LONG TERM OUTCOME OF DEEP ANTERIOR LAMELLAR KERATOPLASTY (DALK) IN EGYPTIAN POPULATION WITH KERATOCONUS

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INTRODUCTION

Keratoconus is a bilateral degenerative disorder of the eye characterized by ectasia and thinning of the cornea, change to conical shape, irregular astigmatism, vision impairment, and eventual corneal scarring.

Although penetrating keratoplasty (PK) is still considered the gold standard for the treatment of advanced keratoconus (KCN), deep anterior lamellar keratoplasty (DALK) has emerged as an alternative treatment in the last decade.

Deep anterior lamellar keratoplasty (DALK) is an increasingly popular alternative to penetrating keratoplasty (PK) for patients with corneal diseases that spare the Descemet membrane (DM) and endothelium, such as Keratoconus. DALK is preferred in cases where the disease is restricted to the anterior layers of cornea.

DALK techniques have been described and classified into 2 categories, descemetic DALK (dDALK) and predescemetic DALK (pdDALK) depending on whether Descemet membrane-endothelium was thought to be exposed or minimal residual stroma was left behind.

AIM OF THE WORK

The aim of this study was to assess long term outcome of DALK in Keratoconus patients by measuring the best corrected visual acuity, autorefraction, pentacam and specular microscopy.

PATIENTS AND METHODS

Patients:

Inclusioncriteria: Preoperative clinical and topographic diagnosis of KC. Postoperative follow-up time equal to or more than 3 years .

Exclusioncriteria: Any coexisting ocular disease that could affect visual acuity. Other previous intraocular surgery.

Methods:

This retrospective study was conducted on 50 eyes for patients diagnosed with keratoconus and treated by DALK technique 3years ago or more by measuring the best corrected visual acuity, autorefraction, pentacam and specular microscopy. All patients included in this study were subjected to the following:

Detailed history taking including: Demographic dataandhistory of postoperative complaint (cataract, glaucoma, etc.)

Complete ophthalmic examination will be performed postoperatively by measuring the best corrected visual acuity, refractive error, endothelial cell density and corneal topographic keratometry.

RESULTS

Table 1 : Comparison between the different studied periods according to auto refraction

	1st visit (n = 50)	2nd visit (n = 50)	3rd visit (n = 50)	Final visit (n = 50)	Fr	p
UCVA (LogMAR)						
Min. – Max.	0.30-1.52	0.22 – 1.52	0.15 – 1.52	0.10-2.0	46.555*	<0.001*
Mean ± SD.	0.92 ± 0.37	0.83 ± 0.36	0.75 ± 0.41	0.79 ± 0.05		
Median (IQR)	1.0(0.70 – 1.30)	0.70(0.52 – 1.0)	0.70(0.40 – 1.0)	0.70(0.30 – 1.30)		
p_0		0.075	<0.001*	<0.001*		
Sig. bet .periods	p_1=0.008*,p_2=0.025*,p_3=0.699					
BCVA (LogMAR)						
Min. – Max.	0.22-1.0	0.15 – 1.0	0.10 – 1.0	0.05 – 1.0	134.405*	<0.001*
Mean ± SD.	0.63 ± 0.26	0.47 ± 0.25	0.35 ± 0.22	0.30 ± 0.24		
Median (IQR)	0.70(0.40– 0.70)	0.40(0.30 – 0.52)	0.30(0.22–0.40)	0.22(0.15 – 0.40)		
p_0		0.003*	<0.001*	<0.001*		
Sig. bet. periods	p_1<0.001*,p_2<0.001*,p_3=0.003*					
CYL(diopter)						
Min. – Max.	-9.0 – -0.10	-9.0 – -0.50	-9.0 – -0.50	-9.0 – 2.25	71.822*	<0.001*
Mean ± SD.	-4.55 ± 2.51	-4.37 ± 2.50	-4.10 ± 2.50	-3.69 ± 2.75		
Median (IQR)	-5.50(-6.50--2.0)	-5.0(-6.0 --2.0)	-4.50(-6.0 ---2.0)	-4.0(-5.50 ---1.50)		
p_0		0.188	<0.001*	<0.001*		
Sig. bet. periods	p_1=0.005*,p_2<0.001*,p_3=0.025*					
MRSE (diopter)						
Min. – Max.	-19.0 – 8.0	-19.0 – -1.0	-19.0 – -1.0	-19.50 – 5.0	3.102	0.376
Mean ± SD.	-5.0 ± 5.37	-6.20 ± 4.56	-5.92 ± 4.65	-4.76 ± 5.98		
Median (IQR)	-4.0(-6.0 --2.50)	-4.0(-8.0 – -3.0)	-4.0(-7.0 – -3.0)	-4.0(-7.25– --1.75)		

IQR: **Inter quartile range**   SD: **Standard deviation**
Fr: **Friedman test**, Sig. bet. periods was done using **Post Hoc Test (Dunn's)**
p: p value for comparing between the studied periods
p_0: p value for comparing between **1st visit** and **each other period**
p_1: p value for comparing between **2nd visit** and **3rd visit**
p_2: p value for comparing between **2nd visit** and **Final visit**
p_3: p value for comparing between **3rd visit** and **Final visit**
*: Statistically significant at p ≤ 0.05
1st visit: **After 3 months**
2nd visit: After 1 year
3rd visit: After 3 years
Final visit: >3 years

Table 2: Comparison between Big bubble and manual according to auto refraction (Final visit >3 years)

	Big bubble (n = 38)	Manual (n = 12)	Test of sig.	P
UCVA(LogMAR)				
Min. – Max.	0.10-1.52	1.0 – 2.0	U=80.0	0.001*
Mean ± SD.	0.64 ± 0.45	1.27 ± 0.37		
Median (IQR)	0.52 (0.30 – 1.0)	1.15 (1.0 – 1.30)		
BCVA(LogMAR)				
Min. – Max.	0.05 – 0.40	0.52 – 1.0	U=0.0*	<0.001*
Mean ± SD.	0.19 ± 0.10	0.66 ± 0.18		
Median (IQR)	0.15 (0.15 – 0.22)	0.61 (0.52 – 0.70)		
CYL(Diopter)				
Min. – Max.	-8.50 – -0.50D	-9.0 – 2.25D	U=188.0	0.362
Mean ± SD.	-3.87 ± 2.32	-3.13 ± 3.91		
Median (IQR)	-4.0 (-5.50 – -1.50) D	-3.0 (-5.50 – -0.50) D		
MRSE (diopter)				
Min. – Max.	-9.50 – 5.0D	-19.50 – 4.0D	U=88.0*	0.001*
Mean ± SD.	-3.02 ± 3.92D	-10.29 ± 7.98D		
Median (IQR)	-4.0 (-5.50 – 0.75) D	-12.25 (-16.0 – -5.75) D		
Sph(diopter)				
Min. – Max.	-6.50 – 5.50D	-19.25 – 2.25D	U=94.0*	0.002*
Mean ± SD.	-0.79 ± 3.47D	-7.83 ± 7.36D		
Median (IQR)	-1.25 (-2.75 – 2.75) D	-7.25 (-13.0 – -2.50) D		
A				
Min. – Max.	5.0 – 165.0°	50.0 – 160.0°	t=1.159	0.252
Mean ± SD.	98.68 ± 41.52°	82.83 ± 40.59°		
Median (IQR)	100.0 (80.0 – 120.0) °	67.50 (52.0 – 100.0) °		

IQR: **Inter quartile range**   SD:**Standard deviation**
U: **Mann Whitney test**   t: **Student t-test**
p: p value for comparing between the studied groups
*: Statistically significant at p ≤ 0.05

CONCLUSION

DALK provides stable long-term visual and refractive outcomes. In DALK, manual lamellar dissection is a reasonable alternative when big bubble separation of the descemet's membrane is not achieved.