Closed System and Expanded Instrumentation Improves MIVS Outcomes

By Martin Charles, MD

I have been using the CONSTELLATION® Vision System (Alcon Laboratories, Inc., Fort Worth, TX) for more than 2 years for all of my vitreoretinal surgeries. I switched to 23-gauge microincisional vitrectomy surgery (MIVS by Alcon) 4 years ago, and since making the change, I have not reverted to using 20-gauge technology.

The first instruments that I used for MIVS included the GRIESHABER REVOLUTION® ILM forceps, serrated forceps, and curved scissors. The only time that I enlarge my sclerotomies is for intraocular foreign body extraction because it is impossible to extract foreign body material from a microincision; however, in these cases, I perform the vitrectomy using 23-gauge technology.

Although an obvious advantage to MIVS is the sutureless incisions, I find that the most significant advantages of MIVS for my surgery are that entry is faster, instrument exchange is easier because the conjunctiva does not block the entrance, and most importantly, there is a reduced risk of vitreous or retinal incarceration, which in my opinion, increases the safety of vitrectomy.

IOP CONTROL + CLOSED VITRECTOMY SYSTEM = MAXIMUM SAFETY

One of the features I like most on the CONSTELLATION® Vision System is that it offers me the ability to continuously monitor the infusion rate and the intraocular fluid dynamics, both which allow for true intraocular pressure (IOP) control during the entire surgery.

As an ophthalmologist who performs both anterior and posterior segment surgeries, I can appreciate the value of a closed surgical system, as this has been the standard for some time in cataract surgical technology.

Any surgeon who utilizes an open cannula system has to be concerned with the possible complications. This may include the potential risk that a high volume of liquid may be expressed resulting in retinal incarceration. Further, the increased outflow may cause turbulence and raise the risk of hypotony when working under air in highly myopic eyes (Figure 1).

How can we combat these potential problems and make our vitrectomy procedures as closed as our cataract surgeries? Recently, Alcon Laboratories, Inc., introduced a new 23- and 25-gauge EDGEPLUS® valved cannula entry system (Figure 2).

In my opinion, the combination of these valved cannulas and the IOP control feature on the CONSTELLATION® system offers maximum control during surgery and increases the overall safety of the procedure.

VALVED CANNULAS IN USE

I recently had the opportunity to use the 23-gauge valved cannulas in my practice and have found that the cannula insertion is as simple as the non-valved EDGEPLUS® trocar cannula. Additionally, the new valved cannula is easily removed from the trocar without the need for additional forceps. The valved cannula also removes the need for plugs.

My first case using the valved cannula was a patient with macular pucker for whom I performed a combined cataract and vitrectomy procedure (Figure 3) with an internal limiting membrane (ILM) peel. At the close of the case, I realized that for the first time, I had...
performed a truly closed-system vitrectomy.

I make a tangential incision at the lowest possible angle, which in my opinion provides a good grip on the cannulas and more effective closure at the end of the surgery. For stabilization, I depress the lid speculum toward the eye, providing for a more controlled incision by preventing movement of the globe and raising the IOP during entry. When I am performing a combined cataract and vitrectomy procedure, I insert the cannulas prior to cataract extraction to ensure a controlled maneuver.

An additional feature on the valved cannulas is a vented extension that can be inserted to allow air to go through the cannula (Figure 4) for air/silicone oil exchange.

My experience with the valved cannula system has led me to believe that this technology will become the standard for MIVS, as it allows for a closed procedure. With a closed procedure, there is less risk of wound leakage, no turbulence while working under perfluorocarbon liquid and less possibility of vitreous or retina incarceration in the sclerotomies. Further, the valved cannulas provide true IOP control under air, a scenario that was previously not possible while exchanging instruments.

EXPANDED GRIESHABER® DSP INSTRUMENTATION

As any surgeon who performs MIVS procedures can relate, one of the more difficult aspects of transitioning to small gauge has been the historical lack of instrumentation in 23- and 25-gauge. Alcon Laboratories, Inc. has addressed this need through its GRIESHABER® DSP line of instrumentation.

I have been using GRIESHABER® DSP instruments routinely for the last 4 years and the selection of disposable instruments within this line has expanded significantly, allowing me to perform a wide variety of procedures with MIVS.

As stated earlier, my first experience with these instruments was using the GRIESHABER REVOLUTION® DSP ILM forceps (Figure 5). However, when I acquired the CONSTELLATION® Vision System, I tried the GRIESHABER® DSP Pneumatic Handpiece (Figure 6),
which is activated through the foot pedal.

I believe that the pneumatic handpiece offers a much easier way to initiate internal limiting membrane (ILM) peeling in macular hole surgery, diabetic ILM peeling, and ILM extraction in macular pucker surgery.

I recommend the use of this foot-controlled forceps or scissors actuation for surgeons on the learning curve of the ILM peeling, as it simplifies the surgical maneuver.

Any GRIESHABER® Advanced DSP tip (Figure 7) will attach to the hand piece for maximum utility in both fine and heavy membrane cases. The DSP tips that I routinely use are the ILM forceps tip, the serrated forceps, the curved scissors tip and the new 23-gauge vertical scissors tip. These DSP tips can also be used with any GRIESHABER® Reusable Handle.

For most ILM peeling procedures, the ILM forceps are sufficient. For more difficult and heavy membrane cases, however, I recommend using the serrated forceps (Figure 8) or the MAXGRIP® forceps (Figure 9), or in bimanual surgery, a combination of both.

Other handy accessories are now available in small gauge like piks (Figure 10), delamination spatulas and...
illuminated piks (Figure 11) for bimanual surgery.

For my anterior segment surgeries, I use serrated forceps for cases of foreign body removal (Figure 12) or in haptic manipulation for a dislocated lens (Figure 13). I also commonly use the curved scissors for anterior chamber surgical maneuvers.

GRIESEHABER® DSP instruments allow me to offer my patients a sterile instrument for every surgery so I do not have to worry about cross contamination issues. They allow for a safer and more reproducible procedure. I do not have to worry about broken instruments at the beginning of the surgery, mis-aligned tips or scissors that tear instead of cutting. Lastly, the wide variety of instruments that is now available fulfills my needs for both simple and more difficult MIVS cases.

**SUMMARY**

Overall, I am more comfortable entering the eye with small-gauge instrumentation as I have a good view of the retina and the instruments are more maneuverable than 20 gauge, particularly the vitrec-

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**Figure 7.** Final result of the surgery under air.

**Figure 8.** Injection of silicone oil with the right hand and venting valve on the left cannula.

**Figure 9.** Posterior pole retinal photo showing good aspect of macula at postoperative day 1 (A). Peripheral photography showing border of retinectomy and laser marks at day 1 (B). Fundus photomontage at day 1 (C). Posterior pole retinal photo showing good aspect of macula at 1 week (D). Peripheral photography showing border of retinectomy and laser marks at 1 week (E). Fundus photomontage at 1 week (F).

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the eye at the end of the procedure under air.

The last step of the surgery was to inject silicone oil into the eye using the venting valve on the valved entry system probe tip for photocoagulation, which vents the air as the silicone oil enters the eye and prevents IOP spikes (Figure 8).

The cannulas were then removed from the eye at the end of the case without the need for sclerotomy sutures.

The postoperative fundus photos show an attached retina with progressive resolution of the hemorrhage in the upper left-hand quadrant (Figure 9).

CLOSED SYSTEM AND EXPANDED INSTRUMENTATION IMPROVES MIVS OUTCOMES

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Figure 8. Serrated forceps on left and spatula on right.

Figure 9. Curved scissor on left and MAXGRIP® forceps on right.

Figure 10. GRIESHABER® DSP pik and spatula.

Figure 11. Alcon® illuminated pik.

Figure 12. Spine stuck in the cornea is removed with a serrated forceps.

Figure 13. Haptic manipulation with a serrated forceps in a case of a dislocated IOL.
tomy probe. For example, the 23-gauge vitrectomy probe enters perfectly through an anterior-chamber paracentesis, allowing anterior chamber vitrectomy without incision enlargement. This is particularly important in trauma cases or for complicated cataract surgery.

I have no reason to go back to using 20-gauge technology for my surgeries. I have found the 23-gauge MIVS has allowed me to improve my surgical technique, efficiency, and safety for all of the procedures that I perform.

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Indications for Use: The CONSTELLATION® VISION SYSTEM is an ophthalmic microsurgical system that is indicated for both anterior segment (i.e., phacoemulsification and removal of cataracts) and posterior segment (i.e., vitreoretinal) ophthalmic surgery. GRIESHABER® DSP instruments are a line of single-use vitreoretinal micro-instruments which are used in ophthalmic surgery, for cases either in the anterior or the posterior segment. The GRIESHABER® Advanced Backflush Handles DSP are a family of instruments for fluid and gas handling in vitreoretinal surgery.

Caution: Federal (USA) law restricts this device to sale by, or on the order of, a physician.

Warnings and Precautions: CONSTELLATION® VISION SYSTEM
- The disposables used in conjunction with Alcon instrument products constitute a complete surgical system. Use of disposables and handpieces other than those manufactured by Alcon may affect system performance and create potential hazards.
- Attach only Alcon supplied consumables to console and cassette luer fittings. Do not connect consumables to the patient’s intravenous connections.
- Mismatch of consumable components and use of settings not specifically adjusted for a particular combination of consumable components may create a patient hazard.
- Vitreous traction has been known to create retinal tears and retinal detachments.
- The closed loop system of the CONSTELLATION® VISION SYSTEM that adjusts IOP cannot replace the standard of care in judging IOP intraoperatively. If the surgeon believes that the IOP is not responding to the system settings and is dangerously high, this may represent a system failure. Note: To ensure proper IOP Compensation calibration, place infusion tubing and infusion cannula on a sterile draped tray at mid-cassette level during the priming cycle.
- Leaking sclerotomy may lead to post operative hypotony.

Warnings and Precautions: GRIESHABER® DSP Instruments
- Potential risk from reuse or reprocessing Grieshaber instruments include: reduced optical quality, surface damage on the optics, and foreign particle introduction to the eye; reduced cutting or grasping performance; path leaks or obstruction resulting in reduced fluidics performance, and foreign particle introduction into the eye.
- For light fiber instruments: Minimize light intensity and duration of exposure to the retina to reduce risk of retinal photic injury. The light fiber instruments are designed for use with an ALCON® Illumination source.
- Good clinical practice dictates the testing for adequate irrigation and aspiration flow prior to entering the eye. If stream of fluid is weak or absent, good fluidics response will be jeopardized.
- If unwanted tissue gets engaged to the aspiration port, it should be released by interrupting aspiration before moving the instrument.

Attention: Reference the Directions for Use for a complete listing of indications, warnings, and precautions.