

Gaining Surgical Confidence Through Greater Surgical Control

Advanced fluidics and a Continuous Flow-Cutter differentiate the OS4 platform from other vitrectomy machines.

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The equipment the surgeon uses in the OR should feel like an extension of his or her hands. Not only should it be comfortable to use, it should also be reliable, stable, and capable of precise maneuvers. This is especially true for retinal surgery, where careful micromovements are needed to dissect and operate on delicate tissue, and where the surgeon often has to make critical adjustments based on the anatomy he or she encounters. Thus, there is another element that is essential to surgical confidence: the degree of control the surgeon has over the equipment and whether it is responsive and adaptable to one's personal preferences.

I have had personal experience using several of the vitrectomy platforms available on the market. Each has its benefits and downsides. In my view, many of the technologies require the surgeon to learn a certain way of performing surgery, either because of the onboard settings or because they are limited in their functionality. I find the opposite to be true of the Oertli OS4 surgical platform (Figure 1). Not only does the OS4 come with several advanced features, it is also responsive and is capable of doing exactly what I need to provide patients the best possible outcome. Instead of having to retrain myself to use the OS4, the platform is versatile enough that I can maintain my surgical preferences while still being confident that I am performing excellent surgeries.

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ADVANCED HDC FLUIDICS

The OS4 is designed with several advanced features, but its most important element is its High Definition Dynamic Direct Control (HDC), which functions as a brain, monitoring and controlling all onboard functions and intuitively adjusting parameters. Yet, the interface is easy to use and user friendly, thus minimizing the time it takes to reprogram and recalibrate between OR sessions. If this feature is a brain, it is a natural extension of the surgeon's brain, putting two "minds" to work during every case.

Perhaps the most innovative aspect of the OS4 platform is its next generation fluidics, including the ability to quickly switch between three different pump modes: peristaltic, Venturi, and SPEEPMode. Understanding the principles of pump and fluid dynamics will help explain why having these options can be beneficial.

In posterior segment surgery, the surgeon is manipulating delicate tissue in a tight space with limited visibility. When he or she is removing vitreous, the dynamics of the pump and its relationship to vacuum and aspiration are critical for safe maneuvers. The peristaltic pump creates a relative vacuum when the aspiration port is occluded; the operator controls flow rate with the foot pedal but cannot adjust the vacuum. In practical terms, when the tip is not occluded, the fluid level in the eye is maintained, and the vacuum engages at the lowest level required to remove the vitreous when the tip becomes occluded. Such a system may have distinct advantages at the start of surgery during the core vitrectomy, in the periphery where tractional forces are more consequential, or when dissecting near fragile vitreomacular adhesions. With Venturi, the vacuum is controlled by pedal and the flow by preset parameters, meaning that the fluid turnover in the eye depends on the vacuum power, size of the aspiration port, and the condition of the material being aspirated. Such systems require less movement of the tip to engage and remove vitreous; however, they also attract material less discretely than peristaltic pumps, and thus, may create unwanted tractional forces. Fundamentally, with the peristaltic pump, the pedal determines flow, vacuum occurs when the tip is occluded until the preset



Figure 1. The OS4 platform is versatile and responsive, which helps surgeons provide patients with the best possible outcomes.

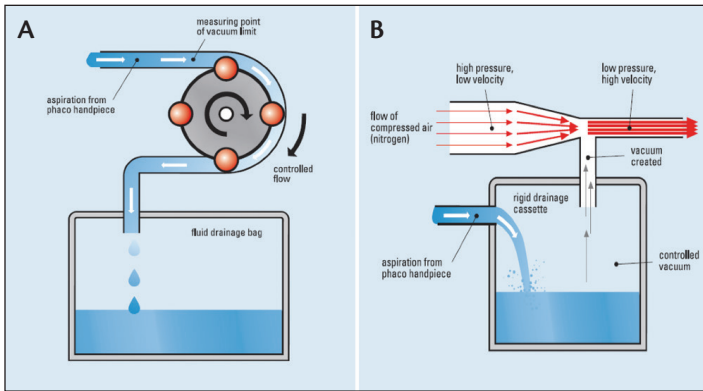


Figure 2. Peristaltic pumps (A) employ rollers to compress the tubing system to create flow while a preset vacuum level is engaged when the port is occluded. As the port becomes occluded, the rollers slow down, yielding decreased outflow. Venturi systems (B) operate on a different principle, where the flow is generated by compressed air, the air nozzle is connected to a closed drainage bag, and vacuum is constantly on.

The dynamics of the pump and its relationship to vacuum and aspiration are critical for safe maneuvers.

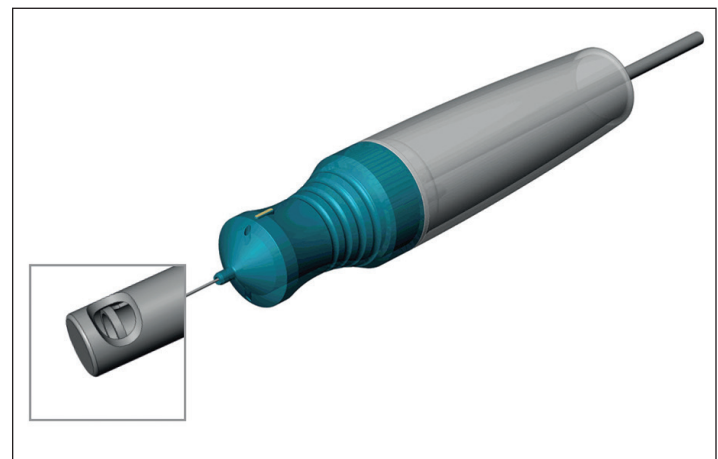


Figure 3. The Continuous Flow-Cutter has a cutting speed of up to 10,000 cuts per minute.

Using the SPEEPMODE, I am able to maintain the holding force of the vacuum, enabling the highest degree of efficacy while also assuring safety and control of flow.

value, and there is a possibility to work with low flow at high vacuum. With the Venturi pump, the pedal determines vacuum, flow results from vacuum and the resistance of the tubing, vacuum level remains constant when the tip is occluded, and there is no independent control of flow and vacuum. Additional differences are seen in the Table 1 and Figure 2.

Within the dynamics of surgery, there is not much difference when the tip is not occluded. However, tip occlusion with a peristaltic pump results in a high vacuum surge, often to uncontrollable levels. With Venturi, the surgeon gains greater control over the vacuum, but flow drops to zero when the tip is occluded.

What differentiates the OS4 platform from others is the availability of a third option, SPEEPMODE, which gives surgeons access to the best features of peristaltic and Venturi. Using this mode, which offers controlled flow and vacuum, I am able to maintain the holding force of the vacuum, enabling the highest degree of efficacy while also assuring safety and control of flow. In my hands, this is the ideal setting for controlled lifting of epinucleus; aspiration of cortex, especially when zonulas are weak; creating a posterior vitreous detachment or detaching posterior hyaloid; and for working precisely and controlled in the periphery with or without detached retina.

TABLE 1. KEY DIFFERENCES BETWEEN PERISTALTIC PUMP, VENTURI PUMP, AND SPEEPMODE

	Peristaltic	Venturi	SPEEPMODE
Basic	Flow control	Vacuum control	Vacuum control Flow control
Practical possibilities	<ul style="list-style-type: none"> Vacuum by occlusion Low flow/high vacuum possible 	<ul style="list-style-type: none"> Quickly available vacuum without occlusion No flow control Low flow/high vacuum not possible 	<ul style="list-style-type: none"> Vacuum by occlusion Fast vacuum control under occlusion Low flow/high vacuum better controllable
Practical application	<ul style="list-style-type: none"> Good for delicate work Little rests difficult to grasp Low traction Release of particles means loss of occlusion 	<ul style="list-style-type: none"> High efficiency for fast core removal Traction Turbulence 	<ul style="list-style-type: none"> High efficiency and still safe Low traction Precision in delicate work Little rests can be grasped well Controlled manipulation and release of particles without loss of occlusion

Flow-Cutter with SPEEPMode allows me to safely use much faster cut rates. If I use Venturi in the periphery, I hold the cutter opening away from the retina to be safe. With SPEEPMode, it is possible to hold the opening to face the retina.

My preferred settings on the OS4 platform for 23G vitrectomy are as follows:

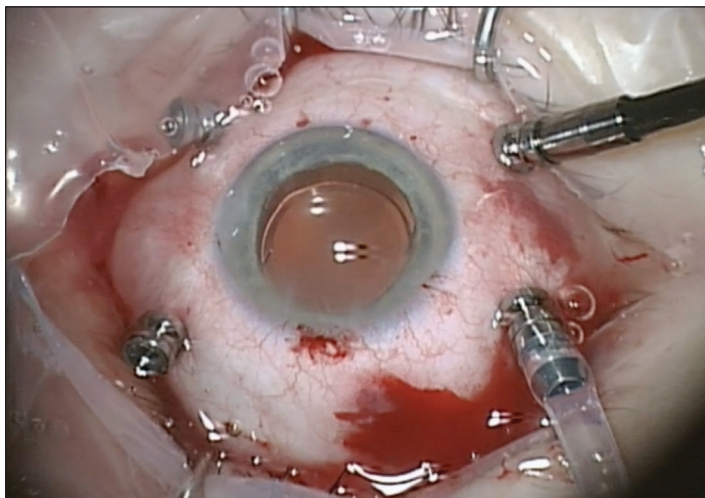
- Core vitreous: with SPEEPMode Flow 20 ml, Vacuum 300 mmHg, Cut Rate 3,000
- Peripheral shaving: with SPEEPMode Flow 5 ml, Vacuum 250 mmHg, Cut Rate: 4,000

CASE NO. 4: CORRECT POSITIONING WITH THE 25G CHANDELIER



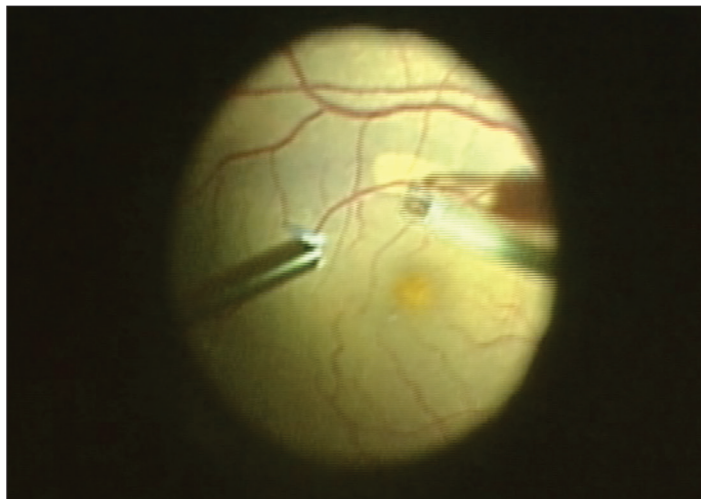
In this case, I demonstrate the correct positioning for using a chandelier in bimanual cases. The new Oertli 25G Chandelier provides perfectly bright and stable 360° illumination.

CASE NO. 5: REPOSITIONING THE LIGHT PIPE TO GAIN BETTER VISUALIZATION



Repositioning of the chandelier from one trocar to the opposite trocar allows best visualization for shaving at the 12 o'clock position.

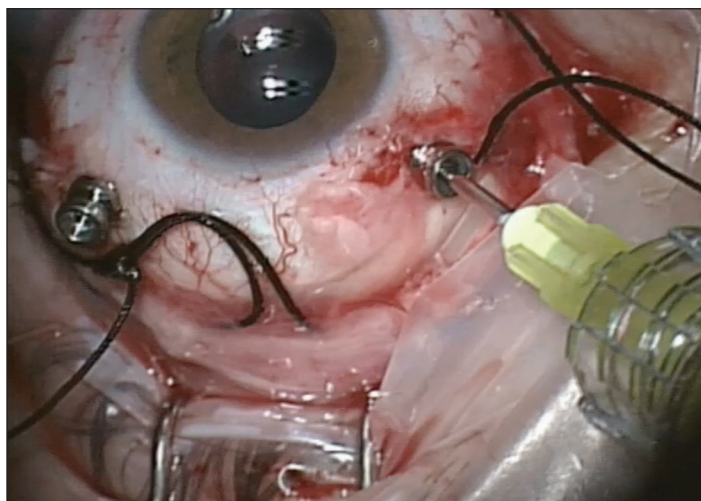
CASE NO. 6: MACULAR HOLE TECHNIQUE WITH INVERTED FLAP



In this case involving a macular hole, I am using a novel forceps, the Membrane FEELceps. This instrument has advantages:

- Strong holding capability at the tip
- No sticking of tissue on the tip, making it the perfect tool to perform an “inverted flap technique” for macular holes

CASE NO. 7: TECHNIQUE FOR OIL INJECTION



The Oertli trocar system is another highlight of the platform: the knife design is very smart. The incisions are perfectly tight; it is almost impossible to find the wound after removal. Additionally, I really like the fact that silicon oil can be filled with a 20G cannula placed in the trocar head at maximum speed, because the complete lumen of the trocar is used to fill the oil. ■