



AN ANALYTICAL STUDY TO IDENTIFY THE RISK FACTORS ASSOCIATED WITH DESCMET'S MEMBRANE DETACHMENT IN PATIENTS UNDERGOING CATARACT SURGERY

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ABSTRACT

Background

Descemet's membrane detachment (DMD) or tears may occur as a complication of intraocular procedures. The aim of this study was to analyze the risk factors predisposing to Descemet's Membrane Detachment during conventional small incision cataract surgery and also to determine the association of these risk factors to final visual outcome after pneumodescemetopexy.

Methods

A prospective observational study was conducted on 40 patients who had developed DMD following small incision cataract surgery. Complete ophthalmic examination was done using slitlamp biomicroscopy, Pachymetry, ultrasound biomicroscopy and AS-OCT. In all patients in whom DMD was documented and classified, descemetopexy was performed using intracameral air with a standard technique. The anatomic outcome was defined as complete reattachment of Descemet membrane and the functional outcome was defined as the increase in BCVA and a decrease in corneal edema. Student's 't' test and Chi square test were used to test the significance of difference between quantitative variables.

Results

The mean age of the patients was 63.97 $\pm$ 7.66. About 47.5% of them were in the age group of 61-70 yrs. There was no specific sexual preponderance. Risk factors like Brown cataract ($p < 0.001$) and pseudoexfoliation ($p < 0.009$) had more significant association with DMD. The mean pretreatment and post treatment CCT were 717.3 μ m and 528.4 μ m respectively (p value < 0.001). At one month follow-up, the logMAR visual acuity improved significantly from 1.7 $\pm$ 0.44 to 0.45 $\pm$ 0.12. This study showed that more severe the DMD, the poorer will be the final visual outcome. ($p < 0.001$).

Conclusion

Early surgical intervention, even in cases with small Descemet membrane detachments, by pneumodescemetopexy was associated with a satisfactory final anatomical and visual outcome.

Keywords: Descemet's Membrane Detachment, Pneumodescemetopexy, Air Tamponade in DMD.

INTRODUCTION

Descemet's membrane with its endothelium has a vital role in maintaining the corneal transparency. Descemet's membrane detachment (DMD) or tears may occur as a complication of intraocular procedures. It was first reported in 1927 by Weve.^[1] Surgical trauma is the predisposing factor in DMD and is reported after cataract surgery, viscocanalostomy, trabeculectomy, iridectomy, penetrating keratoplasty and cyclodialysis.^[2-7]

The cause of DMD is probably a mechanical one related to faulty instrumentation or technique. A dull knife, keratome, scissors, anterior chamber irrigator, phacoemulsification or irrigation-aspiration handpiece are likely causes, but in some eyes there is an added possibility of an inherent predisposition.^[8] The aim of this study was to analyze the risk factors predisposing to Descemet's Membrane Detachment during conventional small incision cataract surgery and also to determine the association of these risk factors to final visual outcome after air bubble tamponade.

MATERIALS AND METHODS

This was a prospective observational study conducted on 40 patients who attended the outpatient and inpatient department of Ophthalmology of a tertiary care center in Tamil Nadu over a period of 2 years. The study was approved by the Institutional Ethical Committee.

Inclusion Criteria

- Patients who had developed DMD following small incision cataract surgery
- Eyes with focal/ sectoral corneal edema with CCT <800 μ and associated DMD

Exclusion Criteria

- Previous history of trauma
- Post operative eyes with very dense corneal edema with CCT >800 μ
- Pre-existing corneal opacities/ scars
- Patients uncooperative for examination and unwilling for follow-up.

A total of 40 patients who fulfilled the above inclusion criteria were recruited from the OPD and post-operative ward of the study centre. The demographic data and the pre-operative ocular condition was obtained from the patient's case file. Informed consent was obtained from all the patients.

Pachymetry was done to assess the Central Corneal Thickness (CCT). The extent of involvement in various zones of the cornea was determined, drawn in the zone map, and then classified in 3 zones as follows: zone 1 (central 5.0 mm), zone 2 (paracentral, 5.0 to 8.0 mm), and zone 3 (periphery, over 8.0 mm). Zone involvement was evaluated clinically using slitlamp biomicroscopy and AS-OCT with undilated pupils and then noted in the Descemet membrane detachment treatment chart. The height and length (chord length) of the DMD were measured in millimeters using Ultrasound biomicroscopy (UBM). In all patients in whom DMD was documented and classified, descemetopexy was performed using intracameral air with a standard technique.

Post interventionally, topical 0.5% Moxifloxacin hydrochloride ophthalmic solution 3 times a day and 1% Prednisolone acetate ophthalmic suspension were prescribed in tapering dosage for a period of 4 weeks. Patients were evaluated on postoperative day 1, day 7, day 14 and day 28. The parameters evaluated were visual acuity, intraocular pressure, corneal clarity, and any evidence of DMD on slit-lamp examination. Patients were also evaluated on the basis of anterior segment OCT of the cornea for the resolution of DMD. The anatomic outcome was defined as complete reattachment of Descemet membrane and the functional outcome was defined as the increase in BCVA and a decrease in corneal edema.

Statistical Method

The information collected regarding all the cases were recorded in a Master Chart. Data analysis was done with Statistical Package for Social Sciences (SPSS) software developed by the IBM corporation. Using this software range, frequencies, percentages, means, standard deviations, 't' value and 'p' values were calculated. Student's 't' test and Chi square test were used to test the significance of difference between quantitative variables. A 'p' value of less than 0.05 was taken to denote significant relation.

RESULTS

A total of 40 patients were included in the study. The mean age of the patients was 63.97 $\pm$ 7.66. The age ranged from 42 to 83 years. Majority of the study population (47.5%) were in the age group of 61-70 yrs. There was equal distribution in the number of males and females affected. There was no specific sexual preponderance. Out of 40 eyes that were studied, 24 cases had DMD in the right eye and 14 in the left eye.

Age in Years	No. of Cases	Percentage
< 50	2	5
51-60	13	32.5
61-70	19	47.5
> 70	6	15
Total	40	100

Table 1: Age wise distribution of patients

Out of the forty patients, 2 were less than 50 years of age, 13 were in the 51-60 years age group, 19 were in the 61-70 years age group and 6 were more than 70 years of age. Majority of the patients were in the 6th and 7th decade.

Severity of DMD	Number of Cases	Percentage
Mild	2	5
Moderate	5	12.5
Severe	33	82.5
Total	40	100

Table 2: Distribution of severity of DMD

Of the 40 patients who had DMD, there were 2 mild (involving < 25% of cornea), 5 moderate (involving 25-50% of cornea), and 33 severe (involving >50% of cornea) cases. In the study group, more severe DMD was found in the older age group of 61-70 yrs.

In the study group, there were 15 cases each in Brown hard nuclear cataract and Pseudoexfoliation; 4 cases had Hypermaturation cataract; 2 cases had thick arcus. There were no risk factors in 4 cases. In the study group it was found that patients with risk factors like Brown cataract ($p < 0.001$) and pseudoexfoliation ($p < 0.009$) had more significant association with DMD.

CCT	Pre treatment	Post treatment
<600 μ m	0	40
600- 650 μ m	2	0
651-700 μ m	8	0
>700 μ m	30	0
Mean	717.3	528.4
SD	33.2	5.2
p value	< 0.001	

Table 3: Central corneal thickness before and after treatment

Among the 40 patients, severe corneal edema was found in 28 cases, moderate corneal edema in 10 cases, and mild edema in 2 cases. The mean pre-treatment CCT was 717.3 μm as against the post-treatment CCT of 528.4 μm with p value less than 0.001. The central corneal thickness got reduced significantly to normal levels after air tamponade.

BCVA in Log MAR	Pre Treatment	Post Treatment
< 1	0	40
1-1.2	13	0
> 1.2	27	0
Mean	1.7	0.45
SD	0.44	0.12
p value	< 0.001	

Table 4: BCVA Vs treatment

At one month follow-up, the logMAR visual acuity improved from 1.7 ± 0.44 to 0.45 ± 0.12 with p value less than 0.001 (significant).

Grade of DMD	BCVA Mean	
	Pre treatment	Post treatment
Mild (N=2)	1	0.2
Moderate (N=5)	1.04	0.4
Severe (N=33)	1.85	0.51
p value	< 0.001	

Table 5: Grade of DMD Vs BCVA before and after treatment

This study showed that more severe the DMD, the poorer will be the final visual outcome. (p less than 0.001).



Figure 1: Showing slit lamp photograph with corneal edema

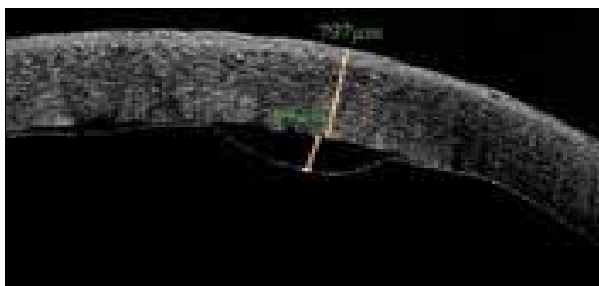


Figure 2: Showing AS OCT photograph showing Descemet's membrane detachment



Figure 3: Showing slit lamp photograph showing clear cornea after pneumodescemetopexy

DISCUSSION

Descemet's membrane detachment is a distinct clinical entity that has been known to ophthalmic surgeons as a postoperative complication for many years. Some common causes are a shallow anterior chamber, accidental insertion of the instruments between the corneal stroma and Descemet membrane, use of blunt microkeratomes, inadvertent injection of saline or ophthalmic viscosurgical device in the space between the stroma and Descemet membrane, genetically related weak adhesions between the stroma and Descemet membrane, preoperative glaucoma and recent onset of corneal edema.

Jain et al. graded Descemet membrane detachment after small-incision cataract surgery as mild, moderate, or severe, depending on the percentage of corneal involvement, and reported the results after descemetopexy.^[9] When the Descemet membrane detachments were left to attach spontaneously, the potential for full visual recovery decreased because of the formation of residual Descemet membrane folds, wrinkles, fibrosis, pre-Descemet membrane pigments, opacities, or scars. When these develop in the pupillary region or zone 1, the potential for visual disturbance will be high. Those eyes need to be treated aggressively even though the intensity of the Descemet membrane detachment was small. Multiple linear regression in his study showed that the factors associated with a significantly poorer final visual outcome were found in patients with a cataract score of 5 ($p=0.014$), a cataract score of 4 with compromised visibility due to a corneal opacity ($p=0.039$) and prolonged duration between the cataract surgery and descemetopexy ($p=0.007$). This is similar to the present study in which poor visual outcome was associated with brown cataract ($p < 0.001$) and pseudoexfoliation ($p<0.009$).

In another study by Namrata Sharma et al,^[10] AS-OCT based protocol was created for management of DMD based on which intracameral air or C3F8 was used. In the present study, only air bubble tamponade was used to treat the DMD. Of 40 eyes, only one eye required repeat air injection and one eye did not require any intervention. 100% of DMD which underwent intervention were reattached successfully. No eye developed a reaction (uveitis or infection) after air injection thus signifying that air bubble tamponade is equally effective and safe procedure.

In this era in which many patients expect the best visual outcomes in the immediate postoperative period, managing Descemet membrane detachments is very essential. In this study, the factors associated with a significantly poorer final visual outcome were found in patients with cataract score of >3 ; those with compromised visibility due to a persistent severe corneal edema and those with increased central corneal thickness at the time of presentation. Moreover brown cataract and pseudoexfoliation were found to be significant risk factors for development of Descemet's Membrane Detachment. No association of final visual outcome was seen with age, gender, eye treated and pre-operative visual acuity. In the present study, severe Descemet's Membrane Detachment (involving zone 1 and $>50\%$ of cornea) was associated with poorer visual outcome.

CONCLUSION

This study shows that early surgical intervention, even in cases with small Descemet membrane detachments, prevented the visual loss caused by Descemet membrane scarring. Thus timely

surgical intervention in Descemet's membrane detachments might prevent complications such as fibrosis, shrinkage, and wrinkling of Descemet membrane, which can subsequently prevent reattachment. Moreover intervention by pneumodescemetopexy (Air Bubble tamponade) was associated with a satisfactory final anatomical and visual outcome.

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Nil

Conflicts of Interest

There are no conflicts of interest.

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