Consultation section

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The following post-cataract photograph along with the following questions were given to five senior cataract surgeons for opinion and comments.

1. Why has this occurred? Can a small piece of cortex which was not noticed during the primary surgery swell up to this extent?
2. What would be your preferred method of cortex removal? Is it a simcoe cannula, IA cannula or vitrectomy cutter?
3. Would you consider removal of the IOL for removing the cortex?
4. If the PC rent enlarges what is the contingency plan?
5. Is it mandatory to have VR backup while doing this case?
6. Would you reposition the lens into the capsular bag?
7. If a significant amount of cortex goes into the vitreous, would you prefer a pars plana approach?

Fig. 1. Anterior segment photograph of the left eye showing the thick cortical material behind IOL.

This is the photograph of the left eye of a 65 year old lady who underwent cataract surgery 14 days back in another hospital. She came with a vision of Counting fingers 1 metre, but no other symptoms suggestive of inflammation.

According to the patient, the vision was slightly better immediately after surgery, but deteriorated after 1 week. On examination, her intraocular pressure was 16 mm Hg, dilated examination revealed a hydrophilic acrylic IOL placed in the ciliary sulcus. There was thick intumescent, cortical and epinuclear lens material behind the IOL. Although not very clear in the photograph, there is a small central rent in the posterior capsule. (Fig. 1)

Fig. 2. Pseudo PC rent seen as a relatively clear area between swollen cortical fibres

Dr. Suhas Haldipurkar

1. PC rent caused the abandoning of surgery prior to complete cortical removal. Cortical swelling of this magnitude is common after such events.

2. I would prefer vitrectomy cutter for this clean up.

3. No. I will not disturb the IOL in this instance. My approach would be by pars plana.

4. By parsplana approach the pc rent can be converted in to a controlled circular opening in the pc so that the lens can shift back in to the bag after the cortical clean up.

5. It is mandatory to have the knowledge of parsplana approach to undertake this procedure.

6. Yes . I would reposit the IOL in to the bag if the rhexis is intact and the pc rent is converted back in to a well circumscribed central PCCC.

7. Yes. My preferred approach is pars plana.

Dr. Arup Chakrabarti

Introduction

Before I proceed to address the questions raised by the editor I would like to gather further information about the patient whose case is being discussed.

(a) The status of the corneal endothelium:
Specular microscopy can be of great help in revealing the true status of the corneal endothelium. This information will be useful in patient counseling and detailed surgical planning. Regardless of the endothelial status, the surgeon should recruit the best quality viscoelastic agent and minimize avoidable intraocular manipulations intraoperatively.

(b) Presence of vitreous stands in the anterior chamber: Careful slitlamp biomicroscopy may help. The presence of pupillary peaking may also indicate vitreous in anterior chamber. Intraoperative injection of triamcinolone acetonide will help to delineate vitreous in the anterior segment.

(c) Presence and location of the PC rent:
Detecting the presence of a PC rent may be tricky in this patient. A relatively clear area between swollen cortical fibres may resemble a PC rent. On the other hand true PC rent may be camouflaged by swollen opaque cortical fibres. In many situations PC rent can be confirmed only intraoperatively (Fig. 2).

(d) Presence of significant amount of cortex and / or nucleus in the vitreous cavity. B Scan ultrasonography may hold a clue regarding this complication.

(e) The integrity and size of the capsulorhexis.
In the presence of an intact rhexis (and a large PC rent) we may consider placing a suitable PC IOL in the ciliary sulcus.

(f) A-Scan Biometry result of the affected eye is to be obtained. An appropriate AC IOL, rigid PC IOL and a 3 piece hydrophobic acrylic IOL are to be kept as a standby.

(g) A proper informed consent of the patient is a must.

Now the queries raised by the editor:

1. We are dealing with a residual cortical and epinuclear sheet trapped between the intraocular lens and the posterior capsule. This cannot result from a small piece of the leftover cortex. It is important to note that a similar picture is not uncommon in the hands of a novice surgeon who may fail to detect, the presence of an epinuclear sheet intraoperatively in the presence of a bright fundal reflex. The possible reasons in the given patient are as follows:

(a) The surgeon, having attempted removal of the epinuclear sheet would have abandoned efforts at complete removal due to intraoperative miosis. Underestimating the amount of residual lens matter, he would have implanted the intraocular lens which perhaps landed in the sulcus (unintentionally). The lens appears to be in the sulcus since it is found to be decentered (nasally in this case).

(b) Intraoperative manipulations may have resulted in a posterior capsular rent. Fearing further extension of the rent with ensuing vitreous disturbance, the surgeon might have abandoned further efforts at cortical removal in a moment of panic, implanting the IOL in the sulcus.
2. All the intraocular manipulations in this case should be performed in a closed chamber environment. The key issue here is to maintain a deep anterior chamber at all stages. Hence use of simcoe cannula, which is a co-axial system, is ruled out. I would go in with a bimanual I/A cannula and work through 2 paracentesis incisions. The cannula may have to be switched to facilitate complete cortex removal. The anterior vitrectomy unit should be kept as a standby. If I harbour the slightest suspicion as regards the presence of vitreous in the anterior chamber I would inject triamcinolone acetonide (TA) into the anterior chamber. Vitreous, if present, will trap the TA particles and will get delineated. Then I will proceed with anterior vitrectomy through a side port incision, the other side port incision being used for the infusion cannula. If vitrectomy is performed (at high cut rate and low suction levels) the same cutter could also be used to remove the residual cortex (but at a low cutting speed and high suction levels). Once the vitreous has been removed cortex aspiration can also be performed with the bimanual I/A system. The cortex should be stripped from the periphery to the centre keeping the area of the PC rent for the end. A 26 G straight and a bent J cannula will also be handy to remove wispy cortical material towards the completion of irrigation and aspiration.

3. In the given case, since the IOL appears to be in the sulcus, adequate space can be created behind the IOL in an atraumatic manner to deal with the residual lens matter and / or the vitreous. In a hypothetical case where the IOL is found within the bag, the management option may depend on the rhexis size and / or the presence of a posterior capsular rent. If the rhexis is relatively large (as compared to the optic diameter) the I/A cannula and or cutters can still be maneuvered to atraumatically aspirate the residual cortex. The problem begins when the rhexis is quite small. If there is no PC Rent the lens can be maneuvered into the sulcus and repositioned back once the residual lens matter is removed. However, in the pressure of a PC rent I would prefer to remove the cortex through the pars plana approach. Explanation of the IOL would be quite traumatic. If one does not want to extend the incision, the IOL would have to be cut with a lens cutting scissors before being extracted through the unenlarged incision.

4. Every effort should be made to prevent the occurrence of a PC rent or if it has already occurred to prevent its further extension. Vitreous disturbance also should be prevented and, if present, minimized. I would like to convert the PC rent into a posterior capsulorhexis. In that case the hydrophilic acrylic IOL can still be implanted within the capsular bag. However, the PC rent may be too large to be converted into a posterior capsulorhexis and in that case my considerations will be modified. I am not comfortable with this type of lens in the ciliary sulcus. Hence I would prefer to explant this IOL (after cutting it with dedicated lens cutting scissors under viscoelastic cover) and then inject a 3 piece hydrophobic acrylic IOL into the ciliary sulcus.

5. The surgeon performing this case must be competent in anterior vitrectomy. Every phaco surgeon’s armamentarium should include a functioning anterior vitrectomy unit. If properly performed, there should not be any loss of cortical matter into the vitreous cavity.

6. If there is no PC rent and no zonular instability I would definitely relocate the same IOL into the capsular bag. If there is a small PC rent and I have successfully converted it into a posterior capsulorhexis I will not hesitate to relocate the same IOL into the bag. However, if the PC rent is large I would exchange the hydrophilic acrylic IOL with a 3 piece hydrophobic acrylic IOL (Sensar).

7. If the surgeon is not cautious, cortex may drop into the vitreous cavity particularly if the vitreous is liquefied. A small amount of cortex may get absorbed with time with the only complaint being that of seeing floaters which diminish over time. However a significant amount of retained cortex may be associated with postoperative complications like recalcitrant glaucoma, cystoid macular oedema, uveitis etc. So a thorough removal of the residual cortex is called for which can be achieved only through the parsplana approach.
In summary, a patient with significant amount of retained cortex needs to be managed surgically after conducting appropriate preoperative workup and extensive counseling. With adherence to proper surgical strategy the postoperative results will be no different from that of a routine uncomplicated case.

Dr. J.K. Reddy

1. A small PCR might have occurred during the last nucleus piece phacoemulsification. What is seen here is epinucleus plate which is very transparent in immature cataracts and can swell and becomes opaque.

2. Fill the anterior chamber with cohesive viscoelastic (sodium hyaluronate). Aspirate the cortex with Simcoe with very low flow of BSS, a drop every second. Start the aspiration of cortex first in the periphery, as the PCR is in the centre. If the above technique doesn’t work use virectomy cutter.

3. Hydrophilic IOLs in the sulcus are not very stable and produce gross myopia unless the surgeon has undercorrected intentionally. In this case IOL looks fairly well centred, so leave it.

4. IOL is on the anterior capsule. So PCR extension may not create any further problem.

5. VR back up is not necessary for handling this case.

6. Hydrophilic single piece IOLs are difficult to reposition into the capsular bag with PCR. So it is better to leave it in the sulcus or exchange it with a PMMA IOL.

7. This fine hydrated cortex will get absorbed very well. It does not produce much vitritis. So I will leave it and observe.

Dr. Suven Bhattacharjee

Since the IOL is well centred and placed in the sulcus, it would be reasonable to assume that the capsulorhexis is intact. The same should be confirmed on slit lamp examination. It would also be reasonable to assume that a PC rent had occurred with no/minimal vitreous loss and the surgeon chose to implant the IOL in haste leaving behind a rim of epinucleus & cortex which might have been fairly transparent at the time of surgery. The possibility of a dropped nucleus should be kept in mind and ruled out by an Indirect Ophthalmoscopy (through small opening in PC) and Bscan USG. Assuming that the capsulorhexis is intact and that there is no dropped nucleus, I would prefer the following line of management:

I would prefer a Pars Plana approach and a vitrectomy cutter over a clear corneal / limbal paracentesis & I/A cannula for removal of the epinucleus and cortex. A clear corneal approach with bimanual / coaxial I/A would involve going across the pupillary edge, around the edge of the IOL and then behind it. The pupil is likely to get smaller due to handling. We will be attempting to draw out cortex and epinucleus sandwiched between the remnant PC and the anterior capsular rim & IOL. The epinucleus is likely to offer significant resistance to I/A and may drop into the vitreous during manipulation.

I would prefer a 3 port vitrectomy approach. With the sutured PP infusion in place, I would use a vitrectomy cutter through PP to remove the vitreous behind the PC rent. Thereafter, alternating between cutter ‘on’ & ‘off’ modes (in the off mode the cutter works as a aspiration cannula with a fairly wider aspiration port than the conventional 0.3 mm), I would attempt to remove the cortex & epinucleus sector by sector. While an attempt would be made to preserve the remnant PC, I wouldn’t hesitate to remove it sector wise, to gain access and completely remove the cortex and epinucleus. Once all the cortical / epinuclear matter is removed, I would use an endo illuminator with Irrigating lenses/ Landers lenses to check for any vitreous droppings. Thereafter, I would capture the Optic of the IOL in the capsulorhexis using the cutter and light pipe through the pars plana itself. While the sulcus is not the most desirable place for a hydrophilic lens, a rhexis capture of the optic would ensure stability and centration. Needless to mention, this procedure is best performed by a vitreo retinal surgeon. The next best would be an Anterior segment surgeon with a VR back up. We must remember to ensure that the patient doesn’t require a 3rd surgery.

Dr. Mohammed Naved Abdul Karim

Cataract surgery is performed in the majority of cases with a view to improve vision. In this case it is unfortunate that this patient has been left with poor vision following the procedure. Cortex left behind by
the surgeon mixes with the aqueous humour and can swell up and fill the eye. The lens cortex retained in the eye after cataract extractions usually undergo lyses by aqueous but may persist as in this case.\[2, 3\] Since there is no inflammation or raised IOP we can assume that it is not an infection or inflammatory response.\[4\]

The plan of action is to remove the residual cortex especially from the visual axis for the patient to be able to see. My aim would be to remove the cortex without hydrating the vitreous causing vitreous prolapse. After filling the anterior chamber with viscoelastic the cortex would be removed with a simcoe cannula with a low flow or as a dry aspiration \[5, 6\]. In case there is vitreous prolapse I would then do an anterior vitrectomy as any vitreous left in the wound has the potential for further complications.\[7, 8\] The vitrectomy can be performed with the IOL in place as the IOL is in the sulcus and has less chance of dropping into the vitreous than if it was in the bag. If I am able to aspirate the cortex without enlarging the pc rent and/or vitreous prolapse, I may try to put the IOL in the bag provided the pc rent is small. It is preferable to have the IOL in the bag but is not essential. If I feel that more manipulation is necessary then I prefer to leave it in the sulcus as this is a second surgery and less manipulation the better. \[9\]

I don’t think a vitreoretinal backup or pars plana approach is necessary in this case as the cortex is usually quite soft especially after 14 days and the pc tear is very small. With a low flow/dry aspiration the cortex can be removed without difficulty. Postoperatively the patient should be on frequent doses of topical steroids and topical ketorolac to dampen the inflammation and prevent cystoids macular oedema.\[10, 11\]

Dr. S.J. Saikumar

These are my comments and the way I managed this case.

1. Most obviously the primary surgeon must have panicked on seeing a PC rent before removal of the entire cortex, and has implanted the IOL. But the residual cortex has swelled up to such an extent that the post op vision is very similar to that of a mature cataract. This much cortex will not get spontaneously absorbed. Plugging the PC rent with a cohesive OVD and if needed a limited anterior vitrectomy would have aided in cortex removal during the primary surgery. The IOL can then be placed either in the bag or in the sulcus without compromising the final visual outcome.

2. I preferred an anterior approach initially with 2 paracentesis openings. An infusion was in place through one and a vitrectomy cutter was put through the other. After removal of the central cortex mixed with vitreous, a Simcoe cannula was used to remove the rest of the cortex. Since the cortex was hydrated and fluffy, it came out very easily.

3. There is no need to disturb the IOL in this case. The IOL can be repositioned either in the bag or in the ciliary sulcus after cortex removal. IOL removal may be needed only in rare instances like when the primary surgical manipulation has been significant and there is some underlying retinal pathology like RD or vitreous hemorrhage.

4. Even if the PC rent enlarges, the IOL can be positioned on the ciliary sulcus. If the PC opens up wide and the CCC also is not intact, one may have to consider explanting the PC IOL and replacing it with an AC IOL. But in this case, with a little care, chances of the rent enlarging are quite minimal.

5. Since there is only retained cortex anterior to the PC, a VR backup is not absolutely essential. But knowledge of the pars plana approach is advantageous.

6. If the rent is small, the IOL can be positioned back into the bag. Another method is to convert the rent into a PCCC with the cutter before positioning the IOL in the bag.

7. The take home message in this discussion would be that one should not panic on seeing a PC rent. Limited vitrectomy and cortical removal in the primary sitting itself will help avoid a second surgery.

References
