

A New Era in Implant-Free MIGS



The OMNI Surgical System addresses all the potential points of resistance without leaving a device in the eye.

BY IMRAN MASOOD, BSC, MB CHB, MRCS(ED) FRCOPHTH

Glaucoma affects multiple points in the eye, and the damage caused by this disease is irreversible. With treatment and regular checkups, however, IOP can be controlled and vision loss prevented. When IOP elevation progresses beyond control with eye drops or for uncompliant patients, surgical treatment options intended to improve the drainage of fluid within the eye are often required.

The OMNI Surgical System (Sight Sciences; Figure 1) is the only device combining two accepted and well-established mechanisms to alleviate outflow resistance in the conventional outflow pathway: canaloplasty and trabeculotomy. The OMNI can be used to address both proximal (trabeculotomy) and distal (canaloplasty) resistance with a single surgical system that is capable of performing both procedures sequentially and via an ab-interno approach. The OMNI enables physicians to treat 360° of Schlemm's canal and address the three sources of outflow resistance (trabecular meshwork [TM], Schlemm's canal, collector channels) in a single surgery.

THREE POINTS OF RESISTANCE

The pathophysiology of glaucoma is not fully understood. We do know, however, that three points of resistance affect the conventional outflow pathway of aqueous humor. These are the TM, Schlemm's canal, and distal collector channels. Most of the outflow resistance lies within the TM's juxtacanalicular connective tissue.¹ As trabecular function starts to decline and glaucoma progresses, there is increased resistance to aqueous flow into Schlemm's canal, resulting in increased IOP. This causes the endothelial side of the canal to not only atrophy and constrict but also to

prolapse into the distal collector channels. As a result, the distal collector channels atrophy and constrict, increasing the resistance to flow of aqueous humor within the conventional outflow pathway and further affecting IOP.²

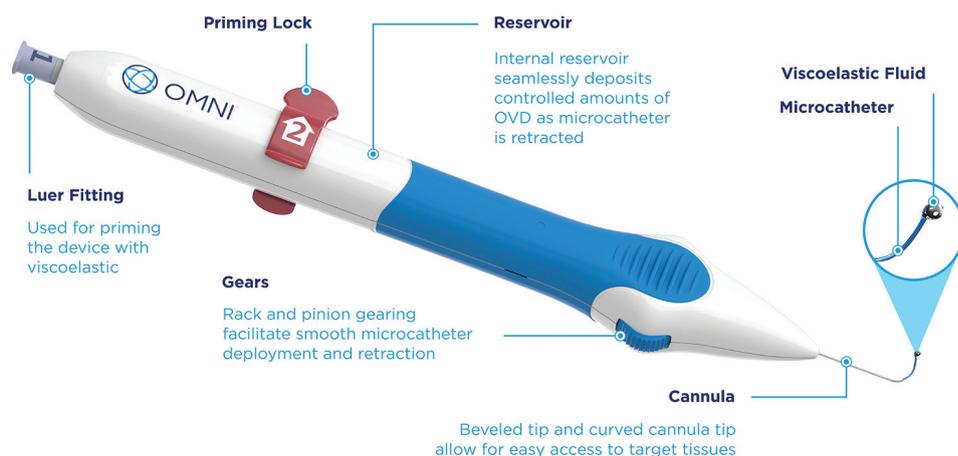
Studies have shown that, as IOP becomes elevated, the degrees of damage to Schlemm's canal and distal collector channels increase, the canal will collapse, and herniations are more likely to occur.^{2,3} Further, Stegmann showed that less blood reflux into Schlemm's canal occurs as IOP increases.⁴

Addressing all three points of resistance, like with the OMNI Surgical System, therefore is the best way to help improve IOP control in patients with glaucoma. In my experience, results are better than what can be achieved with some other devices that address only one point of resistance. Additionally, I believe that patency remains in the system in high pressure and advanced disease, which means I can treat, and have treated, patients with fairly

advanced glaucoma with OMNI. In fact, I have treated patients with fairly advanced glaucoma with OMNI. Postoperatively, the aqueous veins have laminar flow and blood cells traverse the area. So even in advanced disease, it is possible to rejuvenate Schlemm's canal and the distal outflow system.

SURGICAL TECHNIQUE

Schlemm's canal is intricate. It varies in size, location, and shape depending on the eye. Tiny hinged flaps within Schlemm's canal bridge the canal, the endothelial cells, and the back wall of the TM. In anterior segment perfusion models, these little strands help to regulate aqueous outflow. Because of these intricacies, surgery in Schlemm's canal can be complex, and certain types of devices that can be used in the angle might not pass through the canal smoothly depending on its size and shape. Sometimes, it is impossible to know which device will work best until you are inside the eye. An implant-free



Figures 1-3 courtesy of Sight Sciences

Figure 1. The OMNI Surgical System.



Figure 2. OMNI is an implant-free surgical procedure that may be easier to perform in any canal shape, size, and location.

procedure like OMNI, therefore, is beneficial because it may be easier to perform in any canal shape, size, and location (Figure 2).

A change in the angle of insertion and other modifications to your typical surgical technique may be required to navigate the TM. This structure varies in thickness, which can also influence the effort required for the procedure. Below is a brief overview of my surgical technique.

The OMNI device enters Schlemm's canal through a microcatheter and guided tip. The microcatheter is blue, making it easy to spot within the canal (Figure 3). Once the microcatheter reaches the correct position within the canal, it is retracted from the canal. A reflux of OVD into the anterior chamber should be observed, indicating that the amount of viscoelastic that's going into the canal is sufficient. To perform trabeculotomy once the canal has been microcatheterized, the cannula is withdrawn from the corneal incision, causing the microcatheter to cut through the TM and unroof Schlemm's canal upon cannula withdrawal.

CONCLUSION

As trabecular function starts to decline, the flow of aqueous into Schlemm's canal will meet with greater resistance. The canal will start to collapse and atrophy, as will the distal collector channels. These events can dramatically affect the conventional outflow pathway of aqueous humor.

Combining ab-interno canaloplasty and trabeculotomy attacks all three points of resistance—the TM, Schlemm canal, and distal collector channels. Targeting Schlemm's canal alone with a canaloplasty-only procedure can improve the outflow resistance, but not as significantly as a procedure that targets all three conventional outflow pathways. The OMNI Surgical System attacks all three parts of the pathological process, which in my opinion makes it a superior option for glaucoma management.

Schlemm canal surgery procedures that can accomplish canaloplasty and cutting of the TM will prove to be extremely useful for glaucoma surgeons.

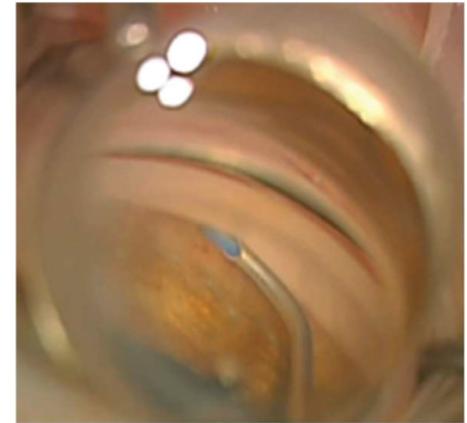


Figure 3. The blue catheter of the OMNI makes it easier to spot in the canal.

I believe we're now in a new era of glaucoma management where targeting the pathology of the disease and individualizing the surgery to the patient are possible. ■

1. Rosenquist R, Epstein D, Melamed S, et al. Outflow resistance of enucleated human eyes at two different perfusion pressures and different extents of trabeculotomy. *Curr Eye Res.* 1989;8:1233-1240.
2. Battista SA, Lu Z, Hofmann S, et al. Reduction of the available area for aqueous humor outflow and increase in meshwork herniations into collector channels following acute IOP elevation in bovine eyes. *Invest Ophthalmol Vis Sci.* 2008;49:5346-5352.
3. Gong H. Morphological changes in the distal outflow pathway of primary open angle glaucoma. Paper presented at: ARVO 2015; May 3-7, 2015; Denver, Colorado.
4. Grieshaber MC, Pienaar A, Olivier J, Stegmann R. Clinical evaluation of the aqueous outflow system in primary open-angle glaucoma for canaloplasty. *Invest Ophthalmol Vis Sci.* 2010;51(3):1498-1504.

IMRAN MASOOD, BSC, MB CHB, MRCS(ED) FRCOPHTH

- Consultant Ophthalmic Surgeon and Glaucoma Service Director, Birmingham and Midland Eye Centre, United Kingdom
- Honorary Consultant Ophthalmologist University, Hospital Birmingham, United Kingdom
- Codirector, Birmingham Institute for Glaucoma, United Kingdom
- Researcher, Centre for Translational Medicine, United Kingdom
- imranmasood777@gmail.com
- Financial disclosure: None acknowledged

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.