Optimize Your Timing and Technique

Both aspects of CTR insertion are crucial.

By Bonnie An Henderson, MD

The most important aspects of implanting a capsular tension ring (CTR) include proper timing and proper technique. The optimal time to place the ring is challenging to master; it should be placed as early as needed during surgery but as late as possible. In other words, implant the CTR sufficiently early enough to provide adequate support for continuation of surgery but as late in the procedure as possible to prevent the capture of the residual cortex or epinucleus with the CTR.

I prefer to implant the CTR with an inserter; however, manual insertion is not difficult in the event that an inserter is unavailable. I always ensure that the capsular bag is fully inflated with an ophthalmic viscosurgical device (OVD), and when inserting the leading eyelet of the CTR I point the eyelet toward the area of zonular weakness. I slowly advance the plunger of the inserter until the CTR has been placed in the bag. The trailing eyelet can sometimes be difficult to release, so using a second instrument such as a Sinskey hook can facilitate the release of the CTR from the plunger.

For inserting the CTR manually, I prefer nontoothed forceps to feed the ring into the capsular bag. I also use a Sinskey or Y hook to guide the CTR and to release the trailing eyelet. I am careful to avoid early anterior release of the trailing eyelet because it can be difficult to regrasp and reposition it in the bag if the eyelet settles into the angle. One helpful tip for novice CTR inserters is to thread the trailing eyelet with a suture. Then, if the eyelet is inadvertently released into the angle or sulcus, pulling on the suture will retrieve the eyelet.

Tips for Insertion in Difficult Cases

Several pointers facilitate the fishtail technique.

By Rupert Menapace, MD

I have been using CTRs regularly for 17 years as a valuable adjunct in eyes with weak or dehiscent zonular apparatus.1,2 But if the surgical technique is not done carefully, implantation may exert considerable mechanical stress on the zonules and likely add to the existing damage (Figure 1). A gentle insertion method such as the fishtail technique is best. However, it requires a sufficiently wide incision. Too small an incision may cause kinking and damage to the CTR at the apex of the sharp bend created during insertion.

Because my current incision sizes are 2.2 mm or less, I implant the CTR manually, inserting the leading end tangentially into the capsule equator. Below I have listed the key maneuvers to be considered, especially in the presence of zonular pathology.

No. 1: I do not use shooters. When extrusion starts, the exposed portion of the CTR is short and rigid, and its leading end points in a rather steep angle toward where it meets the capsular equator. This may result in significant localized zonular stress that only gradually decreases along with the spring force as the CTR is further extruded. Additionally, the CTR can get caught in a capsular fold as the leading end is advanced. When forceps are used for insertion, entanglement of the leading end is easily detected when the ring springs back during advancement; such resilience is not felt with the injector. When entanglement ensues, there is risk of zonular dehiscence or capsular perforation. Although entanglement is

TAKE-HOME MESSAGE

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• Always use maneuvers that minimize traction on the zonules.
usually indicated by a capsular tension fold extending from the end of the CTR, premature or unnoticed dehiscence or perforation may have already occurred.

No. 2: I use bimanual insertion into the entry incision. I grasp the CTR with McPherson forceps and insert it bimanually through the main incision or, in the presence of a localized dehiscence, through an extra paracentesis located in an area that minimizes stress on the zonules around the dehiscence. This is usually opposite to the zonular disinsertion.

No. 3: I perform tangential implantation into the capsular bag. In preparation, one flank of the main incision should be extended or the paracentesis directed obliquely, allowing tangential insertion of the CTR into the capsular bag fornix.

No. 4: I choose between CTRs with straight or bent ends depending on the pathology. CTRs have either a straight or bent end. When the nucleus is still in place, I implant a CTR with a straight end, such as the Morcher Type 14 (Morcher GmbH, Stuttgart, Germany), after careful hydro- and viscodissection. The straight end helps to avoid cortical and nuclear entanglement. When the CTR is inserted after phaco but cortex removal was not possible, an undulated CTR such as the Morcher Type 10C may be used to make easier the aspiration of cortical fibers with the CTR in place. For insertion in a cleaned capsular bag, a bent-end CTR such as the Morcher Type 13 is preferred, especially with a flaccid capsule. This avoids entangling the capsule.

No. 5: I use a Y spatula to avoid rotational stress. With a smaller capsulorrhexis, the CTR will drag the capsular edge. I avoid the resulting tangential stress by inserting a Y spatula through a paracentesis at this meridian. This tool engages the CTR at the crossover and gently pushes it centrally, allowing the CTR to slide through the open Y as it is advanced (Figure 2). When the trailing end enters the eye, it is lifted over the rhexis edge with the Y spatula and released into the capsular bag equator (Figure 3; video is available at http://eyetube.net/v=toort).

No. 6: I thread the leading loop of the CTR if visualization may be difficult. If zonular support is very loose or the pupil is too small, I thread the leading loop with a 10-0 nylon suture, thus creating adequate visual control of the insertion maneuver. This allows me to free the advancing eyelet by gently pulling on the U suture centrally should it entangle with the capsule. Additionally, the suture continuously indicates the position of the leading eyelet during insertion and eases retrieval of the CTR, if necessary, during any stage of implantation.

No. 7: I always choose maneuvers that minimize traction on the zonules. With a partially absent (traumatic or congenital) but otherwise intact zonular apparatus, it is important to insert the trailing loop at a location where traction on the zonules neighboring the dehiscence is minimized. With general weakening of the zonules, gentle insertion is key. In the presence of pseudoexfoliation, I make a large capsulorrhexis and/or gently abrade the anterior lens epithelial cell layer with the CTR already in place. These maneuvers counteract fibrotic rhexis contraction. Alternatively, a capsular bending/distance ring may be chosen. I do not use CTRs with a locking mechanism; rather, I would sew the two eyelets together using 10-0 nylon.

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