6(3)	50.0	50.0
			6/12 (3)	N/10 (3)	50.0	50.0
	10-11 %	3	6/12 (3)	N/10 (3)	100	100
	11-12 %	2	6/24 (2)	N/12(2)	100	100

Discussion

Hypertension is closely affiliated to diabetes mellitus. Unfortunately diabetic patients with co-existing hypertension have a poor control of their disease. Surgeons do not operate upon these patients without prior control of these disorders. Therefore patients get their blood pressure and diabetes stabilized before cataract surgery by compulsion. After the surgery, when the vision improves, the compliance is relaxed and blood glucose and blood pressure exceed the normal range. Chronic macular oedema is seen in 14% diabetics as compared to over 10 year period while macular oedema with decreased vision following modern cataract surgery is seen in only 1% of eyes.[14,15] The elderly diabetic patients having fluctuations in refraction due to uncontrolled diabetes, get their glasses changed. This is without any benefit, and causes confusion between cataract and macular oedema, leading to delay in treatment, and irreversible macular damage. Our patients usually have uncontrolled diabetes and in a substantial number of patients diabetes is diagnosed at the time of surgery.[16] In the presented study, 52.6% patient had HbA1c level 8.0% or above indicating a poor control. It has been documented that poor control of diabetes assessed by the level of HbA1c[17] is associated with poor surgical outcome in diabetic patients,[18] as oedema does not resolve spontaneously in patients with diabetes and hypertension. Intravitreal anti-VEGF has revolutionized the treatment of vascular disorder of the eye. Patients with cataract, diabetic maculopathy and co-existing hypertension are prone to get their macular oedema aggravated after phacoemulsification.[19] These patients have to be treated

aggressively to get good results after cataract surgery. Macular grid laser for diffuse maculae oedema is an established method to overcome this problem.[20] Another method for treating macular oedema is intavitreal Avastin with very good results.[21,24] It has been studied that postoperative pseudophakic cystoid macular oedema is unresponsive to intra-vitreal Avastin.[25] No study has been conducted to address the problem of macular oedema in patients with co existing diabetes and hypertension in which both treatment modalities of grid laser and intra-vitreal Avastin was employed. In a recent study by Cheema et al[26] role of intra-vitreal Avastin during cataract surgery was evaluated. This study revealed that after intra-vitreal Avastin during cataract surgery, macular oedema progressed only in 5.71 % patients while 45.45% patients in controlled group (without intra-operative Avastin) had progression of macular oedema. In our study by employing both grid laser and intra-vitreal Avastin, success rate with a visual acuity of 6/6 approached 60.5% and only two patients had worsening of their macular oedema. In our study it was observed that patients with long duration of diabetes and high level of glycosylated haemoglobin had poor results. Optical Coherent Tomography (OCT) can be a useful monitoring device for macular oedema. We did not have the facility of OCT in our department during this study, but in future it will be used.

Conclusion

Prior macular grid and intra-vitreal Avastin is safe and effective in improving macular oedema after un-complicated phacoemulsification in diabetic patients with co-existing macular oedema and hypertension. Good control of diabetes assessed by HbA1c is beneficial.

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