Canaloplasty MIGS Characteristics: Correlation Between Pressurized OVD Volume and Effectiveness on IOP and Medications in PACG eyes

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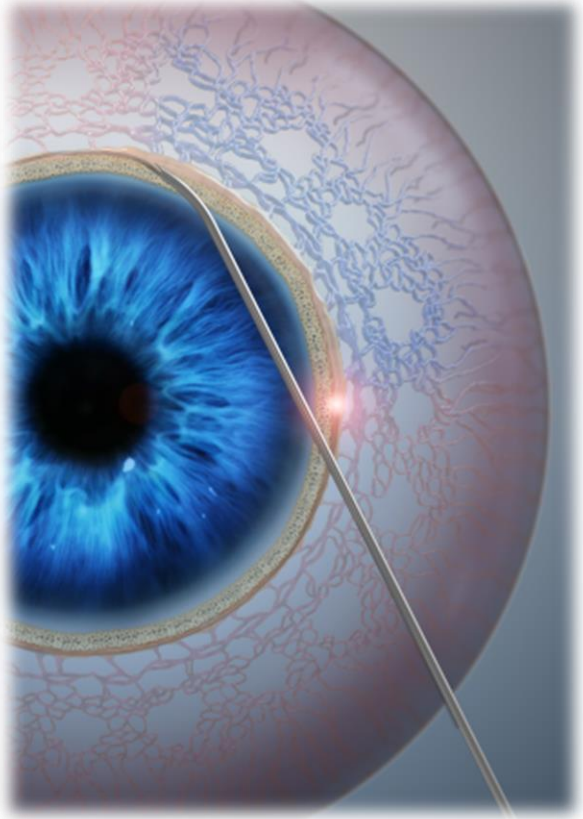
Overview

- Over the past decade, significant attention has focused on minimally invasive glaucoma surgery (MIGS) in open-angle glaucoma. However, there is a comparatively limited exploration of MIGS in primary angle-closure glaucoma (PACG) patients.[1-2]
- **Canaloplasty** is a MIGS that preserves the physiological anatomy of the eye and reestablishes natural aqueous humor outflow without the need for a stent or tissue removal, regardless of the degree of angle closure. [3-4]
- The technique involves using a microcatheter advanced 360 degrees through Schlemm's canal (SC), with subsequent pressurized injection of high molecular weight ophthalmic viscosurgical device (OVD) during withdrawal of the catheter.



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Overview

How does canaloplasty work?

Canaloplasty achieves these multiple mechanisms of action through both mechanical and physiological effects

Mechanical Effect

1. **Microcatheterization** breaks adhesions in SC
2. Breaks tethering of the juxtacanalicular tissue
3. Separates herniations of the inner wall of SC from the outer wall

Physiological Effect

1. **Pressurized viscodilation** dilates SC and the collector channels
2. Importantly, it also creates focal disruptions within the TM.

Pressurized Volumetric Circumferential Viscodilation (PVC) determines whether viscodilation is clinically effective.

1. PRESSURIZED delivery of OVD
2. High VOLUME of OVD
3. The ability to deliver OVD across the full 360 degrees of SC

iTrack™ Advance

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Purpose

To investigate the correlation between the volume of ophthalmic viscosurgical device (OVD) delivered during ab-interno canaloplasty with the iTrack microcatheter (Nova Eye Medical) and its effectiveness in reducing intraocular pressure (IOP) and number of required medications in glaucoma patients.

Methodology

A single-center, retrospective case series

Eyes with a diagnosis of primary angle-closure glaucoma (PACG) based on gonioscopy findings were included.

All eyes received canaloplasty via an ab-interno technique using the iTrack with titrated pressurized OVD delivery.

Eyes were stratified based on:

- preoperative IOP (uncontrolled eyes defined as >18mmHg).
- number of medications (3+ medications).

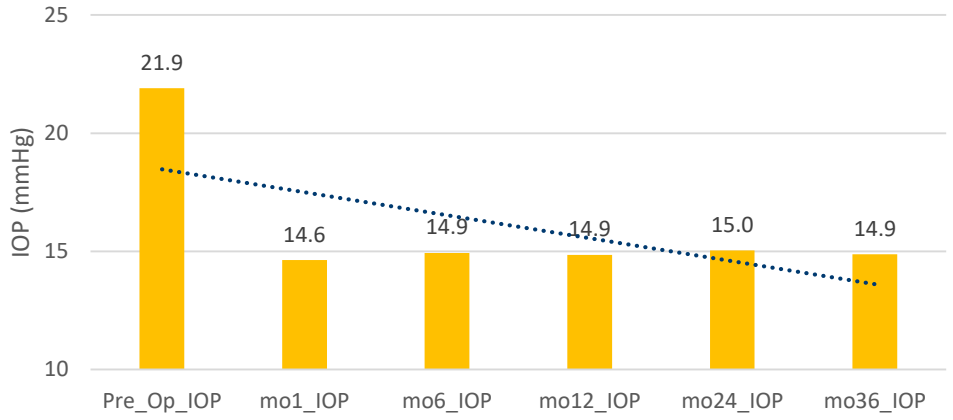
Outcome measures included

- IOP.
- Number of glaucoma medications.

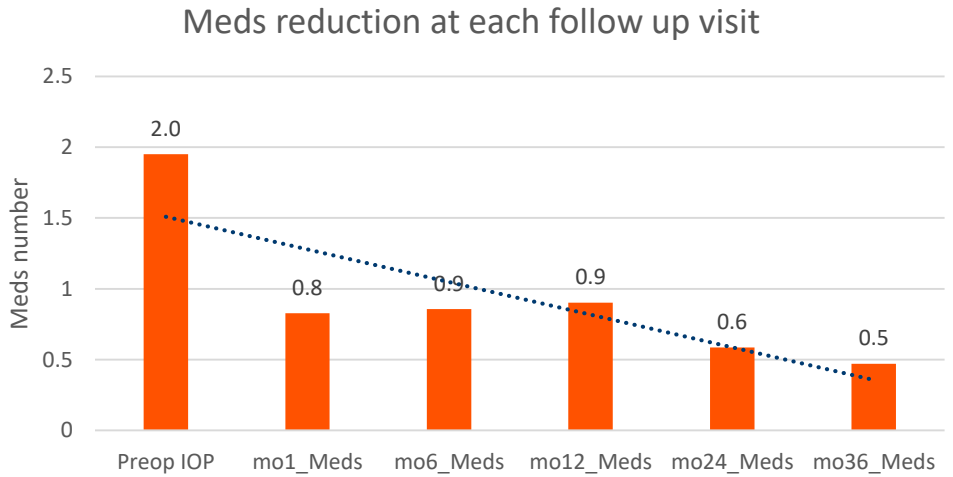
Patients were followed up at 3, 6, 12 months, and after 12 months up to 36 months.

Results

Number of eyes	60
Mean age	**63.9±11.5 years**
The mean latest follow-up (only including those after 12 months)	**26±9.2 months**.
Mean number of clicks "click delivers 2.8 µL of OVD into the canal"	**36** "average of 100 µL of OVD"



Mean baseline IOP (mmHg) and number of medications were 21.9±7.3 and 1.95±1.42, respectively, which reduced significantly to 14.6±3.73 and 0.96±1.18 (p<0.001), respectively, at the mean latest follow-up



Results (all eyes)

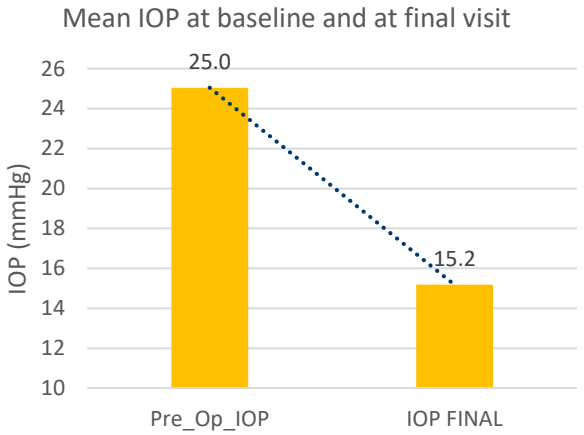
		Number of clicks	IOP_reduction	Meds_reduction	IOP_reduction_percent	Med_reduction_percent
Number of clicks	Pearson's r	—				
	p-value	—				
	N	—				
IOP_reduction	Pearson's r	0.032	—			
	p-value	0.838	—			
	N	43	—			
Meds_reduction	Pearson's r	0.327 *	0.250	—		
	p-value	0.032	0.080	—		
	N	43	50	—		
IOP_reduction_percent	Pearson's r	0.051	-0.908 ***	-0.072	—	
	p-value	0.746	<.001	0.621	—	
	N	43	50	50	—	
Med_reduction_percent	Pearson's r	-0.270	-0.114	-0.768 ***	0.002	—
	p-value	0.080	0.429	<.001	0.991	—
	N	43	50	50	50	—

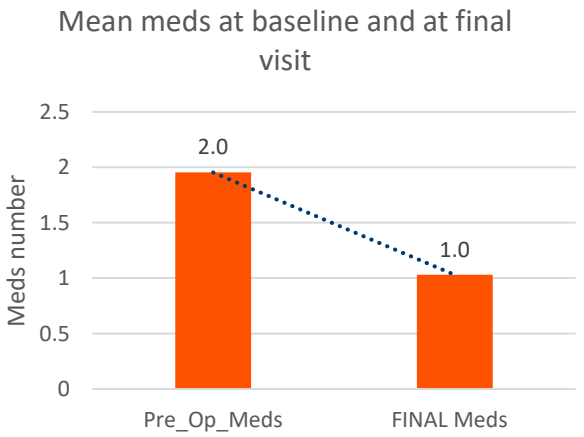
Note. * p < .05, ** p < .01, *** p < .001

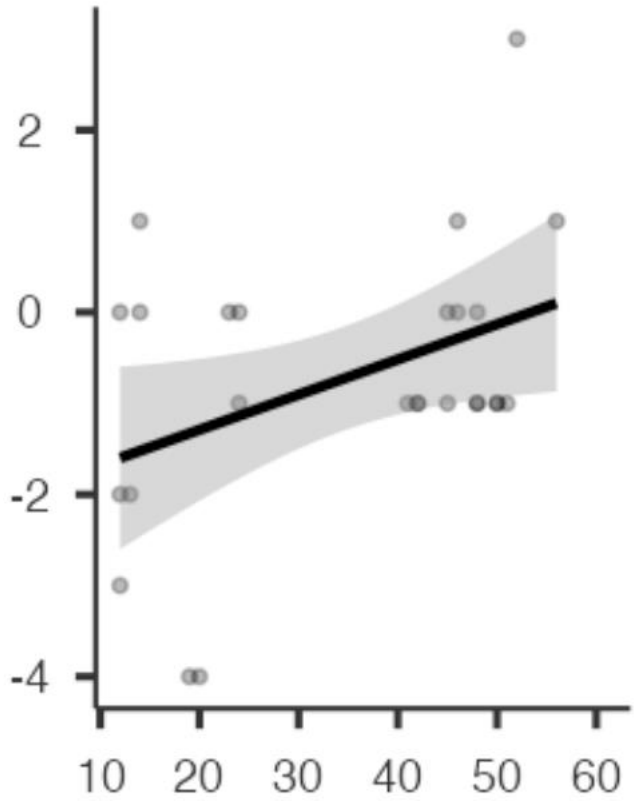
When all eyes were considered, the volume of OVD delivered was moderately correlated with medication reduction (Pearson's r=0.327; p=0.032).

Results (uncontrolled eyes)

Mean baseline IOP (mmHg) and number of medications for uncontrolled group were 25±5.9 and 1.95±1.41, respectively, which reduced significantly to 15.17±3.8 and 1.02±1.17 ($p<0.001$), respectively, at the mean latest follow-up



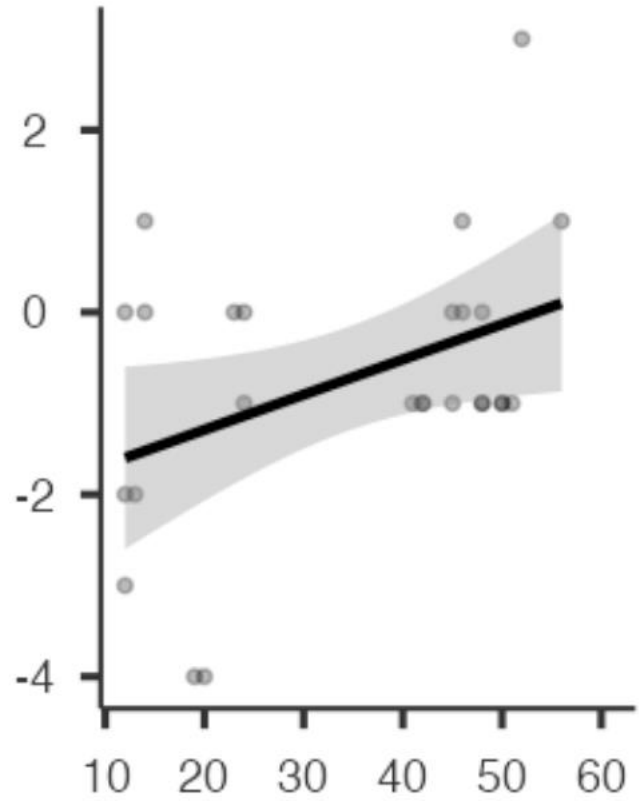




When only uncontrolled eyes (>18mmHg) (n=26) were considered, **the correlation between OVD delivered and medication reduction grew stronger and was significant (r=0.407; p=0.039).**

Results (uncontrolled eyes)

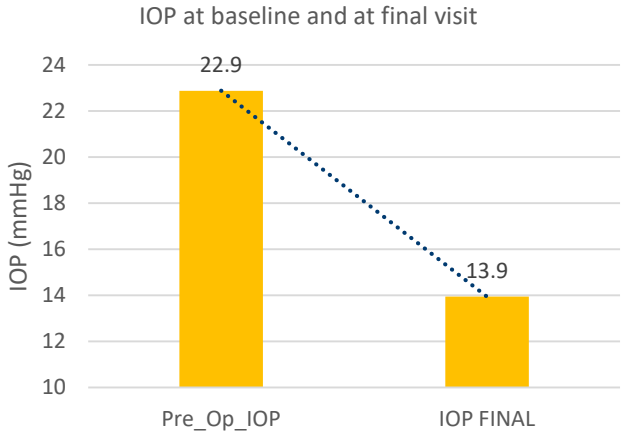
		2_Microboluses
2_Microboluses	Pearson's r	—
	p-value	—
	N	—
2_IOP_reduction	Pearson's r	0.159
	p-value	0.438
	N	26
2_Meds_reduction	Pearson's r	0.407 *
	p-value	0.039
	N	26

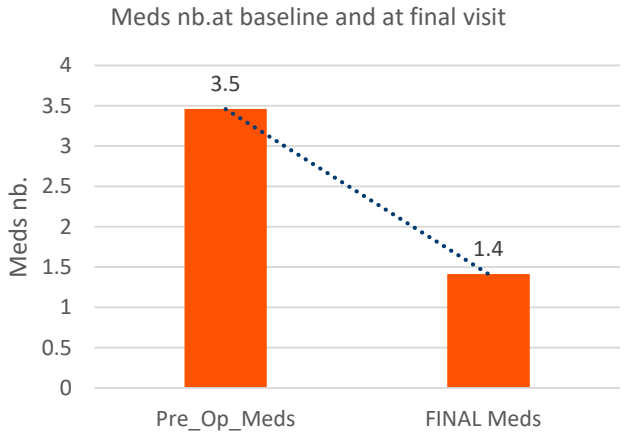


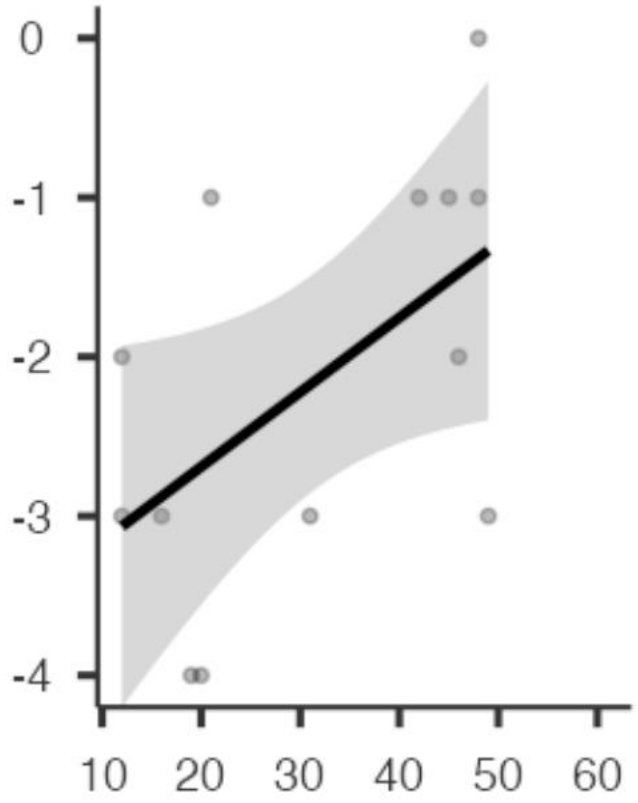
When only uncontrolled eyes (>18mmHg) (n=26) were considered, **the correlation between OVD delivered and medication reduction grew stronger and was significant (r=0.407; p=0.039).**

Results (eyes on 3+ meds)

Mean baseline IOP (mmHg) and number of medications for meds 3+ group were 22.9±9 and 3.5±0.5, respectively, which reduced significantly to 13.9±4.1 and 1.4±1.3 ($p<0.001$), respectively, at the mean latest follow-up



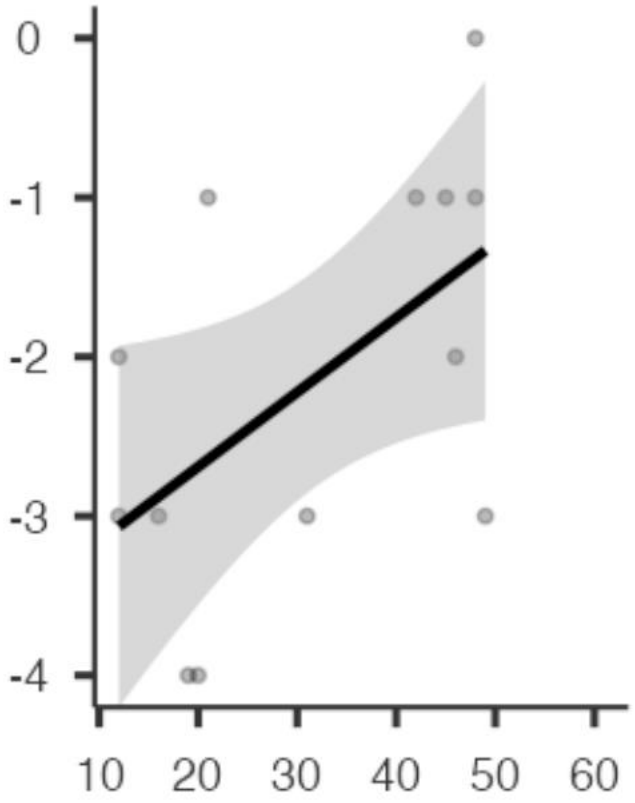




The correlation was strongest (r=0.544; p=0.05) when only eyes with 3 or more medications (n=13) were considered.

Results (eyes on 3+ meds)

		3_Microboluses
3_Microboluses	Pearson's r	—
	p-value	—
	N	—
3_IOP_reduction	Pearson's r	0.220
	p-value	0.469
	N	13
3_Meds_reduction	Pearson's r	0.554 *
	p-value	0.050
	N	13



The correlation was strongest (r=0.544; p=0.05) when only eyes with 3 or more medications (n=13) were considered.

Discussion

- Pressurized viscodilation, performed after catheterization, aims to dilate the SC and the distal outflow system and to create micro-perforations within the trabecular meshwork (TM), producing a potentially durable anatomical effect. Certain types and amounts of OVDs may be associated with higher success rates than others. However, there's limited evidence in the literature.
- In our study, we found a correlation between the number of clicks (the volume of OVD delivered into Schlemm's canal) and the reduction of number of medications, meaning that the greater the volume of OVD delivered, the greater the reduction of medications
- *When only uncontrolled eyes were considered, the correlation grew stronger. This correlation was strongest when only eyes with 3 or more medications were considered.*

Conclusion

OVD volume delivered into Schlemm's canal was found to be positively correlated with medications reduction: a higher volume of OVD delivered in the canal was associated with a larger reduction of the number of medications. This correlation was observed to be stronger in eyes with high preop IOP or which required a high (3+) number of medications.