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Methodology Article

A Novel Inexpensive Rhexis Technique-Can Vac Ccc for Immature and White Intumescent Cataract - Our Experience

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Abstract: Background: 870 eyes of 855 patients with intumescent immature and total white cataract were enrolled in this retrospective clinical study (2013-2018). Methods: Through a side port using a 25 gauze round/flat tipped fine cannula connected to a 5ml syringe (after a nick being created by a regular 26 gauze cystitome) the free capsular flap was vacuumed by the tip of the 25 gauge cannula and suction pressure created by withdrawing the piston of the syringe and a controlled motion done to create a circular rhexis, without withdrawing the instrument from anterior chamber and aspirating liquefied cortex by the same cannula. All cases were done under peribulbar anesthesia. Results: A complete cannula vacuum continuous curvilinear capsulorhexis (CanVac-CCC) was achieved in 860 cases (98.85%) except eight cases (0.91%) which had anterior capsular rhexis extension and two cases (0.22%) which had also extended posterior capsular tear. Conclusion: Performing CanVac -CCC with our technique is safe and affordable and may be an alternative promising method to routine CCC by using 26 gauge cystitome, Utrata or microrhexis forceps.

Keywords: Intumescent, Capsulorhexis, Cannula, Vacuum

1. Introduction

Continuous curvilinear capsulorhexis is extremely important for a safe phacoemulsification and in the bag implantation of intra ocular lens. Intumescent cataracts have a high intra lenticular pressure due to the high anterior and posterior liquefied cortex and due to lens swelling. Conventional capsulorhexis made by 26 gauze cystitome involves a sheering and tearing action on the capsule which further increases the risk of capsular extension due to the high intralenticular pressure. [1] Thus any technique which can avoid pressure on the bag could help to do away with the pressure fluctuationsin the anterior chamberand thus extension of the rhexis margins. We describe a new technique using manual cannula rhexis which requires a simple 25 gauge rounded/flat tipped fine cannula connected to a 5ml syringehalf filled with balanced salt solution.

2. Technique

870 eyes of 855 patients of age 29-82 years with male:female ratio of 401:454 were enrolled for the study. 840 had unilateral and 15 bilateral surgery between 2013-2018 in a tertiary eye care centre by a single surgeon. Informed written consent were taken from all patients and clearance was obtained from the Institute ethics board. 860 eyes underwent a successful capsulorhexis with this technique. Patients included all intumescent cataract (white mature and immature cataract with ratio of 608:162 eyes) and cannula vacuum continuous curvilinear capsulorhexis (Can Vac-CCC) was done in all.

Routine preoperative ocular examinations including Snellen visual acuity, slit lamp biomicroscopic examination, Goldmann applanation tonometry, biometry, and dilated

fundus examination was done in all patients. In patients with total cataract in whom posterior segment could not be visualised, B-scan was done (Appasamy associates-SBLF). Patient with any ocular disease, such as lens-induced uveitis, or glaucoma, or with a history of ocular trauma were excluded. Traumatic and complicated cataracts were also excluded. Tropicamide 1% and phenylephrine 2,5% eye drops were used for mydriasis four times 1 hour before the surgery. After peribulbar anesthesia with xylocaine 2%, the eyes were prepared and draped. Side port was made 45 degree away from the planned main port site and anterior capsule stained with tryphan blue dye (0.06%) and anterior chamber (AC) filled with viscoelastics (HPMC – hydroxypropyl methylcellulose). A 26 gauze needle bent to make a cystitome was used to make a gentle central nick at the centre of the anterior lens capsule and to raise a small flap (as shown in figure 1). A 25 gauze rounded/flat blunt tipped cannula attached to a 5ml syringe was then used to create the vacuum rhexis. The cannula tip was used to hold the free flap of the rhexis margin and suction was manually created by the withdrawing the syringe piston and at the same time a rounding motion was attempted. The vacuum could be released (by slightly releasing the suction on the piston) and capsule near the base of the tear is regrasped again and again as per requirement as the rhexis was being completed. This gave a more controlled capsulorhexis. Any loose liquefied cortex which gets released in intumescent cataracts were easily removed by the cannula and helped in better visualization during the rhexis and also helped reducing the intralenticular pressure (shown in Figures 2-5). The whole procedure was done without removing the instrument from the anterior chamber, thereby reducing chances of chamber fluctuation and rhexis extension. We aimed at a smaller sized rhexis inorder to reduce the chance of peripheral extension. 25 gauze cannula was chosen specifically due to its adequate bore size which was not too small (inadequate suction) and not too big (too much suction leading to flap amputation and excessive viscoelastic aspirationand anterior chamber collapse).

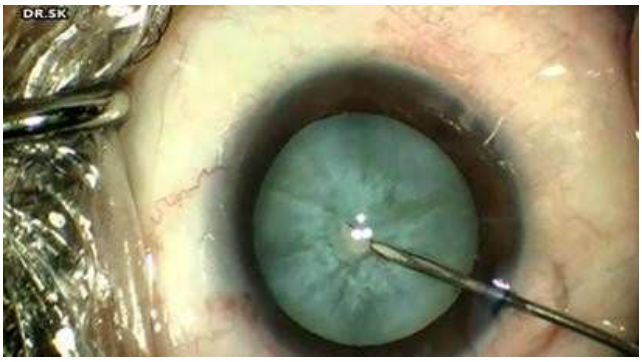

Figure 1. *Initiating rhexis by raising a flap using 26 gauge cystitome.*

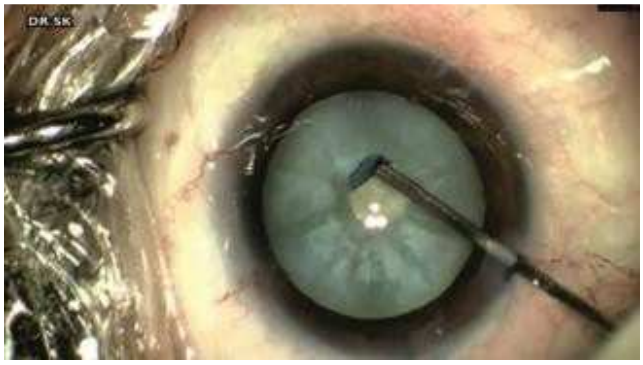

Figure 2. *After flap has been raised, it is being grasped using vacuum from the syring.*

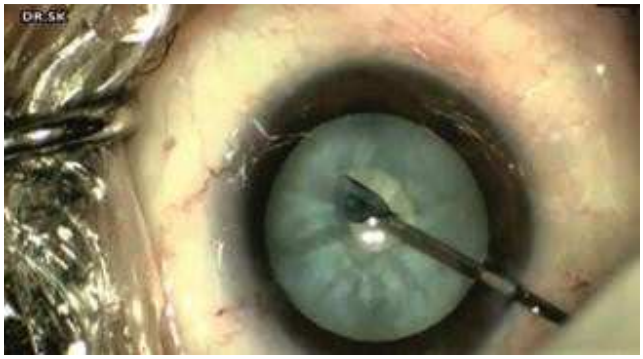

Figure 3. *Using vacuum built from the suction pressure of the syringe rhexis is being done.*

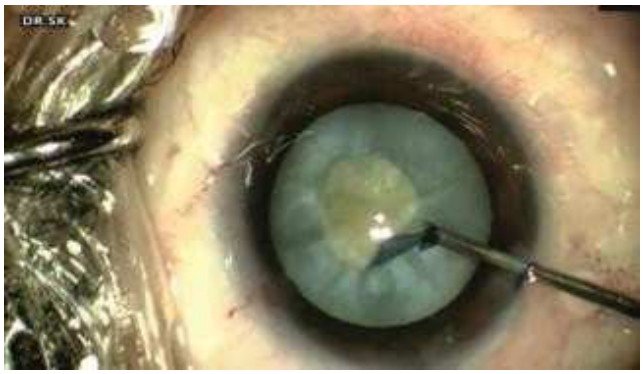

Figure 4. *Continuation of CanVac-CCC.*

Figure 5. *Rhexis completed.*

3. Results

Using this technique, 860 cases (98.85%) except eight cases (0.91%) which had anterior capsular rhexis extension and two cases (0.22) which had also extended posterior capsular tear had a successful capsulorhexis. Among the 860 cases with successful rhexis, 133 cases (15.3%) cases a double rhexis was made, 17 (1.95%) cases a triple rhexis and in 64 (7.35%) cases a partial enlargement (after phacoemulsification and after IOL placement rhexis enlargement) was done. The double, triple rhexis and partial enlargement of rhexis was done using Utrata or microrhexis forceps after the primary rhexis being completed by CavVac-CCC. Among the total 10 (1.14%) cases which had rhexis extension, successful phacoemulsification was done in five cases with adequate preventive measures to reduce the chance of wrap around tear, and in other three cases manual small incision cataract surgery (SICS) was done and IOL placed in sulcus (table 1). Two cases had posterior capsular rupture (PCR) and required anterior vitrectomy and all others underwent a successful phacoemulsification. In all cases, follow up for a minimum of one year and only one patient who had a posterior capsular tear developed cystoid macular edema at the end of three months and was treated with intra-vitreal steroids (OZURDEX) (table 2).

Table 1. *Successful surgeries done using CanVac-CCC.*

Surgeries done	Successful phacoemulsification (%)	Manual small incision cataract surgery (due to rhexis extension%)
NUMBER	857 (99.65)	3 (4.49)

Table 2. *Complications seen in our series of cases.*

Complications	Anterior capsular tear (%)	Posterior capsular tear (%)	Anterior Vitrectomy done (%)	Cystoid macular edema (%)
NUMBER	8 (0.91%)	2 (0.22%)	2 (0.23)	1 (0.12)

4. Discussion

Common techniques for rhexis such as routine CCC using 26 gauge cystitome, Utrata or microrhexis forceps can be easily used for immature cataract. However, in intumescent cataract there is a high chance of rhexis runoff and wrap around capsular tear with the routine techniques. Also liquefied cortex (in total cataracts) causes obscuration of the operative field and repeated viscoelastic injection and aspiration of the cortex is required for better visualisation and completion of rhexis. Repeated instrumentation can cause chamber collapse and thus, further risk of rhexis runoff. A successful rhexis is a key requirement for a safe and good cataract surgery especially phacoemulsification and it is well known that the most difficult step in an intumescent cataract is to obtain a good rhexis due to its tendency for rhexis extension and wrap around capsular tear and risk of nucleus drop. Rhexis runoff or Argentina flag sign is very common in intumescent cataract due to the high intralenticular pressure and it is imperative to prevent chamber fluctuations in these cases. [8, 9] Routine rhexis with cystitome is difficult in these cases and even with double rhexis there is a chance of runoff. [6, 7, 9, 11, 16] Other rhexis technique such as Zepto precision rhexis and femto rhexis have been described but they are expensive. [2, 3, 14, 15, 17]

A novel technique for safe capsulorhexis in intumescent (immature and mature) cataract using an affordable 25 gauge cannula which provides a controlled rhexis and at the same time helps removing any liquefied or viscous cortex in 860 cases (98.85%) except eight cases (0.91%) which had anterior capsular rhexis extension and two cases (0.22) which had also extended posterior capsular tear. The entire rhexis procedure can be done without withdrawing the cannula from the eye and thus preventing chamber collapse. This technique of CanVac-CCC has the advantage of having no pressure on the anterior lens capsule, very manual and affordable. The whole procedure was done without removing the instrument from the anterior chamber which prevented viscoelastic leakage and chamber collapse and thus also preventing rhexis extension. Repeated instrumentation was also avoided. Another technique using irrigation aspiration cannula was attempted in immature cataracts, but obtaining the same in mature intumescent cataracts could be difficult due to the irrigating jet of fluid from the irrigation cannula. [4] The limitations of our study could be the technical comfort of surgeons to perform the same.

5. Conclusion

Careful following of the steps could help achieve a successful Can Vac-CCC in all intumescent cataracts. Also this technique can be used in any setup and in manual small incision cataract surgery.

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