

## Ophthalmic Viscosurgical Devices: Seven Secrets to Success

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### INTRODUCTION

Dr. Robert Kershner spoke about OVDs, the correct term for the entire spectrum of viscoelastics. He illustrated the different characteristics between the available products. No longer a question of using a single OVD as a space-occupying material and being done with it. OVDs have become much more sophisticated, each one designed for a specific application. Today's OVDs behave differently, so to be most effective, surgeons need a step-by-step approach to cataract surgery that optimizes the uses of the different OVDs at different stages of the procedure.

### OVD CATEGORIES

OVDs can be divided into three categories based upon their performance characteristics: *dispersive* represented by ProVisc<sup>®</sup> (1% sodium hyaluronate), Viscoat<sup>®</sup> (3% sodium hyaluronate, 4% chondroitin sulfate) combined as DuoVisc<sup>®</sup>, Ocucoat<sup>®</sup> (2% hydroxypropyl methylcellulose, or HPMC) and Vitrax<sup>®</sup> (3% hyaluronate), *cohesive* represented by Healon<sup>®</sup> (1% hyaluronate) and Healon GV<sup>®</sup> (1.4% hyaluronate) and the new *viscoadaptive* Healon 5<sup>®</sup> (2.3% hyaluronate). As noted, it is not the concentration of the hyaluronate that determines whether it is more viscous, but rather the overall size and molecular weight (Daltons).

### DIFFERENCES BETWEEN OVDS

To demonstrate the performance characteristics between the different OVDs, Dr. Kershner illustrated a comparison (**Figure 1.**) By increasing the size and density of the hyaluronate molecule the same substance can behave quite differently. Healon is clear, keeps it's space well and is easily inserted and removed. It was the first OVD to be developed, and completely changed the way cataract surgery was performed. Healon GV has greater molecular weight and better able to remain in place. According to Dr. Kershner, Healon 5 is "hyaluronate on steroids". It is a tenacious product and behaves like liquid glass. Its surgical application is distinct from that of other OVDs; if surgeons express aqueous with overfilling, they may not be able to work within it. Healon 5 requires a purposeful insertion, and like all OVDs it must be removed.

### AN "INSTRUMENTAL" ROLE

OVDs are really devices and not drugs, they can and should be used like instruments. An OVD should be selected based upon it's intended use and applied just like an instrument. A surgeon wouldn't use an IOL forceps to tear a capsule, they should no more leave an OVD in the eye than they would leave a forceps. Why would surgeons need a selection of OVDs? It is costlier to use more than one syringe of an OVD, but as Dr. Kershner pointed out, one doesn't play golf with just one club, neither should a surgeon perform cataract surgery with just one OVD.

### HEALON 5 THE VISCOADAPTIVE

Viscoadaptive OVDs such as Healon 5 have characteristics that change depending upon how it is used. If injected slowly it acts as a dispersive; if injected quickly, it acts like a cohesive. Surgeons who slowly fill the eye with Healon 5 may overfill the anterior segment. If Healon 5 is injected quickly as a bolus, the surgeon can then work around, under, and over it, but *not* inside it. Healon 5 will offer exquisite control of tissues, is clear, doesn't get in the way, and will create and maintain space better than any other OVD. Because it stays where it is placed and is the most dense OVD available, Healon 5 will better protect the

cornea. Despite reservations about using more viscous OVDs, studies show that as long as it is completely removed it is not a problem. Dr. Kershner suggests that surgeons avoid placing the OVD where it isn't needed so that they don't have to hunt for it at the end of the procedure. Little is more. Less is better. Only use that which is needed.

## Multiple Uses

Dr. Kershner discussed the application of these new products with the new technology IOLs. Healon 5 can be used as a niche product to enlarge small pupils, stabilize intraoperative floppy iris syndrome (IFIS), stabilize an anterior capsular tear, tamponade a posterior capsular tear and aid in removal of recalcitrant nuclear chips or cortex. Although it is superior for these purposes, Healon 5 should not be considered a niche product to be used with the occasional difficult case. Healon 5 is ideal for every case and can improve results for every patient.

## THE SEVEN SECRETS

Dr. Kershner has developed seven "secrets" of success that optimizes the use of Healon 5 in cataract surgery. Routine or complicated, Dr. Kershner has found that using a viscoadaptive at the beginning of a case can head off problems before they start.

### Secret 1: Capsulorhexis

Healon 5 deepens the anterior chamber for capsulorhexis and can reduce zonular stress (**Fig. 2**). A little goes a long way, so it is important not to overfill. Placing a small bolus of Healon 5 onto the center of the lens capsule before making the capsulorhexis pushes the anterior lens capsule back, and reduces zonular stretch which could inadvertently redirect a tear toward the equator. Healon 5 stabilizes the capsule, tearing around the bolus with a single instrument to open the capsule and conduct the tear works best (Kershner One-Step capsulorhexis forceps, Rhein Medical, Tampa, Florida USA) (**Fig. 3**). OVDs are not used for hydrodissection. Dr. Kershner suggests performing this procedure with a curved Binkhorst cannula to prematurely irrigate beneath the incision to loosen any cortical attachments.

### Secret 2: Phaco Tip Insertion

Immediately prior to removing the OVD cannula, place a small bolus of Healon 5 beneath the incision. The OVD deepens the subincisional space and facilitates phaco tip insertion. It is easily removed with the first pass of the phaco tip on aspiration.

### Secret 3: Protect During Phacoemulsification

Dr. Kershner reminded the audience to never leave the imaginary phacoemulsification triangle of safety. Bordered by the incision above and the iris leaflets on either side, phaco only in the deepest and widest area of the chamber, well away from problematic tissues.

### Secret 4: Expand the Bag

OVDs can expand the capsular bag, but it is not necessary to fill it. Dr. Kershner suggests using regular Healon to fill the bag if that is what the surgeon is most comfortable with. Then, placing a small bolus of Healon 5 into the center of the capsulorhexis (**Fig. 4**), the surgeon can inject the IOL under the bolus, displacing the OVD into the AC and protecting the endothelium. If the bag is filled, a hydraulic is created, and as fluids are noncompressible, unloading the IOL can be made more difficult.

### Secret 5: IOL Loading

This can be achieved by lubricating the cartridge with Healon 5 into the nose cone being careful to not overfill the injection cartridge. Instead, he suggested using a tiny ribbon of Healon 5 along the hinge and an equally small amount into the end of the chamber.

## Secret 6: IOL Injection

Healon 5 can be used to control IOL implantation. If a small amount of the OVD exits the injector first, then the IOL can easily follow into the space created by the OVD. Too much OVD into the cartridge can make IOL injection difficult.

## Secret 7: OVD Removal

OVDs must be completely removed at the end of any procedure. Remaining OVDs can contribute to a rise in postoperative intraocular pressure. Dr. Kershner recommended using the amounts injected sparingly and only placing them where necessary. The same properties of Healon 5 that cause it to be cohesive and adaptive can aid in its removal with the irrigation and aspiration as a single piece.

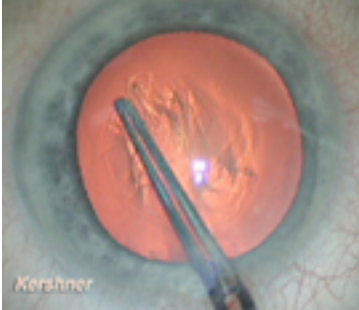
If surgeons follow these seven simple secrets to OVD success, then improved outcomes, clearer corneas and happier patients can be reproducibly achieved with each and every surgical experience.



**Fig. 1** From left to right, Healon, Healon GV, Healon 5, and Vitrac.



**Fig. 2** Healon 5 deepens the anterior chamber for capsulorrhexis.



**Fig. 3.** Capsulorrhexis can occur around the bolus of Healon 5 with the one-step capsulorrhexis forceps.



**Fig. 4** Healon 5 injected into the center of the capsulorrhexis aids in IOL insertion.