

# Documenting Visual Outcome of Descemet's Stripping Endothelial Keratoplasty in A Tertiary Care Setting From Gujarat

\*Ami Tank, \*\*Falguni Mehta, \*Deepika Singhal, \*\*\*Anand Shah, \*Shivani Acharya

\*Department of Ophthalmology, Gujarat Medical Education & Research Society, Ahmedabad, Gujarat

\*\*Department of Ophthalmology, Rotary Eye Institute, Navsari, Gujarat

\*\*\*Department of Community Oncology, The Gujarat Cancer & Research Institute, Ahmedabad, Gujarat

**Background:-** One of the available treatments of corneal blindness is Keratoplasty. Although there are various techniques practiced by corneal surgeons; Descemet's stripping endothelial keratoplasty (DSEK) with its technical advantages and manageable complications is rapidly becoming the preferred treatment for corneal endothelial dysfunction. The present study evaluates outcomes of DSEK in terms of its efficacy (visual acuity and refractive outcome).

**Objective:-** To document Visual Outcomes Post Descemet Stripping Endothelial Keratoplasty (DSEK) amongst patients with endothelial dysfunction.

**Materials and Methods:-** DSEK as a part of treatment was performed on 50 eyes of 50 subjects with endothelial pathology at a tertiary eye care institute in Gujarat. The subjects were enrolled based on pre fixed inclusion criteria and the results were evaluated in terms of Visual acuity Pre and Post DSEK surgery. Post DSEK surgery, the subjects were followed serially as the operating surgeon was the same in all the DSEK patients.

**Results:-** The mean age of the study population was  $63.90 \pm 16.32$  years. Majority were males (66%). The difference between mean pre-operative BCVA ( $1.6 \pm 1.0$ ) and 1 week follow up ( $1.13 \pm 1.01$ ), 1 month follow up ( $0.7 \pm 1.0$ ), 6 month follow up ( $0.65 \pm 1.1$ ) was statistically significant with  $p$  value  $< 0.01$ .

**Conclusion:-** After DSEK surgery, a significant improvement in post-operative visual acuity was documented at each follow up. No significant change in spherical and cylindrical refractive errors was noted.

## Abstract

Delhi J Ophthalmol 2018;28;23-5; Doi; <http://dx.doi.org/10.7869/djo.328>

**Keywords:** DESK, PBK, Visual Acuity

## Introduction

Corneal transplantation is a well documented treatment of corneal blindness, Dr. Eduard Konrad Zirm<sup>1</sup> in Moravia performed the first successful penetrating keratoplasty (PKP).<sup>1</sup> Till recently, penetrating keratoplasty was the only treatment for patients with corneal scars and endothelial decompensation. Although it is relatively simple procedure when compared to lamellar surgery, but post PKP there is evident documentation of complications.<sup>2</sup>

Descemet's stripping endothelial keratoplasty (DSEK) represents an evolution in corneal surgery, offering advantages over PK in terms of wound healing and predictability of refractive outcomes. Several studies in non-Indian populations published in the past 5 years show long-term benefits of DSEK, as well as a variation on the procedure with an automated microkeratome in a procedure known as Descemet's stripping automated endothelial keratoplasty, or DSAEK.<sup>6</sup> Descemet's stripping endothelial keratoplast (DSEK) with its technical advantages and manageable complications is rapidly becoming the preferred treatment for corneal endothelial dysfunction but majority of evidence from Western literature cites use of a 9 mm graft.<sup>3</sup> It is often debated that the difference in the size of the average Indian eye is also a factor in the donor cornea. Indian corneas tend to be thinner, and so donor cell counts used in most published studies — a preoperative count of at least 2,500

cells per  $\text{mm}^2$  — have been lowered in India to at least 2,000 cells per  $\text{mm}^2$ .<sup>4</sup>

In the present study, we have evaluate the outcomes of DSEK in terms of its efficacy (visual acuity and refractive outcome).

## Objectives

To assess the results of Descemet's Stripping Endothelial Keratoplasty (DSEK) in patients with endothelial dysfunction.

## Materials and Methods

DSEK as a part of treatment was performed on 50 eyes of 50 subjects with endothelial pathology at a tertiary eye care institute in Gujarat. The subjects were enrolled based on pre fixed inclusion criteria and the results were evaluated in terms of visual acuity Pre and Post DSEK surgery. The duration of the data collection was over a period of two years (May 2012 to April 2014).

They were evaluated pre operatively to be included in the present study. The inclusion criteria included the following pathologies:

- Pseudophakic Bullous Keratopathy (PBK)
- Aphakic Bullous Keratopathy (ABK)
- Fuchs Endothelial Dystrophy (FED)

Post DSEK, the subjects evaluated at regular intervals pre

operatively and postoperatively at 1 week, 1 month and 6 months to document the clinical outcomes of DSEK surgery. Formal ethical permission was sought from the institutional ethical committee and only the participants who had consented to be a part of the study were included.

As per the inclusion criteria, only the patients who were diagnosed with endothelial pathology and presented to the tertiary care institute for further management were included. A total of 50 samples are included in the present analysis, the sampling method was purposive sampling based on operational feasibility.

### Results

All the patients were evaluated pre operatively and postoperatively at 1 week, 1 month and 6 months. The observations were recorded and charted for analysis. The statistical analysis was performed using ANOVA and paired t test. The mean age of subjects included in the present study was  $63.90 \pm 16.32$  years that included 33 male patients (66%) and 17 female patients (34%). Majority of subjects were from 61-70 age group (23%). The most common indication for DESK surgery in the present study was pseudophakic bullous keratopathy (PBK) in 43 cases (86%), which was followed by Fuch's endothelial dystrophy (FED) in 6 cases (12%). Only 1 case with Aphakic Bullous keratopathy (ABK) was included in the present study.

Table 1 narrates pre-operative visual acuity of more than 1.20 among 33 subjects whereas 17 patients had visual acuity greater than 2. None of the patients had pre-operative visual acuity less than 0.39. The mean ( $\pm 2SD$ ) pre-operative visual acuity (Log MAR) in the study was  $1.606 \pm 1.006$ . Post operatively at the end of 1 week, majority of the patients (34 cases) had visual acuity within range of 0.80-1.59. The mean ( $\pm 2SD$ ) Post-operative visual acuity (Log MAR) at the end of 1 week was  $1.131 \pm 1.012$ . Post operatively at the end of 1 month, the majority of the patients had their visual acuity within range of 0.40-0.79 which contributes for 22 cases, followed by visual acuity within range of 0.80-1.19 which contributes for 15 cases. Only 8 patients had visual acuity less than 0.39. The mean ( $\pm 2SD$ ) Post-operative visual acuity at the end of 1 month was  $0.778 \pm 1.002$ . At the end of 6 months, majority of the patients had their visual acuity less than 0.79, of which 19 patients had visual acuity more than 0.39. Only 3 patients had visual acuity more than 2.00. The mean ( $\pm 2SD$ ) post-operative visual acuity at the end of 6 months was  $0.657 \pm 1.172$ . The difference of post-operative BCVA at 1 month and 6 month was statistically not significant with p value  $> 0.05$ . Average BCVA pre operatively was  $1.606 \pm 1.006$ , whereas average BCVA at 1 week, 1 month and 6 months was  $1.154 \pm 1.012$ ,  $0.778 \pm 1.002$  and  $0.657 \pm 1.172$  respectively as shown in Graph 1. The statistical analysis of above observation using ANOVA test states the difference in preoperative BCVA and post-operative BCVA at 1 week, 1 month and 6 month as statistically significant with p value of  $< 0.01$ .

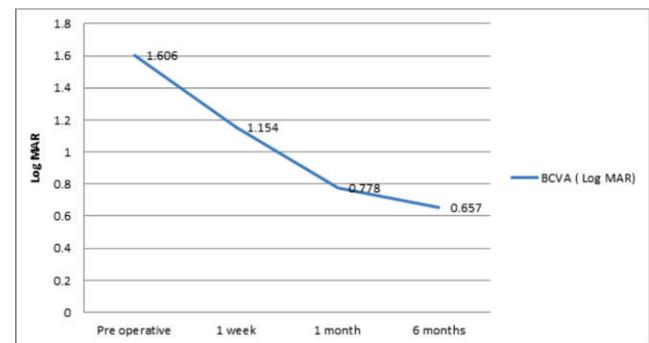
Average (Mean $\pm 2SD$ ) spherical and cylindrical refractive errors pre-operatively and at 1 month and 6 months are shown in Table 2. Pre-operatively, the average spherical

**Table 1: Distribution of BCVA (Best Corrected Visual Acuity) During Each Follow Up**

Visual acuity (Log MAR)	Pre- Operative (No of patients)	Post Operative ( No of patients)		
		1 week	1 month	6 months
$\geq 2.00$	17	4	3	3 (6%)
1.60-1.99	11	3	2	3 (6%)
1.20-1.59	11	14	0	2 (4%)
0.80-1.19	9	20	15	3 (6%)
0.40-0.79	2	7	22	20 (40%)
$\leq 0.39$	0	2	8	19 (38%)

**Table 2: Spherical and Cylindrical Refractive Outcomes**

Duration	Spherical Error (Mean $\pm 2SD$ )	Cylindrical Error (D) (Mean $\pm 2SD$ )
Pre Op	$+0.17 \pm 2(1.500)$	$-0.345 \pm 2(1.829)$
1 Month	$+0.76 \pm 2(1.575)$	$-0.375 \pm 2(1.968)$
6 Month	$+0.51 \pm 2(1.222)$	$-0.227 \pm 2(1.766)$



**Graph 1:** Graphical representation of average BCVA pre-operatively and at each follow up.

refractive error was  $+0.17 \pm 3.00$ , at 1 month, it was  $+0.76 \pm 3.15$  and at 6 months, it was  $+0.51 \pm 2.444$ . Pre-operatively the average (Mean $\pm 2SD$ ) cylindrical refractive error was  $-0.345 \pm 3.658$ , at 1 month, it was  $-0.375 \pm 3.936$  and at 6 months it was  $-0.227 \pm 3.532$ . The statistical analysis of the above observation indicates that the difference in spherical as well as cylindrical refractive error after DSEK surgery at each follow up was statistically not significant with 'p' value of  $> 0.05$ .

### Discussion

The mean age of the patients in present study was  $63.90 \pm 8.16$  years. Price et al (2005)<sup>5</sup> study had mean age of the patients of  $70 \pm 12$  years, with 60% female and 17% male cases. Another study done by Rice et al (2007)<sup>10</sup> had mean age of  $69 \pm 11$  years. Our study had younger population as compared to other studies. In our study, the major indication for DSEK was pseudophakic bullous keratopathy which contributed to 43(86%) cases, similarly in a study done by Basak et al (2008)<sup>6</sup> pseudophakic bullous keratopathy/ corneal edema in 53 (70.7%) cases was the main indication, whereas Fuch's endothelial dystrophy was the main indication of DSEK

surgery in studies done by Koenig et al (2009)<sup>4</sup>, Price et al (2005)<sup>5</sup> and Rice et al (2007).<sup>10</sup>

In our study, 19 cases (38%) had visual acuity less than 0.39 and 20 cases (40%) had visual acuity between 0.40-0.79 at 6 months. Similar findings were also seen in studies done by Basak et al (2008)<sup>6</sup> were post operatively average BCVA was 0.5 or better in 62(82.7%) cases at 3 months. In the study by Lee et al (2009)<sup>8</sup> the average best corrected visual acuity ranged from 0.2 to 0.5 at 9 months. Similarly Koenig et al (2009)<sup>7</sup> also noted that average BCVA pre-operatively was 0.7 and post operatively at 6 months, it was 0.3. Rice et al (2007)<sup>13</sup> study had mean BCVA pre-operatively of 1.2 and mean BCVA post operatively of 0.48. In Price et al (2005)<sup>5</sup> study, 31(62%) cases had average BCVA more than 0.3 and 38(76%) cases had BCVA more than 0.4 at 6 months after DSEK surgery. On summarizing findings of all studies, we found that with follow up of DSEK surgery, the average BCVA decreases. In our study, improvement in spherical and cylindrical error with DSEK surgery was insignificant, however, significant improvement was seen in the studies done by Koenig et al (2009)<sup>7</sup>, Price et al (2005)<sup>5</sup>, Lee et al (2010)<sup>8</sup> and Rice et al (2007).<sup>10</sup>

### Conclusion

After DSEK surgery, there is significant improvement in post-operative visual acuity at each follow up compared to pre-operative visual acuity. No significant change in spherical and cylindrical refractive errors are noted following DSEK surgery compared to pre-operative refractive error. However, visual rehabilitation is early in DESK surgery.

### References

1. Zirm E. Successful total keratoplasty. *Graefes Arch Klin Exp Ophthalmol* 1906; 64:581.
2. Varley GA, Meisler Dm, Complications of penetrating keratoplasty: graft infections. *Refract Corneal Surg*. 1991; 7:62-6.
3. Balachandran C, Ham L, Birbal RS, Wong TH, van der Wees J, Melles GR. Simple technique for graft insertion in Descemet-stripping (automated) endothelial keratoplasty using a 30-gauge needle. *J Cataract Refract Surg* 2009; 35:625-8.
4. Bernard E, McCarey, Henry F, Edelhauser, Michael J, Lynn, Review of Corneal Endothelial Specular Microscopy for FDA Clinical Trials of Refractive Procedures, Surgical Devices and New Intraocular Drugs and Solutions. *Cornea* 2008; 27:1-16.
5. Price FW, Price MO. Descemet's stripping with endothelial keratoplasty in 50 eyes: a refractive neutral corneal transplant. *J Refract Surg* 2005; 21:339-45.
6. Basak SK. Descemet stripping endothelial keratoplasty in endothelial dysfunctions: three month results in 75 eyes. *Indian J Ophthalmol* 2008; 56:291-6.
7. Koenig SB. Visual acuity, refractive error, and endothelial cell density six months after Descemet stripping and endothelial keratoplasty (DSEK). *Cornea* 2007; 26:670-4.
8. Price MO, Price FW Jr. Endothelial Keratoplasty-a review. *Clin Exp Ophthalmol* 2010; 38:128-40.
9. Price MO, Gorovoy M, Benetz BA, Price FW Jr, Menegay HJ, Debanne SM,. Descemet's stripping automated endothelial keratoplasty outcomes compared with penetrating keratoplasty from the Cornea Donor Study. *Ophthalmology* 2010; 117:438-44.
10. Rice A, Spokes DM, Anand S, Ball JL, Endothelial cell survival and graft profile analysis in descemet stripping endothelial keratoplasty. *Cornea* 2011; 30:865-71.

**Cite This Article as:** Tank A, Mehta F, Singhal D, Shah A, Acharya S. Documenting Visual Outcome of Descemet's Stripping Endothelial Keratoplasty in A Tertiary Care Setting From Gujarat.

**Acknowledgements:** Nil

**Conflict of interest:** None declared

**Source of Funding:** None

**Date of Submission:** 21 August 2017  
**Date of Acceptance:** 30 November 2017

### Address for correspondence

**Ami Tank** DNB

Resident,  
Department of Ophthalmology,  
Gujarat Medical Education & Research Society,  
Ahemdabad, Gujarat, India  
Email id: ameexyz@gmail.com



Quick Response Code