Flow restriction device allows higher-vacuum phaco

Bimanual microincisional phaco possible at higher settings, transition is easier

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San Francisco—With the Cruise Control flow restriction device (STAAR Surgical), surgeons can perform bimanual microincisional phacoemulsification at the high vacuum settings normally used for coaxial phaco and still maintain excellent chamber stability, said David F. Chang, MD.

"This has been a huge help to me in terms of improving the fluidic balance during bimanual microphaco," said Dr. Chang, clinical professor in the Department of Ophthalmology, University of California, San Francisco.

The Cruise Control device is a disposable flow restrictor with a 0.3-mm internal diameter; it is placed between the phaco handpiece and the aspiration tubing to prevent surge during occlusion breaks at higher vacuum levels. To prevent the device from becoming clogged, it has a mesh filter that traps the nuclear emulsate just in front of the flow restrictor so that only fluid passes through. It can be attached to the aspiration tubing set of any phaco machine.

Although Cruise Control was developed as a surge-limiting device for conventional phaco, Dr. Chang, who is also in private practice in Los Altos, CA, investigated its use in bimanual microincisional phaco to see whether it would improve chamber stability with 20-gauge instrumentation.

"When I started using this device in the summer of 2003, we were spending a lot of time experimenting with our fluidic settings for bimanual microincisional phaco. Even the higher flow rates of front-irrigating choppers still did not equal the inflow rate that we got with the coaxial phaco sleeve," Dr. Chang said. "For me, this meant that I couldn't perform phaco chop at the high vacuum levels that I was accustomed to, and this was a distinct disadvantage."

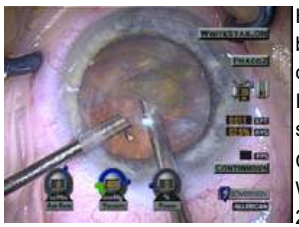

Figure 1 The 400-mm Hg high vacuum setting provides excellent holding power and control for horizontal phaco chop. (Photo courtesy of David F. Chang, MD)

He evaluated the effect of Cruise Control by performing bimanual microincisional phaco chop with the device in a consecutive series of 50 nuclei ranging in density from 2 to 3+. Instrumentation included the AMO Sovereign with WhiteStar system, a 20-gauge beveled phaco tip, and an MST 20-gauge Chang irrigating horizontal chopper[1] (Figure 1).

With a bottle height of 30 inches and an aspiration flow rate of 26 ml/min, the vacuum was set at 400 mm Hg during nuclear emulsification and lowered to 200 mm Hg for the epinucleus. These settings and instrumentation were used in all 50 cases.

"What I found was that by using Cruise Control I was able to use the same high vacuum rates that I normally would with a standard coaxial system, and I consistently had an absolutely stable anterior chamber in the process," Dr. Chang said.

There were no instances of capsular rupture. Using identical instrumentation, the same vacuum level without Cruise Control resulted in unacceptable postocclusion surge, he said.

Cruise Control is different from other flow-restricting strategies for decreasing surge, Dr. Chang noted.

"Usually fluid outflow is restricted by the smallest lumen diameter in the aspiration pathway.

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Typically that's been the opening in the phaco needle or the I/A aspiration port," Dr. Chang said. "For example, during cortical removal, we typically operate with vacuums of 500 mm Hg but we don't see chamber shallowing because the tiny 0.3-mm aspiration tip diameter restricts flow so much.

"Flare tip designs seek to combine a narrower needle shaft with a standard tip opening so as to reduce surge without sacrificing holding power. However, this creates a mechanical bottleneck within the needle that often tends to clog with brunescent nuclei," he said.

"Cruise Control is very different in that the 2-cm long flow restrictor is located further downstream. Clogging is eliminated by filtering off the nuclear emulsate upstream," he continued.

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