Surgical Technique

Vitrector-assisted anterior capsulorhexis in adult intumescent cataract

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Performing capsulorhexis in white intumescent cataracts during phacoemulsification surgery is challenging for cataract surgeons because of high intralenticular pressure and reduced red reflex. Capsulorhexis extension to the periphery of the lens is a common occurrence due to lens intumescence. We used a vitrectomy cutter to create an initial tear in the anterior capsule and simultaneously remove a part of milky fluid coming out of the intumescent lens. Once the lens was decompressed, capsulorhexis was completed using capsulorhexis forceps. This technique helped in controlling capsulorhexis in eyes with intumescent cataracts by reducing the intralenticular pressure and thereby preventing unexpected radial capsular tear.

Key words: Capsulorhexis, intumescent cataracts, vitrector

Access this article online

Website: www.ijo.in

DOI: 10.4103/ijo.IJO_1626_21

Quick Response Code:

Capsulorhexis is one of the most vital steps during cataract surgery.[1] An intact capsulorhexis is fundamental for a successful cataract surgery, particularly phacoemulsification. Performing capsulorhexis in intumescent cataracts is very challenging for surgeons. There is rapid egress of liquefied cortex on the puncture of the anterior capsule, which impairs the surgeon's view in an already compromised red reflex. Moreover, due to the increased intralenticular pressure, there is a tendency of the capsule tear to rapidly progress toward the periphery of the capsule. This might lead to the creation of the Argentinean flag sign, where the white cataract is observed with the trypan blue-stained blue anterior capsule.[2]

Various methods have been documented in the literature to perform capsulorhexis in intumescent cataracts. One of the oldest techniques was developed by Gimbel and Willerscheidt, who recommended a two-stage technique in which a deliberately small capsulorhexis was secondarily enlarged, with frequent aspiration of the liquid cortex.[3] Another controlled technique was given by Kasturi *et al.*, in which the lens decompression was done with a viscoelastic agent under the microscope's high magnification and noncoaxial oblique illumination, followed by the creation of the capsulorhexis with a capsule forceps while using an endoilluminator as an oblique source of illumination.[4] The use of a cohesive ophthalmic viscosurgical device to pressurize the intumescent lens after aspirating the liquefied cortex by using 27- or 30-G needle has also been described.[5,6] Femtosecond and Nd: YAG laser-assisted system for capsulotomy has also been reported as safe and technically feasible techniques to assist capsulorhexis in intumescent cataracts.[7,8]

A similar technique to what is described in this study is phaco capsulotomy, wherein the phacoemulsification tip is used to create a tear in the anterior capsule and remove a portion of the intumescent lens to debulk and relieve pressure from the lens.[9-11] We used a parallel concept, but instead we used a vitrectomy cutter to create the initial tear in the anterior capsule, which we believe is more controlled and is more likely to give a clean linear capsule leaflet, thereby helping in the creation of continuous capsulorhexis thereafter.

Surgical Technique

The surgery is performed under topical anesthesia by using proparacaine 0.5% eyedrops. Adequate ocular decompression is done by preoperative external ocular massage. After establishing sterile preparation, a paracentesis is made at the limbus, and the anterior chamber is washed with balanced salt solution (BSS) and filled with sterile air. The anterior capsule is then stained with 0.06% trypan blue dye under the air bubble and again washed with BSS. A highly cohesive viscoelastic is injected into the anterior chamber, and the vitrectomy cutter is introduced into the eye via the same paracentesis. The direction of the cutter should be toward the capsule and is situated over its center [Fig. 1]. The anterior capsule is then punctured with the vitrectomy cutter [Fig. 2], and one can see the milky cortex oozing out of the lens, which is thenaspirated into the vitrectomy probe simultaneously. One can appreciate the backward fall of the anterior capsule leaflets as the intralenticular pressure decreases. Once this is completed, the vitrectomy cutter is removed from the eye and the anterior chamber is refilled with viscoelastic. The vitrectomy settings were set to a vacuum of 500 mm Hg and a cut rate of 300 per second. Following this, the advancing edge of the capsular tear

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Received: 21-Jul-2021 Revision: 22-Aug-2021
Accepted: 26-Aug-2021 Published: 22-Mar-2022

Cite this article as: Bharti S, Sharma S, Singh B, Bharti N. Vitrector-assisted anterior capsulorhexis in adult intumescent cataract. Indian J Ophthalmol 2022;70:1408-9.

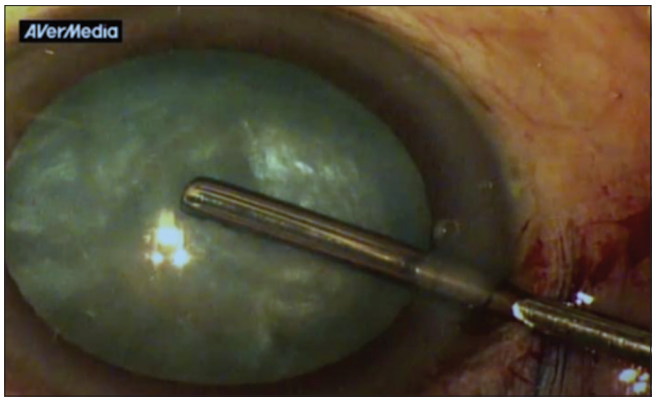

Figure 1: Positioning of the vitrector over the intact anterior capsule

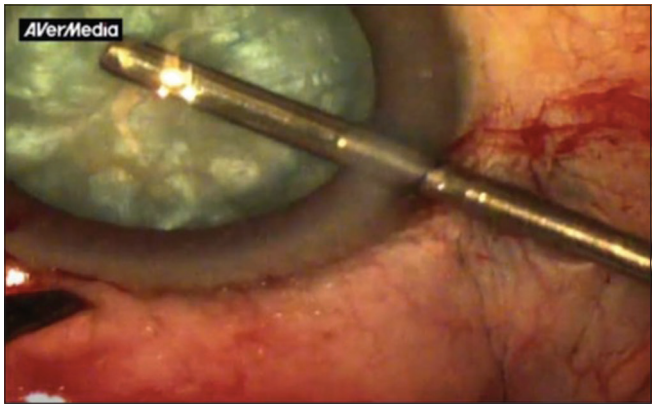

Figure 2: Linear capsule edge is seen after puncturing of the anterior capsule

is identified and the completion of the capsulorhexis is achieved using capsulorhexis forceps or cystitome as per the surgeon's convenience. The remaining steps of the surgery are identical to routine phacoemulsification.

Discussion

We describe a technique for performing anterior capsulotomies in patients with intumescent cataracts. We used a vitrectomy cutter to create an initial tear in the anterior capsule and simultaneously remove a part of milky fluid coming out of the intumescent lens, thereby reducing the intralenticular pressure to create a smooth circular and stable capsulorhexis minimizing the chance of radial capsular tear or extension.

Phacoemulsification in white cataracts is a challenge for cataract surgeons, and it requires adept technique and proficiency. Various techniques have been described for capsulorhexis, including aspiration of milky cortex with a needle, Nd: YAG puncture of capsule, a two-stage technique with frequent aspiration of liquid cortex, femtosecond laser-assisted capsulotomy, and lens as compared to vitrectomy cutter. However, to our knowledge, this is the first documentation of vitrector–assisted anterior capsulorhexis in eyes with intumescent cataracts.

The technique of phaco capsulotomy is on the same lines as ours, but we believe that by using a phacoemulsification probe, the surgeon directs more force on the capsule and lens as compared to the vitrectomy cutter. This might increase the chances of zonular dehiscence. Too much phaco power can also pull the nucleus toward the phaco tip, further exerting stress on zonules. Use of phaco probe also necessitates the creation of main wound incision, while vitrectomy probe can be used via paracentesis incision only. This helps in maintaining the adequate chamber pressure on the anterior capsule, thereby helping in preventing the radial extension of the initial tear. In phaco capsulotomy, the viscoelastic material is washed out simultaneously due to continuous irrigation. This makes the anterior chamber pressure low on the removal of phaco probe, which might cause extension of capsular opening.

Moreover, the width of the phaco tip is bigger than that of a vitrectomy cutter, which increases the chances of a bigger opening in the capsule. The chances of wound burn also increase with the use of phaco power. The anterior lens capsule opening is bigger, punched out, and irregular in shape. Converting this punched-out capsular opening in smooth circular capsulorhexis is difficult, whereas in the vitrector technique, the capsular opening is always linear which is easier to grasp.

Conclusion

In conclusion, we describe a simple yet effective technique of vitrector-assisted anterior capsulotomy, which helps to prevent unexpected radial tears and other intraoperative complications and thus allows for safe phacoemulsification even in eyes with adult intumescent cataracts.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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