

Transitioning to Venturi Cataract Surgery

As with a high-performance sports car, switching from automatic to manual makes for a better drive.

BY SUMIT "SAM" GARG, MD

Like most cataract surgeons, I learned to perform phacoemulsification with a peristaltic pump system. The advantages of peristaltic systems, especially for surgeons in training, are obvious. They provide a great deal of control and a measure of safety, particularly with modern features like occlusion modes and advanced fluidics. Peristaltic pumps, which are flow based, typically create flow using serial compression of the phaco tubing by rollers. The faster the rate of compression, the higher the flow; however, vacuum is only generated once occlusion is achieved.

Much like a car with an automatic transmission, today's advanced peristaltic systems do a lot of the work for the user. They downshift at just the right time to avoid surge, and they regulate speed to maintain a steady pace. Although the vacuum, flow rate, and rise time can all be controlled separately, much of this complexity is built in, so one does not even need to completely understand the machine to operate it.

In contrast, venturi vacuum offers more direct, enhanced power. In venturi pumps, which are vacuum based, the flow rate is not directly regulated but is instead determined by the vacuum level created. Venturi allows for instantaneous vacuum. It can be driven a little more "on the edge," ramping up to full power quickly and achieving high performance with less fuel. With all that power comes a greater risk of grabbing the capsule and getting into trouble, but I was intrigued to find out if a venturi system could increase my surgical efficiency and potentially have some postoperative advantages for patients.

COMBINED CASES

The Whitestar Signature system (Abbott Medical Optics Inc.) makes it relatively painless for peristaltic surgeons to experiment with venturi vacuum, because both pumps are accessible from the same cartridge. During a given case, the surgeon can easily switch back and forth from one vacuum mode to the other.

In my first combined case, I began with the peristaltic pump for the initial steps of the procedure, then switched to venturi at the end for removal of the viscoelastic and cortical cleanup. This is when the powerful venturi vacuum really shines. I quickly discovered that I did not need to spend as much time vacuuming behind the IOL, because the pump was so effective at drawing viscoelastic to the tip. The fast cortical cleanup still felt very safe, and the capsule looked pristine.

A clean capsule helps maximize early visual outcomes and reduces the chance of pressure spikes or posterior capsular opacification after surgery. I was meticulous about my cleanup with peristaltic vacuum, but now, I am able to get to the same point in a lot less time.

CHOPPING TECHNIQUE

My next step was to begin experimenting with venturi vacuum for the entire case, including nuclear fragmentation.

I perform phacoemulsification with a straight chop technique. First, I impale and divide the nucleus in half with a 20° curved tip. Then, I move the tip behind the heminucleus and use it mostly as a point of counter-resistance instead of actively chopping. This is a great technique to teach residents, who sometimes lose focus on where the chopper is relative to the phaco handpiece until they suddenly rupture the capsule with overexuberant phaco chopping. Although I teach residents using the peristaltic mode, I believe the straight chop technique will allow them to safely transition to venturi mode as they gain surgical experience.

Since establishing new settings for a primarily venturi technique, my case time has dropped by about 15%, a finding very similar to what Steven Dewey, MD, has reported. In a study comparing venturi and peristaltic vacuum, he found a 14% reduction in phaco time and a 20% reduction



in power by using venturi for all or part of the case.¹ I think it would be interesting to compare endothelial cell loss with the two approaches. My expectation is that venturi induces slightly less trauma to the endothelium and that cell counts would therefore be slightly higher.

Certainly, venturi systems work extremely well for soft lenses, where one can practically remove the nuclei with vacuum alone. Followability is excellent, so there is very little “fishing around” for fragments. These cases are smooth, with no unnecessary maneuvers, which means less phaco energy and less fluid through the eye. I find that the corneas look clear on postoperative day 1. Although I try to lower patients’ expectations with counseling, in reality, theirs and mine are high with regard to day 1 visual outcomes.

FLEXIBILITY FOR COMPLEX CASES

Today, I perform most cases with the venturi pump. I rarely switch to a peristaltic pump, but I value the ability to do so when needed. Recently, I performed surgery on a 96-year-old man with a very dense nucleus. Because his right eye had poor vision due to macular degeneration, cataract surgery on the fellow eye had been delayed. Operating on this patient’s only sighted eye, I opted to begin the case with peristaltic vacuum to enhance safety.

In another case, I found an unexpectedly floppy iris. I became much less interested in surgical efficiency and more interested in toning down all of my parameters to keep the iris less mobile. On the fly, I was able to switch to the intraoperative floppy iris syndrome mode with the peristaltic pump to slow down the case. The beauty of the Signature system is that I can make this change in the middle of the case.

CONCLUSION

Ultimately, I do not think a single mode or setting is ideal for every situation. Even a driver who loves the power and responsiveness of a manual transmission will at times want the simplicity and safety of an automatic. The ability and willingness to change from one’s preferred settings as the situation demands make for better outcomes. ■

Sumit “Sam” Garg, MD, is an assistant professor of ophthalmology, vice chair of clinical ophthalmology, and the medical director at the Gavin Herbert Eye Institute at the University of California, Irvine. He acknowledged no financial interest in the product or company mentioned herein.



Dr. Garg may be reached at (949) 824-0327; gargs@uci.edu.

1. Dewey SH. Peristaltic vs venturi vacuum: relationship to surgical time and power usage. Paper presented at: Hawaiian Eye; January 16-21, 2011; Maui, HI.