Precision Engineering in a Vitrectomy Platform

Vented valves, a three-pump platform, and other features are worth noting.

BY FABIO PATELLI, MD

I have had the opportunity to use the OS4 vitrectomy platform (Oertli Instrumente; not available in the United States) on several occasions. I used this platform in live surgery at the Floretina meetings in 2017 and 2019. I have also visited the company and its manufacturing facility in San Gallo, Switzerland, where I learned much about the platform's capabilities and engineering.

In this article, I present some of my impressions of the OS4 platform and the ways that it can be used in posterior segment surgery.

PRECISION ENGINEERING

The most profound impression I have about the OS4 is its precision. Every aspect of the platform, including trocars, vitrectome, light, and laser control pedal, are built with extreme precision. The machine's display is easy to understand and to use. It is also straightforward for the OR nurses to prepare and set up.

Several aspects of the platform deserve particular mention.

Trocar Structure

The valved trocars are metal, and the instrument's entry point is designed like a funnel. The valve is situated in the middle of the trocar in the narrow part (Figure 1). This trocar design makes introducing soft-tip instruments easier than with other trocars that have the valve at the top of the trocar, where it can bend the soft tip. I have found that the positioning of the valve system inside the trocar leads to excellent watertightness (Figure 2).

Pump System

The OS4 has a unique three-pump system with vacuum and flow control. The system includes peristaltic and venturi pumps, and what the company calls *SPEEP* mode (for *Speed* and *Precision*). SPEEP mode is similar to a peristaltic pump but makes use of the advantages of vacuum control. In SPEEP mode, the vacuum is controlled by the surgeon while the flow is held within a preset limit. This results in controlled holding power, high efficiency, and optimum flow—and thus highly precise work during vitrectomy.
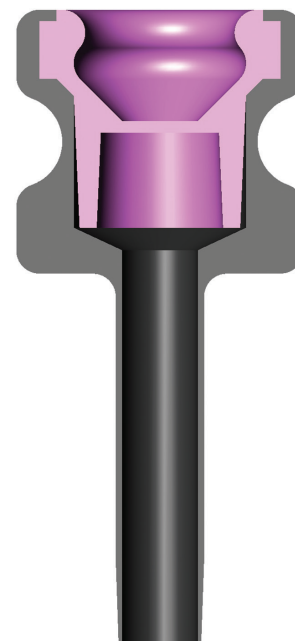
The pumps can be easily changed

Figure 1. The valved trocars are designed like a funnel, with the valve situated in the middle of the trocar in the narrow part. Figure credit: Oertli Instrumente.

AT A GLANCE

▶ A vitrectomy platform with valved trocars makes introducing soft-tip instruments easy.

▶ The platform used by the author features a three-pump system that allows pump switching via the footpedal.

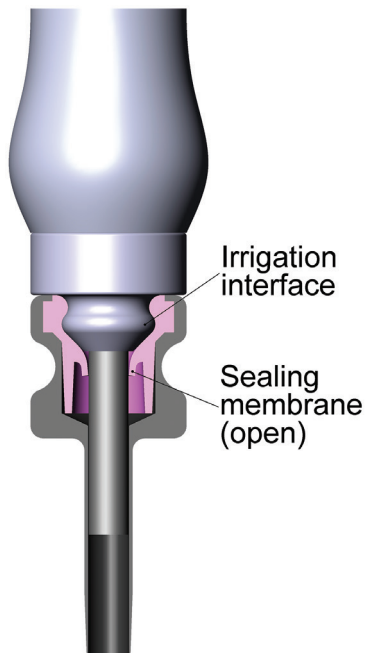▶ A transscleral illumination device, outfitted with the correct attachment, is useful for scleral indentation.

Figure 2. The positioning of the valve system inside the trocar leads to excellent watertightness. Figure credit: Oertli Instrumente.

Figure 3. The ViPer scleral indentor/illuminator is a plastic hood that is fitted over an optical fiber. Figure credit: Oertli Instrumente.

with the footpedal during vitrectomy, giving the OS4 great versatility. I use the venturi pump at maximum vacuum to remove central vitreous and the peristaltic pump for peripheral vitreous. The SPEEP mode provides incredible flow control at the vitrectome port, so I use it to remove vitreous in surgery for a detached retina. In this modality, I can go very close to the detached retina and shave the vitreous safely (Video 1). Everything is easily controlled with the footpedal, which has eight function controls.

The vitrectome probe, with double-cut action providing 10,000 cpm, is available in 23, 25, and 27 gauge. It is highly efficient and, thanks to the different pump functions, very versatile.

Vented Valve

The vented valve in the OS4 permits perfect control of IOP, a very useful characteristic. I particularly appreciate it during perfluorocarbon liquid (PFCL) injection. When I use other surgical platforms, I usually close the infusion line and use a dual-bore cannula for PFCL injection in order to
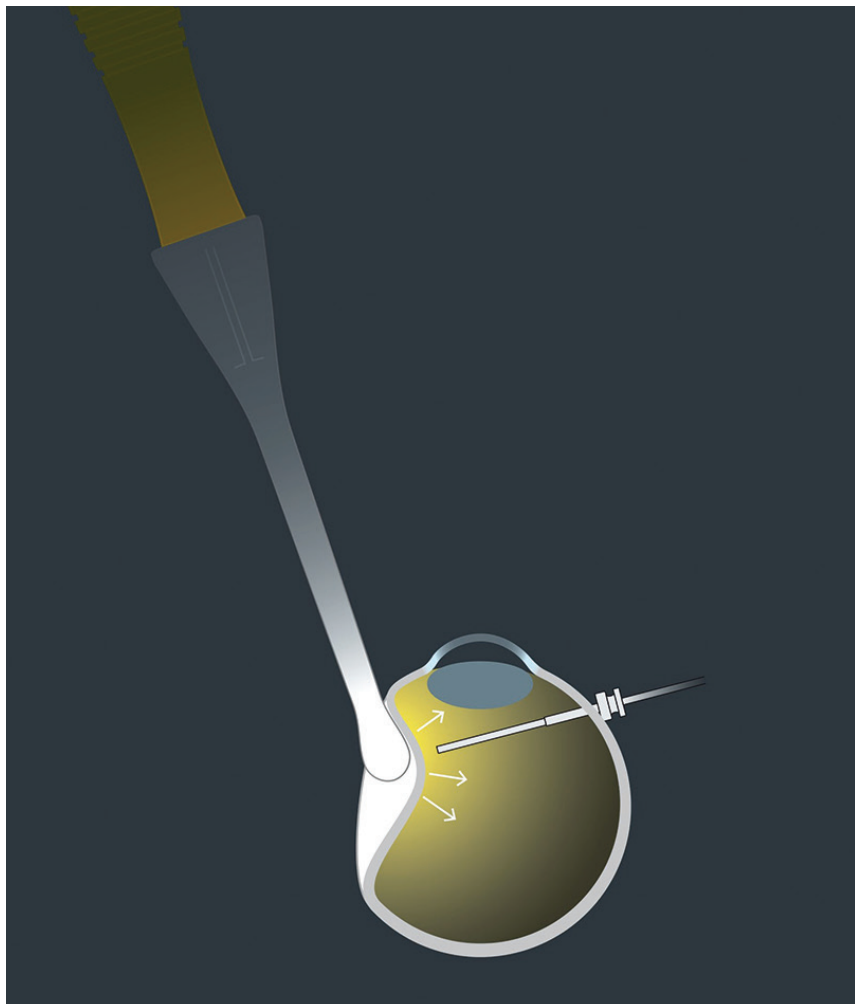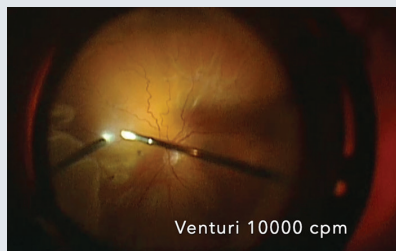

Figure 4. The device provides both intraocular transscleral illumination and a tool for scleral indentation. Figure credit: Oertli Instrumente.
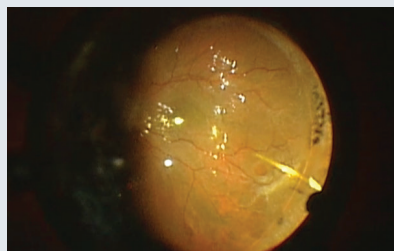
WATCH IT ON EYETUBE

Fabio Patelli, MD, has posted three videos to Eyetube demonstrating the techniques and technologies discussed in this article. Access his videos via the bit.ly links below.
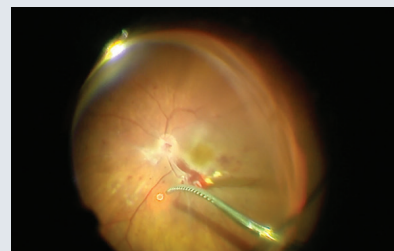
▶ VIDEO 1 ◄-----------------------

Venturi 10000 cpm

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▶ VIDEO 2 ◄-----------------------

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▶ VIDEO 3 ◄-----------------------

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allow reflux of balanced saline solution outside the eye without increasing the IOP. With this approach, PFCL injection is quite slow. With the vented valve of the OS4, I can inject PFCL faster, without turbulence, and with the infusion remaining open (Video 2).

Endolaser

The OS4 has a fully integrated 532 nm wavelength endolaser. It is fully controllable with the vitrectomy pedal. What I find especially useful is the flexible probe of the laser. It can be bent from 0° to 90°, so even peripheral portions of the retina can be reached (Video 3).

Illuminated Scleral Indentor

Oertli recently developed a new Illuminated Scleral Indentor called the ViPer (for *Visible Periphery*). This is a plastic hood that is fitted over an optical fiber, providing both intraocular transscleral illumination and a tool for scleral indentation (Figures 3 and 4). I find this very useful for peripheral vitreous shaving. The surgeon can indent with greater precision, no chandelier light is needed, and the vit-

reous is well highlighted by the transscleral illumination. The ViPer, thanks to its design, permits high transmission of light with wide-angle illumination. The device is also rigid, and this permits easy movements on the surface of the eye.

At the time of publication, the ViPer has not received the CE Mark and, like the OS4 system, is not approved by the US FDA.

CONCLUSION

The Oertli OS4 is an advanced and complete surgical platform. Every aspect is precisely built and controlled. With the three-pump system and vented valve, vitrectomy is safe even in difficult cases. I highly recommend this machine to vitreoretinal surgeons who have not yet tried it. ∎

FABIO PATELLI, MD
- Director, Vitreoretinal Service, ASST Santi Paolo e Carlo Hospital, University of Milan, Milan, Italy
- fabio@patelli.it
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