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Original Research Article

An Observational Study Assessing Outcomes of Descemetopexy in Descemet Membrane Detachment Post-Cataract Surgery

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Abstract

Aim: The aim of the present study was to assess the preoperative risk factors, type of cataract surgery, cataract grade, and final visual outcome in patients undergoing descemetopexy for descemet membrane detachment (DMD).

Methods: This was a retrospective interventional study conducted on cases with DMD following cataract surgery who presented to Netaji Subhas medical college and Hospital, Bihta, Patna, Bihar, India during the period of 1 year. Out of the approximately 19000 MSICS and 1000 phacoemulsification surgeries that were performed during the study period, a total of 20 eyes (0.10%) underwent descemetopexy for Descemet detachment repair.

Results: The mean age of the patients was 61.19±6.4 years. 16 cases (80%) were after manual small incision cataract surgery (MSICS) and 4 (20%) were post phacoemulsification. 13% (n=3) cases had pre-existing corneal opacity and 26% (n=6) cases had climatic droplet keratopathy. The number of clock hours of DMD ranged from 3 to 12 hours with a mean of 6.9 hours. The most common site of DMD was total (35%), temporal (30%) followed by superior (25%). 65% (n= 13) that underwent descemetopexy were recorded to have a cataract of grade 4 or higher (LOCS III) at the time of cataract surgery.

Conclusion: This study highlighted the importance of identifying important preoperative risk factors like cataract grading and pre-existing corneal pathology that increase the chance of DMD during cataract surgery. Moreover, early postoperative intervention with either air or SF 6 can help achieve good final anatomic and visual acuity outcomes in patients developing this complication.

Keywords: preoperative risk factors, cataract surgery, final visual outcome, descemet membrane detachment

Introduction

Incision-related Descemet membrane detachment (DMD) is a common complication in cataract surgery. Previous studies [1-3] have found that the incidence of DMD at the incision site 1 day after phacoemulsification is high, ranging from 36.7% to as high as 82.0%. Slight incisional DMD can be self-healing. However, in the case of inexperienced surgeons or unhealthy corneas, severe DMD may occur, leading to corneal decompensation that requires transplantation. [4-7] The surgical steps during which incisional DMD is most likely to be initiated remain unknown, as do the potential factors that contribute to or reduce the risk of DMD, which limits the ability of surgeons to formulate effective prevention strategies.

Incision-site DMD occurred as early as the capsulorrhexis phase and was observed most commonly during the phacoemulsification and irrigation-aspiration steps. Descemet membrane detachment was initially most commonly observed at the posterior margin of the corneal incision and increased in length during surgery. These results suggest that the occurrence and severity of DMD are likely related to intraoperative manipulation of surgical instruments. Steps such as nuclear chopping, phacoemulsification, and aspiration all use the corneal incision, especially the posterior margin, as a fulcrum. The diameter of the surgical instrument exactly matches the incision size and is larger than that of the syringe used for capsulorrhexis and hydrodissection. An animal study by Vasavada et al [8] found that regular vibration of the phacoemulsification tip and mechanical activity can cause incision-site DMD during phacoemulsification. Previous studies [9-11] have reported corneal incision enlargement during surgery, more prominently with smaller incisions,

including a total wound enlargement of 11.4% with a 1.8-mm incision.

Descemet's membrane detachment (DMD) is a well-recognized and potentially vision-threatening complication of cataract surgery. It occurs when fluid enters the corneal stroma through a break in Descemet's membrane (DM) or an area of separation between the DM and the corneal stroma. Acute loss of vision from severe corneal edema can be the first sign and may also be the cause of a delayed diagnosis. [12] The natural history of DMD and the appropriate timing of intervention have been an ongoing debate. There is no clarity in the existing literature regarding the need for surgical reattachment [13–16] and the efficacy of various substances used as tamponade, such as 100% air, viscoelastic material, 14% isoexpansile perfluoropropane (C3F8) and 20% sulfur-hexafluoride.10 Potter and Zalatimo [17] have reported air to be the least efficacious tamponade for descemetopexy.

The aim of the present study was to assess the preoperative risk factors, type of cataract surgery, cataract grade, and final visual outcome in patients undergoing descemetopexy for descemet membrane detachment (DMD).

Materials and Methods

This was a retrospective interventional study conducted on cases with DMD following cataract surgery who presented to Netaji Subhas medical college and Hospital, Bihta, Patna, Bihar, India during the period of 1 year. Out of the approximately 19000 MSICS and 1000 phacoemulsification surgeries that were performed during the study period, a total of 20 eyes (0.10%) underwent descemetopexy for Descemet detachment repair. These patients had undergone either intracameral air or SF6 injections for DMD reattachment. Cases with less than one month of follow-up after descemetopexy and who underwent cataract surgery elsewhere were excluded.

Medical records were reviewed, and data collection included demographic data, eye operated, pre-existing corneal pathology, grade of cataract, type of cataract surgery, site of DMD, visual acuity, duration between descemetopexy and cataract surgery, slit lamp examination findings, and anterior segment optical coherence tomography (AS-OCT) records.

On ASOCT, DMD was identified as a free-floating membrane in the anterior chamber behind the area of stromal edema. Cataract was graded according to Lens Opacities Classification System III. The extent of DMD was recorded in clock hours. Other details recorded were the type of gas used for intracameral injection, intraoperative and postoperative complications. Post-operative visual acuity and status of Descemet membrane detachment were also recorded.

Surgical Technique

Descemetopexy was performed in an operating room under local or topical anaesthesia. The procedure was performed under a microscope with all aseptic precautions. The choice of gas to be injected was based on the surgeon's preference. With a 30 G needle mounted on a 5-ml disposable syringe, 100% air or 20% iso expansile mixture of SF6 was injected into the anterior chamber. The site of entry was in an area opposite the area of DMD or in the case of total DMD away from the site of detachment. The pupil was subsequently dilated with homatropine 2% to prevent pupillary block and increase in IOP.

Post-Operative Management

On the first post-operative day, the patient was examined to assess the attachment of DM. ASOCT was also done to confirm complete reattachment. Intraocular pressure was assessed and any increase in intraocular pressure was managed with antiglaucoma medications. Standard postoperative treatment of tapering course of antibiotic- steroid drop was given for four weeks. The patient was reassessed at one week and one month. Descemetopexy was repeated with SF6 if DMD persisted on a post-operative day one.

Statistical Analysis

All the descriptive parameters were noted in the form of mean and standard deviations. Differences between preoperative and postoperative parameters were considered to be significant at a p-value of <0.05. Statistical analyses were performed with GraphPad Prism 5.0 (GraphPad Software, Inc., San Diego, CA).

Results

Table 1: Demographic and clinical data of the patients that underwent descemetopexy

Parameters	
Age in Mean±SD	61.19±6.4
Gender N (%)	
Male	8 (40)
Female	12 (60)
Eye N (%)	

Right	9 (45)
Left	11 (55)
Corneal pathology	7 (35)
MSICS	16 (80)
Phacoemulsification	4 (20)
Air	15 (75)
SF6 injection	5 (25)

The mean age of the patients was 61.19±6.4 years. 16 cases (80%) were after manual small incision cataract surgery (MSICS) and 4 (20%) were post phacoemulsification. 13% (n=3) cases had pre-existing corneal opacity and 26% (n=6) cases had climatic droplet keratopathy.

Table 2: Site of detachment and grades of cataract

Site of detachment	**N (%)**
Nasal	1 (5)
Total	7 (35)
Temporal	6 (30)
Inferior	1 (5)
Superior	5 (25)
Grades of cataract	
Grade 2	3 (15)
Grade 3	4 (20)
Grade 4	13 (65)

The number of clock hours of DMD ranged from 3 to 12 hours with a mean of 6.9 hours. The most common site of DMD was total (35%), temporal (30%) followed by superior (25%). 65% (n= 13) that underwent descemetopexy were recorded to have a cataract of grade 4 or higher (LOCS III) at the time of cataract surgery.

Discussion

Descemet's membrane detachment (DMD) is a well-recognized and potentially vision-threatening complication of cataract surgery. It occurs when fluid enters the corneal stroma through a break in Descemet's membrane (DM) or an area of separation between the DM and the corneal stroma. Acute loss of vision from severe corneal edema can be the first sign and may also be the cause of a delayed diagnosis. [18] A review of the literature revealed that only a few reports have determined the incidence of DMD. It was found to be 2.6% for extracapsular cataract extraction (ECCE) and 0.5% for phacoemulsification. [19] Jain et al have reported an incidence of 0.81% in over 40000 cataract surgeries. [20]

In these patients, the most common site of DMD after total detachments was temporal followed by superior. This is because we constructed the main incision and scleral tunnel temporally or superiorly. Improper incisions or inadvertent movements at the main incision during the surgery may be responsible for these cases of DMD. In our series, we found poorer visual outcomes were seen with higher grades of cataracts. This may be attributed to the larger size of the nucleus causing difficulty in nucleus delivery. A higher rate of DMD was also seen in patients with pre-existing corneal opacity or climatic droplet keratopathy, highlighting the inherent weakness in the adhesion of DM to stromal layers in patients with pre-existing corneal pathology. The mean age of the patients was 61.19±6.4 years. 16 cases (80%) were after manual small incision cataract surgery (MSICS) and 4 (20%) were post phacoemulsification. 13% (n=3) cases had pre-existing corneal opacity and 26% (n=6) cases had climatic droplet keratopathy. The number of clock hours of DMD ranged from 3 to 12 hours with a mean of 6.9 hours. The most common site of DMD was total (35%), temporal (30%) followed by superior (25%). 65% (n= 13) that underwent descemetopexy were recorded to have a cataract of grade 4 or higher (LOCS III) at the time of cataract surgery.

Pneumatic descemetopexy using air has been considered as a weaker method in some case studies. [21] The primary aim of any cataract surgery is an improvement in visual acuity and patients expect excellent vision almost immediately. DMD can result in a significant visual impairment which can be reversed with timely intervention. Anterior chamber injection of gas as the primary management strategy has been well described. It can hasten the absorption of corneal oedema and, thus, visual recovery. [12] Several authors have found that DMD was most commonly associated with MSICS. [19,22]

Conclusion

This study highlighted the importance of identifying important preoperative risk factors like cataract grading and pre-existing corneal pathology that increase the chance of DMD during cataract surgery. Moreover, early postoperative intervention with either air or SF 6 can help achieve good final anatomic and visual acuity outcomes in patients developing this complication.

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