

# Capsular Tension Ring in Damaged Zonules

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## ABSTRACT

*Capsular tension ring (CTR) is endocapsular support device important during cataract surgery in eyes with weak zonular apparatus. It was presented our experience, advantages and limitations of CTR in phacoemulsification cataract surgery with damaged zonules. Phacoemulsification surgery was performed by clear corneal technique using topical anesthesia. Capsular ring was implanted to stabilize the capsular bag before implantation of intraocular lens. CTR has become increasingly important in the management of zonular weakness during cataract extraction. It lowers the incidence of capsule contraction, stabilizes the capsular bag and enhances IOL centration.*

**Key words:** capsular tension ring, zonular dialysis

## Introduction

The capsular tension ring (CTR) was for the first time described in 1991 by Hara and coauthors. They design it for maintain the capsule's contour but how it was of flexible silicone did not adapt to different capsular bag size. After 2 years, 1993 Withscel and Legler introduced polymethyl methacrylate (PMMA) capsular tension ring<sup>1</sup> and Morcher produce it. Since 1993 numerous other manufacturers have been produced similar devices. Originally CTRs were used to manage zonular weakness during cataract surgery, as in pseudoexfoliation<sup>2</sup>, lens subluxation, high myopia<sup>3</sup> and Marfan's syndrome. The CTR prevents the postoperative shrinkage of the anterior capsular opening as a result of capsular contraction<sup>4</sup>. After standard model, there were developed the modifications like models with integrated iris shields used in eyes with iris coloboma or aniridia. Square edge CTRs reduces the incidence of posterior capsular opacification inhibiting epithelial cell migration<sup>5,6</sup>. In 1998 Cionni developed the modified CTR with scleral fixation for severe zonular dehiscence.

The aim was to present our experience, advantages and limitations of capsular tension ring in phacoemulsification cataract surgery with traumatic damaged zonules.

## Methods

We performed surgery on man with traumatic cataract lens and damaged zonules in range of 45 degrees. Phacoemulsification surgery was performed by clear corneal technique using topical anesthesia. After continuous curvilinear capsulorrhexis (CCC) phaco-emulsification has been done and the Morcher CTR was implanted to stabilize the capsular bag before remaining cortical mass aspiration. Acrylic foldable IOL was implanted after cortical masses aspiration.

CTR was implanted through the corneal tunnel by the injector. Before implantation of CTR the viscoelastic material was injected gently to well expand the capsular bag and protect it.

## Results and Discussion

After successful phacoemulsification surgery of traumatic cataract with partially zonular dialysis we stabilize the capsular bag with capsular tension ring before IOL implantation. The CTR was implanted successfully. The placement in the ring allowed the completion of surgery and IOL implantation without complications in the eyes with zonular dehiscence. The use of CTR facilitated safe surgery in cases with zonular dehiscence or in eyes prone

to IOL decentration<sup>7</sup>. CSRs and other newer endocapsular devices have become increasingly important during cataract surgery in eyes with a weak zonular apparatus. They have been found to improve both, intraoperative support during phacoemulsification and postoperative intraocular lens centration<sup>8,9</sup>. A condition of zonular instability include missing or damage zonules, zonulolysis, lens subluxation, pseudoexfoliation, myopia, intraocular condition in Marfan's sy, mature cataract<sup>7,10,11</sup>.

Depending of stability of the capsular bag, the CTR can be inserted at any stage of the cataract procedure, before phacoemulsification, after capsulorhexis has been performed, after phacoemulsification, either before cortical aspiration or before IOL implantation. The ideal timing for CTR placement is after lens extraction and decompression of the capsular bag<sup>12</sup>. Except better postoperative outcome, CTR allow us to minimize intraoperative complications. It gives circular expansion of capsular bags and improves

IOL centration. Postoperatively CTR reduces risk of capsular fibrosis and resists capsular shrinkage<sup>13,14</sup>. Postoperative outcome was satisfied and there were no intraoperative or postoperative complications. Using the CTR in traumatic cataract phacoemulsification surgery, the surgical goals are keep vitreous posterior with viscoelastics, minimize stress on remaining zonules, removing lens without endothelial damage and implantation PC IOL in bag with long-term stabilization<sup>15</sup>.

## Conclusion

The CTR may provide an alternative means to manage zonular dialysis during phacoemulsification and posterior chamber intraocular lens implantation. It lowers the incidence of capsule contraction, stabilizes the capsular bag and enhances IOL centralization. CTR can place any time after successful CCC.

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## KAPSULARNI TENZIJSKI OBRUČ KOD OŠTEĆENJA ZONULA

### SAŽETAK

Kapsularni tenzijski obruč (CTR) je endokapsularni potporni umetak koji se implantira za vrijeme operacije mrene u očima sa slabim zonularnim aparatom. Prikazano je naše iskustvo, prednosti i ograničenja CTR-a kod operacije mrene metodom fakoemulzifikacije kod oštećenih zonula. Primjenjena je metoda fakoemulzifikacije sa čistom kornealnom tehnikom koristeći lokalnu anesteziju. CTR je implantiran za stabilizaciju kapsularne vrećice prije implantacije intraokularne leće. CTR je postao sve bitniji umetak za uspješan ishod operacije mrene sa oslabljenim zonulama. On smanjuje incidenciju kapsularne kontrakcije, stabilizira kapsularnu vreću i omogućuje centriranje intraokularne leće.