EVOLVING SURGICAL PARADIGMS FOR PRIMARY ANGLE-CLOSURE GLAUCOMA

Two recent randomized trials challenged traditional approaches by demonstrating the efficacy of angle-opening procedures for the treatment of advanced disease.

BY KIMBERLY JUN, MD, AND NEHALI NANTI, MD

PERIPHERAL IRIDECTOMY WITH GONIOSYNECHIALYSIS AND GONIOTOMY VS TRABECULECTOMY FOR ADVANCED PACG: A RANDOMIZED CLINICAL TRIAL

Lin F, Lv A, Li F, et al; TVG Study Group[1]
Industry support for this study: None

ABSTRACT SUMMARY

This multicenter randomized controlled trial (RCT) compared the safety and effectiveness of surgical peripheral iridectomy with goniosynechialysis and goniotomy (SPI + GSL + G) versus trabeculectomy in 88 eyes with advanced primary angle-closure glaucoma (PACG) without cataract. The primary outcome was IOP at 12 months. Secondary outcomes included surgical success, defined as an IOP between 5 and 18 mm Hg or a 20% or greater reduction from baseline with or without medication; postoperative complications and interventions; and number of prescribed antihypertensive medications.

At 12 months, the mean IOP was 15.6 and 14.9 mm Hg in the SPI + GSL + G and trabeculectomy groups, respectively, which met the noninferiority criteria. Complete success (unmedicated IOP of 6–18 mm Hg and ≥ 20% reduction) was achieved in 60.5% and 82.2% of the patients in the SPI + GSL + G and trabeculectomy groups, respectively; qualified success (IOP of 5–18 mm Hg and ≥ 20% reduction with medication allowed) was 88.4% versus 93.3%. Patients in the SPI + GSL + G group had a substantially lower need for postoperative interventions (7% vs 55.6%). Complication rates, BCVA, and endothelial cell counts were comparable between groups.

The results indicated that SPI + GSL + G can provide trabeculectomy-level IOP control with a reduced postoperative burden.

DISCUSSION

How does the exclusion of patients with coexisting cataract affect the generalizability of this RCT's results?

To isolate the effects of SPI + GSL + G versus trabeculectomy, the RCT enrolled only patients with advanced PACG but no cataract. This exclusion criterion limits the generalizability of the study's results to clinical practice because many PACG patients present with coexisting cataract or are candidates for refractive lens exchange (RLE), which itself deepens the anterior chamber and can address pupillary block. In routine practice, phacoemulsification—whether as a part of cataract surgery or RLE—often forms the cornerstone of PACG management and is sometimes combined with angle procedures. Although this RCT showed that SPI + GSL + G was noninferior to trabeculectomy for IOP control, the

STUDY IN BRIEF

- A randomized controlled trial compared the safety and effectiveness of surgical peripheral iridectomy with goniosynechialysis and goniotomy versus trabeculectomy in patients with advanced primary angle-closure glaucoma (PACG) without cataract. The combined procedure demonstrated a noninferior IOP reduction compared to trabeculectomy at 12 months. Complete success rates were slightly lower with the combined procedure (60.5% vs 82.2%), but far fewer postoperative interventions were required (7% vs 55.6%).

WHY IT MATTERS

PACG is a leading cause of irreversible blindness worldwide. Although advanced disease has traditionally been managed with filtering surgery, the results of this trial suggest that surgical peripheral iridectomy with goniosynechialysis and goniotomy might be a safer, less invasive alternative to trabeculectomy for select patients with PACG.

study's findings might not fully extend to the broader PACG population for whom cataract surgery or RLE is an integral part of management.

How appropriate was a 4 mm Hg noninferiority margin for evaluating surgical outcomes in patients with advanced PACG?

The 4 mm Hg noninferiority margin has precedent in several major glaucoma RCTs, such as the Tube Versus Trabeculectomy (TVT) Study and the Primary Tube Versus Trabeculectomy (PTVT) Study, both of which used this threshold to assess comparative surgical efficacy. The margin balances statistical feasibility with clinical significance; a smaller margin (eg, 2 mm Hg) would dramatically increase the necessary sample size. In eyes with advanced disease, however, even small IOP differences can lead to progression, raising concern that 4 mm Hg might be too wide a margin to detect clinically meaningful differences. Thus, although the 4 mm Hg cutoff was consistent with prior landmark surgical trials and accepted for regulatory/statistical purposes, a tighter margin might have been more appropriate for advanced disease.

TWO-YEAR OUTCOMES OF PHACOGONIOTOMY VS PHACOTRABECULECTOMY FOR ADVANCED PRIMARY ANGLE-CLOSURE GLAUCOMA WITH CATARACT: A NONINFERIORITY RANDOMIZED CLINICAL TRIAL

Song Y, Fan S, Tang L, et al; PVP Study Group[2]

Industry support for this study: None

ABSTRACT SUMMARY

A multicenter RCT investigated whether phacogoniotomy (phacoemulsification + GSL + G) was noninferior to phacotrabeculectomy for the treatment of advanced PACG in 124 eyes with cataract. At the 2-year follow-up visit, the mean IOP reduction was -25.6 and -24.7 mm Hg in the phacogoniotomy and phacotrabeculectomy groups, respectively, for a difference of -0.5 mm Hg, which met the noninferiority criteria. Complete success (IOP of 5–18 mm Hg, ≥ 20% IOP reduction, no antihypertensive medications) and qualified success (same criteria but with medication allowed) were statistically equivalent between the groups (complete: -6.7% difference, *P* = .47; qualified: +1.4%, *P* = .30). The median number of glaucoma medications remained zero in both treatment arms, with no significant difference between the groups.

Compared to phacotrabeculectomy, phacogoniotomy demonstrated noninferior long-term efficacy and similar medication independence and safety. These findings support consideration of phacogoniotomy as an alternative to phacotrabeculectomy for patients with advanced PACG and cataract.

STUDY IN BRIEF

- A multicenter randomized controlled trial investigated whether phacogoniotomy was noninferior to phacotrabeculectomy for the treatment of advanced primary angle-closure glaucoma in eyes with cataract. At 2 years, the IOP reduction with phacogoniotomy was noninferior to phacotrabeculectomy, and the medication-sparing effects of both procedures were comparable. Overall complication rates were similar between groups, but fewer bleb-related risks were observed with phacogoniotomy.

WHY IT MATTERS

Phacogoniotomy may be a safer, minimally invasive alternative to phacotrabeculectomy for the treatment of advanced primary angle-closure glaucoma in appropriately selected patients.

DISCUSSION

How do postoperative complications factor into surgical decision-making?

Overall, postoperative morbidity was low in both groups at 12 and 24 months, but the nature of complications differed between the two groups. The risks of trabeculectomy are well recognized and include bleb leaks, blebitis, hypotony, and late bleb failure, all of which may compromise long-term success and visual outcomes. In contrast, phacogoniotomy avoids bleb formation, and most complications are limited to angle-related issues such as hyphema, postoperative inflammation, and peripheral anterior synechiae formation in addition to the standard risks of cataract surgery.

In this study, postoperative shallowing of the anterior chamber occurred in both groups (n = 3). Hyphema was more frequently observed in the phacogoniotomy group (n = 4) compared to the phacotrabeculectomy group (n = 1). Filtering bleb–related complications occurred only in the phacotrabeculectomy group (n = 2). No excess endothelial cell loss was observed, no eyes met the criteria for surgical failure due to

hypotony (IOP < 5 mm Hg), and no vision-threatening adverse events were reported in either group, supporting a favorable overall safety profile for both procedures. Although not a replacement for trabeculectomy in eyes with advanced disease, phacogoniotomy may represent a safer alternative when minimizing bleb-related morbidity is desirable.

Did the 2-year results justify a shift in clinical practice, or is longer-term follow-up required before phacogoniotomy can be widely adopted as an alternative to phacotrabeculectomy?

The 2-year outcomes of this study are encouraging. Phacogoniotomy combined with cataract extraction achieved IOP reductions and medication-sparing effects comparable to phacotrabeculectomy in patients with advanced PACG. The long-term durability of phacogoniotomy, however, remains uncertain. Decades of data are available on the sustained IOP control achieved with and safety of trabeculectomy, whereas extended follow-up on phacogoniotomy is lacking. Questions remain about late IOP elevation, patients' need for adjunctive medication, and the risks of synechial closure or fibrosis.

Longer-term (≥ 5 years) studies are required to determine whether the early noninferiority of phacogoniotomy persists and to identify which patients with advanced PACG might benefit more from this intervention than traditional filtering surgery. ■

1. Lin F, Lv A, Li F, et al; TVG study group. Peripheral iridectomy with goniosynechialysis and goniotomy vs trabeculectomy for advanced PACG: a randomized clinical trial. *JAMA Ophthalmol*. 2025;143(6):472-479.
2. Song Y, Fan S, Tang L, et al. Two-year outcomes of phacogoniotomy vs phacotrabeculectomy for advanced primary angle-closure glaucoma with cataract: a noninferiority randomized clinical trial. *JAMA Ophthalmol*. 2025;143(6):462-469.

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