Descemet's stripping automated endothelial keratoplasty(DSAEK) with Anterior Chamber Intraocular Lenses –Complications and 3 year outcomes

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FINANCIAL DISCLOSURES

None for Li Lim, Marcus Ang, Hla M Htoon

Donald Tan and Jodhbir S Mehta, inventors of the EndoGlide, have financial interests in the device (AngioTech, Reading, Pennsylvania, USA/Network Medical Products, North Yorkshire, UK).

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Introduction

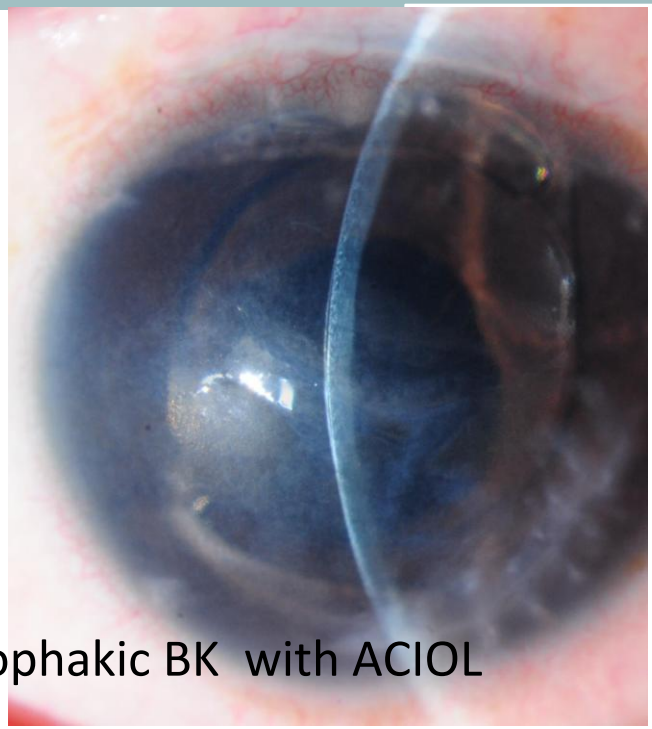
Performing DSAEK in an eye with an ACIOL can be challenging due to the shallower anterior chamber depth, difficulty in unfolding the graft or the escaping of air from the anterior chamber in the presence of the peripheral iridotomy.

Options for intraocular lens

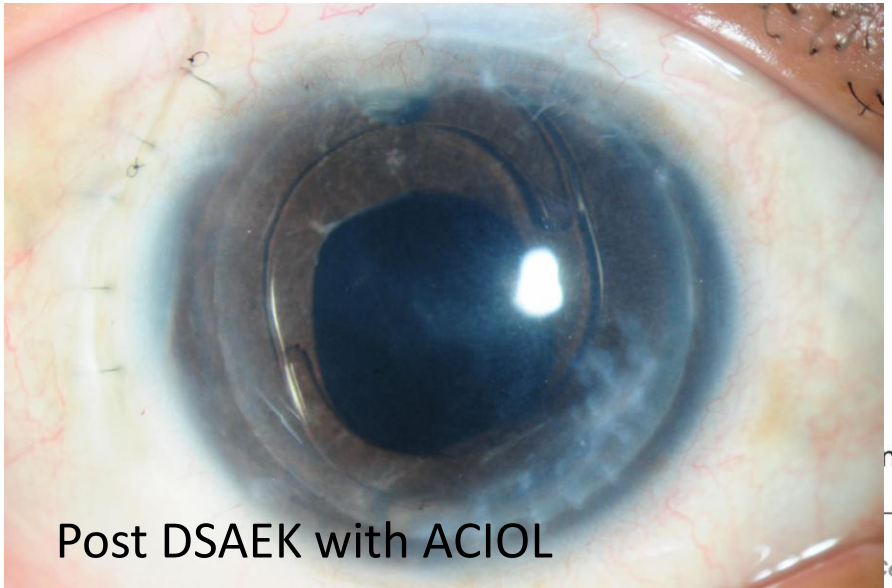
- Whether to perform a DSAEK and retain the ACIOL OR
- Perform an IOL exchange (either in conjunction or as a staged procedure).

PURPOSE

- To describe outcomes and complications following Descemet's stripping automated endothelial keratoplasty (DSAEK) in eyes with pseudophakic bullous keratopathy (BK) while retaining the anterior chamber intraocular lenses (ACIOL).



Pseudophakic BK with ACIOL



Post DSAEK with ACIOL

Methods

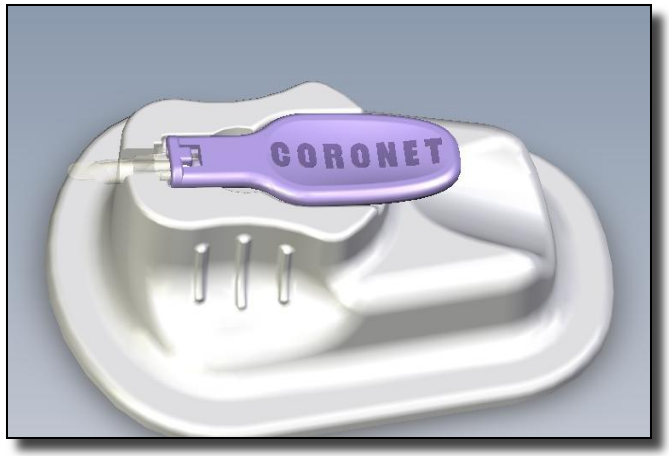
- Data was obtained from the Singapore Corneal Transplant Study (SCTS),* which is an audited, prospective cohort study which tracks and records all clinical data and outcomes in patients undergoing corneal transplants
- All consecutive patients who underwent DSAEK for bullous keratopathy from 1st January 2008 to 1st April 2010 were included.
- Eyes with BK, which underwent DSAEK while retaining ACIOL (n=18),were compared to those with DSAEK alone with the posterior chamber intraocular lenses left in place (n=114).
- Main outcome measures were endothelial cell loss and graft survival
- All surgeries were performed by the 5 corneal surgeons at SNEC, which included cases performed or partially performed by corneal fellows in training under direct supervision

*Tan DT, Janardhanan P, Zhou H, et al. Penetrating keratoplasty in Asian eyes: the Singapore Corneal Transplant Study. Ophthalmology 2008;115:975-82 e1.

Surgical Technique

- Descemet's stripping automated endothelial keratoplasty surgeries were performed by non-folding techniques
  - Sheets glide technique,[1] or
  - The Endoglide (Angiotech, Reading Pennsylvania, USA/ Network Medical Products, North Yorkshire, UK) technique.[2]

Tan Endoglide



1. *Mehta JS, Por YM, Beuerman RW, Tan DT. Glide insertion technique for donor cornea lenticule during Descemet's stripping automated endothelial keratoplasty. J Cataract Refract Surg 2007;33:1846-50.*
2. *Gangwani V, Obi A, Hollick EJ. A prospective study comparing EndoGlide and Busin glide insertion techniques in descemet stripping endothelial keratoplasty. Am J Ophthalmol 2012;153:38-43 e1.*

Characteristics of patients(DSAEK,ACIOL and PCIOLwith BK)

		DSAEK		
	Total (n=132)	ACIOL (n=18)	PCIOL (n=114)	P value
Mean age, years (±SD)	69.0(10.0)	69.7(12.1)	68.9(9.7)	0.965
Gender (%)				
Male	67(50.8)	10(55.5)	57(50.0)	0.801
Female	65(49.2)	8(44.5)	57(50.0)	
Race (%)				
Chinese	87(65.9)	13(72.2)	74(64.9)	
Malay	7(5.3)	1(5.6)	6(5.3)	0.892
Indian	8(6.1)	0(0.0)	8(7.0)	
Others	30(22.7)	4(22.2)	26(22.8)	
Baseline/Pre-operative				
Visual Acuity (logMAR; mean, ±SD)	1.6(0.7)	1.8(0.7)	1.6(0.8)	0.147
Pre-operative glaucoma (%)	41(31.1)	6(33.2)	35(30.7)	0.823
Donor characteristics				
Donor ECD (mean, ±SD)	2827(219)	2822(277)	2827(210)	0.878
Donor thickness (microns; mean, ±SD)	186(47)	181(41)	187(48)	0.778
Donor diameter (mm; mean, ±SD)	8.6(0.4)	8.7(0.4)	8.6(0.4)	0.600

DSAEK = Descemet's stripping automated endothelial keratoplasty; ACIOL = Anterior chamber intraocular lens; PCIOL = Posterior chamber intraocular lens; ECD=endothelial cell density; SD=standard deviation

Outcomes and Complications	ACIOL (n = 18)	PCIOL (n = 114)	P Value
Outcomes (1 year)			
[a]Post-operative ECD (mean, ±SD)	1910(615)	2132(609)	0.618
[b]Number of graft failure at 1 year (%)	0(0.0)	3(2.6)	0.486
Post-operative visual acuity			
Overall (logMAR; mean, ±SD)	0.7(0.7)	0.6(1.1)	0.630
[c]Outcomes (3 years)			
Post-operative ECD (mean, ±SD)	1236(762)	1906(587)	0.022
Number of graft failures at 3 years (%)	7(36.8)	12(10.3)	0.006
[d]Complications			
Glaucoma	8(44.4)	20(17.5)	0.009
Graft rejection episode	0(0)	2(1.8)	0.644
Graft detachment	0(0)	1(0.9)	0.745
Corneal infection	0(0)	2(1.8)	0.644
Epitheliopathy	0(0)	2(1.8)	0.644
Primary graft failure	0(0)	1(0.9)	0.745
Recurrence of primary disease	0(0)	0(0)	NA
Viral/ herpetic infection	0(0)	0(0)	NA
Suprachoroidal hemorrhage	0(0)	0(0)	NA
Endophthalmitis	0(0)	0(0)	NA

DSAEK = Descemet's stripping automated endothelial keratoplasty; SD=standard deviation; ECD = Endothelial cell density; ACIOL = Anterior chamber intraocular lens; PCIOL = Posterior chamber intraocular lens; NA = Not applicable

[a]Number of patients with valid endothelial cell density (ACIOL, n=14; PCIOL, n=101).
[b]Graft failure was defined as irreversible loss of optical clarity, sufficient to compromise vision for a minimum of three consecutive months
[c]Number of patients (ACIOL, n=8; PCIOL, n=39).
[d]Complications as recorded in our prospective SCTS database at 1 year follow-up

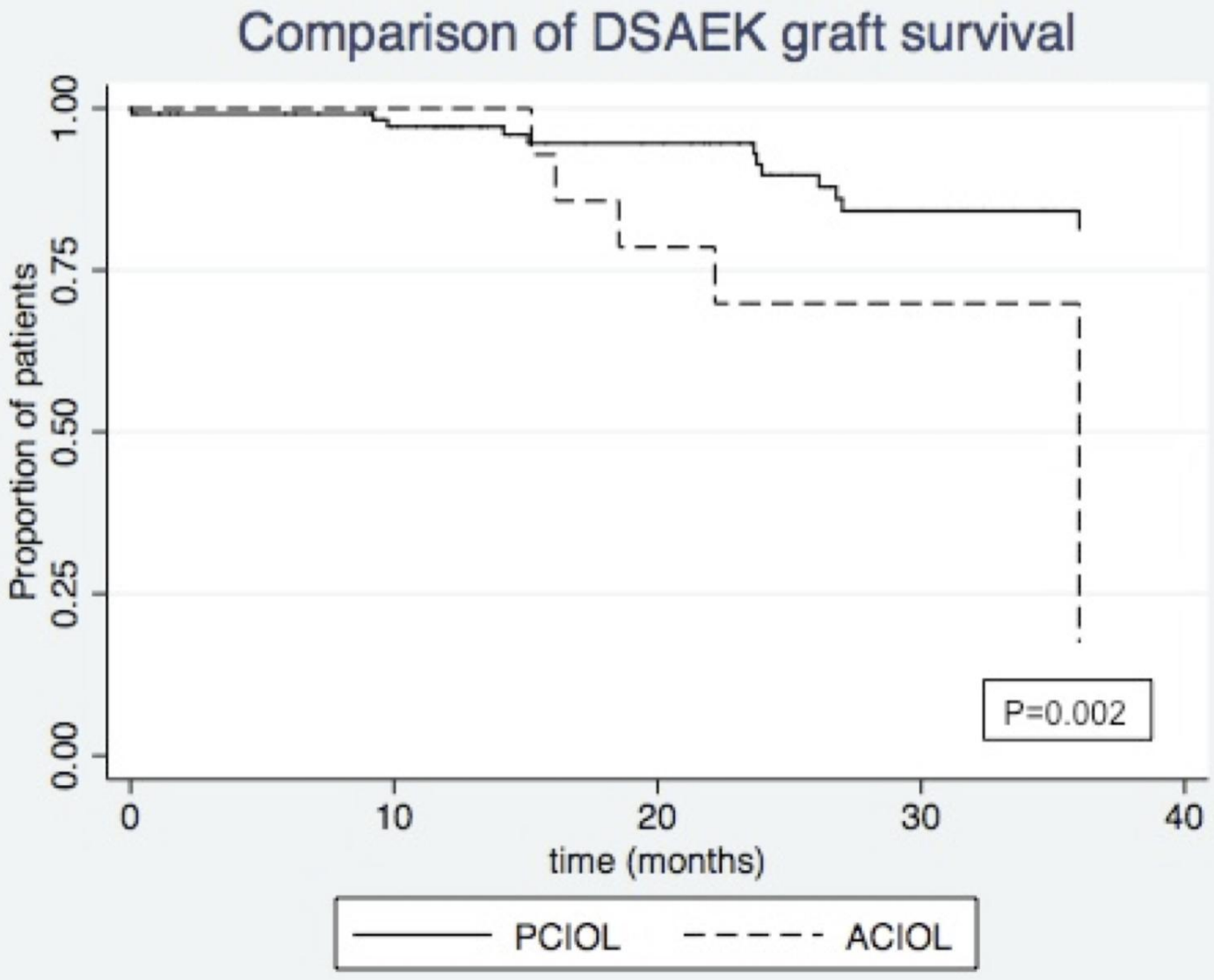
Summary of Results

- Higher incidence of de novo glaucoma compared to DSAEK with PCIOL.
  - 4 X higher risk of developing glaucoma(44.4%), compared to DSAEK alone (17.5%) in eyes that did not have pre-existing glaucoma (OR 3.76 95% Confidence Interval 1.3-10.7, P=0.013).
  - 5 eyes (27.8%) required glaucoma filtering surgery (trabeculectomy with topical mitomycin-C) within 1 year, which was significantly higher than in DSAEK with PCIOL group (11 eyes, 9.6%; P = 0.029).

<u>Endothelial cell counts</u>

- The EC loss was significantly higher in DSAEK with ACIOL at 3 years compared to DSAEK (55.3%±29.2 versus 33.3%±20.8; P=0.01), with a significantly lower mean ECD (P=0.044).
- <u>No significant difference in BCVA:</u> Mean BCVA was 20/40 (logMAR, 0.27±0.11) in the DSAEK with ACIOL group (9 eyes) versus the DSAEK group (87 eyes) with a mean post-operative BCVA of 20/40 (logMAR 0.28±0.11, P=0.601)- co-morbidities excluded.

Poorer graft survival in the DSAEK-ACIOL group vs the DSAEK group



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Limitations of Study

- Limited follow-up of 1 year and the small sample size
- However, it would be difficult to attain the large numbers of eyes required to study the outcomes of DSAEK while retaining the ACIOL such as percent EC loss;
  - our current sample size is comparable to previous similar published reports*
  - *Esquenazi S, Schechter BA, Esquenazi K. Endothelial survival after Descemet-stripping automated endothelial keratoplasty in eyes with retained anterior chamber intraocular lenses: two-year follow-up. J Cataract Refract Surg. 2011 Apr;37(4):714-9.

Conclusion

- DSAEK while retaining the ACIOL in selected cases has greater EC loss and graft failure at 3 years follow-up. Moreover, there is a higher risk of developing de novo glaucoma in these eyes.
- Direct comparative studies between DSAEK-ACIOL and DSAEK with IOL exchange are required to confirm the superiority of either procedure in such eyes with corneal decompensation