

## BACKGROUND

Gonioscopy-assisted transluminal trabeculotomy (GATT) is a promising method of minimally invasive glaucoma surgery (MIGS) that has been shown to lower intraocular pressure (IOP) in glaucoma patients. GATT involves creating a trabeculotomy using a polypropylene suture passed through Schlemm's canal via goniotomy.

Currently, trabeculectomy is the gold-standard glaucoma surgery but carries higher risk of sight threatening complications. This has encouraged glaucoma surgeons to consider gonioscopy assisted transluminal trabeculotomy (GATT) and other minimally invasive glaucoma surgery (MIGS) for a wide array of glaucoma patients. However, patients presenting with medically refractory high intraocular pressure (IOP) would be less likely considered for MIGS procedures as they required a lower target IOP.

## PURPOSE

The purpose of this study is to explore the potential utility and safety profile of using GATT as a surgical method to treat severe and/or medically refractory glaucoma.

## METHOD

- This is a case series that investigates a cohort of patients presenting with IOP  $\geq 25$ mmHg who underwent the GATT procedure opposed to more invasive treatment with a mean follow-up time of 16.7 $\pm$ 11.4 months.
- A retrospective chart review of patients who underwent GATT between October 2015 and January 2019 was performed. This study included patients diagnosed with various types of glaucoma who had an IOP  $\geq 25$ mmHg while on medical therapy at the time of surgical decision.
- The primary outcomes of our study were change in IOP, change in medications, surgical complications, and need for additional glaucoma surgery.
- For analysis, patients were assigned to one of three subgroups based on the type of GATT intervention: GATT only, GATT in combination with cataract extraction (GATT + CE), and GATT in the setting of previous cataract extraction (GATT + Prior CE).

## RESULTS

### Baseline Patient Characteristics

A total of 92 GATT surgeries were performed on patients presenting with various types of glaucoma and an IOP  $\geq 25$ mmHg, with an average patient age of 59.8 $\pm$ 18.0. Overall, 20 patients received GATT only, 44 received GATT with CE and 28 received GATT with prior CE.

	GATT Only	GATT with CE	GATT with Prior CE	P Value
<b>Demographics</b>				
Median (IQR), years	45(27.5-55.3)	69(61.0-73.0)	69(50.0-76.0)	<0.001
Left eye, n (%)	7(35.0%)	21(47.7%)	17(60.7%)	0.209
Female, n (%)	6(30.0%)	21(47.7%)	10(35.7%)	0.344
Diabetes, n (%)	1(5.0%)	7(15.9%)	6(21.4%)	0.291
<b>Vision</b>				
Preoperative BCVA (logMAR), median (IQR)	0.1(0.1-0.3)	0.3(0.2-0.5)	0.4(0.2-0.6)	<0.001
Preoperative BCVA (logMAR) 0.4 or worse	4(20.0%)	21(47.7%)	16(57.1%)	0.032
<b>Glaucoma Type</b>				
Primary open-angle	5(25.0%)	10(22.7%)	12(42.9%)	0.167
Primary angle-closure	1(5.0%)	14(31.8%)	0(0.0%)	<0.001
Uveitic	5(25.0%)	4(9.1%)	4(14.3%)	0.238
Neovascular	0(0.0%)	4(9.1%)	1(3.6%)	0.289
Other	9(45.0%)	12(27.3%)	11(39.3%)	0.322
<b>Type of GATT, n(%)</b>				
360-degrees	9(45.0%)	9(20.5%)	16(57.1%)	0.005
270-degrees	3(15.0%)	7(15.9%)	8(28.6%)	0.353
180-degrees	8(40.0%)	26(59.1%)	4(14.3%)	<0.001
90-degrees	0(0.0%)	2(4.5%)	0(0.0%)	0.328

Table 1 - Baseline characteristics of study patients. BCVA = best-corrected visual acuity (LogMAR); IQR = interquartile range

Differences in baseline patient characteristics between subgroups were significant for age, visual acuity, proportion of closed angle glaucoma, and type of GATT performed.

### Reduction in Medication & IOP

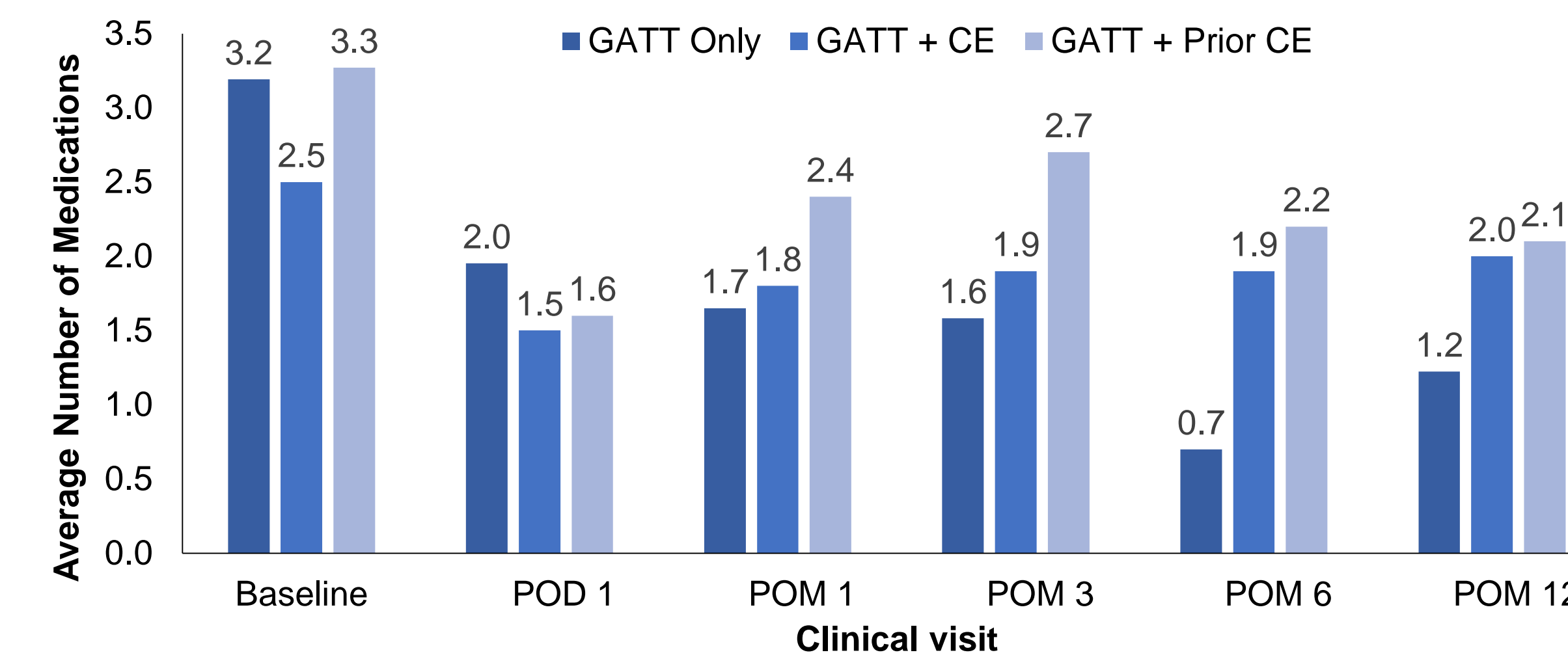


Figure 1. Average number IOP lowering medication used at various postoperative clinical visits

The overall mean reduction in medications was 1.3 (3.2 $\pm$ 1.4 to 1.9 $\pm$ 1.3, P<0.001). Similarly, there was a significant reduction in medication for all subgroups.

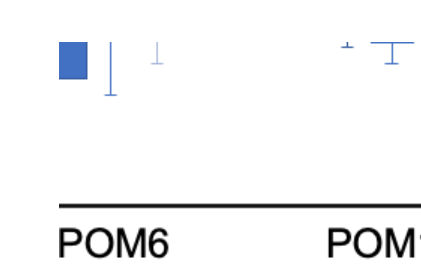


Figure 2. Average IOP measurements at various postoperative clinical visits

The overall mean reduction in IOP at 12 months was 43.2% (26.3 $\pm$ 10.5 mmHg to 14.9 $\pm$ 6.2, P<0.001). Similarly, there was a significant reduction in IOP for all subgroups

### Complications & Interventions

Postoperative Complications	GATT Only (N=20)	GATT + CE (N=44)	GATT + Prior CE (N=28)	Total Frequency (N=92)
Choroidal effusion	1	0	0	1
HypHEMA	8	13	12	33
HypHEMA > 2mm	2	0	4	6
Iritis	2	0	5	7
Corneal edema	1	4	3	8
Vitreous hemorrhage	0	3	6	5
Macular edema	0	2	2	4
NLP vision	0	1	0	1
Ptosis after 1 month	0	1	2	3
Binocular diplopia	0	1	2	3

Figure 3. Postoperative complications in eyes organized by subgroups based on the type of GATT intervention

In total, 55 (59.8%) of patients experienced a postoperative complication, with hypHEMA being the most prevalent. All hypHEMA cases reached resolution, with 95% resolving within 30 days of onset.

Postoperative Interventions	GATT Only (N=20)	GATT + CE (N=44)	GATT + Prior CE (N=28)	Total Frequency (N=92)
Needling	0	1	2	3
Anterior chamber tap	2	5	7	14
Laser trabeculoplasty	3	3	4	10
Cyclophotocoagulation	2	3	8	13
Trabeculotomy	0	0	1	1
Trabeculectomy	1	0	0	1
Glaucoma valve implantation	0	0	4	4

Figure 4. Postoperative interventions in eyes organized by subgroups based on the type of GATT intervention

In total, 30 (32.6%) of patients required additional intervention for IOP control with cyclophotocoagulation being the most common reoperation needed by 13 (14.1%) of patients.

## CONCLUSIONS & LIMITATIONS

- GATT is a safe procedure that effectively lowers IOP and decreases medications in all subgroups of glaucoma patients presenting with high IOP. Although a majority of patients experienced postoperative complications, the most common complication, hypHEMA, resolved within 30 days of onset. Furthermore, a significant proportion of patients did not require any additional intervention for IOP control. These findings suggest that GATT may be an effective conjunctival sparing treatment alternative to more invasive procedures such as trabeculectomy or tube shunts.
- Limitations of this study include a small sample size for each subgroup as well as differences in baseline patient characteristics. Additionally, due the retrospective nature of the study, surgical intervention for each individual patients was based on the individual surgeon's discretion.

## REFERENCES

