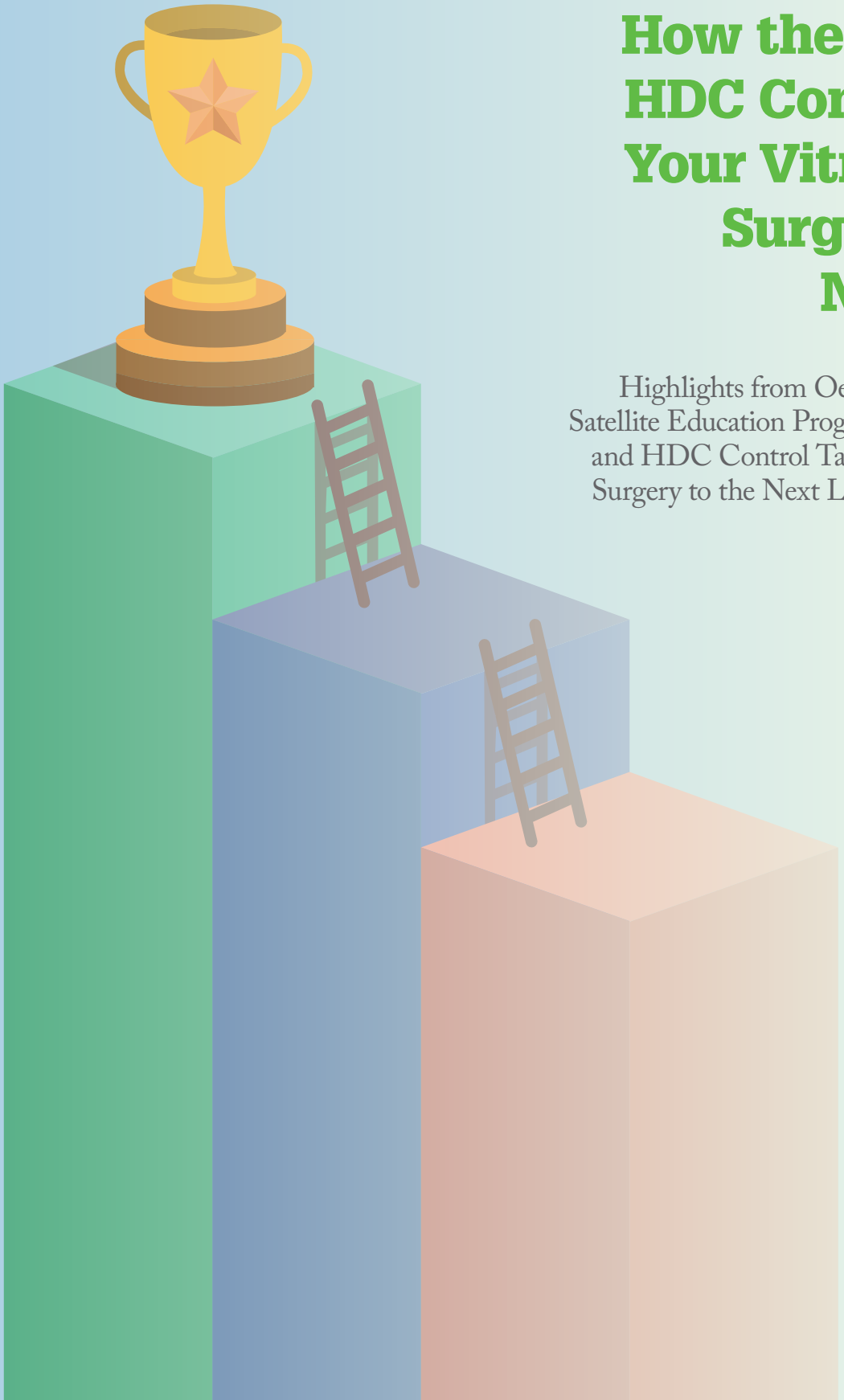


# How the OS4® and HDC Control Take Your Vitreoretinal Surgery to the Next Level

Highlights from Oertli Instrumente AG's Satellite Education Program, "How the OS4® and HDC Control Takes Your Vitreoretinal Surgery to the Next Level," held September, 2015, Nice, France.

# A milestone in vitreoretinal surgery

*By Arnd Gandorfer, Medical Director, MVZ Memmingen Augenheilkunde, Memmingen, Germany*

Oertli Instrumente AG was founded in 1955 by Heinz Oertli and now, 60 years later, the company is still a 100 percent independent and family-owned business. The difference is that Oertli® now has 60 years of proven Swiss excellence in developing instruments and platforms for vitrectomy, phacoemulsification and glaucoma. Right from the start, Oertli® was a pioneer of key inventions – in 1971, the company developed the Klöti vitrectomy stripper, and three years later the first functioning vitrectomy machine. Additionally, Oertli® produced the first dual linear foot pedal, the first double-pump vitrectomy system, and many more groundbreaking instruments for posterior segment surgery.

I've worked with Oertli® for many years, and I'm always struck by the high quality and ambition of the company's newest instruments. Recently, I had the privilege of working with the new OS4® surgical platform, and it's not just a new machine, but a milestone in development. In my opinion, it's a true Oertli machine in the tradition of the company's commitment to safety, efficiency, and innovation.

Oertli invited five leading ophthalmic surgeons – with no financial interests in the products or the company – to share their experiences with the OS4® platform and its HDC (High Definition Dynamic Direct Control), which perfectly unites the system with the micromotoric movements of the human body. What follows are their stories.

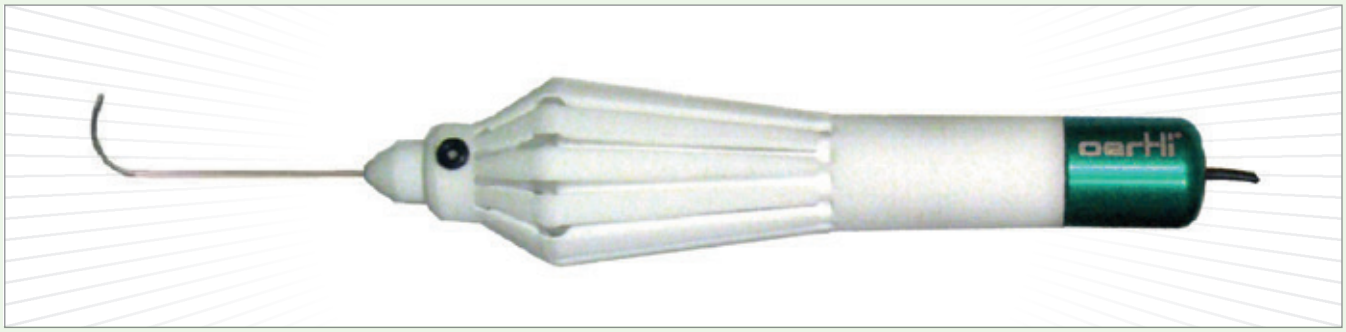
# Innovative surgery with innovative instruments

*By Andrea Mercanti, Director, UOC Ophthalmology, Azienda Ospedaliera Treviglio, Treviglio BG, Italy*

The OS4® has a high quality glass touch screen

Oertli's OS4® brings a new experience to vitreoretinal surgery with its range of new features – from newly-developed vacuum and flow tri-pump systems to enhanced surgical illumination. The tri-pump system is worthy of note: it combines peristaltic, Venturi and SPEEP® (Speed and Precision) modes – and it's the latter that's an important step forward in vitrectomy system. SPEEP® mode (Figure 1) combines the best of peristaltic and Venturi pump systems, and although it's based on a peristaltic pump, the wheel actually generates and measures flow, rather than vacuum. Vacuum is controlled by the surgeon via the machine's foot pedal. How does it work? As the pump reaches the surgeon's chosen vacuum setting, the wheel automatically slows down, reducing flow. Doing this before achieving full vacuum allows the machine to precisely and gently reach the appropriate vacuum level – whereas maintaining a fixed flow and wheel speed would significantly overdrive the vacuum setting and would risk causing issues during surgery (see page 5 for more information).

The SPEEP® mode offers a useful combination of features from peristaltic




Oertli's 25G, steerable laser probe for the OS4®.

and Venturi pumps for both vitrectomy and phacoemulsification. Its controllable vacuum offers a number of possible new applications – for instance, aspiration of membranes, subluxated lens particles, or subluxated intraocular lenses (IOLs).

*"With its innovative pumps, lighting and laser integration, I believe that it has contributed to faster and safer treatment for my patients."*

But the pumps aren't the only significant advance in this platform. Its LED illumination, with application-oriented light modes, user control, and three color memory slots for user-defined lighting conditions is a great step forward in surgical illumination. The OS4® system allows the surgeon to change between different predefined light settings using the foot pedal. LEDs not only decrease the cost and increase the lifespan of the lights relative to traditional light sources, but also maximize the surgeon's ability to visualize the retinal structures. The user-defined blue and yellow light settings refine this even more – whereas full blue light enhances visualization of the vitreous body and the internal limiting membrane, blending with yellow to produce a more amber light gives surgeons a better chance of spotting problems like hemorrhage. Overall, the controllable LED provides benefits like faster, safer procedures and reduced light toxicity (see page 6 for more information).

Good intraocular illumination is crucially important during any ocular surgery. Oertli's 25 G chandelier – which combines a chandelier fiber with a snap-in mechanism and a 25 G one-step trocar – is particularly useful. The chandelier is typically of greatest utility when operating on diabetic patients with heavy membranes, proliferative vitreoretinopathy, or any other situation in which a surgeon might choose to use bi-manual mode. It has one characteristic in particular that appeals to me – it fits into a 23 G trocar as well as a 25 G one, and I personally prefer 23 G vitrectomies. My method for using the chandelier is to make a fourth port at the 12 o'clock position, then create an anterior-posterior trocar incision. This allows me to perfectly fine-tune the position up and down, and when I have the illumination where I want it, I use a steri-strip to fixate the fiber at the drape. I find that the 25 G chandelier gives me flexibility to use the trocar I want and provides great illumination in any position or surgical situation.

The OS4® also includes a totally new integrated green endolaser. It's a 532 nm laser that can be used to treat retinal problems like breaks and detachments, diabetic retinopathy and macular edema, retinal vein occlusions, peripheral retinal neovascularization, and central serous chorioretinopathy. Conveniently, it can be controlled by either the touchscreen or the same pedal that controls phaco and vitrectomy – a benefit that, combined with its full integration, makes for simplified setup, time and space savings, and improved ease of use. Oertli® offers a wide range of laser probes compatible with the endolaser; there are straight and curved probes available in 20, 23 and 25 G, as well as steerable probes – my tips of choice – in 23 and 25 G. They're called "steerable" because the surgeon controls the curvature of the probe by pressing the handle, a feature I find gives me very precise control when treating the peripheral retina (see video at http://top.txp.to/Oertli-Steerable-Laser).

I'm pleased to have had the opportunity to use the OS4® for vitreoretinal surgery. With its innovative pumps, lighting and laser integration, I believe that it has contributed to faster and safer treatment for my patients.

*See the videos online at: http://top.txp.to/Mercanti-video*

# The power of fluidics in combined phaco/vitrectomy surgery

*By Christian Prünte, Head, Department of Ophthalmology, Kantonsspital Basel-land, Liestal, Switzerland*

I've been happily using Oertli's OS3® platform for many years now, but I recently upgraded to the OS4®. What I've found so far is that it meets all of my expectations for a surgical platform – the absolute reliability and stability that I'm accustomed to from Oertli® devices, extreme precision control of the machine, instant reactions to my foot pedal commands, and reduced overall surgery times. But one of the most unique things about the OS4® is its impressive HDC, which stands for High Definition Dynamic Direct Control.

*"The surgeon can control both vacuum and flow – the best of both worlds."*

What does that mean? The OS4® has a tri-pump system that features traditional peristaltic and Venturi pumps alongside a new mode known as SPEEP® (Speed and Precision). Of course, it's useful to have two standard pump modes because that gives each surgeon the chance to use

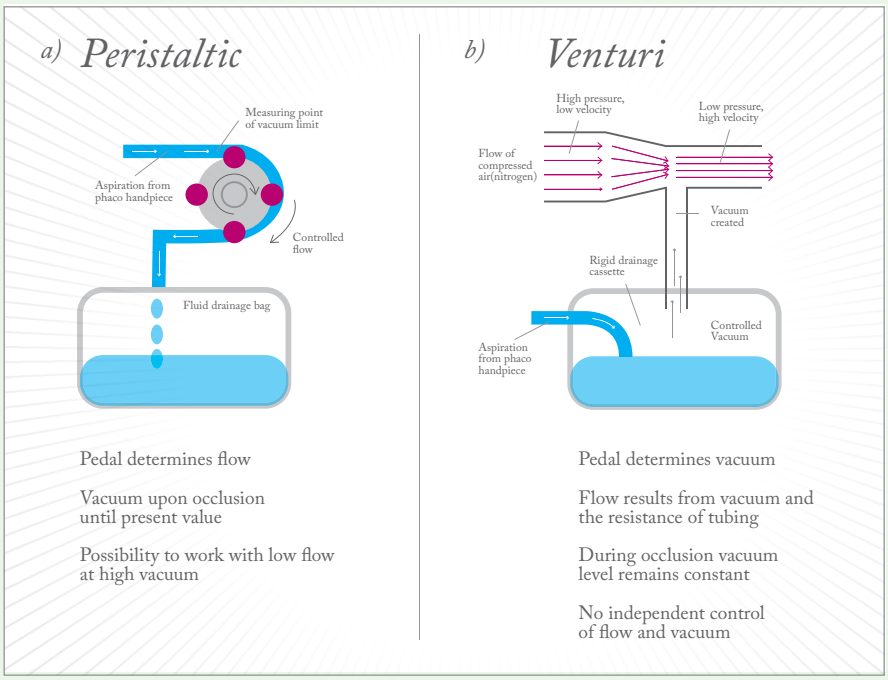



Figure 1. The conceptual differences between a) peristaltic and b) Venturi pumps.

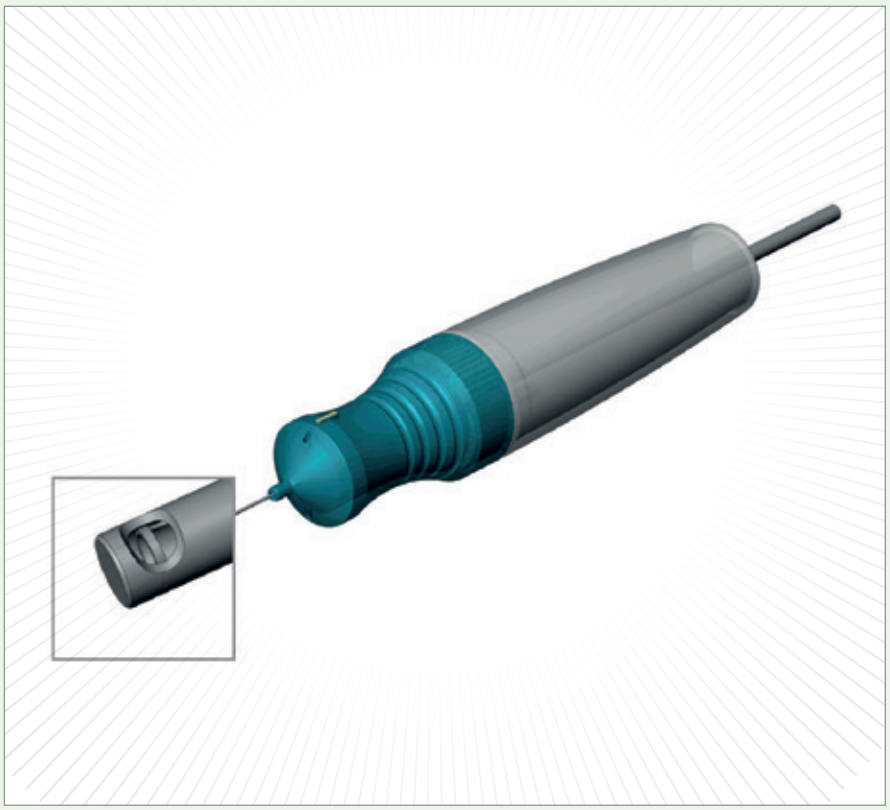


Figure 2. Oertli's Continuous Flow-Cutter.

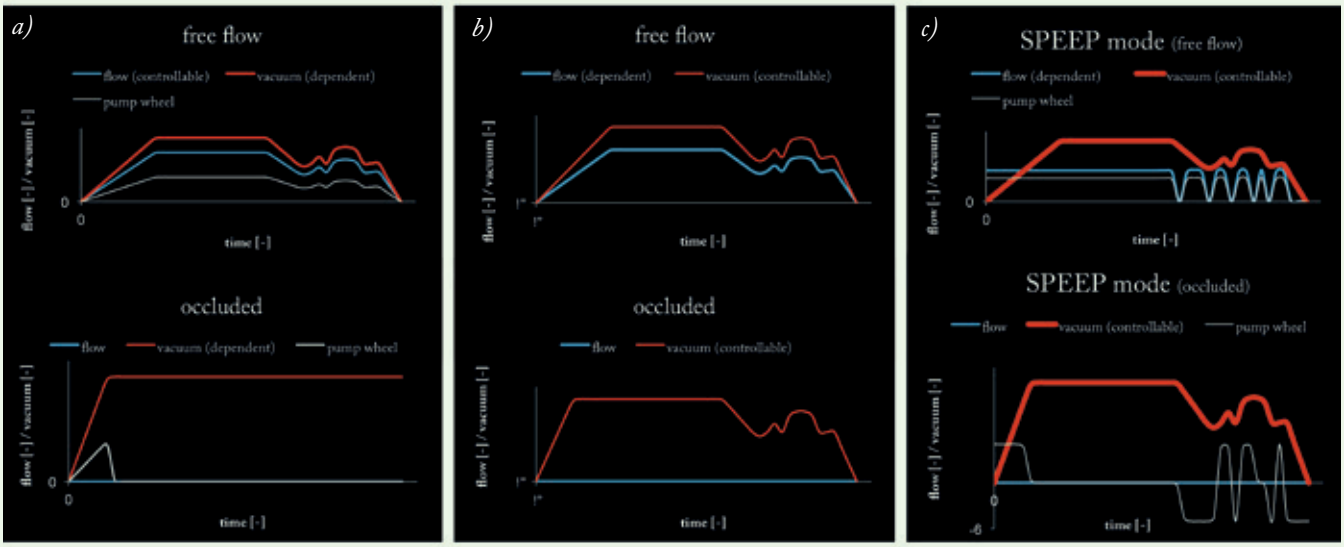



Figure 2. Flow, vacuum and (where applicable) pump wheel function over time using a) a peristaltic pump, b) a Venturi pump, and c) SPEEP® mode.

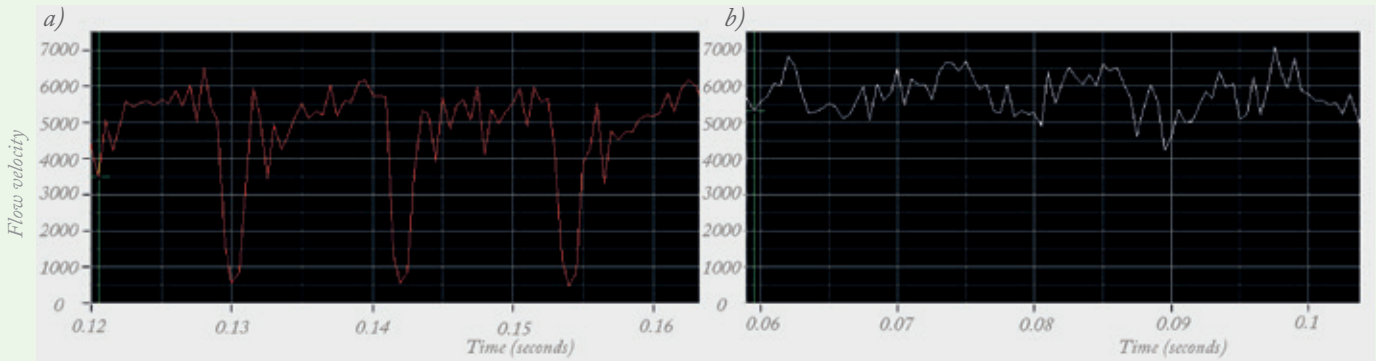



Figure 3. Measurement of flow velocity at 5,000 cpm showing a) interrupted flow with conventional cutter and b) uninterrupted flow with an Oertli® Continuous Flow-Cutter.

his or her preferred method depending on the surgical situation. But the SPEEP® mode, which is driven by a peristaltic pump but combines the best features of both types, is even better. The surgeon can control both vacuum (via the foot pedal, which interfaces with a sensor in the cassette) and flow (via presets that regulate the speed of the peristaltic wheel).

The infusion can be either gravity-driven or active (gas-forced), and the aspiration allows up to 60 mL/min of flow and 650 mmHg of vacuum. One aspect that has proven extremely useful in my practice is the fact that the pump works with only five bars of external air pressure – much faster and easier to achieve than the eight we previously needed.

To get a better idea of the SPEEP® mode's advantages, it helps to consider how the two traditional pumps work (see Figure 1). In a peristaltic pump, you regulate flow by controlling the speed of the wheel. Vacuum is secondary – but that means that, as soon as you increase resistance or occlude the tip, the vacuum levels increase. For safety, you might set a very low maximum level for the vacuum, but that results in a slow vitrectomy. The alternative is to use a Venturi pump, which makes sense; if you use your cutter to manipulate tissue, you need to control vacuum rather than flow. But increasing the vacuum also increases flow, which can reach dangerously high levels – meaning that you risk aspirating too much. In SPEEP® mode, you control the vacuum – so you can use it as a holding force for tissue manipulation – but the flow is limited by a preset maximum. It's a feature I find useful for both anterior and posterior chamber procedures involving a need for precise, controlled work in the periphery, because SPEEP® mode combines the efficacy of a Venturi pump with the safety of a peristaltic (see Figure 2) – the best of both worlds (see videos

at http://top.txp.to/Oertli-Membrane-Manipulation and http://top.txp.to/Oertli-Membrane-Preparation).

SPEEP® mode is thoughtfully designed to work with Oertli's new Continuous Flow-Cutter, a device that offers minimal-traction cutting at a rate of up to 10,000 cuts per minute (cpm). The cutter has a double pneumatic actuator rather than a spring, which allows it to function without noticeable fluctuations for continuous extraction of the vitreous. Classic cutters have an open-close cycle of 50 percent; when they're closed, the flow is interrupted, which in turn interrupts the vacuum and holding force at the tip (see video at http://top.txp.to/Oertli-BSS-Vacuuming). In contrast, the Continuous Flow-Cutter has an open-close cycle of greater than 90 percent, meaning that the opening of the cutter is never fully occluded (see video at http://top.txp.to/Oertli-23-G). This results in uninterrupted flow, which leads to continuously maintained vacuum and holding force at the tip (see Figure 3).

In my experience, the Continuous Flow-Cutter performs a very efficient continuous-flow vitrectomy. There's minimal traction to the vitreous and thus to the retina, which makes the vitreous itself is far less dynamic during the procedure (see video at http://top.txp.to/Oertli-OS4). When the new cutter is combined with the SPEEP® pump mode in Oertli's OS4®, the result is a fast, effective and impressive surgical instrument.

*See the videos online at: http://top.txp.to/Pruente-video*

# Enlightening aspects of a modern vitrectomy machine

*By Levent Karabas, ophthalmologist and associate professor, Kocaeli University, Kocaeli, Turkey*

No matter how much the instruments used to perform a vitrectomy change, the principles of the procedure remain the same: cut the vitreous, aspirate it without damaging the retina, and replace by infusion the amount that was removed. In order to do these things safely and efficiently, the vitreous cavity must be properly illuminated. That means more than simply having a bright enough light – the light must be safe for the patient and the surgeon as well.

Light toxicity is the physical effect of photon energy on the retina, and has a retinal hazard threshold of 25 joules/cm$^2$. As the wavelength of light decreases, its frequency and photonic energy increase; this means that the shorter the wavelengths, the greater the potential for ocular toxicity.

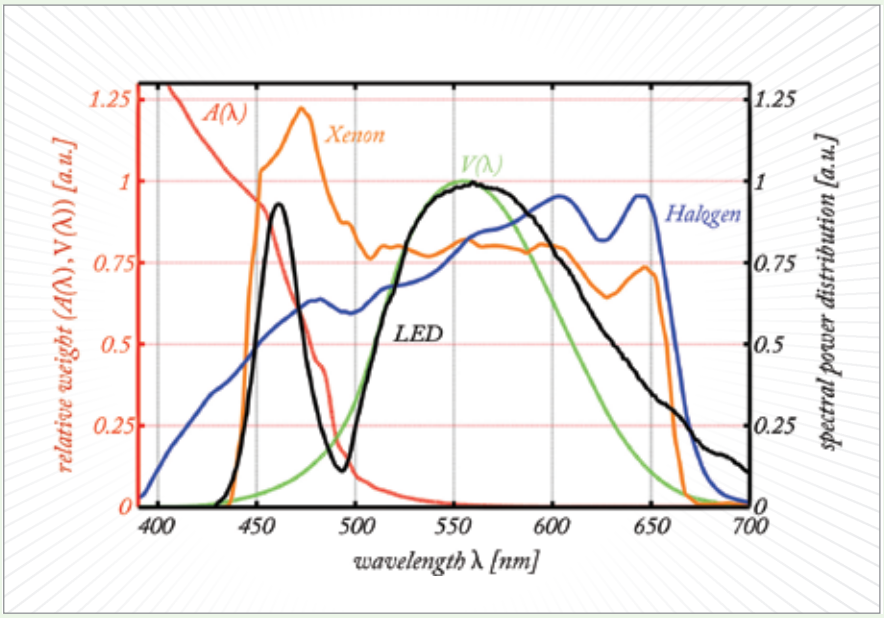



Figure 1. The spectral power distributions of different types of light sources as well as the aphakic hazard function A(λ) and the luminous efficiency function V(λ). The spectral power distributions are scaled for equal brightness. For the spectrum of the LED light source (black), the setting is adjusted for a color temperature of 4500 K. The aphakic hazard function A(λ) describes the potential of light-induced retinal injury as a function of wavelength.

Five factors determine this toxicity:
1. Irradiance (light intensity),
2. Illuminance (light brightness),
3. Absorbance (of the retinal tissue),
4. Wavelength (nanometers), and
5. Exposure (time).

Not all lights are created equal. Under the same lighting conditions and exposure times, the safest source is a mercury vapor light. Next best is a xenon light with a 435 nm filter, followed by a halogen light, and then by a xenon light with a 420 nm filter – and least safe of all is a metal halide light source (see Figure 2).

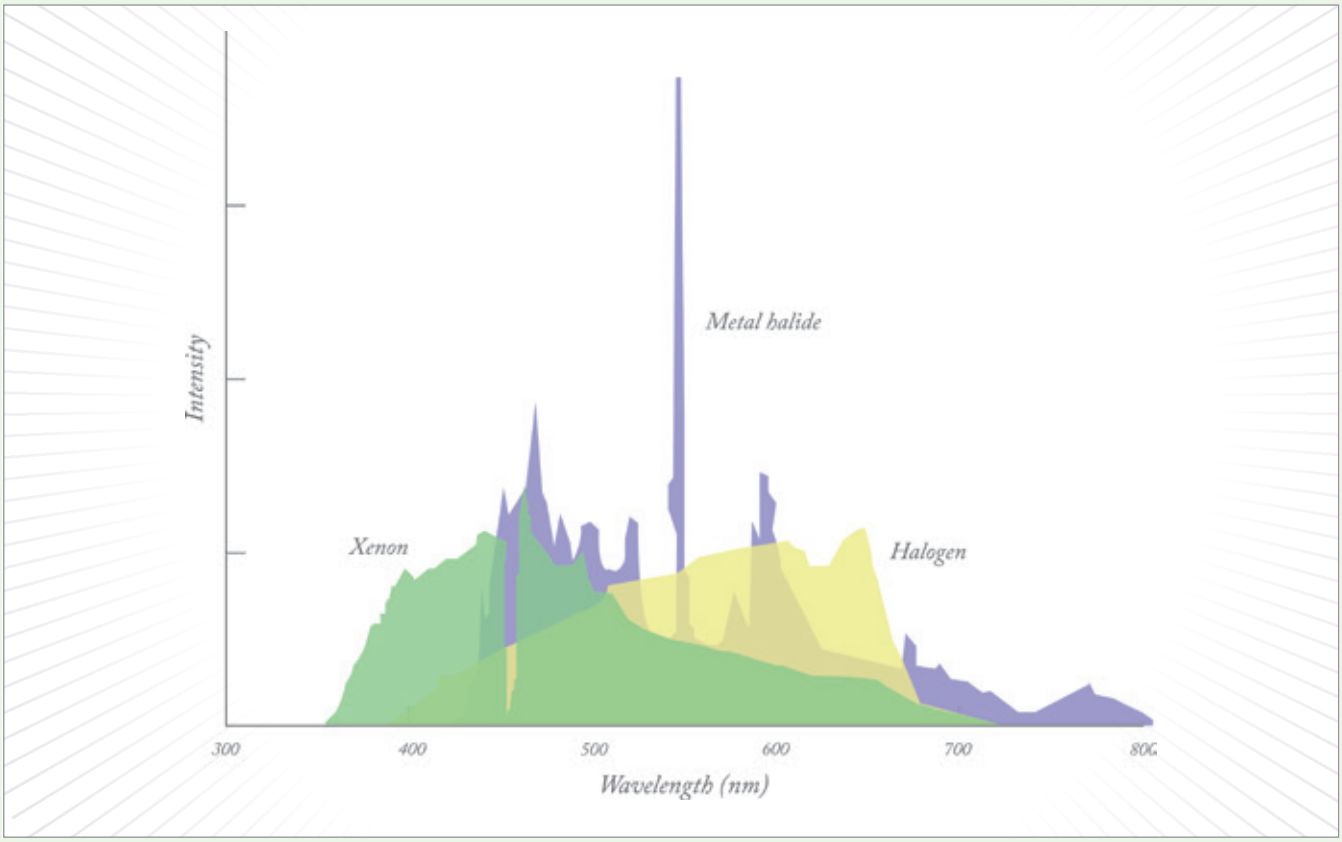



Figure 2. The intensity of xenon (green), halogen (yellow) and metal halide (violet) lights at different wavelengths. Both xenon and metal halide lights have intensity peaks at short wavelengths.

Because surgeons need high illumination to see the details of their work, any chosen light source must have a high output while minimizing toxicity. Minimizing the incision size only increases the need for high output – using the same light source, a 23 G endoilluminator transmits about half the light of a 20 G one, whereas a 25 G illuminator transmits about 40 percent. That means that these instruments require a light source with twice the illuminating power. Halogen and metal halide lights lack sufficient output, whereas mercury vapor and xenon lamps lose power as they age. Xenon light sources also emit short wavelengths, increasing the risk of toxicity. It's clear that a better alternative is overdue – and Oertli's OS4® offers one: the Goodlight® LED.


Figure 3. Adjustable colors on the Oertli OS4®'s Goodlight® LED. Users can set any ratio of their choosing and save up to three different ratios in the device's memory.

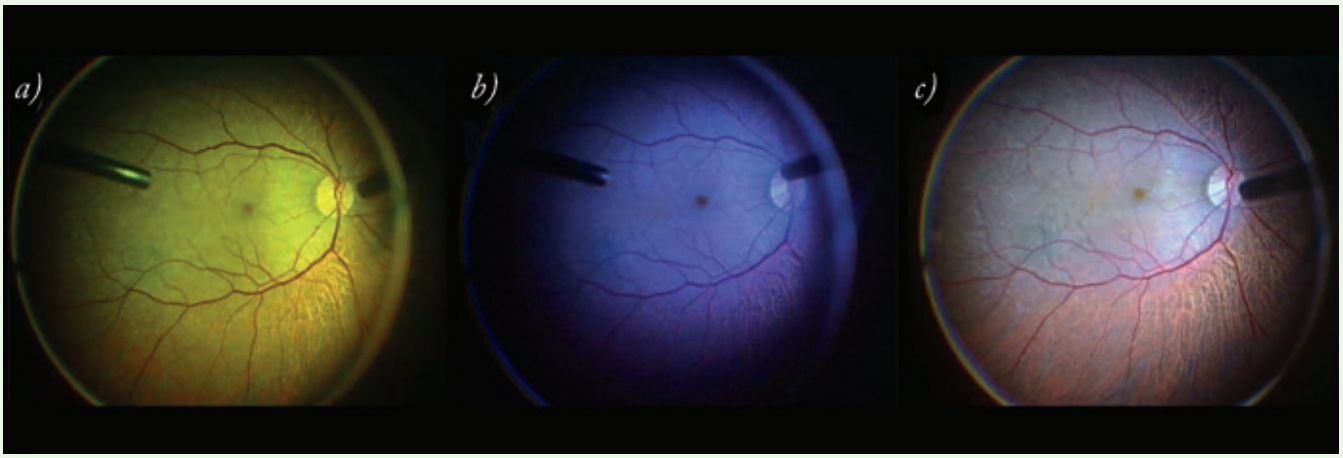



Figure 4. Different lighting options available during vitreoretinal surgery using the Goodlight® LED. a) Predominantly yellow, b) predominantly blue, and c) white lighting.

Oertli® pioneered the first xenon light source for ophthalmic surgery in 1995, long before small-gauge surgery had been introduced and before the hazards were fully understood. As the causes of light toxicity became better known, Oertli® introduced LED lighting for vitrectomy in 2009. Now, the company is well-placed to introduce the newest evolution of that lighting system. The Goodlight® LED has a long lifespan and does not diminish in brightness over time. Although it has a high intensity, leading to good visibility, the resulting irradiance is very low (see Table 1).

| | *Blue light proportion (%)* | *Maximum radiant power (mW)* | *Maximum irradiance (mW/cm²)* | |
|---|---|---|---|---|
| | | | *5 mm working distance* | *10 mm working distance* |
| *ocuLED (cool white)* | 22.3 | 29.6 | 58 | 15 |
| *ocuLED (neutral white)* | 15.5 | 29.6 | 58 | 15 |
| *Xenon (no filter)* | 30.8 | 59.2 | 140 | 35 |
| *Xenon (435 nm filter)* | 28.8 | 150 | 357 | 89 |
| *Mercury vapor* | 14.1 | 68.5 | 162 | 41 |

Table 1. Relative safety of several available light sources for ophthalmic surgery. Lower numbers in each of these measurements equate to lower potential for light toxicity.

*"That means more than simply having a bright enough light – the light must be safe for the patient and the surgeon as well."*

Thanks to this, and to its automatic absorption of all wavelengths under 435 nm, the LED minimizes the danger of photoretinitis. But how does it work? The OS4® contains two LED light sources, one white and one colored. The colored light allows mixing of yellow and blue wavelengths for optimal contrast

to visualize intraocular structures (see video at http://top.txp.to/Oertli-OS4-5) and surgeons can adjust the color ratio as desired at any point during a procedure (see Figure 3). For example, blue wavelengths can be preferentially emitted by the light source to better visualize internal structures, and yellow wavelengths in order to spot bleeding; surgeons can also take advantage of any mixture of the two (see Figure 4) – and all during the same case.

The Goodlight® LED also works well with a chandelier; you can move it to the position you need, lock it in place, and adjust the lighting conditions as appropriate. That makes it easy to illuminate all of the retinal structures without compromising safety.

Illumination is important during surgery, but I'm also impressed by a feature that is most useful after the procedure has been completed. The OS4® has sharp trocars that I can insert easily and with great precision (see video at http://top.txp.to/Oertli-Knife-Trocar); I've found that when I remove the trocars, the wound is almost invisible. Postoperatively, the incisions seal so well that I very rarely have to place a suture. **The sum of the platform's new lighting options, lancet bevel trocars and effective pump system make it an indispensable tool for all of my vitreoretinal procedures.**

*See the videos online at: http://top.txp.to/Karabas-video*

# Stable management of retinal detachment cases with OS4® and Continuous Flow-Cutter

*By Andy Luff, Consultant ophthalmic surgeon, Optegra Eye Hospitals, Hampshire and Surrey, United Kingdom*

I've been using an Oertli OS3® with a standard pneumatic cutter for many years. As with all Oertli® machines, it's solid, reliable, fantastically engineered, and will probably keep running forever. But traditional cutters have limitations, and with variable duty cycles, bidirectional drive, and changes to port size and position, the original design has probably been modified as far as possible – so it's time to look at something different.

What makes a good cutter? Above all else, it must allow for safe and efficient removal of the vitreous. There are a number of characteristics that facilitate this: speed, control, stability, ergonomics and rigidity

Speed, in particular, gets a lot of attention. There are clear benefits to a faster cutter, but those benefits don't exist in isolation; there's much more involved in performance – for instance, fluidics.

I've always been impressed by the emphasis Oertli® places on fluidics, so when the OS4® came out, the most intriguing aspect for me was the new Continuous Flow-Cutter. The cutter has a double pneumatic actuator and provides continuous flow with no perceptible fluctuations, leading to traction-free cutting and optimal emulsification of the vitreous. There are plenty of features to consider in a cutter, from the most basic – cut rate, flow rate, pump design, port size and position – to the very detailed – port-based flow limiting, non-Newtonian fluidics, bite size, and sphere of influence. But all of those considerations come down to one basic question: does it work?

The Continuous Flow-Cutter does work. I had the chance to conduct a three-way test comparing a 25 G standard cutter, a 23 G standard cutter, and a 23 G Continuous Flow-Cutter for core vitrectomy (see video at http://top.txp.to/Oertli-OS4-6). The Continuous Flow-Cutter was so effective that, for the first time in my life, I actually asked the staff nurse to turn the machine down as I used it. With a rate of up to 10,000 cuts per minute, the Continuous Flow-Cutter is faster and more effective than any other cutter I've used. It works because the port is never fully closed, allowing it to minimize fluctuations in its flow and remove vitreous body twice with each cycle, rather than once like other cutters (see Figure 1).

*"The Continuous Flow-Cutter was so effective that, for the first time in my life, I actually asked the staff nurse to turn the machine down as I used it."*

This continuous flow and high cut

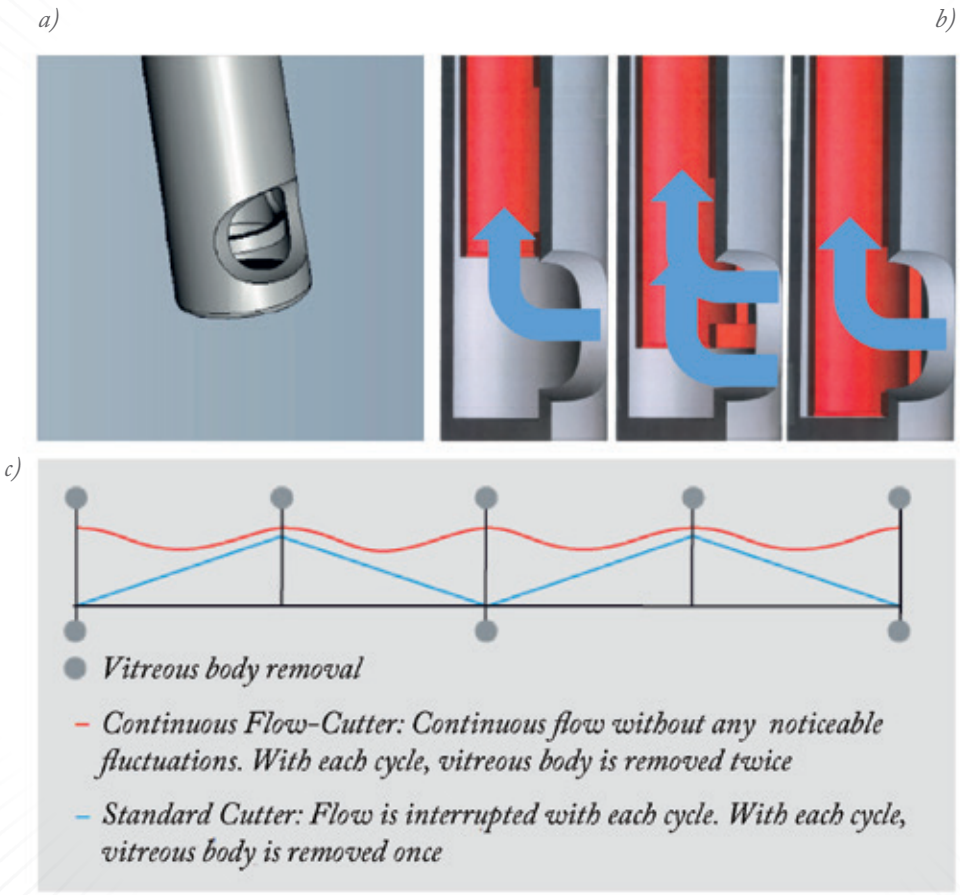


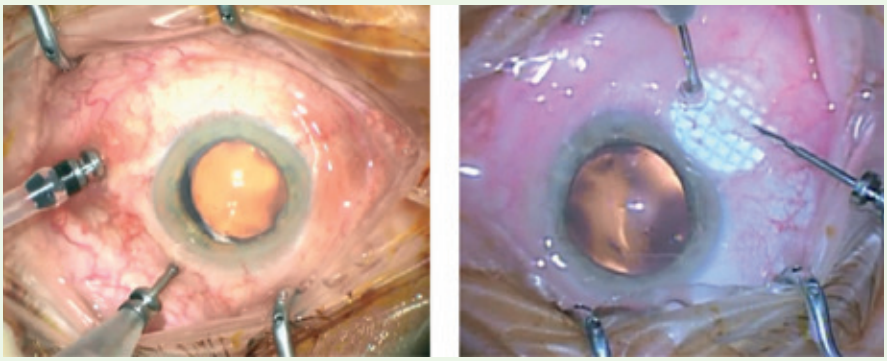

Figure 1. a) The port of Oertli's Continuous Flow-Cutter, showing its unique always-open design. b) Flow is maintained at all points in the open-close cycle. c) A plot of the flow resulting from the Continuous Flow-Cutter (red) and from a standard cutter (blue). Fluctuations in flow with the Continuous Flow-Cutter are minimal and vitreous body is removed at two points in the cycle, whereas flow is interrupted during each cycle with the standard cutter and vitreous body is removed only once.

rate are the obvious benefits of OS4® and the Continuous Flow-Cutter, but the rest of the design involves an equal amount of thought and care. The cutter perfectly portions vitreous body removal and offers excellent precision, thanks to having its port at the absolute minimal distance from the distal end. When combined with the new SPEEP® pump mode, it's an ideal setup for situations where you don't want uncontrolled vacuum – for instance, when peeling and manipulating membranes using the device's continuous holding force. All of these features lead to the highest safety and efficiency not just in core vitrectomy, but other procedures as well. What do I think? I'm not sure why, even after using the Continuous Flow-Cutter only once, I would go back to anything else – and my advice to all other surgeons is to try the OS4® and the Continuous Flow-Cutter for themselves.

*See the video online at: http://top.txp.to/Oertli-OS4-6*

# Macular surgery experiences with the OS4® platform

*By Siegfried Priglinger, Professor, Ophthalmology, Ludwig-Maximilians-University, Munich, Germany*



Placing a 23 G standard trocar (left; see video at http://top.txp.to/Oertli-23-G-Limbus) and a 25 G Oertli® lancet bevel trocar (right; see video at http://top.txp.to/Oertli-23-G-Limbus.) The Oertli® trocar offers less resistance and requires less incision force than other needle designs.

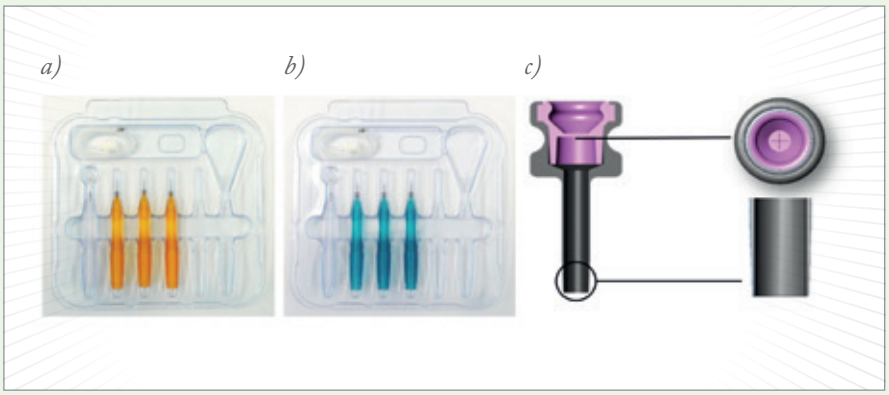



Figure 1. The color-coded Oertli Caliburn® cannula system in a) 23 G and b) 25 G, with c) integrated sealing valve for constant intraocular pressure.

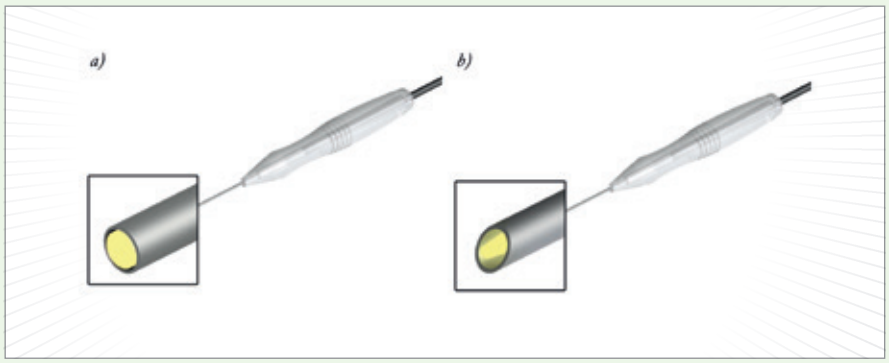



Figure 2. a) The Oertli Endo Illuminator 90° and b) the Oertli Endo Illuminator Panorama.

I use the OS4® to perform vitrectomies and macular surgeries, and for me, the most valuable aspect has been the combination of this powerful surgical platform with Oertli's newest instrument technologies. In my practice, I've been able to take advantage of the SPEEP® pump mode and Goodlight® LED systems in conjunction with new cannulas, cutters and forceps – leading to faster and safer macular procedures.

The Oertli Caliburn® color-coded cannula system (see Figure 1a and b), which uses Oertli's lancet bevel trocar, is available in 23 G (orange) and 25 G (blue). In a recent independent study, Carsten Meyer *et al.* (1) showed that these Oertli® trocars exhibited the lowest penetrating force of any tested and created a small, smooth, linear incision with good wound architecture. I found that a standard trocar requires me to push quite hard to penetrate the sclera, whereas the lancet bevel involves much less incision force, even at the trocar edge. It's also easier to pull back the lance while ensuring that the trocar remains safely in place.

The Caliburn® cannula system comes with a unique integrated sealing valve (see Figure 1c), which guarantees constant intraocular pressure. To ensure that there's no leakage during the intervention, the seal has to be quite tight – but there's a solution that can assist with membrane aspiration: a backflush needle with a built-in light. The active aspiration allows the surgeon to remove tissue without having to exit and re-enter the eye, and the integrated light means there's no need to insert a separate trocar for a light source (see video at http://top.txp.to/Oertli-Illuminated-Vacuum). And once the procedure is completed, the wound closure is excellent. The trocars create smooth, linear incisions,

Figure 3. Oertli's DEX™ Maculorhexis Forceps for peeling the ILM.

and because I use the Oertli incision plate with them, I can ensure exact positioning and a defined 30° angle. After removing the trocar, I just massage for a few seconds – the most important contributor to successful sealing – and the wound closes (see video at http://top.txp.to/Oertli-23-G-removal).

In the clinic, I take advantage of the Oertli's new High Definition Dynamic Direct Control (HDC) and continuous flow system for vitrectomy. The OS4® offers more efficient removal of the vitreous thanks to an increased flow rate, which it accomplishes by virtue of:

- increased port size on the cutter,
- powerful vacuum (up to 650 mmHg),
- increased cut rate (up to 10,000 cpm), and
- increased duty cycle.

The last two are key components of the Continuous Flow-Cutter, which contains a double cutting blade (to cut by centripetal and centrifugal movement) and maintains constant aspiration independent of cut rate. Traction-free cutting, reduced turbulence, and optimal vitreous emulsification are also essential in treating retinal detachment, as they help surgeons avoid iatrogenic tears. In every vitrectomy situation, the difference is noticeable.

See a 23 G anterior vitrectomy using a conventional cutter (http://top.txp.to/Oertli-23-G-OS4-2) and the same procedure using the 25 G Continuous Flow-Cutter (http://top.txp.to/Oertli-25-G).

The Goodlight® LED included in the OS4® makes vitreoretinal procedures much easier and minimizes the risk of light toxicity. Surgeons can set individual mixtures of blue and yellow light, program them into the device's memory, and use different light modes for different applications. There are two handheld probes available for the endoilluminator – a 90° angle probe and a panorama probe. The Endo Illuminator Panorama is available in color-coded 20 G (yellow), 23 G (orange) and 25 G (blue); it has a wide tip for optimal illumination and is shielded to avoid glare as the surgeon works.

The 90° probe offers a good focused spot for visualizing the vitreous, but a limited overview, whereas the panoramic tip has a wide-field geometry and allows a good overview of the entire operating area. The principal advantage of using a chandelier is that it enables bimanual surgery (with cutter or scissors in one hand and forceps in the other); that way, surgeons can complete many cases without the help of an assistant. However, the chandelier does require at least one additional sclerotomy and may reduce the surgeon's ability to visualize retinal structures by creating instrument "shadowing" or compromising retroillumination. Better illumination allows the vitreous and periphery to be removed perfectly – and these probes provide the best illumination I've ever seen.

See a 25 G core vitrectomy using a separate, handheld endoilluminator probe (http://top.txp.to/Oertli-25-G-Core) and the same procedure using an Oertli 25 G chandelier (http://top.txp.to/Oertli-25-G-Chandelier).

The final consideration for a perfect procedure is the surgeon's choice of forceps. For both the epiretinal membranes and the inner limiting membrane (ILM), I prefer to use the Oertli DEX™ Maculorhexis Forceps (see Figure 3), which are perfect for my "pinch and peel" technique (http://top.txp.to/Oertli-25-G-Vitrectomy). Peeling the fragile ILM requires particular attributes in the ideal forceps – for instance:

- an ergonomic handle,
- precise grasping,
- good rigidity,
- good holding force for removal of the membrane, and
- availability in small gauge sizes.

In reducing the size of our surgical tools from 23 G to 25 G, we've assumed that "the smaller, the better." But is this really true? Does it make sense to minimize even further? In my opinion, the next step – 27 G tools – is more trouble than it's worth. The internal limiting membrane is fragile and frequently breaks. With 27 G tools, I've found that I have reduced holding force and peeling is quite difficult (http://top.txp.to/Oertli-27-G-Peeling). I think it's best to continue working with 25 G instruments, and I think that Oertli's tools are the best in precision and reliability of any I've used.

*Reference*

1. *CH Meyer et al., "Geometry, penetration force, and cutting profile of different 23-gauge trocars systems for pars plana vitrectomy", Retina, 34, 2290–2299 (2014). PMID: 25046392.*

***See the videos online at: http://top.txp.to/Priglinger-video***