

Restoring Physiological Aqueous Outflow



Key features of the OMNI Surgical System stand out from those of other MIGS treatment options.

BY ANDREW TATHAM, MD, MBA, FRCOPHTH

The OMNI Surgical System (Sight Sciences) is a relatively new addition to the MIGS armamentarium and is the only device that can be used to perform ab-interno circumferential viscodilation and trabeculotomy with a fully integrated, handheld system. OMNI, like the trabecular implants, treats the conventional outflow pathway but is differentiated in that it addresses outflow resistance at all three points in the pathway, including the trabecular meshwork (TM), Schlemm's canal, and the distal collector channels.

This article details my experience with the device and outlines a recent surgical case to highlight the effectiveness of the procedure to restore aqueous outflow.

BACKGROUND

Prior to the advent of MIGS, first-line treatment was generally one or more topical ocular hypotensive drugs or, in some cases, selective laser trabeculotomy. Surgery was reserved for eyes with IOP control inadequate to prevent progression despite maximum-tolerated medical therapy. However, treatment norms have been evolving over the past 10 to 15 years. The introduction of MIGS has lowered the threshold for surgical intervention, and it is now an accepted early disease treatment option.

Various surgical options can be used to try to overcome the aqueous outflow resistance at the TM. It can be bypassed, ablated, cut, or torn at different routes. Generally, we can improve outflow by bypassing the TM (Figure 1). If, however, only one or two small sections of the TM are bypassed, the effect on outflow resistance will not be as great because aqueous flow within Schlemm's canal is segmental and access to a patent collector channel is not guaranteed. Moreover, TM bypass procedures don't always work. Most of the outflow resistance is within the TM. Up to about 50% of resistance, however, can be

within Schlemm's canal and the distal collector channels.

On the other hand, the OMNI procedure can treat the TM, 360° of Schlemm's canal, and the distal collector channels in a single, implant-free procedure. This procedure has several advantages over other MIGS procedures, including that there is no device left in the eye, it can be performed as a standalone treatment or combined with cataract surgery, and I can choose how many degrees I treat with canaloplasty or trabeculotomy depending on the patient's needs.

CASE PRESENTATION

My first OMNI case was for an 81-year-old man with primary open-angle glaucoma and symptomatic cataract. His IOP was 25 mm Hg OD and 26 mm Hg OS, and he was on two IOP-lowering medications. The patient had moderate visual field loss with a mean deviation (MD) of -10.91 dB OD and -8.18 dB OS, which had been progressing since first diagnosed.

I opted to combine cataract surgery with the OMNI procedure and operated through the same clear corneal temporal incision for both procedures. Surgery was scheduled for the patient's right eye first. This case presentation details surgery in this eye.

Upon completion of the cataract

surgery procedure, I injected Miochol-E (acetylcholine chloride intraocular solution, Bausch + Lomb) into the anterior chamber to constrict the pupil, followed by a cohesive OVD. The cannula of the OMNI device was advanced across the anterior chamber and into the nasal angle. The tip of the device was used to make a small (< 1 mm) goniotomy. The microcatheter was gently advanced into Schlemm's canal using a forehead technique, treating the superior 180° first.

The microcatheter was slowly retracted by dialing the wheel of the device back. The OMNI is engineered with an internal reservoir that delivers a controlled amount of OVD into Schlemm's canal as the device is retracted from the angle.

I completely remove the device, rotate it, and re-enter the eye through the same goniotomy opening to advance the microcatheter over 180° in the opposite direction. After cannulating the inferior 180°, the microcatheter was retracted again and more OVD was delivered to complete the 360° canaloplasty. The wheel of the device was then advanced for a third time, but this time the microcatheter was removed from the eye to cut through the TM and unroof Schlemm's canal. At the end of the

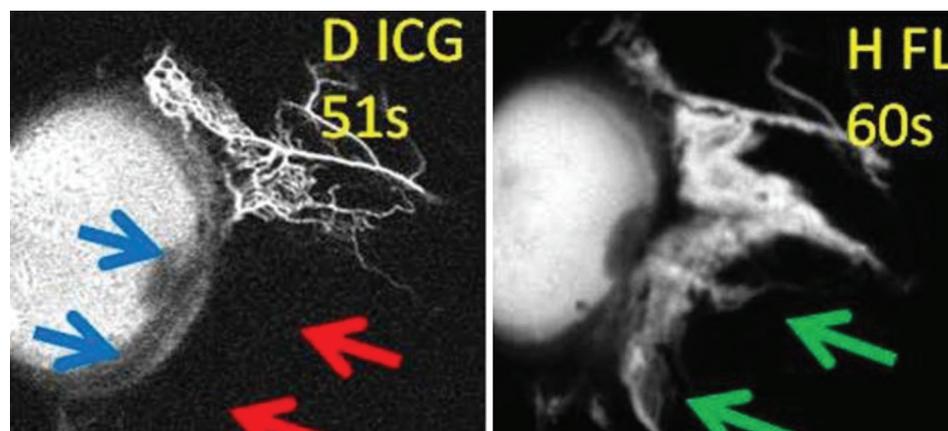


Figure 1. Intraoperative aqueous angiography images demonstrating the restoration of outflow after TM bypass in the inferior angle.



Figure 2. Three months after surgery, the deroofed Schlemm's canal is still visible.

procedure, OVD was removed from the anterior chamber and capsular bag.

Given the high preoperative IOP, the patient was advised to continue with his glaucoma medications and was prescribed standard postoperative cataract drops. On day 1, IOP had improved from 25 mm Hg preoperatively to 16 mm Hg. At 3 months postoperatively, IOP was stable at 16 mm Hg and the deroofed Schlemm's canal was still visible (Figure 2).

The patient continued to take the two glaucoma medications he was previously using, but we have talked about discontinuing their use if the IOP remains stable.

PRACTICAL PEARLS

I have performed about 20 OMNI procedures to date. For me, the learning curve was relatively short. Three practical pearls helped me to hone my surgical technique.

Pearl No. 1: Get comfortable with intraoperative gonioscopy. In the clinic, gonioscopy is used to visualize the anterior chamber angle, with a key feature, identification of Schwalbe's line at the apex of the corneal wedge. With intraoperative gonioscopy, however, different landmarks must be used. The key with intraoperative gonioscopy is to look for pigmentation and the fine line of blood in Schlemm's canal. If no blood is visible, it is likely that the anterior chamber has been overfilled. The position of the goniolens may need to be varied during surgery, and it is helpful to remove the lens completely during the last 90° of trabeculotomy to improve visualization.

Pearl No. 2: Familiarize yourself with the anatomical landmarks. This includes taking time to position the patient

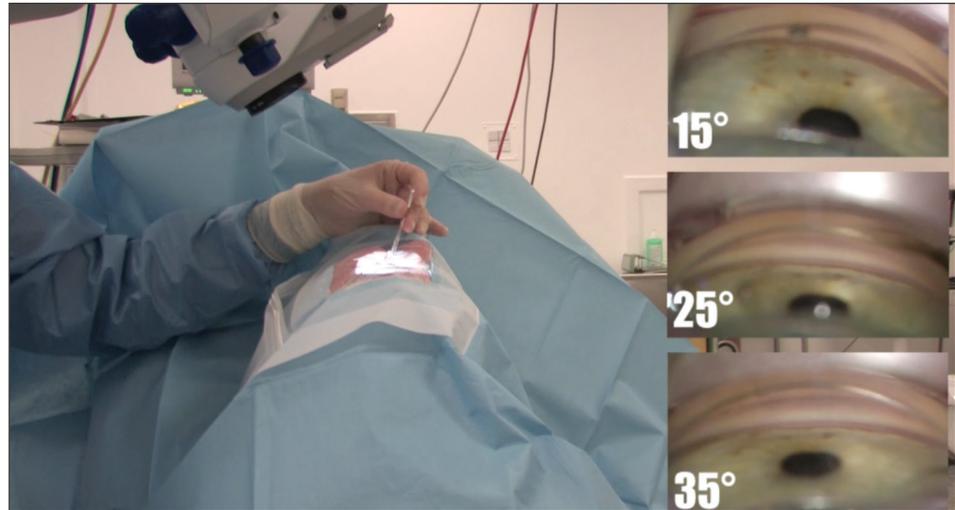


Figure 3. The ideal position is for the patient's head to be tilted 30° to 40° away from the surgeon and the microscope tilted 30° to 40° toward the surgeon.

properly to maximize visualization of the angle and approach the anterior chamber angle at 90°. The ideal position is for the patient's head to be turned away from the surgeon about 30° to 40° and the microscope toward the surgeon by a similar number of degrees (Figure 3).

Pearl No. 3: Introducing and withdrawing the microcatheter. When introducing the microcatheter, I find it helpful to angle the device at about 20°, aiming for the roof of Schlemm's canal. In this position, the microcatheter will brush across the roof of Schlemm's canal and continue its journey in the canal without resistance. During trabeculotomy, it took me some practice to balance movement of the device's wheel to retract the microcatheter while tearing the TM. I found that shortening the catheter a little and then pausing in between motions ensures successful completion of the maneuver.

PATIENT SELECTION

The OMNI is suitable for a broad range of patients with open angles, either combined with cataract surgery or as a standalone procedure. Generally, the best patients to select for early experience with the OMNI are those in which there is a good view of the angle. This helps the surgeon identify that the microcatheter is initially in the correct location and that

it will continue on the correct path. The microcatheter is bright blue, which helps to track its course, especially over the first 60° to 70°. Despite variations in Schlemm's canal anatomy, I find that I can complete 360° catheterization for most eyes.

For patients with high episcleral venous pressure and bleeding disorders, I might choose a procedure that doesn't involve unroofing Schlemm's canal.

CONCLUSION

Identifying where resistance occurs in the conventional outflow pathway in eyes with primary open-angle glaucoma is challenging. By targeting all three sites of outflow resistance—the TM, Schlemm's canal, and distal collector channels, the OMNI Surgical System can successfully lower IOP in a wide variety of patients. With this one MIGS device, surgeons can perform two implant-free procedures to maximize outcomes for their patients safely and effectively.

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OMNI® SURGICAL SYSTEM Important Product Information

INDICATIONS FOR USE: The OMNI® Surgical System is indicated for the catheterization and transluminal viscodilation of Schlemm's canal and the cutting of trabecular meshwork to reduce intraocular pressure in adult patients with open-angle glaucoma.

For important safety information including contraindications, warnings, precautions, and adverse events, please visit omnisurgical.com.