

Capsulorhexis rescue after peripheral radial tear-out: Quick-pull technique

Roberto Pinto Coelho, MD, PhD, Jayter Silva Paula, MD, PhD, José Mello Rosatelli Neto, MD, André Marcio Vieira Messias, MD, PhD

We describe a technique to rescue the continuous curvilinear capsulorhexis (CCC) in cases in which complete radial tears make it impossible to use normal traction forceps. A circumferential path and rapid movement are applied in the plane of the anterior capsule in the direction of the center pupil. This technique was used in 50 cases. In 47, the CCC could be completed; in 3, it could not and surgery was continued with low-parameter phacoemulsification. No other intraoperative complications occurred.

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 Online Video

Continuous curvilinear capsulorhexis (CCC) is a standard technique in cataract surgery that offers many advantages over the can-opener capsulotomy.¹ It is essential for the safety of phacoemulsification and intraocular lens (IOL) implantation because it permits safe nucleus hydrodissection, cortical cleanup, and IOL centration and inhibits posterior capsule opacification.²⁻³

In the presence of common surgical risk factors, including a small pupil, a shallow anterior chamber, high vitreous pressure, weak zonules, pediatric eyes, and poor visibility, CCC may be a challenging procedure.⁴ A discontinuous capsulorhexis could extend around the equator into the posterior capsule, compromising the integrity of the capsular bag. Consequences include vitreous loss, residual nucleus or cortex, and suboptimal IOL location and stability.⁵

Techniques for rescuing the CCC have been reported,⁶⁻⁹ but to our knowledge, there is no described procedure for CCC rescue in cases with peripheral (ie,

up to the anterior zonule) tear-out. We describe a simple and reliable technique that permits rescue of the CCC after peripheral radial tear-out.

SURGICAL TECHNIQUE

After radial tear-out is recognized, the anterior chamber is filled with an ophthalmic viscosurgical device to maximize anterior chamber depth. To rescue the capsulorhexis, the anterior capsule flap is pulled forward using quick traction applied to the plane of the anterior capsule in the direction of the projected curvilinear path, completing the capsulorhexis and redirecting the tear centrally (Video, available at <http://jcrsjournal.org>). This movement forces the capsulorhexis back to a continuous curvilinear shape (Figure 1).

Results

The rescue technique was performed in 50 cases. In 47 cases, the CCC was completed. In 3 cases, it was not possible to rescue the CCC. Phacoemulsification was performed using the low-parameter (lower bottle height, vacuum, and flow rate) technique.¹⁰ No zonule dehiscence or other complication was observed in these cases.

DISCUSSION

A discontinuous CCC complication is potentially serious because the tear could extend around the equator into the posterior capsule, compromising the integrity of the capsular bag, causing a wrap-around tear.

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From the Department of Ophthalmology, Otorhinolaryngology and Head and Neck Surgery, School of Medicine of Ribeirão Preto, University of São Paulo, Brazil.

Corresponding author: Roberto Pinto Coelho, MD, PhD, Avenida Independência 2509, Alto da Boa Vista, Ribeirão Preto, SP, Brazil, 14025-390. E-mail: robertopintocoelho@uol.com.br.

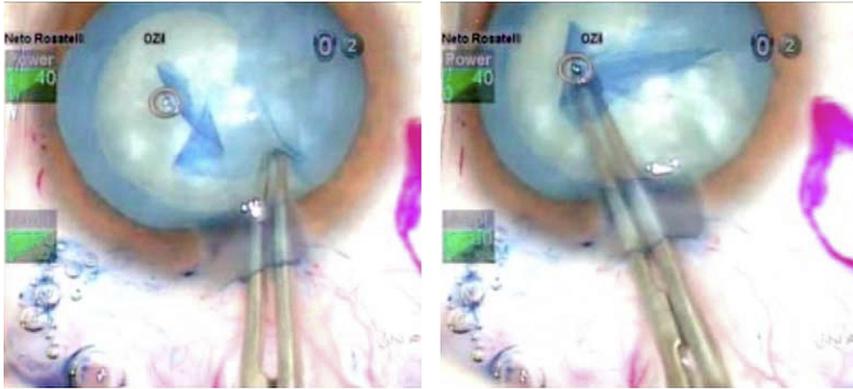


Figure 1. After a tear-out is recognized, a quick forward movement, with force applied in the plane of the anterior capsule and in the direction of the center pupil, redirects the tear centrally and back to the desired circumferential CCC path.

Consequences include vitreous loss, residual nucleus or cortex, suboptimal IOL location and stability, and even dropping of the nucleus into the vitreous cavity.⁵

Surgical techniques to avoid tear-out include direct puncture capsulorhexis,¹¹ 2-stage capsulorhexis,² and diathermy probe.¹² There are also techniques for capsulorhexis rescue after the identification of tear-out; ie, reversing the force vector on the capsule flap,⁶ using a 22-gauge needle or microforceps in a counterclockwise direction,⁷ and using trypan blue to “find” the leading edge of a “lost” lens.⁸ We believe the technique described by Little et al.⁶ is the most commonly used in practice because the tear-out is fortunately identified before the capsulorhexis root reaches the extreme periphery, where the iris impedes visualization. However, none of these methods can be used to rescue the capsulorhexis if the root stops at the zonular fibrils. At that point, rescue can be attempted through redirection to the desired circumferential path using quick traction. We were not able to perform Little et al.’s technique or the other rescue techniques in our cases because of the poor visualization of the capsule root.

After successful capsulorhexis rescue, a 1-piece IOL can be implanted in the capsular bag, but in cases in which CCC is not possible, a 3-piece IOL is recommended.

In conclusion, we describe the quick-pull technique to rescue a CCC if extreme tear-out occurs with the capsulorhexis root stopping on or close to the anterior zonule. We believe the procedure is easy to perform, but as it is a somewhat aggressive movement, we recommend it be performed by experienced surgeons.

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First author:
Roberto Pinto Coelho, MD, PhD

*Department of Ophthalmology,
Otorhinolaryngology and Head and
Neck Surgery, School of Medicine
of Ribeirão Preto, University
of São Paulo, Brazil*