How Physics and Fluidics Bring Modern Cataract Surgery to the Next Level

The promise of next-generation surgery is fulfilled with the Oertli SPEEPMode and easyPhaco technologies.

BY PROF. DR. MED. ARMIN WOLF

Today, both surgeons and patients have high expectations for modern cataract surgery. Surgeons want to use as little ultrasound energy as possible in the eye in order to protect the endothelial cells from damage. At the same time, as surgeons, we want to have a stable anterior chamber with no fragments floating around during the procedure. We would also like to treat all kinds of nuclei using one surgery machine, so that cataracts ranging in density from soft to rock hard can be removed using the same system. After surgery, patients' high expectations include instant results, with clear corneas on postoperative day 1.

To help meet my patients' surgical requirements, as well as my own, I have been using the Oertli OS 4 surgical platform, which has a unique tri-pump system and the proven easyPhaco technology. Their unique fluidics system made by physics takes modern cataract surgery to the next level.

HOW PUMP SYSTEMS AFFECT SURGERY

The efficiency and safety of every cataract procedure is highly dependent on the pump system that we use. Pump systems can vary immensely from each other, but for vitreoretinal and cataract surgery, there are two common types: peristaltic and Venturi. In a peristaltic pump system, a rotating roll 'milks' the tube, and we control the speed of rotation. We can finely tune the flow, but we can only build up the vacuum by occlusion up to the preset limit. The Venturi pump system creates a vacuum using air current. The vacuum is built up quickly and is adjustable, but the flow is not directly controllable.

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To achieve our high goals for modern cataract surgery, we need a new generation of pump system. The Oertli OS 4 features a highly developed pump system: a peristaltic and a Venturi pump, as well as the unique SPEEPMode, are available during vitreoretinal and cataract surgery. In the SPEEPMode setting, we can control both flow and vacuum at the same time. We can precisely dose the flow up to 60 ml/min and directly control the vacuum with a foot pedal up to 650 mmHg.

With the SPEEPMode, we have a dynamic tool that we control throughout the procedure to achieve unsurpassed precision. SPEEPMode gives us a controlled holding power and optimized flow, allowing us to work very efficiently and precisely in both the anterior and posterior segments. We get the best of all worlds—safety, speed, and efficacy at the same time.

PRECISION AND EFFICIENCY WITH NEXT-GENERATION FLUIDICS

Many surgeons are familiar with Oertli's SPEEPMode from vitreoretinal surgery. If we look at how the system supports precision and control in retinal surgery, we can see how those benefits can be applied to cataract surgery as well. In vitreoretinal surgery, SPEEPMode's primary benefits are the safety and precise control it provides in a variety of situations. That added control enables us to safely go closer to sensitive structures, while its controlled power permits fast, efficient aspiration in small-gauge vitrectomies. We have the safety and the power to work efficiently, as well as the ability to adjust throughout surgery.

Can we apply these very strong benefits from retina surgery to cataract surgery? Yes, we can. These two areas share the same principles and demands for pump systems: safety, efficiency, and high precision all at the same time.

FOLLOWABILITY AND HOLDABILITY IN CATARACT SURGERY

For cataract surgery, the OS 4 provides a range of benefits with the easyPhaco technology. The easyTip (Oertli Instrumente AG) is designed to make cataract surgery safe and efficient using the clever application of fluidics based on physics. The special architecture of the easyTip brings the fragments to the tip in a

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highly effective and controlled manner and 'magnetically' holds them to the area of ultrasound application. Consequently, the fragment's core material absorbs all the ultrasound energy, with little ultrasound energy surpassing the fragment. With ultrasound absorbed by the core material in the tip, the technology imparts as little ultrasound as possible in the eye, allowing us to preserve the endothelium and see clear corneas as early as postoperative day 1.

The architecture of the easyTip not only decreases ultrasound transmission, but it also has a higher inflow than outflow to ensure a stable anterior chamber. Now I reliably have stable anterior chambers, controlled followability, strong holdability, and clear postoperative corneas.

Additionally, the easyPhaco technology is effective at treating all nuclei. We can perfectly dissect hard as well as soft materials and perform fine emulsification with no clogging in the aspiration path. The inflow into the anterior chamber is very controlled and higher than the outflow, which provides additional chamber stability.

The easyTip comes in several different sizes, but my favorite is the CO-MICS for incisions of 1.6 -1.8 mm, which allows me to perform cataract surgery even in complex situations such as traumatized eyes. (See *Watch it Now* for a video demonstration.) Using SPEEPMode, I can perform complicated cases such as trauma cases with greater safety and control, as well as remove very hard cataracts without switching devices or producing trauma to the eye.

While I'm utilizing irrigation and aspiration, the I/A Quick Tips (Oertli Instrumente AG) provide a very stable anterior chamber with sub-incisional accessibility (Figure). Together with SPEEPMode, occlusion is achieved very quickly, giving us a strong hold on the cortex material. This approach has a very high safety profile during capsule cleaning, including both anterior and posterior capsule polishing. And it all happens very efficiently using SPEEPMode.

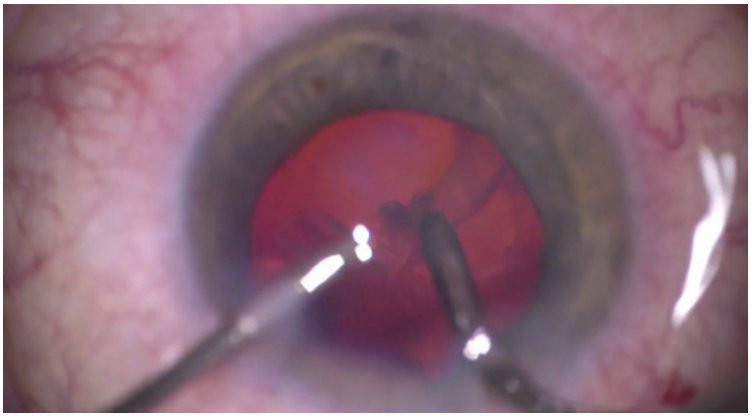
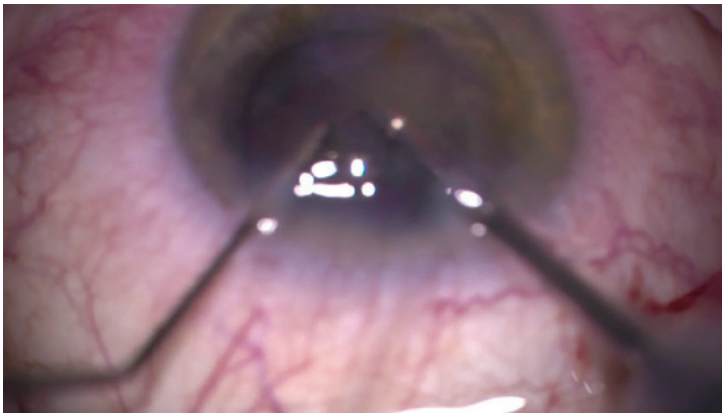


Figure. Using SPEEPMode in irrigation and aspiration helps maintain a very stable anterior chamber.

A TRULY MODERN APPROACH

Modern cataract surgery is all about safety, precision, and efficiency. To reach those goals, we rely on advanced fluidics made by physics. Thus, tips, fluidics, and dynamics need to be closely harmonized. With OS 4's integrated easyPhaco technology and unique SPEEPMode, Oertli optimizes the close relationship between the pump system and tip design, producing an advanced system that helps us to elevate cataract and vitreoretinal surgery. It's just the level of safety, precision, and efficacy that both patients and surgeons expect from modern cataract surgery. ■

WATCH IT NOW



Prof. Dr. med. Armin Wolf demonstrates using the easyTip CO-MICS (Oertli Instrumente AG) for a bi-incision approach, with one I/A entering through the 1.6-mm incision. The easyTip provides strong holdability on the lens fragment for efficient dissection and removal.

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