

Comparisons of glaucoma surgeries show certain techniques are safer, more effective

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Two recent studies by a University at Buffalo researcher could help increase safety and minimize expense for patients undergoing glaucoma surgery.

The studies were conducted over several years by Asher Weiner, MD, clinical associate professor in the Department of Ophthalmology in the

Jacobs School of Medicine and Biomedical Sciences at UB. Weiner is affiliated with UBMD Ophthalmology at the Ross Eye Institute.

Glaucoma is one of the leading causes of blindness in people over the age of 60. It is a progressive condition in which the optic nerve, which is vital for vision, is damaged, often by abnormally high pressure in the eye (intraocular pressure, or IOP). This [high pressure](#) occurs when there is a build-up of fluid (aqueous humor) inside the eye, and in order to prevent blindness from glaucoma, IOP must be reduced to a safe level.

The first study was published in the *Journal of Glaucoma* in May. This retrospective, interventional research was conducted in a private glaucoma and cataract practice in Albany, New York between 2014 and 2016. Weiner was affiliated with St. Peter's Hospital in Albany at that time. He moved to Buffalo in 2017.

In this study, the researchers sought to compare the safety and [success rate](#) of two different types of minimally-invasive glaucoma surgery, or MIGS.

Instead of creating or implanting artificial drainage systems into the eye to reduce IOP, procedures with increased intra- and postoperative risk, most MIGS procedures utilize and enhance the eye's natural drainage system, increasing the drainage out of the eye and thereby reducing IOP.

The eye's drainage system is naturally restricted by the trabecular meshwork, the so-called "strainer in the sink," Weiner said. Most MIGS procedures either remove a significant portion of this natural barrier, or bypass it using a tiny stent.

Weiner conducted the first MIGS in Michigan 12 years ago. Since then, as the success of MIGS has been demonstrated and confirmed, manufacturers have begun to develop devices to insert through the

trabecular meshwork to achieve better flow out of the natural drain. There is a significant cost difference among different types of MIGS, ranging from \$300-\$650 with no implanted stent, to \$1,750 with a stent.

In this study, Weiner compared two different types of MIGS—with and without a stent—over several years to also determine if the extra cost is justified for the patient and to the health care system.

He compared the surgical outcomes in patients who had two different types of MIGS in their eyes—one that included implanting a stent in one eye, and one without a stent in the other eye. The objective, he said, was to examine whether the outcomes are the same, and whether a higher expense is justified.

The less expensive method is more effective

The research found that the original method, without implanting the stent, does a better job than the stent, he said.

"The bottom line is that the expensive device was less effective than the more economical original method," he said.

The second study was published online ahead of print in July in the journal *Ophthalmology Glaucoma*. Like the earlier research, it was a retrospective, interventional study conducted in Weiner's Albany private practice between 2014 and 2016.

When lower-risk surgeries such as MIGS are insufficient to protect the [optic nerve](#) from progressive glaucoma damage, tube shunt implantation is a more effective method to reduce intraocular pressure to a safer level. However, this more aggressive procedure could increase intra- and postoperative risks.

According to the American Academy of Ophthalmology, the principal postoperative risk following tube shunt implantation into the anterior chamber of the eye (the location in the eye where tubes have traditionally been placed) is corneal decompensation and failure, leading to loss of vision and a need for corneal transplantation in an attempt to restore vision.

Thus, said Weiner, the drawback to implanting tubes into the anterior chamber of the eyes is that the tube is placed too close to the cornea, leading to corneal endothelial cell damage and corneal failure over time.

Preventing corneal damage, reducing vision loss

The alternative method is to insert the tube shunt behind the iris through an area called the ciliary sulcus instead of into the anterior chamber, thereby hiding the tubes behind the iris far enough from the cornea to prevent corneal damage and long-term visual loss.

Weiner has been working to further develop this surgical method for the past 12 years, and has presented his results through multiple publications and presentations.

In this study, the authors compared the rate of decline in corneal endothelial cell density following sulcus tube shunt implantation. The research showed that the rate of cell loss following sulcus tubes was a non-statistically significant 8% over two years, compared to a statistically significant loss of 20 to 30% following tubes implanted into the anterior chamber.

"There was still loss, but not as dire when the tube shunt was inserted through the sulcus, and none of our patients demonstrated clinical corneal damage," Weiner said. "This was the first time this was demonstrated."

The researchers also measured cell loss in eyes with glaucoma that were not being treated with shunts. Those eyes also showed cell loss (3%) over the two-year period, Weiner said.

"Our findings strengthen the argument for how tube shunts should be implanted to protect our patients' long-term vision," he said. "But since our surgical methods require a higher skill level and may require a slightly longer operative time, many surgeons still prefer the old method."

However, in recent years, researchers have seen greater conversion to sulcus tubes around the world, Weiner added.

Provided by University at Buffalo

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