



ORIGINAL RESEARCH PAPER

Ophthalmology

A COMPARATIVE STUDY OF TEAR FILM ABNORMALITIES AFTER SMALL INCISION CATARACT SURGERY IN DIABETIC AND NON-DIABETIC PATIENTS

KEY WORDS:

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ABSTRACT

Diabetes is a metabolic disorder where there is high blood sugar levels over a prolonged period. The onset of cataract in diabetes patients develops earlier compared to general population and also have more chance of post operative complications. We aim to study the prevalence of dry eye in diabetic patients postoperatively and the course of the disease in them in this study. Tear film assessment was done for 60 diabetic cataract patients preoperatively and was repeated at 1 week, 1 month, and 3 months postoperatively. These values were compared with values of 70 age matched controls. Tear film abnormalities are seen transiently in the immediate postoperative period and these patients restore the postoperative values by 3 months. Diabetic patients restore the preoperative values more slowly when compared to non-diabetic patients. Therefore careful tear film assessment should be done in all diabetic patients.

INTRODUCTION

Diabetes is a metabolic disorder where there is high blood sugar levels over a prolonged period. Diabetes is a systemic disease with eyes as one of the most commonly affected organs. The common manifestations of diabetes mellitus in eye are cataract, retinopathy, cranial nerve palsy and dry eyes.

The onset of cataract in diabetes patients is much earlier compared to general population. They also have more chance of post-operative complications. These patients are also associated with abnormal tear film characteristics and loss of goblet cells, which play important roles in the tear film function^(1,2,3).

Whenever there is a quantitative or qualitative defect in tear secretion, dry eye results. Abnormal tear can lead to unstable film which ultimately results in dry eye and other ocular surface diseases. The uniform spreading of the tear film over the ocular surface is made possible by a neuronal mediated blink reflex. The other two factors for the uniform spreading of tear film are contact between the ocular surface and the eyelids, and normal corneal epithelium. The four mechanisms responsible for the manifestations of dry eye are tear instability, tear hyperosmolarity, inflammation and ocular surface damage.

There are very few studies which compare the tear film status following small incision cataract surgery in diabetic patients. So here we aim to study the prevalence of dry eye in diabetic patients postoperatively and the course of the disease in them.

AIM

To compare the changes in tear film status preoperatively and postoperatively after small incision cataract surgery in diabetic patients.

MATERIALS AND METHODS

This is a comparative hospital-based observational study done at Stanley medical college, Chennai, India. An informed consent was obtained from all patients. We included 60 patients with diabetes who were planned for cataract surgery. A thorough ocular and systemic history was recorded. A complete ocular examination was done including visual acuity, slit lamp examination and fundus evaluation. Tear film assessment was done for all patients preoperatively which included schirmers I, tear film break up time(TBUT), fluorescein staining of cornea and conjunctiva. Similar tear film assessment was repeated at 1 week, 1 month, and 3 months postoperatively.

These values were compared with values of 70 age matched controls. Similar examinations were performed in controls too. We diagnosed dry eye as schirmers I value less than 10 mm, TBUT less than 10 seconds and with conjunctival or corneal staining.

INCLUSION CRITERIA

Cases: Diabetic mellitus patients planned for small incision cataract surgery.
Controls: Cataract patients without any comorbidities and without pre-existing ocular conditions.

EXCLUSION CRITERIA

Patients with pre-existing dry eye disease, ocular allergies, previous ocular surgery, and ocular injury were excluded. We also excluded glaucoma patients on antiglaucoma medications like timolol, and patients on drugs known to cause dry eye like (anti psychiatric, anti-hypertensive medications, anticholinergics). Those patients who developed complications during cataract surgery and patients who lost follow up also were excluded.

RESULTS

We had 60 patients planned for small incision cataract surgery with diabetes mellitus and 70 age matched controls without any ocular or systemic comorbidities.

AGE

All the patients included in the study, both cases and controls were above 50 years of age. The age distribution of the patients enrolled in this study are shown in the following table.

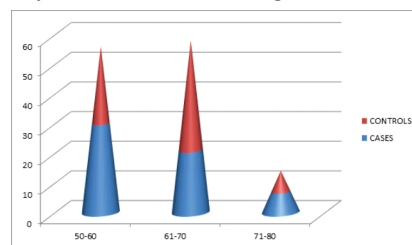
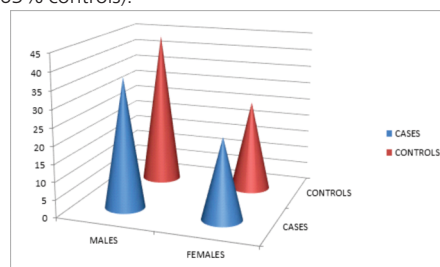


Diagram 1

SEX DISTRIBUTION

Majority of the patients in both the group were males. (62% cases and 63% controls).



SCHIRMERS VALUE- CASES

There was a decline in the schirmers I value recorded in the 1 week and 1 month postoperative period compared to preoperative values in both the groups. 70% of the diabetics had <10 mm schirmers value 1 week postoperatively compared to 24.2 % controls. The decline was more in the diabetic patients. Majority of the patients in both the groups regained the normal values by 3 month postoperatively.

SCHIRMERS VALUE	PRE-OP	1 WEEK	1 MONTH	3 MONTHS
1-5 MM	NIL	7 PATIENTS	5 PATIENTS	1 PATIENT
6-10 MM	NIL	37 PATIENTS	18 PATIENTS	4 PATIENTS
11-20MM	36 PATIENTS	14 PATIENTS	35 PATIENTS	47 PATIENTS
21-30MM	19 PATIENTS	2 PATIENTS	2 PATIENTS	6 PATIENTS
30-35MM	5 PATIENTS	NIL	NIL	2 PATIENTS

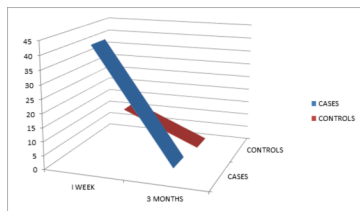
Table 2 SCHIRMERS VALUE -CONTROLS

SCHIRMERS VALUE	PRE-OP	1 WEEK	1 MONTH	3 MONTHS
1-5 MM	NIL	NIL	NIL	NIL
6-10 MM	NIL	17 PATIENTS	15 PATIENTS	2 PATIENTS
11-20MM	11 PATIENTS	14 PATIENTS	16 PATIENTS	20 PATIENTS
21-30MM	36 PATIENTS	31 PATIENTS	31 PATIENTS	32 PATIENTS
30-35MM	13 PATIENTS	8 PATIENTS	8 PATIENTS	16 PATIENTS

Table 3

TEAR FILM BREAK UP TIME

Tear film break up time < 10 seconds was observed in 71.6% diabetic patients 1 week postoperative compared to 46.6 % 1 month values and 5% 3 month postoperatively. 18% of the controls had less TBUT values 1 week and 11.4% ,1 month postoperatively.



Graph showing comparison of number of patients with <10 TBUT values 1 week post-op and 3 months post-op.

CORNEAL FLUOROSCIEN STAINING

	PRE-OP	1WEEK	1 MONTH	3 MONTH
CASES	0	7 PATIENTS	5 PATIENTS	1 PATIENT
CONTROLS	0	0	0	0

Corneal fluorescein staining was seen in 11.6% of the patients 1 week postoperatively and reduced to 1.6% of the patients 3 month postoperatively. These values correlated with the schirmers values. Staining was not seen in control group postoperatively.

DISCUSSION

Tear film abnormalities are very common after corneal refractive procedures. In this study we did a comparison of the tear film values of the diabetics and the normal patients undergoing cataract surgery preoperatively and 1 week, 1 month, and 3 months postoperatively. According to DEWS criteria , dry eye was called when schirmers I value less than 10mm, tear film break up time < 10 seconds ,with conjunctival and corneal staining and presence of Meibomian gland disease. In this study we evaluated schirmers I value ,tear film breakup time and looked for fluorescein staining. Meibomian gland examination couldn't be done postoperatively as it requires eversion of lids which leads to surgical wound compromise.

We found that there was a decrease in schirmers I value and tear film break up time 1 week postoperatively and 1 month postoperatively compared to pre-operative values. 70% of the diabetics had <10 mm schirmers value 1 week postoperatively compared to 24.2 % controls. 1 month postoperative values showed that 38.3% of the patients had <10 mm schirmers 1 value in diabetics compared to 21.4%in control's. 3 month postoperatively 8 % diabetic patients and 2.8% of controls had less values

Tear film break up time < 10 seconds was observed in 71.6% diabetic patients 1 week postoperative compared to 46.6 % 1 month values and 5% 3 month postoperatively. 18% of the controls had less TBUT values 1 week and 11.4% ,1 month postoperatively and 1.4%, 3 month postoperatively.

Oh et al. demonstrated that unlike TBUT or SIT values, the decrease in goblet cell density does not recover at 3 months after cataract surgery, which may be responsible for causing ocular discomfort and DES⁽¹²⁾.

Diabetes mellitus causes tear film abnormalities by various ways, it causes epithelial barrier dysfunction which subsequently leads to corneal complications and then Lacrimal Functional Unit dysfunction⁽¹³⁾. High glucose in type 2 diabetes induce the activation of polyol pathway which triggers the enzyme aldose reductase. Aldose reductase converts glucose to sorbitol.It has been shown that the accumulation of sorbitol within cells leads to cellular edema and dysfunction, which ultimately results in lacrimal gland structure damage and dysfunction and the induction of decreased tear secretion⁽¹⁴⁾. Nakata et al. demonstrated that diabetes induced neuropathy results in loss of autonomic control of lacrimal gland which inturn results in dysregulation of tear film secretion leading to onset of dry eye⁽¹⁵⁾

Dry-eye symptoms can adversely affect post operative outcomes. Visual recovery will be faster with a healthy cornea with good tear film compared to a dry cornea with epithelial surface irregularities . , Topical anaesthesia , exposure to microscopic light, injury to the corneal nerves and damage to the corneal epithelial cells, intraoperative irrigation of the tear film, elevation of inflammatory factors in the tear film , preservatives in topical eye drops postoperatively can aggravate dry eyes in these patients^(4,5,6,7,8)

Kasetsuwan etal found that severity of dry eye peaked 7 days after phacoemulsification, although the severity improved over time⁽¹⁰⁾. In another study Li et al. found that the incidence of dry eye even increased dramatically after cataract surgery. They concluded that poor compliance with the use of eye drops is the main reason for this phenomenon⁽⁵⁾. Ram et al. reported that although phacoemulsification can aggravate the tear film dysfunction of patients with dry eye, this effect seems to be present in the short-term only⁽¹¹⁾

CONCLUSION

Diabetic patients undergoing cataract surgery are prone to develop tear film abnormalities. These abnormalities are seen transiently in the immediate postoperative period and these patients restore the postoperative values by 3 months. Diabetic patients restore the preoperative values more slowly when compared to non-diabetic patients. This abnormal tear film may lead to adverse visual outcomes. Therefore careful tear film assessment should be done in all diabetic patients and the use of artificial tear supplements should be given for diabetic patients in the postoperative period. The use of filters for operating microscope, decreased surgery time, minimal surface irrigation, and gentle handling of the tissue will also reduce these tear film abnormalities.(5,9)

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