

GONIOTOMY: WHAT SIZE IS BEST?

A discussion of partial versus total treatment.

BY ERIN G. SIECK, MD, AND SHAN C. LIN, MD



**PARTIAL
GONIOTOMY**
ERIN G. SIECK, MD

I prefer a partial (90°–180°) to a total (> 180°) goniotomy for several reasons, two of which are ease and efficiency.

First, the only instruments required to perform a partial goniotomy are a goniotrism and a Kahook Dual Blade (New World Medical) or bent 25-gauge needle. During the procedure, the surgeon can maintain a clear view of the blade or needle tip and consistently visualize the area of excision. In contrast, surgeons cannot maintain visualization throughout a total goniotomy, and the polypropylene suture or iTrack catheter (Nova Eye Medical) can migrate posteriorly into the supraciliary space.

Second, a partial goniotomy is more efficient than a total goniotomy in my experience. I recently completed a phaco-goniotomy procedure in 11 minutes and a combined phaco-emulsification and gonioscopy-assisted transluminal trabeculotomy (GATT) procedure in 23 minutes. That may not seem like a significant difference, but the time savings add up over multiple cases.

SCIENTIFIC SUPPORT

In addition to its surgical advantages, partial goniotomy is supported by scientific data. Studies have shown that outflow is not uniform. The

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conventional outflow pathway has areas of low flow and areas of high flow, which likely correlate to the location of active collector channels.¹ Most active collector channels are located nasally and inferiorly,² and they are the targets of a partial goniotomy when the surgeon is operating temporally.

Several studies have also shown that trabeculotomy size has no effect on postoperative outcomes. In a retrospective observational case series of 93 eyes treated with a Trabectome (MicroSurgical Technology), Wecker et al³ used anterior segment OCT imaging to assess whether the size of the trabeculotomy opening was related to IOP outcomes. The investigators concluded that trabeculotomy opening size did not correlate to reductions in IOP.

Hirabayashi et al⁴ conducted a retrospective chart review to compare outcomes in patients who underwent 120° goniotomy with a Kahook Dual Blade versus 360° goniotomy performed with either a Trab360 (Sight Sciences) or GATT. The investigators found that mean reductions in IOP and number of medications were similar between

the groups at 6 months. The researchers concluded, “A full 360° trabecular bypass may not be necessary to achieve maximal efficacy from this class of microinvasive procedures.”

Sato et al⁵ conducted a prospective trial of 99 eyes of 99 patients to compare the extent and locations of Schlemm canal incisions during ab interno suture trabeculotomy. A 360° incision, an upper 180° incision, and a lower 180° incision were included. At 12 months, there were no statistically significant differences in IOP reduction and medication reduction between the different incision types. The investigators did, however, observe a statistically significant difference in the rate of hyphema in the 360° group compared with the lower-180° group (26% vs 6%, respectively; $P = .031$).

CONCLUSION

Based on my experience and on published evidence, I prefer partial goniotomy for its ease and efficiency, established efficacy, and lower rate of complications compared to total goniotomy.

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TOTAL GONIOTOMY

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When it comes to robust efficacy, the evidence favors total goniotomy over partial goniotomy. Many studies have suggested that 360° treatment provides a greater IOP-lowering effect than treating only 180° or 90°. Total goniotomy is likely more appropriate in eyes with severe glaucoma that require a significant IOP reduction. Although this approach is associated with a higher risk of hyphema than partial goniotomy, the accumulation of blood is typically transient.

ROBUST EFFICACY

Several investigations have evaluated the efficacy of 360° goniotomy. Grover et al¹ conducted a chart review of 198 patients aged 24 to 89 years who underwent GATT and completed at least 18 months of follow-up. The investigators found that patients experienced an average IOP reduction of 9.2 mm Hg and required 1.43 fewer glaucoma medications at 24 months.

Sarkisian et al² conducted a retrospective study of 81 eyes with refractory glaucoma that underwent 360° ab interno trabeculotomy using the Trab360 device. The investigators found that the mean reduction in IOP at 12 months was 7.3 ± 6.7 mm Hg from baseline. The mean number of IOP-lowering medications decreased from 1.7 ± 1.3 at baseline to 1.1 ± 1.0 at 12 months.

In another retrospective study, Yalinbas et al³ investigated the efficacy of 360° ab interno and ab externo suture trabeculotomy. Eyes (n = 33) treated with ab externo suture trabeculotomy achieved a mean IOP

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reduction of 15 mm Hg and a mean medication reduction of 3.1. Eyes (n = 23) treated with ab interno suture trabeculotomy achieved a mean IOP reduction of 15 mm Hg and a mean medication reduction of 2.7.

IS TOTAL GONIOTOMY NECESSARY?

Some studies have suggested that it may be necessary to treat 360°. Chin et al⁴ found superior outcomes with a modified 360° suture trabeculotomy compared to a 120° trabeculotomy performed with metal trabeculotomes. At 12 months after the modified 360° suture trabeculotomy and trabeculotomy with metal trabeculotomes, the mean IOP reductions were 15.9 and 10.9 mm Hg, respectively, and the mean medication reductions were 2.3 and 1.3, respectively.

As Dr. Sieck mentioned, other studies have concluded that treating 120° or 180° may be as effective as treating 360°. Why was treating 360° only marginally better? Distal outflow resistance limits additional effect. Most of the trabecular meshwork resistance was eliminated by treating 4 clock hours.⁵ The recent development and use of canaloplasty may allow for expansion of collector channels downstream, thereby enhancing the potential IOP reduction from a greater extent of goniotomy treatment. Future studies may address this possibility.

CONCLUSION

Total 360° goniotomy has a proven efficacy that is likely more robust than 180° or 90° goniotomy. A total goniotomy is appropriate for patients with severe glaucoma. The approach carries a higher risk of hyphema, which is transient. Performing goniotomy in combination with canaloplasty may offer additional advantages, especially in the inferior part of the angle, to open the collector channels and increase the treatment effect. ■

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