FACTORS IN DISEASE PROGRESSION


Researchers evaluated the effects of blood pressure and laser peripheral iridotomy on glaucoma.

BY HARRISON BANNETT, DO, AND CHRISTOPHER C. TENG, MD

BLOOD PRESSURE AND GLAUCOMATOUS PROGRESSION IN A LARGE CLINICAL POPULATION

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Industry support: None

ABSTRACT SUMMARY

A retrospective cohort study assessed the effect of systemic arterial blood pressure (BP) on the rates of progressive structural damage in glaucoma over time. A total of 7,501 eyes of 3,976 individuals with glaucoma or suspected glaucoma from the Duke Glaucoma Registry were monitored. Linear mixed models adjusted for IOP, sex, race, diagnosis, central corneal thickness, follow-up time, and baseline disease severity were used to measure the effects of mean arterial pressure (MAP), systolic arterial pressure (SAP), and diastolic arterial pressure (DAP) on the rates of retinal nerve fiber layer (RNFL) loss over time.

The investigators evaluated 157,291 BP visits; 45,408 IOP visits; and 30,238 spectral domain OCT visits. The mean rate of change in global RNFL thickness was -0.70 µm/y (95% confidence interval, -0.72 to -0.67 µm/y). Univariable analysis of MAP, SAP, and DAP during follow-up was not significantly associated with rates of RNFL loss. When adjusted for mean IOP during follow-up, however, each reduction of 10 mm Hg in mean MAP (-0.06 µm/y; P =.007) and mean DAP (-0.08 µm/y; P < .001) but not SAP (-0.01 µm/y; P < .355) was associated with significantly faster rates of RNFL thickness change over time. These metrics remained significant after additional adjustments for baseline age, diagnosis, sex, race, follow-up time, disease severity, and central corneal thickness.

DISCUSSION

Does BP play a role in the progression of glaucoma?

The study showed an association between lower DAP and MAP and faster progression of RNFL loss in patients with similar average IOP measurements. The rate of progression was faster for each reduction of 10 mm Hg in DAP and MAP.

The correlation between structural nerve loss and elevated IOP is well established. The current study found that MAP and DAP were independently modifiable risk factors in the progression of glaucoma.

How are these data clinically relevant?

BP is frequently modified in clinical practice with oral medications prescribed for the treatment of systemic arterial hypertension (SAH). An estimated 45.6% of the entire US population has SAH, and most of these individuals administer pharmacologic therapy to minimize their risk of stroke and heart attack. Approximately 36.2% of the US adult population has been advised to administer at least one antihypertensive medication.[2]

Jammal and colleagues recommended that eye care providers work closely with primary care providers to avoid overmedicating patients with SAH and glaucoma. This could be done by evaluating 24-hour BP and avoiding excess lowering of DAP, which was associated with faster glaucomatous progression.

How can these data be incorporated into clinical practice?

It may behoove eye care providers to identify the antihypertensive

STUDY IN BRIEF

- A retrospective cohort study found that mean arterial pressure and diastolic arterial pressure were two independent variables for progressive structural damage in glaucoma over time.

WHY IT MATTERS

The study provided evidence that glaucoma may be a disease of perfusion and indicated that blood pressure may be a modifiable risk factor for glaucoma.

therapies their patients are currently using. It may also be beneficial for eye care providers to communicate with primary care providers to ensure that the treatment of SAH does not inadvertently increase patients' risk of glaucomatous progression. Finally, eye care providers may wish to make BP a routinely collected data point to achieve a more complete understanding of the disease spectrum.

THE SINGAPORE ASYMPTOMATIC NARROW ANGLES LASER IRIDOTOMY STUDY: FIVE-YEAR RESULTS OF A RANDOMIZED CONTROLLED TRIAL

BASKARAN M, KUMAR RS, FRIEDMAN DS, ET AL[3]

Industry support: None

ABSTRACT SUMMARY

A prospective, randomized controlled trial examined the efficacy of laser peripheral iridotomy (LPI) in patients who were diagnosed as primary angle-closure suspects (PACS). The study included 480 patients with bilateral asymptomatic PACS who were older than 50 years of age. PACS was defined as having two or more quadrants of appositional angle closure on gonioscopy. Patients were randomly assigned to undergo prophylactic LPI in one eye and no treatment in the fellow eye, which served as a control. The endpoint was the development of PAC (the presence of peripheral anterior synechiae, an IOP > 21 mm Hg, or acute angle closure) or PAC glaucoma (PACG) over 5 years.

Of the 480 randomly assigned participants, 92.7% were Chinese, and 75.8% were women. The mean age was 62.8 ±6.9 years. The investigators found that eyes treated with LPI reached an endpoint less frequently after 5 years (n = 24 [5.0%]; incidence rate, 11.65 per 1,000 eye-years) than control eyes (n = 45 [9.4%]; incidence rate, 21.84 per 1,000 eye-years; *P* = .001). Older participants and eyes with a higher baseline IOP were more likely to reach an endpoint. The number needed to treat to prevent PAC or PACG was 22 (95% confidence interval, 12.8–57.5).

The researchers concluded that, among patients with bilateral asymptomatic PACS, eyes that underwent prophylactic LPI reached significantly fewer endpoints compared with control eyes over 5 years. The overall incidence of PAC or PACG, however, was low.

DISCUSSION

Why is prophylactic LPI up for debate?

Historically, LPI was commonly performed in PACS eyes to prevent acute attacks. The Singapore Asymptomatic Narrow Angles Laser Iridotomy Study (ANA-LIS) and the Zhongshan Angle Closure Prevention (ZAP) trial found that the overall rates at which PACS progresses to PAC or PACG were quite low,[3,4] and the studies have called into question the need for prophylactic LPIs. The incidence of reaching endpoints was low in both trials. The ZAP trial reported a lower incidence of endpoints' being reached over 6 years: 4.2 per 1,000 eye-years in treated eyes compared with 11.7 per 1,000 eye-years in the ANA-LIS. Similarly, the ZAP trial reported 8.0 per 1,000 eye-years in control eyes versus 21.8 per 1,000 eye-years in the ANA-LIS.

In both studies, eyes that did not undergo LPI were almost twice as likely to experience progression to PAC or PACG, with most of the difference attributable to a threefold higher rate of peripheral anterior synechiae development. In the ANA-LIS, of the 960 randomized eyes, only three reached the endpoint due to acute angle-closure attacks—two in the control group and one in the prophylactic LPI group.

Why did the ZAP trial report a lower incidence of endpoints' being reached?

This may be attributable to different recruitment strategies and patient populations. The ZAP trial enrolled patients from the community, whereas the ANA-LIS enrolled patients from eye clinics. Additionally, the IOP cutoffs were different, 24 mm Hg or more in the ZAP trial and 21 mm Hg or more in the ANA-LIS.

How do the findings affect clinical practice?

The ANA-LIS supports that PACS may be monitored without LPI and corroborates the findings of the ZAP trial, which reached a similar conclusion. Important points to consider are that

STUDY IN BRIEF

- A prospective, randomized controlled trial evaluated the efficacy of prophylactic laser peripheral iridotomies (LPIs) in patients who received a diagnosis of primary angle-closure suspect. Eyes treated with prophylactic LPI developed primary angle closure or primary angle-closure glaucoma at almost half the rate of untreated eyes. In both groups, however, the incidence of angle closure was low.

WHY IT MATTERS

The study provided evidence that recommending observation without LPI for primary angle-closure suspects is reasonable.

both studies were conducted in a large majority Chinese population and the results may not be directly applicable to all patients around the world. ■

1. Jammal AA, Berchuck SI, Mariottoni EB, Tanna AP, Costa VP, Medeiros FA. Blood pressure and glaucomatous progression in a large clinical population. *Ophthalmology*. 2022;129(2):161-170.
2. Muntner P, Carey RM, Gidding S, et al. Potential U.S. Population Impact of the 2017 ACC/AHA High Blood Pressure Guideline. *J Am Coll Cardiol*. 2018;71(2):109-118.
3. Baskaran M, Kumar RS, Friedman DS, et al. The Singapore Asymptomatic Narrow Angles Laser Iridotomy Study: Five-Year Results of a Randomized Controlled Trial. *Ophthalmology*. 2022;129(2):147-158.
4. He M, Jiang Y, Huang S, et al. Laser peripheral iridotomy for the prevention of angle closure: a single-centre, randomised controlled trial. *Lancet*. 2019;393(10181):1609-1618.

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