International Journal of Advances in Medicine
Kumar S et al. Int J Adv Med. 2021 Jan;8(1):119-123
http://www.ijmedicine.com
pISSN 2349-3925 | eISSN 2349-3933

DOI: https://dx.doi.org/10.18203/2349-3933.ijam20205483

Original Research Article

Peripheral iridectomy in descemet stripping endothelial keratoplasty: to do or not to do

Santosh Kumar[1]*, Roohie Singh[2]

[1]Department of Ophthalmology, [2]Department of ENT and HNS, Command Hospital (Air Force), Bangalore, Karnataka, India

Received: 08 November 2020
Revised: 10 December 2020
Accepted: 11 December 2020

***Correspondence:**
Dr. Santosh Kumar,
E-mail: santo21051977@gmail.com

ABSTRACT

Background: The purpose of the research was to study role of peripheral iridectomy (PI) in alleviating intra ocular pressure (IOP) spike due to retained air in patients of pseudophakic bullous keratopathy (PBK) undergoing descemet stripping endothelial keratoplasty (DSEK).
Methods: A retrospective case review was done for patients undergoing DSEK at tertiary care eye centre from January 2017 to December 2018. Patients were divided into two groups based on whether they have undergone PI during DSEK surgery or not. Total 25 patients were included in the study. Group 1 consisted of 15 patients who hadn't undergone PI and group 2 consisted of 10 patients who had undergone PI. Study of post-operative IOP spike was done in all cases and role of PI was evaluated. The primary outcome measure was role of PI in alleviating IOP rise. Statistical analysis was done using statistical package for social sciences (SPSS) statistical software version 26.0.
Results: All patients in group 1 had developed an IOP spike on first post-operative day. The mean IOP on day 1 in group 1 patients were 29±2.9 mm of Hg (range 24-34 mm of Hg) and in group 2 were 19±1.49 mm of Hg (range 17-21 mm of Hg). Almost all patients in group 1 required anti glaucoma medications. Group 2 had better post-operative results as compared to group 1in terms of best corrected visual acuity (BCVA) as well as graft clarity. Three patients in group 1 had to undergo repeat DSEK.
Conclusions: DSEK surgery causes increase in IOP post operatively due to retained air in anterior chamber (AC), probably causing pupillary block. PI definitely has some role in alleviating this IOP spike and increasing graft survival in long term.

Keywords: Descemet stripping endothelial keratoplasty, Intra ocular pressure, Peripheral iridectomy

INTRODUCTION

Descemet stripping endothelial keratoplasty (DSEK) has been the mainstay of management of endothelial dysfunctions resulting due to various etiologies. Some of them are Fuchs corneal dystrophy (FCD), pseudophakic bullous keratopathy (PBK), Aphakic bullous keratopathy (ABK) and iridocorneal endothelial syndrome (ICE).[1] DSEK offers various advantages over penetrating keratoplasty (PK), which was the treatment of choice for these conditions previously and these advantages include rapid healing, more predictable refractive outcomes, better corneal integrity, and a rapid visual recovery.[2-4] Intraocular pressure (IOP) elevation after DSEK is a known complication and there are various causes attributable for this.[5-6] One of the causes for this IOP elevation is pupillary block, which is due to air injected in AC at the end of surgery to tamponade the donor lenticule.[7-12] Pupillary block can be prevented by prophylactic peripheral iridectomy (PI), performed during DSEK surgery.[13] Hence, we design this study to evaluate the role of prophylactic PI during DSEK surgery to lessen the post-operative IOP spike and further decreasing the incidence

of glaucoma. To our best of knowledge, this study has never been reported in the literature.

METHODS

A retrospective case review was done for patients undergoing DSEK at tertiary eye care centre of New Delhi, India from January 2017 to December 2018. 25 suitable patients with pre-operative diagnosis of pseudophakic bullous keratopathy (PBK) were selected out of all patients for study purpose.

Inclusion criteria

Adult patients with diagnosis of PBK who has not undergone any corneal surgeries in past, patients with no prior history of glaucoma, and patients with no prior history of any intraocular surgery except cataract surgery.

Exclusion criteria

Patients with dense anterior stromal scarring, ABK, FCD, ICE, ocular co-morbidities and posterior segment pathologies were excluded from the study.

Patients were divided into two groups based on whether they have undergone PI during DSEK surgery or not. Group 1 consisted of 15 patients who hadn't undergone PI and group 2 consisted of 10 patients who had undergone PI. All patients had undergone surgery by single surgeon following standard techniques. Pre-operative evaluation was done thoroughly for all patients including IOP measurement by non-contact tonometry. Following the surgery, patients were followed up on day 1, week 1, monthly once for first three months and then every three months. At each visit, evaluation consisted of best corrected visual acuity (BCVA), IOP measurement, lenticule status and any other complications. Statistical data analysis was done using SPSS statistics software version 26.0.

Surgical technique

The surgeries were performed under local anesthesia. The donor corneal lenticule was prepared from eye bank cornea manually using artificial chamber. The dissection of cornea was done under operating microscope. Based on corneal thickness measured by ultrasound pachymeter (Devine Medihealth pvt ltd, New Delhi, India), level of dissection was decided and appropriate precision depth knife was used. After dissection, the donor tissue was then transferred to Teflon block and 7.5 mm trephination was performed.

The patient was prepared for surgery under aseptic precautions. All surgeries were done with surgeon sitting temporally. The host corneal epithelium was debrided to enhance AC visibility. Anterior chamber maintainer (ACM) was placed tangentially towards the left side of surgeon's hand (6'O clock position in left eye and 12'O clock position in right eye). A temporal clear corneal incision was made with 20 G knife for intraocular procedures and manipulations. The descemet membrane (DM) was stripped using reverse sinskey (Joja surgical pvt ltd, Kolkata, India) after staining with 0.06% trypan blue dye (Auroblue, Aurolab, Tamil Nadu, India). PI was performed in selected cases using 25 G vitrectomy cutter (Alcon Labs, Fort Worth, Texas, USA) inferiorly at 6'O clock position (Figure 1). Intracameral air injection was performed in case of iris bleed to tamponade and arrest the post PI bleed. The air was removed after some time when bleeding stopped. Another clear corneal incision was made nasally opposite to temporal incision with 3 mm keratome. The donor lenticule was transferred to busin glide (Moria surgical, France) and folded (Figure 2). The donor lenticule was inserted into anterior chamber with a pull-through technique using busin glide. The donor lenticule was pulled into AC by 23 G vitreous forcep (Alcon labs, Fort Worth, Texas, USA) inserted through temporal incision while busin glide with folded lenticule was placed at nasal incision (Figure 3). Air was injected posterior to the donor lenticule to facilitate unfolding and tamponade it in position. The ACM was removed. The graft tissue was positioned centrally using two hydrodissection cannulas, which were rubbed on anterior corneal surface to centralize the tissue. The AC was filled completely with an air bubble, which was left for ten minutes (Figure 4). During this time, all incisions were closed with a 10-0 nylon suture. After the ten-minute period some amount of air was released and a bandage contact lens (BCL) was placed. Topical antibiotic was instilled and an eye pad was applied. Patient was shifted out to ward in supine position only and was instructed to remain in same position for maximum time.

Post-operative management

Patient was reviewed on post-operative day 1 and was evaluated (Figure 5). The assessment consisted of BCVA, IOP, status of lenticule attachment and any other complication. Post-operative medications consisted of topical prednisolone 1% (Alcon labs, Fort Worth, Texas, USA) six times/day in tapering doses along with topical antibiotic moxifloxacin 0.5% (Alcon labs, Fort Worth, Texas, USA) four times/day. Any patient having significant IOP rise was treated with oral and/or topical anti glaucoma medications. BCL was removed on first week visit if corneal epithelium had healed. Topical antibiotic was stopped after one month however prednisolone was tapered over a period of three months and continued in a dose of once per day after that. Anti-glaucoma medications were stopped/continued based on IOP measurement. The follow up was scheduled as day 1, week 1, monthly once for first three months and then every three months.

RESULTS

The total number of patients in group 1 and 2 were 15 and 10 respectively. The mean age of the patients in group 1

was 63.87±7.64 years (range 53-76 years), in group 2 it was 64.0±4.92 years (range 59-74 years). Nine patients were females and six males in group 1, six patients were females and four males in group 2 (Figure 6). There was no significant age and sex variation in the both the groups. Pre-operative BCVA in the group 1 was 1.30±0.20 LogMAR units (range 1.0-1.6 LogMAR units) and in group 2 was 1.30±0.18 LogMAR units (range 1.0-1.6 LogMAR units). At three months postoperatively BCVA in group 1 was 1.10±0.25 LogMAR units (range 0.7-1.5 LogMAR units) and BCVA in group 2 was 1.00±0.25 LogMAR units (range 0.6-1.4) (Table 1 and 2). Pre-operative IOP was within normal limits in both the groups. In the group 1, it was 15.33±1.95 mm of Hg (range 13-18) and in the group 2 it was 16.10±1.91 mm of Hg (range 13-18). Post-operative IOP was significantly high in group 1 patient. The mean IOP on day 1 in group 1 patients were 29± 2.92 mm of Hg (range 24-34 mm of Hg) and in group 2 were 19±1.49 mm of Hg (range 17-21 mm of Hg) (Table 3 and 4). Almost all patients in group 1 required anti glaucoma medications apart from topical prednisolone and antibiotic. Those in the relatively lower range of IOP were treated with topical timolol maleate 0.5% (glucomol, Allergan labs, Dublin, Ireland) twice/day and those in the higher range were treated with combination of topical timolol maleate (glucomol, Allergan labs, Dublin, Ireland) and brimonidine 0.1% (alphagan, Allergan labs, Dublin, Ireland) twice/day. One patient in group 1 required tablet acetazolamide, as his IOP was not getting controlled with topical medications. IOP in most of these patients were under control over a period of three months and their anti-glaucoma medications were stopped, however two patients were continued on long term therapy as their IOP were still high on third month follow up. No PI related complication was noticed.

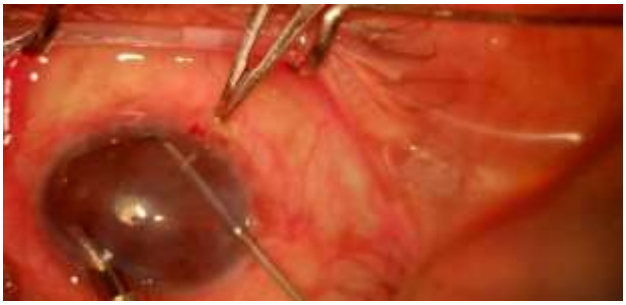

Figure 1: PI made with vitrectomy cutter.

Figure 2: Lenticule being loaded on busin glide.

Figure 3: Lenticule inserted into AC using pull-through technique.

Figure 4: Lenticule attached with complete air fill.

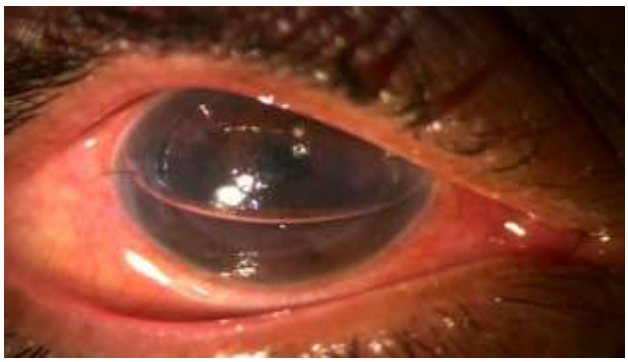

Figure 5: 1st post-operative day with air in AC.

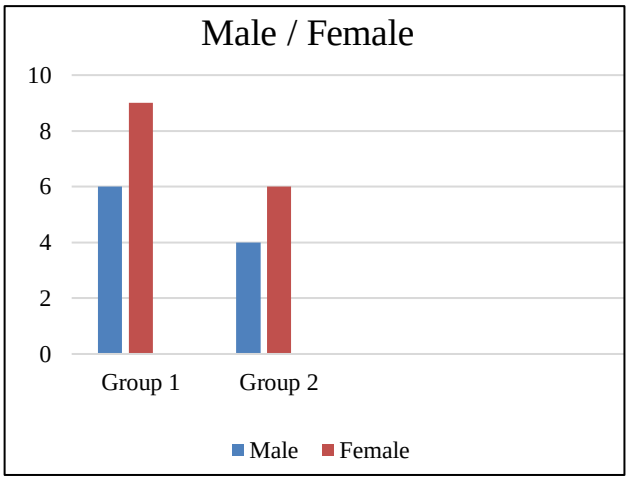

Figure 6: Male/female ratio.

Table 1: Visual recovery in group 1 patients.

Patients	Pre-operative visual acuity (LogMAR units)	Post-operative visual acuity (LogMAR units)
1	1.6	1.5
2	1.6	1.4
3	1.5	1.4
4	1.5	1.3
5	1.4	1.3
6	1.4	1.2
7	1.3	1.2
8	1.3	1.1
9	1.3	1.0
10	1.2	1.0
11	1.2	0.9
12	1.1	0.9
13	1.1	0.8
14	1.0	0.8
15	1.0	0.7
Mean	1.3	1.1
Standard deviation	0.20	0.25
Minimum	1.0	0.7
Maximum	1.6	1.5

Table 2: Visual recovery in group 2 patients.

Patients	Pre-operative visual acuity (LogMAR units)	Post-operative visual acuity (LogMAR units)
1	1.6	1.4
2	1.5	1.3
3	1.4	1.2
4	1.4	1.1
5	1.3	1.0
6	1.3	1.0
7	1.2	0.9
8	1.2	0.8
9	1.1	0.7
10	1.0	0.6
Mean	1.3	1.0
Standard deviation	0.18	0.25
Minimum	1.0	0.60
Maximum	1.6	1.40

One patient in both the groups had complication of lenticule dislocation in the first post-operative week and they underwent rebubbling immediately on recognition. The lenticule got re-attached in both the patients and patient of group 2 had smooth post-operative course thereafter, however in case of group 1 patient corneal edema did not clear even after three months and later he underwent repeat DSEK. One patient in group 1 who had very high IOP and was given oral medication, later developed peripheral anterior synechia (PAS) for which synechiolysis along with AC reformation was done. One patient in group 2 had graft infiltrate, which was noticed on 1-month post-operative visit. Corneal scraping as well as culture did not reveal any organisms and he responded well to broad spectrum antibiotics. There was an episode of endothelial rejection in one of the patients of group 1 at three months. He was treated intensively with topical steroid and cornea got cleared ultimately. Two patients in group 1 had secondary graft failure and ultimately required re DSEK.

Table 3: IOP changes in group 1 patients.

Patients	Pre-operative IOP (mm of Hg)	Post-operative IOP (mm of Hg)
1	18	34
2	17	33
3	17	32
4	18	31
5	15	31
6	14	30
7	18	30
8	17	29
9	14	28
10	13	28
11	15	27
12	14	27
13	14	26
14	13	25
15	13	24
Mean	15.33	29.00
Standard deviation	1.95	2.92
Minimum	13	24
Maximum	18	34

Table 4: IOP changes in group 2 patients.

Patients	Pre-operative IOP (mm of Hg)	Post-operative IOP (mm of Hg)
1	18	21
2	17	20
3	17	21
4	18	20
5	15	19
6	14	18
7	18	19
8	17	18
9	14	17
10	13	17
Mean	16.10	19.00
Standard deviation	1.91	1.49
Minimum	13	17
Maximum	18	21

Statistical calculation was done using SPSS statistics software. Paired t test showed greater IOP rise in group 1 post-operatively as compared to group 2 which was statistically significant with P value <0.001. Group 2 had better post-operative visual recovery as compared to group 1 but it was not statistically significant. There was no statistically significant difference in age and sex of both the groups.

DISCUSSION

Intracameral air has been known to cause secondary IOP elevation by different mechanisms.[8] Scheie and Frayer reported a patient in which IOP rose to 70 mm of Hg after intracameral injection of air.[9] DSEK is known to cause post-operative spike of IOP, as it involves injection of air at the end of surgery to tamponade the lenticule for better attachment. In a study by Lee et al, 13 patients out of 100 DSEK patients experienced IOP spike of 30 mm of Hg or more.[14] They further mentioned that air in the anterior chamber was responsible for half of these cases. They had encountered two patients of intraoperative pupillary block, which were relieved after peripheral iridectomy. Covert and Koenig reported two cases of pupillary block out of 21 cases of DSEK surgery.[11] Price and Price had one case of pupillary block in their series of 200 DSEK cases.[12]

PI is the treatment of choice for pupillary block. In our series of cases, most of the patients who had undergone PI during DSEK surgery did not notice any IOP spike just after surgery or thereafter. In patients who did not undergo PI, medical management was preferred in these cases to control IOP spike and PI was avoided post-surgery to decrease the risk of post-operative infection. PI rarely causes any complication, though at times it can cause bleeding from iris, which can be easily controlled by applying air tamponade for few minutes. In our study we noticed that intraoperative PI decreased the incidence of air induced pupillary block significantly, thus improving overall outcome of DSEK surgery. Since DSEK lenticule attachment is based on air tamponade, air injection is a crucial step which cannot be avoided. PI being an innocuous intervention, should be incorporated as a crucial step in DSEK surgery. MEDLINE search for 'PI in DSEK surgery' did not reveal any study or literature on this topic. In this way our study is unique and first in this regard.

The limitation of our study is a smaller number of subjects. Hence a study comprising of a greater number of subjects are needed to evaluate the safety and efficacy of PI in DSEK surgery.

CONCLUSION

In conclusion, the study suggests that PI should be done in all patients undergoing DSEK to decrease IOP spike and further increasing long term outcome of corneal graft.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Price MO, Fairchild KM, Price DA, Price FW. Descemet's stripping endothelial keratoplasty five-year graft survival and endothelial cell loss. Ophthalmology. 2011;118(4):725-9.
2. Price FW, Price MO. Descemet's stripping with endothelial keratoplasty in 50 eyes: a refractive neutral corneal transplant. J Refract Surg. 2005;21(4):339-45.
3. Terry MA, Shamie N, Chen ES, Hoar KL, Friend DJ. Endothelial keratoplasty a simplified technique to minimize graft dislocation, iatrogenic graft failure, and pupillary block. Ophthalmology. 2008;115(7):1179-86.
4. Gorovoy MS. Descemet-stripping automated endothelial keratoplasty. Cornea. 2006;25(8):886-9.
5. Espana EM, Robertson ZM, Huang B. Intraocular pressure changes following Descemet's stripping with endothelial keratoplasty. Graefes Arch Clin Exp Ophthalmol. 2010;248(2):237-42.
6. Vajaranant TS, Price MO, Price FW, Gao W, Wilensky JT, Edward DP. Visual acuity and intraocular pressure after Descemet's stripping endothelial keratoplasty in eyes with and without preexisting glaucoma. Ophthalmology. 2009;116(9):1644-50.
7. Selinger E. Ocular hypertension induced by air in the anterior chamber after cataract extraction. Am J Ophthalmol. 1937;20:827-8.
8. Barkan O. Glaucoma induced by air blockade: clinical observation and experimental study. Am J Ophthalmol. 1951;34:567-71.
9. Scheie HG, Frayer W. Ocular hypertension induced by air in the anterior chamber. Arch Ophthalmol. 1950;44:691-702.
10. Wyman GJ. Glaucoma induced by air injection into the anterior chamber. Am J Ophthalmol. 1954;37:424-6.
11. Covert DJ, Koenig SB. New triple procedure: Descemet's stripping and automated endothelial keratoplasty combined with phacoemulsification and intraocular lens implantation. Ophthalmology. 2007;114:1272-7.
12. Price FW, Price MO. Descemet's stripping with endothelial keratoplasty in 200 eyes: early challenges and techniques to enhance donor adherence. J Cataract Refract Surg. 2006;32:411-8.
13. Stamper RL, Lieberman MF, Drake MV. Becker-Shaffer's diagnosis and therapy of the glaucomas. 7th ed. San Diego: Harcourt Publishers Limited. 2001.
14. Lee JS, Desai NR, Schmidt GW. Secondary Angle Closure Caused by Air Migrating Behind the Pupil in Descemet Stripping Endothelial Keratoplasty. Cornea. 2009;28:652-6.

Cite this article as: Kumar S, Singh R. Peripheral iridectomy in descemet stripping endothelial keratoplasty: to do or not to do. Int J Adv Med 2021;8:119-23.