

RESEARCH RESULTS



HIGHLIGHTS OF THE AGS ANNUAL MEETING

The latest research findings from the 26th annual meeting of the American Glaucoma Society, held March 3 to 6, 2016, in Fort Lauderdale, Florida.

BY GEOFFREY T. EMERICK, MD



The annual meeting of the American Glaucoma Society (AGS) features presentations of the best in glaucoma research. This year, 1,200 registrants enjoyed 135 poster and 25 paper presentations, a day devoted to glaucoma surgery, and many other opportunities to share ideas and information. The AGS

lecture, delivered by Ann L. Coleman, MD, PhD, was one of many highlights. As has been the case for the past few years, microinvasive glaucoma surgery (MIGS) was prominent on the agenda. From the many excellent studies presented at the AGS meeting, I have chosen some that are most likely to affect clinical practice now and in the very near future.

MIGS DEVICES

Xen45

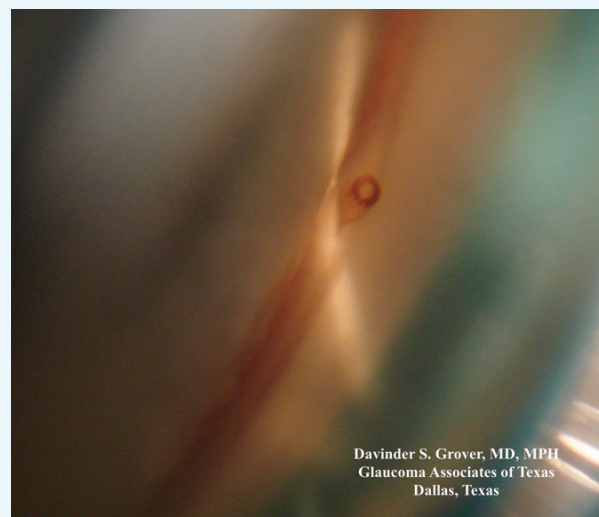
The Xen (Allergan) is a 6-mm-long gelatin implant (Figure 1). Three different lumen sizes (140, 63, and 45 μm) have been developed and are being used in Europe, but the ongoing US clinical trial is with the Xen45. The 45- μm implant provides 6 to 8 mm Hg of flow resistance, reducing the risk of hypotony. During a typical procedure, the surgeon injects mitomycin C and places the shunt, preloaded on a 27-gauge injector, via an ab interno approach across the anterior chamber angle into the subconjunctival space.

Davinder Grover, MD, presented the findings of a study of 975 patients in whom the gel stent was implanted.¹ This research included results using all three lumen sizes; 426 procedures (44%) were combined with cataract surgery. Among patients receiving the stent as a stand-alone surgery, a mean baseline IOP of 22.7 mm Hg on 2.8 medications decreased to 14.9 mm Hg on 0.9 medications at 12 months ($n = 163$). With combined surgery, a mean baseline of 20.9 mm Hg on 2.3 medications was reduced to 14.1 mm Hg

on 0.7 medications at 12 months ($n = 135$). The 45- μm model showed a 39% IOP reduction at 12 months ($n = 160$), better than or equal to the performance of larger-diameter models but with a much lower incidence of hypotony on the first day after surgery (15%), none of which persisted past 30 days. Dr. Grover described a 1% erosion rate, which seemed to be related to nasal placement of the device. During the follow-up period, 2.3% of patients required a related second procedure. Although the Xen creates a bleb, which can become encapsulated, most blebs are low, diffuse, and nonischemic.

iStent Inject

The iStent Trabecular Micro-Bypass Stent (Glaukos) received FDA approval in June 2012 for the treatment of



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Figure 1. Gonioscopic view of the Xen45 gel stent.

mild to moderate open-angle glaucoma. Current approval is for a single iStent placed at the time of cataract surgery. A variation on this device, called the iStent Inject (Glaukos; Figure 2), is in clinical trials. Like the currently available device, the iStent Inject is placed through a clear corneal incision into the canal of Schlemm. Two of these stents are typically implanted.

Richard Lewis, MD, presented the results of a study of 57 patients with open-angle glaucoma who received the iStent Inject as a stand-alone procedure.² Mean preoperative IOP was 19 mm Hg on one medication, and the washout IOP was 24.4 mm Hg. Postoperative mean IOP was less than 15 mm Hg at all time points up to 18 months (n = 27) on no medication. Adverse events were rare, including cataract formation in three patients.

In another MIGS study presented by Michael Greenwood, MD, subjects received two iStent Inject devices and postoperative travoprost.³ In 53 patients, the mean preoperative IOP was 18.8 mm Hg on two medications and 24.9 mm Hg after washout. Postoperative mean IOP was 12.4 mm Hg at month 12 on travoprost, and after washout at month 13, the mean IOP was 16.6 mm Hg. The device also demonstrated an excellent safety profile in the study.

LASER GLAUCOMA SURGERY

Micropulse transscleral cyclophotocoagulation is a new technique in which the surgeon uses a diode laser (MicroPulse P3 Glaucoma Device powered by the Cyclo G6 Glaucoma Laser; both from Iridex) to perform ciliary body destruction. Tissue is allowed to cool between laser pulses, decreasing coagulative damage. In a study of cadaver



(Courtesy of Glaukos.)

Figure 2. The iStent Inject.

eyes presented by Jessica Maslin, MD, micropulse transscleral cyclophotocoagulation applied with a duty cycle of 31.3% over 60 to 90 seconds disrupted tissue far less than a traditional continuous-wave diode laser applied either at 2,000 mW for 2 seconds or 1,250 mW for 4 seconds.⁴

In a study from the University of California, San Francisco, 17 patients were treated using the MicroPulse P3, most of whom had primary open-angle glaucoma.⁵ Mean preoperative IOP was 25 mm Hg on 3.5 medications. With a short follow-up of 35 days on average, postoperative IOP was 17 mm Hg on three medications. Anterior segment ultrasound and optical coherence tomography (OCT) performed on several patients demonstrated no morphologic changes or damage to structures adjacent to the ciliary body. In a similar study from Wills Eye Hospital in Philadelphia, 10 patients received treatment.⁶ Mean IOP decreased from 31.9 mm Hg on two medications to 13.3 mm Hg on 1.2 medications at 1 month. Minimal discomfort and inflammation were seen, much less than is typical of diode transscleral cyclophotocoagulation.

IMAGING IN GLAUCOMA

OCT angiography (OCTA) is an increasingly prevalent alternative to fluorescein or indocyanine green angiography. At this year's AGS meeting, two studies evaluated OCTA findings in glaucoma using the AngioVue Imaging System (Optovue). The first, presented by Hana Takusagawa, MD, included 60 participants with glaucoma and age-matched controls.⁷ Researchers performed a macular scan and evaluated vessel density (percentage area occupied by vessels) in the perifoveal area. In eyes with glaucoma, the vessel density was lower than in healthy controls, particularly in the ganglion cell complex (GCC; 63% vs 79%). The GCC vessel density correlated better with retinal sensitivity on corresponding visual field points than did GCC thickness.



AT A GLANCE

- Researchers presented recent data on MIGS devices not yet available in the United States such as the Xen45 and iStent Inject.
- Micropulse transscleral cyclophotocoagulation is a new technique in which the surgeon uses a diode laser to perform ciliary body destruction. Tissue is allowed to cool between laser pulses, decreasing coagulative damage.
- Investigators suggested that OCT angiography findings reflect ganglion cell damage and could prove useful in the diagnosis and management of glaucoma.
- A patient's self-report of tooth loss with periodontal disease within the past 2 years was associated with an increased risk of developing primary open-angle glaucoma.

The second study, presented by Adeleh Yarmohammadi, MD, included data on 166 participants using optic disc and peripapillary OCTA scans.⁸ Vessel density was lower in eyes with glaucoma compared with glaucoma suspects and controls. The parameter showed good sensitivity and specificity, with areas under the receiver operating characteristic curve similar to those for spectral-domain OCT of the circumpapillary retinal nerve fiber layer.

The investigators for these studies suggested that the OCTA findings reflect ganglion cell damage and could prove useful in the diagnosis and management of glaucoma.

EPIDEMIOLOGY

What can your patients' teeth (or lack thereof) tell you about their glaucoma risk? Periodontal disease can result in endothelial dysfunction and has been implicated in cardiovascular disease and stroke; glaucoma may involve a similar pathogenic mechanism. Louis Pasquale, MD, and associates used data from the Health Professionals Follow-up Study to investigate this hypothesis.⁹ They found that a patient's self-report of tooth loss with periodontal disease within the past 2 years was associated with an 86% increased risk of developing primary open-angle glaucoma. This association was strongest for early paracentral visual field loss, a type of damage often seen in patients with low IOPs in whom endothelial cell dysfunction may play a role in pathogenesis. Although

they did not go so far as to say that treating periodontal disease will reduce the risk of glaucomatous progression, the investigators suggested that eye care providers ask patients about a history of tooth loss. ■

1. Grover D, Kersten-Gomez I, Reitsamer H, Sheybani A. Describing the development of a minimally invasive collagen stent for treating glaucoma: first 975 eyes treated with the Xen Gel stent. Paper presented at: The 26th Annual AGS Meeting; March 3, 2016; Ft. Lauderdale, FL.
2. Lewis R. Second generation stents implanted in mild-moderate open-angle glaucoma patients on one preoperative medication: design review and clinical data through 18 months. Poster presented at: The 26th Annual AGS Meeting; March 4, 2016; Ft. Lauderdale, FL.
3. Greenwood M, Berdahl J. Trabecular bypass second-generation stents and one postoperative prostaglandin to treat patients with open-angle glaucoma not controlled on two preoperative medications. Poster presented at: The 26th Annual AGS Meeting; March 3, 2016; Ft. Lauderdale, FL.
4. Maslin J, Chen P, Sinard, Noecker R. Comparison of acute histopathological changes in human cadaver eyes after micropulse and continuous wave trans-scleral cyclophotocoagulation. Poster presented at: The 26th Annual AGS Meeting; March 3, 2016; Ft. Lauderdale, FL.
5. Babic K, Masis M. Micropulse transscleral diode laser cyclophotocoagulation: short-term results and anatomical effects. Poster presented at: The 26th Annual AGS Meeting; March 3, 2016; Ft. Lauderdale, FL.
6. Resende A, Waisbourd M, Amarasekera D, et al. A prospective pilot study evaluating the novel micropulse trans-scleral cyclophotocoagulation: short-term results. Poster presented at: The 26th Annual AGS Meeting; March 3, 2016; Ft. Lauderdale, FL.
7. Takusagawa H, Morrison J, Jia Y, et al. OCT angiography of macular ganglion cell circulation in glaucoma. Paper presented at: The 26th Annual AGS Meeting; March 4, 2016; Ft. Lauderdale, FL.
8. Yarmohammadi A, Zangwill L, Diniz-Filho A, et al. OCT angiography flow density in healthy, glaucoma suspect and glaucomatous eyes. Paper presented at: The 26th Annual AGS Meeting; March 4, 2016; Ft. Lauderdale, FL.
9. Pasquale L, Hyman L, Joshipura K, et al. A prospective study of dental health and primary open-angle glaucoma in male health professionals. Paper presented at: The 26th Annual AGS Meeting; March 5, 2016; Ft. Lauderdale, FL.

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