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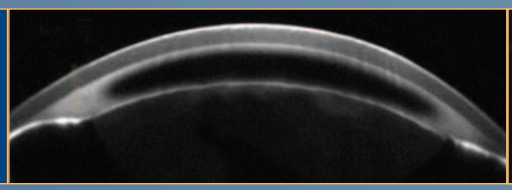
The Ophthalmic Viscosurgical System



Clinical considerations in the choice of OVDs: A roundtable discussion.

Featuring:

David F. Chang, MD (Moderator)

Randall J. Olson, MD

Rosa Braga-Mele, MD, FRCSC

Robert H. Osher, MD

Uday Devgan, MD

Roger F. Steinert, MD

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The Ophthalmic Viscosurgical System

Clinical considerations in the choice of OVDs: A roundtable discussion.

PANEL

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This roundtable is about the Healon family of ophthalmic viscosurgical devices and how they work individually and as a system to assist surgeons in all aspects of cataract surgery.

Dr. Chang: For this roundtable discussion, we have gathered several leading cataract surgeons to discuss the Healon family of ophthalmic viscosurgical devices (OVDs), particularly the most recent to be introduced in the US, Healon D (sodium hyaluronate 3.0%; Abbott Medical Optics, Inc., Santa Ana, CA). Let's begin our discussion with an overview of Healon D, how it behaves, and where it fits within the Healon family of OVD products.

Dr. Devgan: Healon D is a dispersive viscoelastic, hence the *D* in its name. Its primary use is for coating and protecting the corneal endothelium during cataract surgery. As a dispersive agent, Healon D coats the intraocular structures and is not as easily washed out during phacoemulsification as cohesive OVDs. Surgeons will find that its corneal protection remains at the end of phacoemulsification.

Dr. Chang: Are any of you using Healon D for the majority of your cataract cases? What advantages are you finding?

Dr. Steinert: I have long believed in using a dispersive OVD during phacoemulsification for the protection this type of agent provides the corneal endothelium. Cohesive OVDs only stay in the eye if we use low flow. I now use Healon D routinely because it has excellent retention and superior clarity compared to other formulations. Healon D allows me to see tiny particles and bubbles on the eye, and it does not budge during the entire removal of the nucleus. As a result, I have been very pleased with the performance of Healon D.

Dr. Chang: How does Healon D compare with the other dispersive OVD, Viscoat viscoelastic solution (Alcon Laboratories, Inc., Fort Worth, TX), which contains chondroitin sulfate?

Dr. Olson: I examined Viscoat a few years ago when my colleagues and I were evaluating products' corneal protection during phacoemulsification. We conducted a series of studies that found that air bubbles bouncing around in the anterior chamber with an unprotected corneal endothelium could cause profound endothelial damage. We learned that a dispersive OVD could protect against that damage.[1] So, I was interested to see how Healon D compared to Viscoat. My colleagues and I compared the two agents in a masked study so that the surgeon did not know which viscoelastic he was using.[2] We used computer programs to count the endothelial damage after vital staining (also done in a masked fashion) in rabbit eyes. The results showed that both agents protected the cornea and stayed in the eye. Healon D performed slightly better, but the two were not statistically different. We saw no evidence that chondroitin sulfate is important in protecting endothelial cells; it seems to merely contribute to Viscoat's rheology (Figure 1) and to be a factor in decreasing optical clarity.

Dr. Chang: I'd like to talk more about what differentiates Healon D from the other choices in the Healon family. Dr. Devgan, please describe the attributes of each of the Healon products.

Dr. Devgan: The *GV* in Healon GV stands for *greater viscosity*. It is a very cohesive viscoelastic that excels at

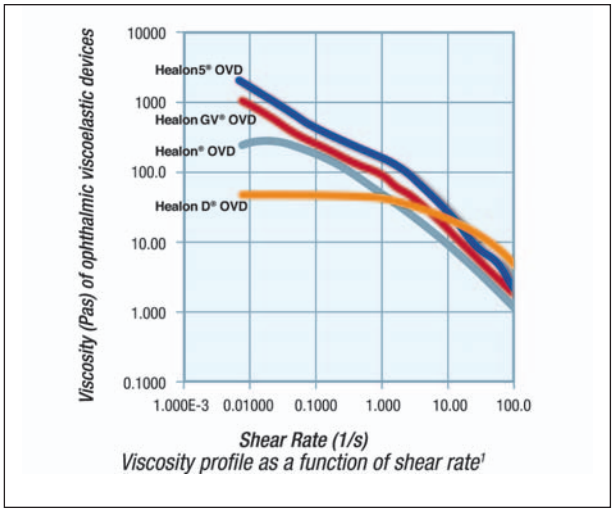

Figure 1. Only the Healon family of OVDs offers a complete range of viscosurgical devices to meet physicians' needs. (1. Data on file, Abbott Medical Optics, Inc.)

maintaining space in the eye during surgery. For example, during steps like capsulorhexis creation, it deepens the anterior chamber and gives the surgeon more control (Figure 2). GV's cohesiveness also makes it very easy to remove. After IOL implantation, this agent acts as a single cohesive mass that exits all at once as the surgeon begins to aspirate it.

Dr. Braga-Mele: I use Healon GV for the majority of my cases. It is my gold standard viscoelastic. It has better staying power than Healon and is easier to remove than Healon5 or a dispersive viscoelastic, yet it provides great stability and corneal coverage throughout standard phaco cases.

Dr. Chang: Dr. Steinert, how does Healon GV behave differently from standard Healon? Are there any differences in how you remove these two agents at the end of a case?

Dr. Steinert: Healon GV is different from regular Healon in that it has a higher molecular weight. The molecular chain is longer. As molecules start to move, the bigger they are, the more likely they are to drag along adjoining molecules, which are attached by various ionic chemical forces. From a clinical point of view, this means that viscoelastics with a high molecular weight will move as a unit in response to aspiration. I am fond of Healon GV for expanding the capsular bag and inserting the IOL, because it is easy to aspirate afterward. As soon as I insert the I/A tip and establish a reasonable amount of flow, the entire bolus of Healon GV follows readily. In a few seconds' time, I can completely evacuate this OVD from the capsular bag. An additional benefit of Healon GV's molecular weight is that it resists positive pressure, thereby giving the surgeon the ability to expand the capsular bag and resist positive pressure while implanting the IOL. It minimizes the risk of tearing the posterior capsule, which in my opinion is Healon GV's greatest benefit.

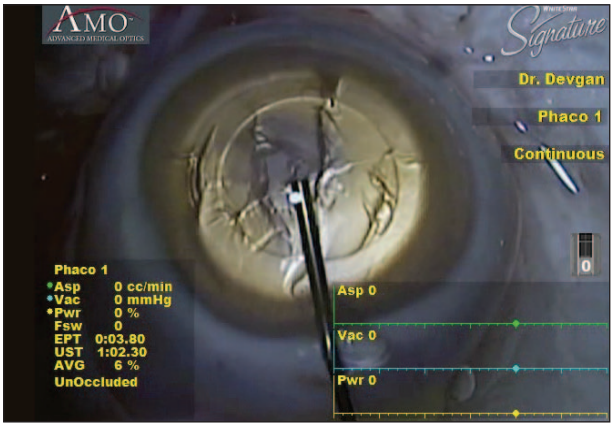

Figure 2. In this pig eye, the capsulorhexis has been created under Healon GV (yellow tint). The dispersive OVD, Healon D (blue tint), is then injected to coat and protect the corneal endothelium before phacoemulsification. (The OVDs have been dyed to assist visualization in the pig eye.) (Reprinted with permission from SLACK Incorporated: Devgan U. Dual-viscoelastic system ideal for cataract surgery: With so many OVD agents available, it can be difficult to find the right combination. *Ocular Surgery News U.S. Edition*, 27(2),77.)

> "I use Healon GV for the majority of my cases. It is my gold standard viscoelastic."
> —Rosa Braga-Mele, MD, FRCSC

Dr. Chang: Dr. Osher, please summarize the pros and cons of Healon5 and how it is different from the other agents we have already discussed.

Dr. Osher: Healon5 has been my OVD of choice since it was introduced in the US. In every case, it gives me immediate viscomydriasis, and it deepens the anterior chamber better than any other OVD for the safe introduction of the needle or forceps for the capsulorhexis. The same safety is afforded when the diamond blade penetrates the cornea for my second stab incision. Healon5 also prevents the anterior capsular edge from running peripherally. Granted, it may slow the creation of the capsulorhexis somewhat, but because Healon5 flattens the anterior lens' convexity, it gives me complete confidence that the capsulorhexis will not run. With my particular phaco parameters, Healon5 remains in the anterior chamber, so it offers extraordinary protection to the corneal endothelium, which translates into crystal-clear corneas the next day. Healon5's protective nature works beautifully with the newer phaco machines that allow the surgeon to work at lower parameters.

In terms of reinflating the capsular bag, Healon5 establishes a firm globe for making microincisions and introducing foldable IOLs. Moreover, without question, it is the easiest OVD to remove, because it does not stay in the eye in the presence of high vacuum. Furthermore, Healon5 has

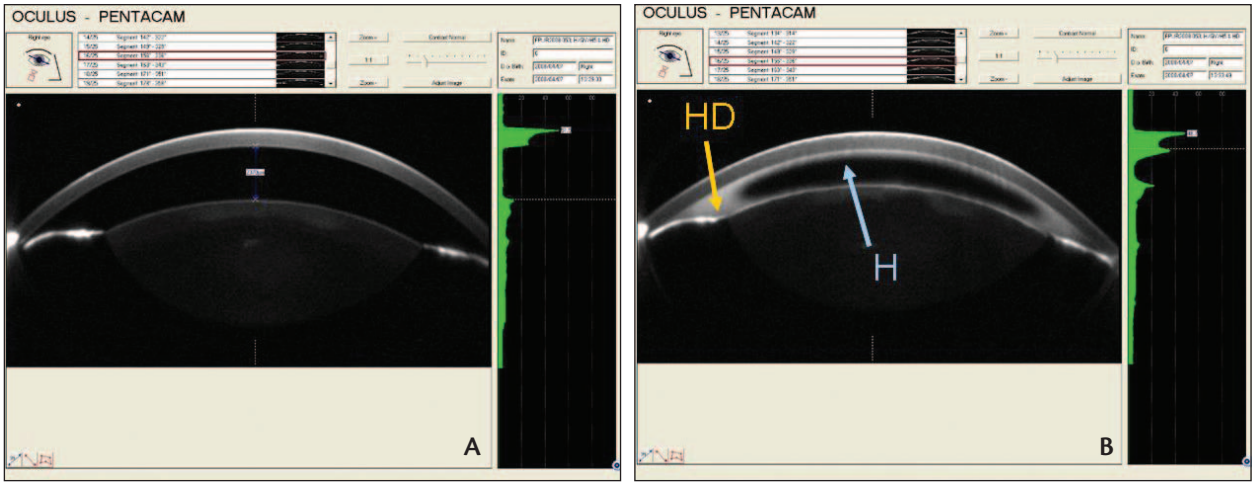

Figure 3. These intraocular images of a pig eye taken with the Pentacam Comprehensive Eye Scanner (Oculus, Inc., Lynnwood, WA) show the eye before injection (A) and after injection of Healon D+H (B). Note that Healon D coats the corneal endothelium and Healon creates space in the anterior chamber. (Reprinted with permission from SLACK Incorporated: Olson RJ. Selecting an Optimal OVD. *Ocular Surgery News* Monograph. October 25, 2008:13.)

been shown to be enormously helpful in challenging cases such as eyes with loose zonules, intraoperative floppy iris syndrome (IFIS), and positive pressure from a host of causes, such as the proptotic, nanophthalmic, or vitrectomized eye.

In summary, I continue to maintain that Healon5 is the most dependable, versatile OVD available today. Not only is it extremely helpful in complicated cases, but it is also ideal for routine cases.

Dr. Braga-Mele: Healon5 is my go-to viscoelastic in any challenging case. It helps me manage small pupils, IFIS, and shallow anterior chambers. It offers tremendous stability when making the capsulorhexis, and when layered on top of the iris, it helps stabilize the iris during phacoemulsification.

Dr. Chang: Steve Arshinoff, MD, of Ontario, Canada, has popularized the soft shell technique,[3] which employs both a cohesive and a dispersive OVD during cataract surgery. Many surgeons throughout the US are now routinely using two different OVDs, if not this specific soft shell technique. Are any of you using the different Healon products in this way?

Dr. Devgan: I like the flexibility of having both a dispersive OVD, like Healon D, as well as a cohesive one such as Healon GV in my routine cases. I can tailor their use to each step of the procedure. For example, at the beginning of the case, Healon GV is perfect for deepening the chamber, flattening the anterior lens capsule, and controlling my capsulorhexis. During phacoemulsification, I prefer the dispersiveness of Healon D to protect the cornea and minimize damage to the endothelium. At the end of a case, I like to use Healon GV again to reinflate the capsular bag, because it maintains that space very well and is easily aspirated from the eye. Most cataract surgeons I know prefer to use a dual viscoelastic system for routine cases, and this approach can also be beneficial if a routine case starts to turn into a challenging case. If the patient has loose zonules or a rent in the posterior capsule, a dispersive OVD such as Healon D can maintain a barrier between the vitreous and the anterior segment of the eye (Figure 3A and B). In the presence of a shallow anterior chamber or iris prolapse, Healon GV's greater viscosity will help maintain that space. Thus, using two OVDs in an ophthalmic viscosurgical system, such as Healon D+GV and Healon D+H, is a good surgical strategy.

Dr. Braga-Mele: I only use the soft shell technique for two types of complications. First, if there is a potential problem with the cornea (ie, guttae or Fuchs' dystrophy) or a particularly dense nucleus, then I will coat the cornea with a dispersive viscoelastic and use Healon GV centrally over the capsule and nucleus. Second, if the iris is constricted or floppy, I will use Healon5 over the iris to push

it down, and then I will instill a dispersive viscoelastic centrally to help maintain Healon5 over the iris.

> "Using two OVDs in an ophthalmic viscosurgical system, such as Healon D+GV and Healon D+H, is a good surgical strategy."
>
> —Uday Devgan, MD

Dr. Olson: My only caveat with the dual-OVD approach is that the dispersive agent, Viscoat, probably due to its chondroitin sulfate, has had concerns raised about its clarity. However, when I examined Healon D, I found that it is absolutely crystal clear.

An important point to remember is that in lens insertion failures, damage to the lens or cartridge is often a result of inadequate lubrication, and dispersive OVDs are much better for lubrication than the cohesives. In fact, my colleagues and I examined the amount of force and damage among dispersive OVDs in our study, and we found that an agent very similar to Healon D (Vitrax; Abbott Medical Optics, Inc.) was superior to the others in protecting against that type of damage.[4]

Dr. Steinert: Personally, I do not routinely use the soft shell technique. I insert the dispersive OVD at the beginning of a case and use the cohesive agent to insert the IOL. However, we surgeons have to tailor our approach to specific situations. If I have a shallow chamber and particularly positive pressure, then I would instill the dispersive OVD first followed by Healon GV or, in extreme cases, Healon5, which has the maximum resistance to positive pressure. As Dr. Osher already explained, Healon5 is a phenomenally successful tool in controlling the capsulorhexis if it starts to slide outward. It is the most effective way to stop an errant tear. When placed in the periphery, it acts like a barricade and allows the surgeon to turn the capsulorhexis much more successfully.

Ever since Dr. Chang identified IFIS, Healon5 has been the most reliable tool in my armamentarium. In fact, I can manage many IFIS cases with Healon5 alone. My approach differs somewhat from the norm in that I instill Healon5 first, rather than a dispersive OVD. I put it in the angle and then spread it over the iris and into the other angle to control the iris. I instill the dispersive OVD second, because it barricades the Healon5 in the angle, and then the irrigation flow never encounters the higher-molecular-weight Healon5. This approach allows me to use somewhat higher flow rates.

Dr. Osher: The beauty of the Healon family of OVDs is that there is an agent to suit any flow rate, technique, and type of cataract (Figure 4). These four viscoelastics not only allow surgeons to tailor surgery to their preferences, but also provide tremendous support in the event of an unanticipated complication. The Healon family of OVDs offers a spectrum of behavioral characteristics that enable the surgeon to exercise his or her judgment for each individual patient.

Dr. Chang: Now that the Healon family has been expanded to four members, the use of any two in combination is being called an *ophthalmic viscosurgical system*. I think this is a suitable name, because it describes a level of flexibility and versatility that we have not had before.

We all want to gain that extra edge in complicated cataract cases, and I think one of the most underutilized tools is the selective and specialized use of different

Figure 4. The Healon family of OVDs.

> "The beauty of the Healon family of OVDs is that there is an agent to suit any flow rate, technique, and type of cataract."
> —Robert H. Osher, MD

OVDs. The ability to combine differing OVD viscosities can be a big help, but we have to do it correctly. Let's discuss complicated cases and how we would each vary the use of different components of this OVS. Let's start with the mature white cataract.

Dr. Osher: It is important to differentiate the hard white lens, the liquefied cortex of the Morgagnian cataract, and the intumescent cataract, which is the dangerous one. Three factors are an issue with the intumescent white cataract: endocapsular pressure, compromised visibility, and the tendency for the anterior capsulorhexis to extend. All surgeons recognize that liquefaction of the cortex creates a pressure gradient inside the lens. Intumescent lenses typically occur in younger cataract patients and involve cortical swelling. Virgilio Centurion, MD, in Brazil measured the size of these lenses and showed that they are swollen 6 mm or more by ultrasound biomicroscopy.[5]

In the past, it was en vogue to decompress the lens and aspirate some anterior cortex, but that is no longer good enough. Carlos Figueiredo, MD, showed that the posterior cortex is also hydrolyzed,[6] so aspirating the anterior cortex creates a pressure gradient behind the nucleus and causes everything to push forward. Therefore, we must neutralize or flatten the convexity of the lens with Healon5 so the capsule will not run downhill. Then, the posterior cortical pressure must be neutralized, which is accomplished by depressing, bouncing, or rotating the nucleus, which Dr. Figueiredo calls *posterior voiding*. Then, it is safe to enlarge the capsulorhexis, if desired.

I prefer to stain these capsules using the three-step technique[7]: (1) injecting Healon5; (2) instilling balanced salt solution on the anterior capsule, which raises the OVD into the dome of the cornea while creating a wafer-like layer of balanced salt solution between the lens and the Healon5; and then (3) injecting Vision Blue (DORC International BV; Zuidland, the Netherlands). By beginning with this three-step technique for staining the anterior capsule, making a small capsulorhexis and posterior voiding to equalize the pressure gradient, the surgeon minimizes the risk of encountering the Argentinian Flag Sign described by Perrone and Albertazzi.[8]

Dr. Olson: I agree; that approach works beautifully on tough cases. One problem that can occur, however, is that if the patient's IOP is high enough, entering the eye through the capsulorhexis opening can cause the OVD to begin to flow out of the eye and collapse the anterior chamber. To avoid that possibility, I make a sideport incision of 0.8 to 1.0 mm and enter with a microcapsulorhexis forceps so that the fit is tight enough to block any egress of the OVD.

Dr. Osher: Of all the OVDs we are discussing, Healon5 behaves like a semisolid and has the least chance of burping out.

> "Healon5 is my go-to agent in challenging situations."
> —Roger F. Steinert, MD

Dr. Steinert: There are three ways to use trypan blue with very dense cataracts. The original approach is with an air bubble, although that can force the dye into the angle and away from the capsule. Some surgeons instill trypan blue directly, but this dilutes it. I prefer to use Healon5 before the trypan blue, because the OVD generally will not absorb the dye. I instill the Healon5 as I normally do, and then I insert a thin layer of the trypan blue underneath it. This approach exposes the capsule uniformly. If you instill too much trypan blue, you can wash it out readily with Healon5 and replace it.

Dr. Chang: Dr. Osher, can you describe the special cannula that you developed for capsular staining?

Dr. Osher: It is distributed by Crestpoint Management Ltd. (St. Louis, MO), as well as Bausch & Lomb (Rochester, NY). The cannula has a slight curvature that hugs the convexity of the lens, but its hole is posterior to allow the surgeon to emit drops of Vision Blue onto the capsule without squirting it across the eye. Injecting the dye indiscriminately can form an inkblot in the anterior chamber, or worse, the dye may pass through the zonules and interfere with the red reflex.

Dr. Chang: One advantage of combining different OVDs from an ophthalmic viscoelastic system is that if surgeons are concerned about evacuating Healon5 from beneath the IOL at the end of a case, they may choose to use it only during the capsulorhexis and then use Healon or Healon GV to inflate the bag for lens insertion. Either of those agents will be easier to remove than Healon5.

Dr. Steinert, which OVD do you prefer in an eye with weak zonules due to pseudoexfoliation?

> "A dispersive OVD, such as Healon D, better resists aspiration and remains in the eye longer than a cohesive agent."
> —David F. Chang, MD

Dr. Steinert: With pseudoexfoliation, in addition to weak zonules, a small pupil presents significant challenges. Again, surgeons can use a viscomydriasis technique with Healon5. It is also my impression that Healon5 is the best for creating the capsulorhexis in these types of eyes, because it stabilizes the lens and prevents rocking and rolling. Minimizing such turbulence is important with weak zonules, because every zonule that springs places additional pressure on the adjacent ones. Healon5 is my go-to agent in those challenging situations. Some cases may still require capsular tension rings and iris hooks, but Healon5 is the starting point.

Dr. Chang: In pseudoexfoliation cases, if the zonules are weak, then the lax posterior capsule tends to trampoline toward you as you remove the last nuclear fragments. Please describe your concept of using OVD to hold the capsule back.

Dr. Steinert: It is a technique that some surgeons call the *visco vault*, because it acts like a bank vault or a security system for the posterior capsule. Because mature cataracts lack an epinucleus, protecting the posterior capsule becomes paramount. We can create an artificial epinucleus with a dispersive OVD; a cohesive will not work very well, because it will likely evacuate. As soon as I can obtain a red reflex so that I know I have accessed the area behind the nucleus, I stop and instill Healon D to coat and create an artificial epinucleus. It protects the posterior capsule and keeps it in place. The Healon D also stabilizes the remaining nuclear pieces so the surgeon may manipulate them in a safe location.

Dr. Chang: That is an important concept: A dispersive OVD, such as Healon D, better resists aspiration and remains in the eye longer than a cohesive agent. As we prepare to extract the last pieces of nuclear material, a supplemental injection of Healon D can be used to keep the posterior capsule back, and it won't be immediately evacuated by the phaco tip.

Dr. Osher: There are two award-winning videos that demonstrate what Dr. Steinert describes. Richard Mackool, MD, of New York introduced his concept of viscodissection to protect the posterior capsule 2 years ago,[9] and his video won an award at the 2007 ASCRS Film Festival. At the 2008 ESCRS meeting, Viraj Vasavada, MD, won an award in the Video Competition for showing the space-creating advantage of viscodissection using a Miyake-Apple setup.[10]

Dr. Chang: Dr. Olson, which OVDs do you prefer for an ultrabrunescent lens? With these types of cataracts, we are concerned both about posterior capsule rupture, as well as corneal endothelial damage.

Dr. Olson: Of course, the rock-hard cataract is one of the most challenging cases we encounter. The main issue I want to address is corneal protection. Obviously, the more time we are in the eye using ultrasound, manipulating nuclear fragments, and working in the anterior chamber, the greater the risk of endothelial damage. Also, out of concern about the posterior capsule, surgeons have a tendency to work a little more anteriorly with ultrabrunescent cataracts than they might otherwise. Corneal edema is not uncommon in these cases, but it is avoidable. I believe the cornea can withstand prolonged intraocular work, but it cannot take direct trauma. Therefore, a dispersive OVD is critical in these cases.

I suggest starting the case with a chamber full of a dispersive OVD such as Healon D, versus using a combination of OVDs, because a dispersive stays in the eye very well. In terms of technique, I think it is more important to work deeply, not anteriorly, with extremely dense lenses. The only way to work deeply safely is to aggressively use a chopping technique. I use a lot of chops to cut the nucleus into bite-sized pieces. If it is a rock-hard cataract, I may use

50 to 70 chops. We should not apply ultrasound indiscriminately, because the energy adds up and will damage the cornea. When working near the posterior capsule, it is often helpful to add a dispersive OVD under the nucleus to protect the capsule. If I think the surgery is moving slowly, I will add a second instillation of Healon D next to the cornea to make sure it stays protected. If surgeons strive to only use ultrasound when they know the cornea is protected, once they have bite-sized nuclear fragments, there is no reason why extracting a rock-hard cataract cannot result in a clear, quiet cornea the next day. If the cornea is steamy the next day, it means it has sustained a lot of endothelial damage.

Dr. Braga-Mele: In fact, I think it is important to re-instill the dispersive viscoelastic after hydrodissection, when some of the viscoelastic may have been inadvertently burped out of the eye. This way, there is a fresh coating of viscoelastic on the endothelium before the surgeon starts phacoemulsification. It is also important to stop partway through the case and reinsert viscoelastic.

> "Healon5 is perfect for the shallow eye, because it helps us mechanically open the pupil, deepen the anterior chamber, and flatten the lens capsule."
>
> —Uday Devgan, MD

Dr. Osher: It is not just the ultrasonic energy that causes damage, but also the amount of fluid and turbulence in the chamber. Endothelial damage is definitely related to turbulence.

Dr. Olson: Right. We must have an agent that protects the cornea from all of those threats.

Dr. Chang: The point that is worth repeating is to pause to recoat the endothelium with a dispersive OVD during nuclear emulsification. The size of the dense nucleus requires a prolonged amount of irrigation and phaco time, and the OVD will become depleted before long. I will stop once or twice to reinject a dispersive OVD to maximize the corneal protection.

Dr. Devgan, please give us your pearls for managing IFIS, small pupils, and shallow anterior chambers, because these risk factors often coexist.

> "For [a posterior capsular rent or zonular dialysis], a dispersive OVD like Healon D is the way to go."
>
> —Randall J. Olson, MD

Dr. Devgan: For a small pupil, particularly in an eye with IFIS, I like a stepwise approach. I begin by injecting epi-Shugarcaine or diluted epinephrine directly under the iris to generate some mydriasis. Healon5 induces great viscomydriasis. I do this in all patients with floppy irides. Sometimes, viscomydriasis is enough, but I usually apply another instillation of Healon5 to keep the iris down. As Dr. Steinert described, I place a bolus (or a doughnut) of Healon5 in the angle on top of the iris, and then I place Healon D in the anterior chamber. This combination keeps the iris in position during the procedure. If the OVD gets washed away, I will stop and redo this procedure.

I am particularly careful with a subincisional iris just before I insert the IOL. At that point, I always inject more Healon5 subincisionally so that the lens injector stays far away from the iris as it passes through the incision. On rare occasions, I will use mechanical devices to open the iris, such as hooks or the Malyugin pupil expansion ring (MicroSurgical Technologies, Redmond, WA).

Dr. Chang: As Dr. Steinert stated before, surgeons who prefer high aspiration flow rates can first use Healon5 to viscodilate the IFIS pupil and then place Healon D over the central lens surface to block the phaco tip from immediately aspirating the Healon5.

Dr. Devgan: Healon5 is perfect for the shallow eye, because it helps us mechanically open the pupil, deepen the anterior chamber, and flatten the lens capsule.

Dr. Olson: It is also a good time to make the capsulorhexis through the sideport incision.

Dr. Devgan: I submitted a case to the *Video Textbook of Viscosurgery* of an ultrahigh hyperope with a very shallow anterior chamber in which I did exactly that.[11] I injected Healon5 via the paracentesis, and then I inserted

a 25-gauge capsulorhexis forceps through that incision. The surgery was a refractive lens exchange in a 21-year-old who was extremely hyperopic. Even in that young, elastic capsule, Healon5 gave me enough control to create a perfectly round capsulorhexis.

Dr. Chang: With a crowded eye, the phaco tip has to work in closer proximity to the cornea, putting the endothelium at greater risk for trauma. The soft shell technique makes sense here; we can first instill Healon D and then inject Healon GV right over the center of the lens to deepen the chamber, flatten out the anterior capsule, and compress the Healon D upward against the cornea.

Dr. Olson, what is the best OVD to use if you recognize a posterior capsular rent or a zonular dialysis?

Dr. Olson: In that situation, a dispersive OVD like Healon D is the way to go. When surgeons break a capsule, their reaction is often to pull out of the eye. Doing that allows the vitreous to prolapse forward, extending the break and bringing vitreous out of the eye. The key is to keep irrigating and enter through the sideport incision to inflate the chamber with the dispersive agent. If we have visibility, we can often control what vitreous is there with the flow. If we do that appropriately, it is not uncommon to be able to elevate a nuclear fragment and perform the visco sandwich that Dr. Steinert described. If the rent is relatively small, by injecting the OVD into the chamber through the incision, we can finish the case almost as if there were no rent at all. It is critical, however, to catch a capsular break and control it before the chamber collapses.

Dr. Osher: If the rent is central, we can also use the OVD to displace the intact anterior hyaloid face posteriorly and convert the tear to a posterior capsulorhexis, which would rescue the case.

Dr. Devgan: Working with residents, as Dr. Steinert and I do, we see countless capsular breaks. Of course, keeping the anterior chamber formed is key. Keeping an extra tube of dispersive OVD is also critical—viscoelastic is always cheaper than vitreous.

Dr. Steinert: Dispersive OVDs are usually the preferred agent to stabilize nuclear fragments. I have had a situation in which I had to perform a refractive lens exchange with an open posterior capsule, and that will become an issue with some of the multifocal IOLs or presbyopia-correcting IOLs when the patient has undergone a YAG capsulotomy that has not solved his problem. With care, I have used Healon5 immediately behind the IOL to be explanted, and its unique properties have kept the vitreous back. I have been able to perform a full exchange and never lost vitreous. I do not think any other agent could allow that. When you are done, the IOL must still be in the bag, and the capsulorhexis must be able to overlay the optic, because the remaining Healon5 will be trapped behind the eye and will not be able to come forward into the angle and cause pressure. You need a sealed system at the end of the case. This is a special situation, but it will apply to many of the premium IOLs.

Dr. Osher: Also, the beauty of Healon5 and GV is that a 27-gauge cannula can be introduced through the sideport incision, and the OVD can be aspirated dry without infusion. That is a wonderful advantage if you do not want to irrigate or enter the volatile chamber through the main incision.

Dr. Chang: To conclude, if you have a posterior capsular complication, a dispersive OVD generally works best to block or barricade a capsular defect. It will stay where we put it, it will better resist aspiration, and, should we leave some behind, which we invariably do with a posterior capsular rupture, it will be more forgiving in terms of an IOP spike. In contrast, for a difficult capsulorhexis, most of us favor a maximally cohesive OVD to push the pupil aside, keep the anterior capsule back, and to deepen the chamber. Finally, when protecting the cornea is our priority, we again favor a dispersive or maximally retentive OVD. These principles allow us to optimally utilize the versatility that an ophthalmic viscoelastic system of multiple agents provides. ■

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