Capsulorhexis with 23-gauge vitreous cutter in intumescent cataract surgery: Case series

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Abstract:

A capsulorhexis technique with a 23-gauge vitreous cutter in intumescent cataract surgery is presented. These patients have a high risk of uncontrollable extension of the opening of the anterior lens capsule. We used vitreous cutter for capsulorhexis along with the other steps performed as in standard phacoemulsification surgery. This technique allows controlled capsulorhexis and may be an alternative method in patients with intumescent cataracts with high intralenticular pressure and absence of red reflex.

Keywords:

23-gauge vitreous cutter, capsulorhexis, intumescent cataract

Introduction

Intracapsular pressure is high in intumescent cataracts because of liquefaction of the cortex and an underlying brunescent nucleus. Therefore, capsule puncture can result in an uncontrollable extension of the opening of the anterior lens capsule to the equator and the posterior capsule.[1] Safe continuous curvilinear capsulorhexis is the most important step in these patients.

Various methods have been described to minimize the risk profile of an uncontrolled opening of the anterior lens capsule. One of them is using high-viscosity ophthalmic viscosurgical devices (OVDs). OVD balances the high pressure in the capsule and makes capsulorhexis safe. A frequently used method is the aspiration of intralenticular fluid with a needle. Another method is making a small capsulorhexis first and draining the intralenticular fluid from there and then enlarging the capsulorhexis.[2] However, despite the methods described above, capsule-related complications may still develop in intumescent cataract surgery. In this article, we present a novel surgical approach for patients with intumescent cataracts.

Case Reports

Case 1

A 51-year-old woman with an intumescent cataract underwent cataract surgery using a 23-gauge vitreous cutter for capsulorhexis. Preoperative anterior chamber depth was 1.9 mm. Trypan blue 0.1% was used under air for staining of the anterior lens capsule. 23-gauge infusion cannula was placed into the anterior chamber through a corneal single-plane side-port incision at the 3 o'clock quadrant, and another corneal single-plane side-port incision was constructed at the 9 o'clock quadrant for 23-gauge vitreous cutter insertion [Figure 1]. Before capsulorhexis, OVD was not given into the anterior chamber to make effective cuts with cutter. The anterior capsule was punctured with a 23-gauge vitreous cutter with the settings of infusion pressure at 80 H_2O, cut rate at 1000–2000 cuts per min, and vacuum level at 300–450 mmHg. This initial opening of the anterior capsule led to the release of intralenticular fluid. Then, we performed 4.5–5.0-mm capsulorhexis with a vitreous cutter blade [Figures 2 and 3, video 1]. Then, the vitreous cutter and the infusion cannula were removed and the anterior chamber was filled with a high-viscosity OVD (sodium hyaluronate 2.0%, protectalon 2.0%). The three-step

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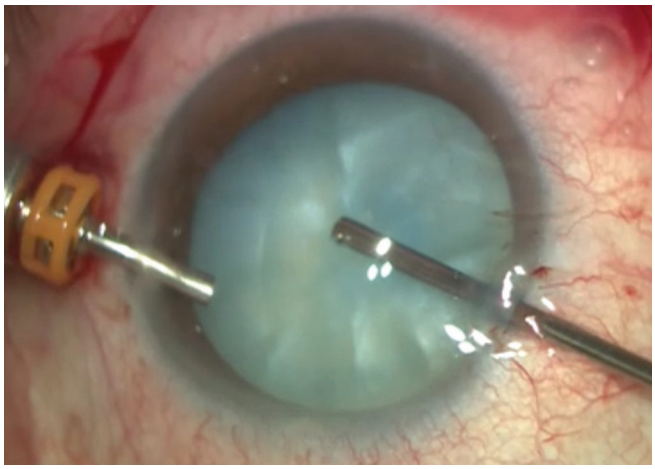

Figure 1: Image of 23-gauge infusion cannula and 23-gauge vitreous cutter placed into the anterior chamber through corneal side-port incisions

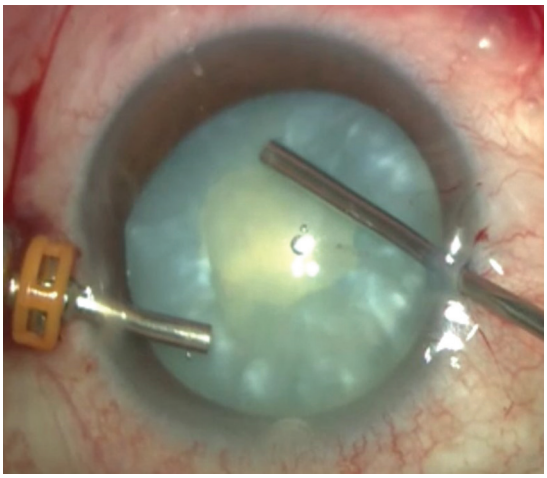

Figure 2: Image of capsulorhexis creation with vitreous cutter

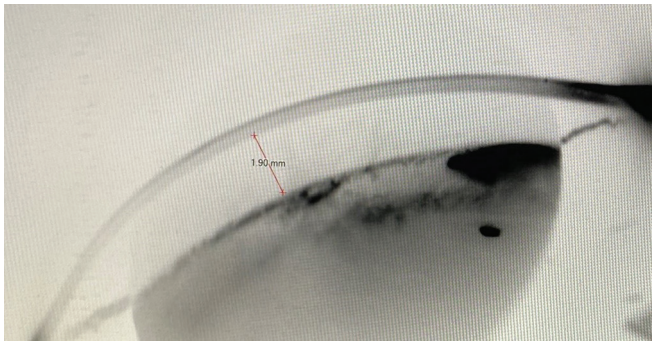

Figure 3: Appearance of capsulorhexis completed with vitreous cutter

clear corneal main incision was made at 12 o' clock using a 2.75-mm metal keratome. Phacoemulsification was performed with minimal hydrodissection or delineation using a Constellation phacoemulsification system (Alcon). Uncontrolled peripheral extension of the anterior lens capsule did not develop. We did not meet any complications during the operation and postoperatively over an average follow-up period of 6 months.

Case-2

A 64-year-old woman with an intumescent cataract underwent cataract surgery using a 23-gauge vitreous cutter for capsulorhexis as described above. Preoperative anterior chamber depth was 2.2 mm. We did not meet any complications during the operation and postoperatively over an average follow-up period of 6 months.

Case-3

A 62-year-old man with an intumescent cataract underwent cataract surgery using a 23-gauge vitreous cutter for capsulorhexis as described above. Preoperative anterior chamber depth was 2.4 mm. We did not meet any complications during the operation and postoperatively over an average follow-up period of 6 months.

Discussion

The capsulorhexis step is the riskiest step of the intumescent cataract surgery. Making a good capsulorhexis is the key for successful phacoemulsification in these patients. We think that this step can be performed with the vitreous cutter more safely than the usual technique. When the anterior lens capsule was punctured with the vitreous cutter, opening of the anterior capsule leads to the release of intralenticular fluid. At the same time, the vitreous cutter aspirates this intralenticular fluid and reduces the possibility of uncontrollable extension of the opening of the anterior lens capsule to the equator. Vitreous cutter makes curvilinear cuts and forms the margins of the capsulorhexis, with a lower risk of capsular tear. In addition, since ultrasonic energy is not used, it is safe for the corneal endothelium.

Gimbel[3] described the two-stage capsulorhexis technique. In this technique first, continuous tear capsulotomy was small and was used for the lens material removal. Then, small initial opening was converted to a larger one. In some studies, different types of OVDs or staining dyes are used for minimizing the risk of an uncontrolled opening of the anterior lens capsule.[4,5] Other authors described using endodiathermy devices to create capsulorhexis in such cases.[6] Neodymium:YAG laser capsulotomy is the other different reported technique.[7]

Femtosecond laser-assisted capsulotomy is another approach used to prevent the extension of capsular tears.[8] However, cases where the capsule tear extension to the periphery have been reported with this method.[9] Figueiredo *et al*.[10] described the Brazilian technique. In this technique, an insulin needle was used to puncture the anterior lens capsule and aspirate the intralenticular fluid. All these techniques have different conveniences and difficulties for different surgeons. Despite these techniques, Argentinean flag sign, posterior capsule rupture, vitreous loss, nucleus drop, and posterior displacement of the intraocular lens (IOL) continue to occur in intumescent cataract surgery.[11]

Erdogan *et al*.[12] used vitreous cutter for cataract surgery in cases without dense nucleus who underwent cataract surgery

with pars plana vitrectomy. Unlike their simple cases, we performed successful capsulorhexis in intumescent cataracts with vitreous cutter.

In conclusion, this technique allows controlled capsulorhexis and may be an alternative method in patients with intumescent cataracts, with high intralenticular pressure and absence of red reflex.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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