Clinical Update: Cataract

Capsular Tension Rings: Innovation and Debate

By Lori Baker Schena, Contributing Writer

It is difficult to believe that a tiny, round device no thicker than 0.22 mm could cause lively discussion and dissension among cataract surgeons. But recent innovations to the capsular tension ring (CTR)—and the fact that the government refuses to reimburse its use—make for a charged topic.

The basics of CTRs are straightforward enough, said Samuel Masket, MD, clinical professor of ophthalmology at the University of California, Los Angeles. Capsular tension rings are designed to stabilize the capsular bag in cases of zonular dehiscence, he said, allowing an IOL to be implanted in the bag when it might otherwise have had to be positioned elsewhere. The open-ended ring has a flexible horseshoe shape and is made of PMMA filament, with eyelets at either end.

The ring works by placing centrifugal forces among the remaining zonules. This helps support areas of zonular weakness and allow redistribution of the existing zonules. Dr. Masket noted that a standard tension ring is used in patients with less than 4 clock hours of zonule loss and both finite zonule loss and diffuse zonular weakness. “In some patients, CTRs can be used in anticipation of later problems,” he said.

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Originals Followed by Innovations

Two manufacturers originally introduced rings to the market. Morcher received approval for its models 14, 14A and 14C in 2003, and Ophtec received approval for its Oculaid and Stableyes in 2004. There also have been some modifications since then:

- Robert J. Cionni, MD, medical director at the Cincinnati Eye Institute, introduced the modified Morcher ring, which has a fixation hook that can be sutured to the scleral wall without piercing the capsular bag.
- Ike K. Ahmed, MD, assistant professor of ophthalmology at the University of Toronto, developed the Ahmed Capsular Tension Segment, a partial ring with a fixation hook that can be placed following anterior capsulotomy and fixated using an iris retractor. It can also be permanently fixated with a suture.
- Bonnie A. Henderson, MD, assistant clinical professor of ophthalmology at Harvard University, modified the original 14C Morcher CTR. The new ring, aptly named the Henderson Capsule Tension Ring, is an open C-shaped loop made of PMMA. Its uniqueness comes from eight equally spaced indentations of 0.15 mm, which are intended to improve the surgeon’s ability to remove nuclear and cortical material while maintaining equal expansion of the capsular bag.
- Ehud I. Assia, MD, and colleagues introduced the Capsular Anchor (Hanita Lenses) at the Academy’s 2007 Annual Meeting in New Orleans. Dr. Assia is chairman of ophthalmology at Meir Medical Center in Kfar-Saba, Israel, as well as associate professor at Tel-Aviv University. This device for securing the capsular bag to the scleral wall is a one-plane intraocular implant made of PMMA. Robert H. Osher, MD, professor of ophthalmology at the University of Cincinnati, explained that the Capsular Anchor works like a paper clip, with a central rod that is placed in front of the capsule, and two lateral arms inserted through the capsulorhexis and

placed behind the capsule. A suture can then be looped through the “paper clip” and anchored to the eye.

“I must say that at the Academy meeting, Bonnie and Ehud’s modifications were among the most interesting devices presented at the lectures,” Dr. Osher said. Drs. Osher and Cionni were the first surgeons to use CTRs in the United States, in 1993. Differences of opinion about the optimal use of CTRs, however, were not ironed out at the meeting.

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Controversy #1: Who Needs a CTR?

Perhaps no one demonstrates more enthusiasm for the CTR than Howard Fine, MD, clinical professor ophthalmology at the Oregon Health & Science University in Portland. He has been using them for more than a decade, serving as a medical monitor in the device’s initial studies. “Capsular tension rings stabilize the cataract and make the surgery safer,” noted Dr. Fine, who inserted 450 CTRs during the early clinical studies alone. “They convert most cases of compromised zonular integrity from complex to routine, and give a level of protection from decentration.”

Dr. Fine has a long list of indications for CTRs: all cases of trauma, any metabolic or endocrine disease, all cataract patients with previous glaucoma filtering surgery, all cases of radial keratotomy (RK) where there are more than eight incisions, and progressive zonular disease. “There may be weakened zonules even when they look intact,” Dr. Fine said. “RK is a good example of how we use CTR in a preventive capacity. When there are more than eight incisions, the surgeon was trying to achieve maximal effect, and the zonules are now weak in many of those eyes. So we use CTRs in all cases just to be sure. We also use CTRs in all eyes longer than 27 mm, where there is a tendency to weaken the zonules with cataract surgery.”

In contrast, Dr. Osher said, “I do not agree that surgeons should implant a ring in every possible case of suspected zonular weakness, or make a blanket statement that all patients with pseudoexfoliation should have a ring. Otherwise we would have implanted thousands of rings for naught. You shouldn’t have to be more aggressive than you need to be.” He added that while the CTR is very safe, there have been reports of problems. He recalled cases where a ring was accidentally placed into the anterior chamber, another ring fractured, and another went through the capsular bag. “The ring may also cause damage to the zonules if the bag is dragged during the insertion, which is why we fully inflate the bag with Healon 5,” Dr. Osher said. “Our experience indicates that you should only put in a ring when you need it.”

Dr. Osher did stress that while not every case of weak zonules requires a CTR, having the CTR available is imperative when performing any phaco procedure because one never knows when a zonular problem will be encountered.

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Controversy #2: When Should Rings Be Placed?

Dr. Osher recommends that a ring be used “when you need it and not before you have to. Surgeons should always hold off until you have to put it in.”

Kenneth J. Rosenthal, MD, in private practice in Manhattan and Great Neck, N.Y., is also an advocate of “trying to place the ring as late as you can and as early as you need to, preferably after cortical cleanup.” He explained that placing it early is more challenging,

with a higher likelihood of entrapment of the cortex between the ring and the bag.

However, Dr. Rosenthal has developed a technique that obviates the risk of cortex entrapment. He explained that after capsulorhexis, but before nuclear disassembly, the surgeon removes as much anterior and equatorial cortex as possible with either the phaco hand piece or bimanual irrigation/aspiration. A retentive viscoelastic is then placed within the capsular bag, which displaces the nucleus and any leftover cortical fibers posteriorly. “You next slip the capsular tension ring just under the rim of the anterior capsule,” he added. “The cortex will not be trapped because the ring is placed anterior and the remaining lens material is posterior.”

Dr. Fine, on the other hand, maintains that a ring should be placed right away, before doing phacoemulsification and as soon as hydrodissection is completed. “In my experience, the ring stabilizes the cataract and makes the surgery safer,” he said. “We sever the cortical connections before inserting the ring, which we do with an injector through a 1-mm sideport incision. We use a Lester hook and a second hook 90 degrees away, which allows us to neutralize the forces on the capsule during implantation of the ring. We can then inject the ring toward the zonular weakness.”

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Controversy #3: Who Will Pay for These?

While contention swirls around CTRs, all of these surgeons stressed the value of having this device available in their practice. Said Dr. Fine, “We just think CTRs provide a great advantage, and we use them every time there is a question of zonular weakness.” A major hurdle, however, is that the device is not reimbursed by the government.

“Medicare has decided not to reimburse physicians for using CTRs, calling them an instrument rather than an implant,” noted Dr. Fine, who cited statistics in which 17 percent of patients with compromised zonular integrity who underwent surgery without a ring required reintervention. “The government is being penny-wise and pound-foolish,” Dr. Fine said. “As a result, there is a reluctance among surgeons to use them because of the cost. Yet they are a very valuable tool.”

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Dr. Masket reports no related financial interests. Dr. Fine is a medical monitor for Morcher. Dr. Osher is a consultant with Alcon and AMO. Dr. Rosenthal has received travel assistance from Ophtec and AMO.

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