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Original Research Article

Usefulness of anterior segment optical coherence tomography in descemet's membrane detachment following cataract surgery

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ABSTRACT

Background: Postoperative descemet's membrane detachments (DMD) can be vision threatening if not detected early and managed appropriately Eyes with DMD usually have corneal haze which may hamper slitlamp evaluation. Anterior segment optical coherence tomography (ASOCT) is a precise, non-invasive imaging technique that yields high resolution cross sectional images of the cornea. This study aims to evaluate the usefulness of AS OCT as compared to slitlamp biomicroscopy in the detection and management of post-operative DMD following small incision cataract surgery.
Methods: It was a prospective study on sixty-seven patients who underwent cataract surgery. Slitlamp biomicroscopy and ASOCT were done in all patients on postoperative day one. The presence of descemet's membrane detachment was noted using each technique. Eyes with DMD were followed up one week and again one month later. ASOCT was repeated to assess the status of DMD. Management was planned accordingly
Results: On post-operative day one, only 1.49% of the study group showed descemet's detachment on slitlamp biomicroscopy, as against 20.89% using ASOCT. This increase in diagnostic yield on ASOCT was statistically significant(p=0.05). On follow-up, descemet's membrane had reattached in seven eyes one week after surgery and in all eyes one month after surgery, with medical management alone.
Conclusions: AS OCT has a definite advantage over slit lamp biomicroscopy in the detection of descemet's membrane detachment following cataract surgery. Our study also validates the fact that AS OCT helps in follow up and decision making in the management of DMD.

Keywords: Anterior segment OCT, Biomicroscopy, Cataract surgery, Descemet's membrane detachment, Slit lamp

INTRODUCTION

Descemet's membrane detachment (DMD) is a potentially vision threatening complication of cataract surgery especially when it is extensive or involving the visual axis.[1] Slitlamp biomicroscopy may fail to detect localized and subtle descemet's detachment in the immediate post-operative period.[2,3] Its use is further limited in eyes with corneal oedema. Optical coherence tomography (OCT) is a non-contact technique for high resolution imaging of tissue. It performs optical biopsy with a resolution higher than any other imaging modality. Anterior segment OCT is documented to be a useful tool for diagnosis, as well as for differentiating between various types of Descemet's membrane detachment.[4] Most of the available literature however focuses on clear corneal incisions and phacoemulsification. Also the incidence of DMD following cataract surgery detected using AS OCT shows wide variations ranging from 4-82%.[3,5] Hence the relevance of the present study, which aims to assess the usefulness of anterior segment OCT, as compared to slit lamp biomicroscopy in the detection of

descemet's membrane detachment in the immediate post-operative period following manual small incision cataract surgery.

METHODS

It was a prospective study done at department of Ophthalmology, Amala institute of medical sciences between February 2014 and August 2015.The study was approved by the institutional ethics committee.

The study group consisted of sixty seven patients who had undergone manual small incision cataract surgery with posterior chamber intra ocular lens implantation. Patients with pre-existing corneal opacities were excluded from the study. All surgeries were done by a single experienced surgeon through a 6 mm superior sclero-corneal frown incision. All patients underwent detailed slit lamp biomicroscopic evaluation on the first post operative day. Presence of descemet's membrane detachment was specifically noted. Anterior segment OCT scans were acquired in all patients one day after surgery using Cirrus™ HD OCT (Carl Zeiss, Germany).Though it is an instrument primarily used for imaging the posterior segment of the eye, it can also be used for imaging the anterior segment of the eye.[6-8] Anterior segment five line raster programme was used to take the scans. All scans were acquired and analysed by the same examiner. Patients detected to have DMD were followed up one week later and again one month later in eyes where the DMD was found to persist. AS OCT scans were repeated at each visit to assess the status of the DMD and management planned accordingly.

Statistical analysis

Statistical analysis was done using SPSS software (16 version, IBM, CA, USA). Fischer's exact test was used to find out the difference in frequency between the groups. P less than 0.05 indicated statistically significance.

RESULTS

Of the sixty-seven patients studied, 26 were male and 41 were female. Mean age of the study population was 67.14±6.75. On post-operative day one, only one out of sixty-seven eyes had clinically detectable descemet's detachment (1.49%) on slitlamp biomicroscopy. But, when imaged using ASOCT (Figure 1), on post-operative day one, fourteen of sixty-seven eyes of (20.89%) had descemet's membrane detachment (Table 1). Follow-up AS OCT done one week after surgery in these fourteen eyes showed that descemet's membrane had reattached in seven, thus bringing down the incidence of DMD at one week to 10.5%. ASOCT one month after surgery showed that descemet's membrane had reattached in all eyes with medical management alone (Figure 2). There was a statistically significant increase in the detection of DMD using AS OCT when compared to that detected using slitlamp biomicroscopy (Fischer's exact test p=0.05).

Table 1: Detection of descemet's membrane detachment using slit lamp and ASOCT.

Examination technique	DMD present	DMD absent	Total
Slit lamp	1 (1.49%)	66 (98.50%)	67
ASOCT	14 (20.89%)	53 (79.10%)	67

Value in parenthesis indicated percentage. Fischer's exact test-P = 0.05.

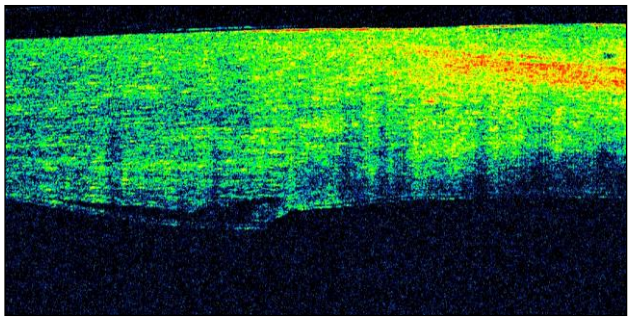

Figure 1: Descemet's membrane detachment on ASOCT.

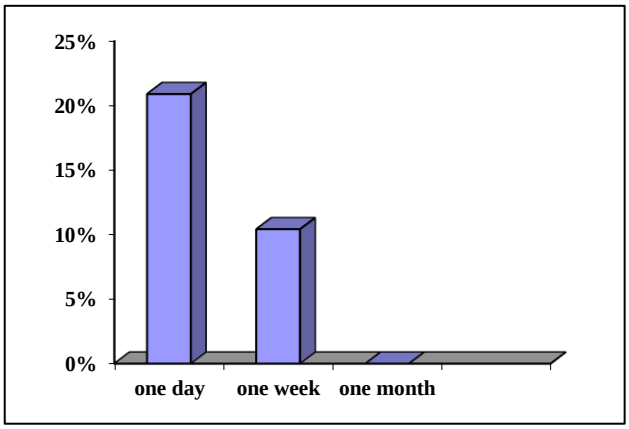

Figure 2: Percentage of patients with DMD on review.

DISCUSSION

Slitlamp examination is the universal, time tested technique used for clinical examination of the eye. But despite its many advantages, its usefulness in viewing the descemet's membrane is limited in eyes with hazy cornea. In the immediate post operative period following cataract surgery, corneal clarity may be compromised due to several factors like a temporary dysfunction of the endothelial pump, inappropriate instrumentation during surgery or secondary rise in intraocular pressure. All these may hamper proper visualization using slitlamp and hence underlying DMD may go undetected.

In such situations where the exact cause of corneal edema and haze cannot be identified due to difficult corneal evaluation, AS OCT can help us not only in identifying the cause but also in making a surgical plan.[9] In this study, the incidence of DMD following SICS using

slitlamp examination was found to be one in sixty-seven (1.49%). But when imaged using AS OCT, fourteen of the sixty-seven eyes (20.89%) were found to have DMD. This difference in diagnostic yield between slitlamp examination and ASOCT was found to be statistically significant (Fischer's exact test p=0.05). The incidence of post-operative descemet's detachment using AS OCT reported in literature range widely from 4 to 82% and pertain to eyes that had undergone clear corneal phacoemulsification. Our DMD rate of 20.89% following small incision cataract surgery was found to be much lower when compared to a study on scleral tunnels by Hayashi et al which revealed a 39.1% incidence of DMD. Present results are in concurrence with available literature which shows a definite advantage for OCT over slitlamp biomicroscopy in the diagnosis of post-operative DMD.[9]

According to Mackool and Holtz classification for Descemet membrane detachment detachments can be planar when separation of the DM from stroma is 1 mm or less in all areas. Nonplanar DM detachments have more than 1 mm of separation. Planar detachments have a much better prognosis than nonplanar detachments do, with or without surgical management.[10] A more recent anterior segment coherence tomography based algorithm using Height, length, extent and pupil (HELP) for management of DMD suggests that If the DMD length is less than 1mm and height <100 microns in any zone (Zone 1 =central 5mm, Zone 2 =5-8mm & Zone 3 = >8mm), medical management is sufficient.[11] As per HELP algorithm, all the DMDs in our study belonged to the category that required only medical management. Hence they were put on topical steroids and hyperosmotics and reviewed periodically. Repeat OCT after a week showed seven of them had re attached, while OCT one month after surgery showed that all the DMDs had re attached. These observations further validate the recommendations of HELP algorithm in the management of DMD.

CONCLUSION

Our study concludes that ASOCT has a definite advantage over slit lamp examination in the early detection of postoperative descemet's membrane detachments following small incision cataract surgery. Tomographic features of descemet's membrane detachments can also help clinicians choose between medical management and surgical options.

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