Two Year Outcomes of iStent vs Kahook Dual Blade Goniotomy When Combined with Cataract Surgery in Patients with Mild to Moderate Stage Glaucoma

Joel Epling, Jaime Tran, Dr. Christopher Grenier MD, Dr. Michael Morgan MD, Dr. Lena Al-Dujaili MD, Dr. James David MD

LSU-HSC Department of Ophthalmology, LSU Healthcare Network, and Oschner Medical Center.

Introduction and Hypotheses

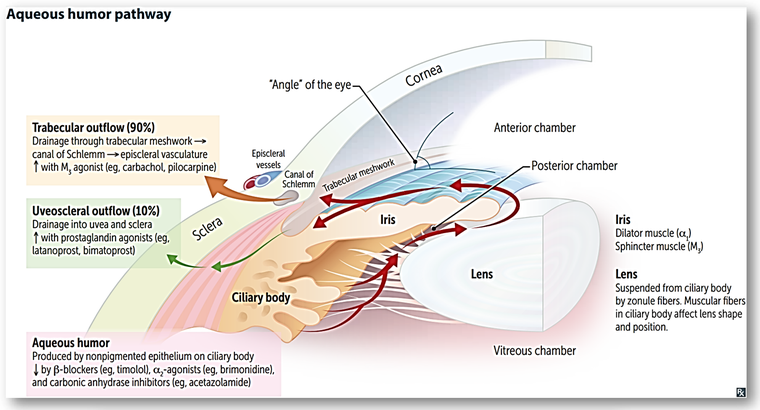
Glaucoma is the leading cause of irreversible blindness worldwide. The disease typically presents as optic nerve damage associated with elevated intraocular pressure (IOP). Elevated IOP in primary open-angle glaucoma is believed to be caused by overproduction or decreased drainage of aqueous humor. The primary site of drainage is the trabecular meshwork, a common target for minimally invasive glaucoma surgeries (MIGS). MIGS procedures are often done at the time of cataract surgery to reduce medication burden and decrease IOP. The purpose of this study is to compare two-year outcomes of Kahook Dual Blade (KDB) goniotomy and iStent trabecular micro-bypass device implantation, two MIGS procedures with few head-to-head comparisons and limited long-term data.

Hypotheses:

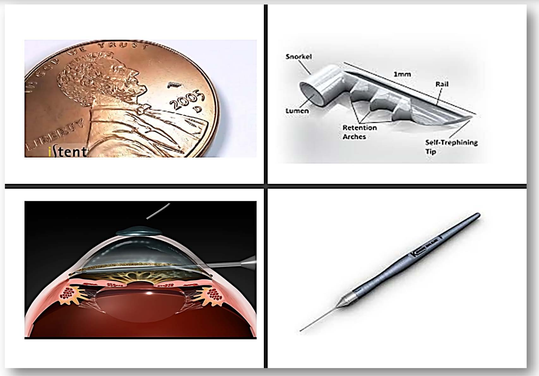
- Both KDB goniotomy and iStent will reduce IOP as well as medication burden.
- One of the devices will outperform the other.
- With longer follow-up, outcomes may not be as favorable as previous studies.
- The risk profile will be favorable in each group.

Methods

We performed an IRB-approved retrospective chart review of all patients with mild-to-moderate glaucoma who had cataract extraction combined with KDB or iStent and a minimum two-year follow up performed by two surgeons. Success was defined as IOP reduction of at least 20% from baseline or reduced use of at least one IOP-lowering medication. All adverse outcomes were recorded. Preliminary statistical analysis of outcomes at one year was completed with t-tests and Pearson's chi square test ($p<0.05$). Univariate and multivariate models of logistic regression analysis will be completed.



iStent



KDB

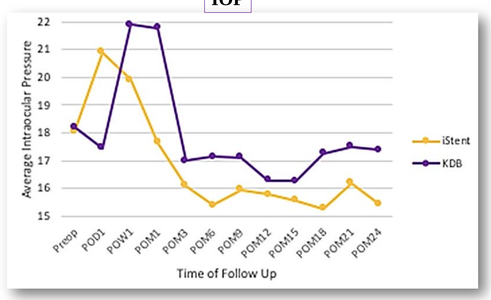
Demographics

	Phaco-KDB	Phaco-iStent	P-value
N	50	138	
Age (mean, years (SD))	73 (+/- 7)	74 (+/- 8)	0.31
Eye treated (n %)			
• Right	20 (40 %)	71 (51 %)	0.17
• Left	30 (60 %)	67 (49 %)	
Gender (n (%))			
• Male	12 (24 %)	49 (36 %)	0.14
• Female	38 (68 %)	89 (64 %)	
Race/ethnicity (n (%))			
• Caucasian	26 (52 %)	82 (59 %)	0.36
• African American	21 (42 %)	54 (39 %)	0.72
• Other	3 (6 %)	2 (2 %)	
Cup-to-disc ratio			
• Mean (SD)	0.47 (+/- 0.18)	0.55 (+/- 0.14)	**0.01*** **
• Range	0.20 – 0.95	0.2 – 0.9	
Glaucoma stage (n)			
• Mild	26 (52 %)	70 (51 %)	0.87
• Moderate	24 (48 %)	68 (49 %)	
CCT (mean (SD)	548 (+/- 32) *N = 22*	544 (+/- 41) *N = 49*	0.69
History of (n (%))			
• SLT	23 (46 %)	49 (36 %)	0.19
• LPI	2 (4 %)	3 (2 %)	0.49
• Canaloplasty	0 (0 %)	1 (1 %)	N/A
Preop med use (n (%))			
• Alpha agonist	4 (8 %)	8 (6 %)	0.59
• Beta blocker	22 (44 %)	56 (41 %)	0.67
• PG analogue	41 (82 %)	114 (83 %)	0.92
• CAI - topical	16 (32 %)	17 (12 %)	**<0.01*** **
Number of preop drops (mean (SD))	1.7 (+/- 1.1)	1.4 (+/- 0.8)	0.10
Preop IOP	18.2 (+/- 3.9)	18.0 (+/- 3.9)	0.80

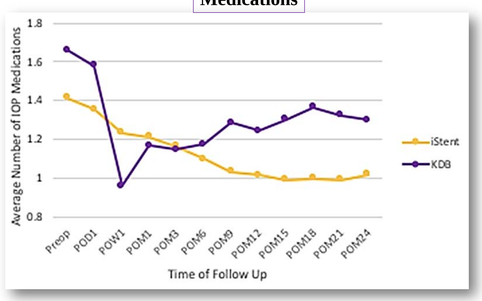
Complication Rates at 24 Months

	Phaco-KDB	Phaco-iStent	p-value
Prolonged iritis	4 (8 %)	0 (0 %)	N/A
Recurrent iritis	2 (4 %)	4 (3 %)	0.70
Postoperative hyphema	3 (6 %)	1 (1 %)	**0.03*** **
IOP spike (≥ 10mmHg from baseline)	10 (20%)	24 (17%)	0.68
IOP spike (≥ 10mmHg from baseline at >POD1 visit)	7 (14%)	8 (6%)	0.05
Posterior capsular opacification	10 (20%)	18 (13%)	0.24
Posterior vitreous detachment	2 (4 %)	16 (11%)	0.12
Ptosis	0 (0 %)	2 (1 %)	N/A
Persistent corneal edema	0 (0 %)	0 (0 %)	N/A
Cystoid macular edema without vascular event	0 (0 %)	2 (1 %)	N/A
Epiretinal membrane	0 (0 %)	1 (1 %)	N/A
Vascular occlusion	0 (0 %)	3 (2 %)	N/A

IOP

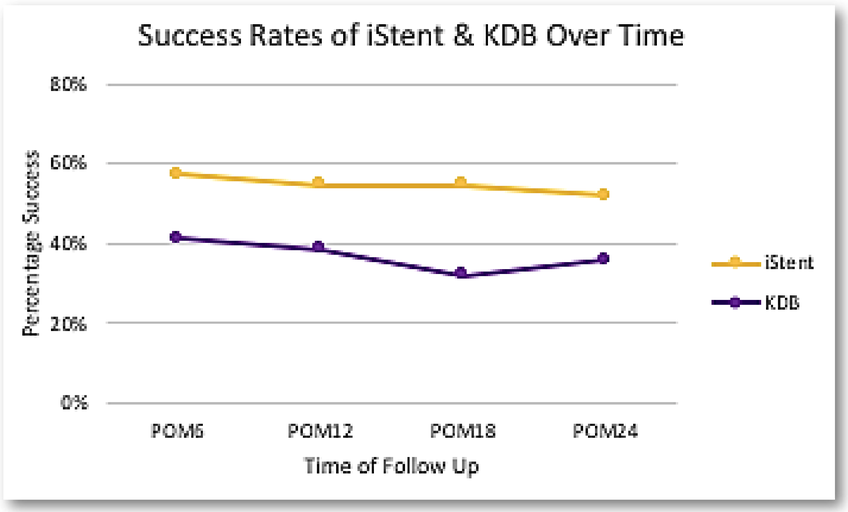


Medications



Results

Of 50 eyes treated with KDB and 138 eyes treated with iStent, success rates at two years were similar between groups at 46% and 52%, respectively ($p = 0.45$). IOP and medication burden decreased from baseline in the iStent group ($p<0.001$ and $p<0.001$, respectively), but not the KDB group ($p=0.22$ and $p=0.07$, respectively). iStent success rates were higher in mild stage glaucoma than moderate stage (61% vs 43%, $p=0.03$), but this was not true for KDB ($p=0.08$). Patients with a history of selective laser trabeculoplasty (SLT) were found to have lower success rates with iStent (28% vs 44%, $p=0.047$), but this was not noted for KDB ($p=0.36$). KDB had higher incidence of short-term postoperative hyphema (6% vs 1%, $p=0.03$), but other complications were similar between groups.



Variables Predictive of Treatment Success

	Phaco-KDB			Phaco-iStent		
	Success	Failure	*p-value*	Success	Failure	*p-value*
N	23	27		72	66	
Age (mean, years (SD))	72.1 (6.4)	73.9 (7.3)	0.37	74.4 (8.2)	74.3 (7.5)	0.97
Eye treated						
• Right	10	10	0.64	41	30	0.18
• Left	13	17		31	36	
Gender						
• Male	7	5	0.32	24	25	0.58
• Female	16	22		48	41	
Race/ethnicity						
• Caucasian	8	13	0.34	44	38	0.67
• African American	14	12	0.25	28	26	0.95
• Other	1	2	0.65	0	2	N/A
Cup-to-disc ratio (mean (SD))	0.43 (0.17)	0.50 (0.18)	0.21	0.53 (0.14)	0.57 (0.14)	0.07
Glaucoma stage (n)						
• Mild	15	11	0.08	43	27	**0.03*** **
• Moderate	8	16		29	39	
CCT (mean (SD))	550 (26)	546 (36)	0.78	541 (35)	546 (47)	0.67
History of (n)						
• SLT	9	14	0.36	20	29	**0.047*** **
• LPI	2	0	N/A	2	1	0.94
• Canaloplasty	0	0	N/A	1	0	N/A
Preop med use (n)						
• Alpha agonist	2	2	0.86	6	2	0.18
• Beta blocker	9	13	0.52	28	28	0.67
• PG analogue	23	18	N/A	58	56	0.51
• CAI - topical	6	10	0.41	9	8	0.95
Number of preop drops (mean (SD))	1.7 (1.0)	1.6 (1.2)	0.64	1.4 (0.9)	1.4 (0.8)	0.88
Preop IOP (mean (SD))	18.5 (3.7)	18.0 (4.2)	0.66	18.7 (4.5)	17.3 (3.0)	0.052

Conclusion

These data suggest iStent may be superior to KDB in terms of efficacy and safety profile at two years. Patients without a history of SLT and with milder stage glaucoma have higher likelihood of success with iStent. Limitations of this study include smaller case numbers of KDB goniotomy, and its retrospective design. Further follow-up and larger studies are needed to confirm these findings.