A 48 year old diabetic lady was seen in our OPD with complaints of defective vision right eye following a closed globe injury (blunt trauma) 3 years back. She was having moderate visual loss at that time and was being treated by ophthalmologists at two local hospitals. Available records show that she was on systemic steroids for some time.

Presently examination of her right eye revealed a clear cornea, dilated non reacting pupil, mature (white) cataract with phacodonesis. IOP recorded was 4mm of Hg in the right eye and vision was perception of light with accurate light projection. Gonioscopy revealed cyclodialysis from 9'O'clock to 2'O'clock. The cyclodialysis was confirmed by UBM.

B Scan did not show any retinal detachment.

Left eye was normal, BCVA of 6/6.

How would you approach this case?

**Dr. Mohan Rajan**

Cyclodialysis clefts are due to disinsertion of the longitudinal fibres of the ciliary body from the scleral spur. They can occur following blunt trauma or due to surgery for cataract or glaucoma. The result is a communication between the anterior chamber and the suprachoroidal space which results in internal filtration and therefore hypotony. Hypotony causes choroidal effusions, macular / optic disc edema and decreased visual acuity. Later generalised detachment of the ciliary body occurs which results in decreased aqueous humour production which further aggravates hypotony.

The goal of treatment is to reverse hypotony and restore visual function. The indications for treatment of cyclodialysis include hypotonous maculopathy, macular folds, choroidal detachment, corneal edema & worsening vision. A cyclodialysis cleft with hypotony but without structural or functional abnormalities does not require treatment. The management algorithm includes treatment by medical, laser or surgical methods.

Medical management consists of apposition of ciliary body against the scleral spur and promotion of adherence by scar formation. This is enhanced by strong mydriasis (1% atropine eye drops) and minimising / stopping of steroid medication for up to 6 weeks.

Noninvasive laser methods include treatment by argon laser to the ciliary body and sclera through a goniolens. If visualisation of the cleft is difficult due to shallow anterior chamber, the chamber can be deepened with viscoelastics prior to the procedure. Joondeph who did the first argon laser treatment used powers of 400-800mw, 200 micron spot and 0.1-0.2 sec exposure time. Other noninvasive methods include use of transcleral yag / diode laser, transcleral cryotherapy.

If medical /noninvasive laser methods do not work then surgical methods become the next option. Methods adopted depend on the size of the cleft. Small clefts <2 clock hours can be approached by direct / indirect cyclopecty or ciliochoroidal diathermy. Medium clefts

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of 2-4 clock hours need to be approached by direct cycloplexy or diathermy. Large clefts >4 clock hours can be approached by direct cycloplexy or by anterior scleral buckling. Large chronic clefts are reported to benefit from parsplana vitrectomy, cryotherapy and gas tamponade. Delay of treatment for >8 weeks increases the risk of losing 1-3 snellen lines of visual acuity.

With respect to our patient, medical management with Atropine eye drops and transcleral diode laser in two rows of contiguous burns 2 to 3mm behind the limbus or argon laser photocoagulation. Following this since the patient has mature cataract, phacoemulsification and implantation of nonfoldable intraocular lens in the ciliary sulcus will enhance closure of the Cyclodialysis cleft. If the above treatment fails then direct repair of the cleft is recomended. In cases of traumatic cyclodialysis there could be alterations in the iridocorneal angle which persists after cyclodialysis repair and therefore regular monitoring of intraocular pressure is recommended.

Dr. Andrew Braganza

This is a very interesting clinical scenario. One more piece of information I would like is to know whether there is a relative afferent pupillary defect in the affected (right) eye. Even though the pupil is dilated and non reactive, presumably secondary to traumatic mydriasis, this information is easily obtained by the swinging flashlight test and observation of its effects on the left eye. I assume there is no RAPD and that therefore there is no significant disc damage in the right eye. The problems that need addressing are the following:

1. Cataract
2. Cyclodialysis and hypotony

The traumatic mydriasis may be a problem, but can be addressed subsequently. Diabetes related ocular problems is unlikely to be an issue here in view of the normal fellow eye.

Cataract: The cataract needs to be removed and an IOL implanted. It is likely that there is extensive zonular damage, and capsular support for the IOL may be lacking. I would plan a superior scleral tunnel incision with the intention of doing a manual small incision surgery, converting to a sclerally fixated lens if needed.

It is easy enough to pass the sutures needed through the posterior lip of the tunnel and under a scleral flap 180 degrees away, so that they remain buried under partial thickness sclera after being tied. Alternatively, there are techniques available to handle this cataract by phaco even to the extent of sclerally fixating or iris fixating a foldable lens. Details of this are outside the scope of this discussion. Please note that scleral fixation of the IOL must be done only after repair of the cyclodialysis.

Cyclodialysis: Applying laser treatment or cryo is a conservative option for a cyclodialysis cleft. With a small cleft the results are quite good, the advantage of this approach being that it is non invasive and can be repeated if it fails, still leaving a surgical option open. With a large cleft, this treatment is unlikely to succeed; in this patient, therefore, I would recommend commitment to a surgical repair, especially as the cataract surgery has to be done anyway. The technique involved is similar to scleral fixation of an IOL. A double armed suture needs to be passed through or just behind the root of the iris, through the scleral spur and out under a partial thickness scleral flap and tied, to appose the dialysed ciliary body to its normal attachment. 10-0 prolene is a suitable material, though over tightening must be avoided as the delicate ciliary and iris tissue cheese-wires quite easily. For a superior cleft like this, an open-sky approach through a scleral tunnel using 10-0 monofilament nylon on a curved needle is also possible. The procedure is to some extent blind, as one cannot directly visualize the exact entry point of the suture from the inside. But, as with sclerally fixating an IOL, using external surface anatomy and a 26 or 30G hypodermic needle introduced from outside the eyeball as a guide, precise placement can be achieved by railroading the prolene suture through the hypodermic needle. Many variations of technique have been described; the reader can study these in detail and decide for him- or herself which makes the most sense. With 5 clock hours of dialysis in this patient it is likely that two separate sutures will be needed for the repair. If a scleral tunnel incision is being used for the cataract, it should be possible to pass both these sutures through the bed of the tunnel without the need for separate scleral flaps or dissections.
Apart from the technical difficulty of the repair, the challenging part of treating a cyclodialysis is handling the IOP once the repair is achieved. A steep rise to 40 or 50 mmHg can be expected in the postoperative period associated with pain and acute danger to the optic nerve head. Prophylactic administration of Diamox is obviously not an option in a hypotonic eye. Early removal of the bandage and checking of IOP postoperatively, probably within 12 hours of the procedure is a logical precaution. The initial reversal and upswing of IOP does eventually stabilize in most cases, but requires monitoring and treatment; it may take days to weeks to stabilize and the patient needs to be closely followed up during this period. Permanent secondary glaucoma may ensue, and require lifelong treatment. To my mind this is preferable to macular damage from hypotony. If surgical control of IOP is needed later, this would usually take the form of a glaucoma drainage device, not a trabeculectomy. In this patient, even assuming that surgery is successful, the visual prognosis remains guarded. This is because we don’t know the condition of the macula preoperatively. Prolonged hypotony may result in permanent damage and irreversible visual loss. The dilated pupil may cause the patient problems. If so, an iris implant can be considered at a later stage.

Dr. Arup Chakrabarti

The given patient presents with a couple of intriguing problems. The condition of the patient is to be tackled at two levels.

1. Visual rehabilitation
2. Management of hypotony

Visual rehabilitation

Careful preoperative counseling is mandatory. Patient is to be informed that non improvement of vision postoperatively may be related to subtle changes in the posterior segment which may not be evident preoperatively in view of the media opacity. Late postoperative complications may arise because of the prior trauma unrelated to the cataract surgery. The extent of subluxation should be evaluated with the patient in supine position. A scan biometry may be difficult in view of the hypotonicity. Injection of viscoelastic through a paracentesis site on the slit lamp has been recommended prior to gonioscopy. Another option would be to perform A scan biometry on the surgical table with sterile precautions. It is preferred to use peribulbar anesthesia since the surgery is likely to be complicated and a prolonged one. A temporal scleral tunnel incision would be appropriate since it will render conversion to a non phaco technique easier, should the need arise, due to intraoperative complications. Anterior capsule must be stained with trypan blue dye. The capsulorhexis should be performed with a closed chamber technique preferably with micro rhexis forceps. Fibrotic anterior capsular plaque may be seen in similar situations. In difficult situations, placement of iris hooks may be called for, to support the capsular bag, during capsulorhexis. Hydrodissection may perhaps be avoided since this is a traumatic mature cataract and a preexisting posterior capsular dehiscence may not be completely ruled out. A good quality viscoelastic agent should be employed to protect the endothelium and maintain the anterior chamber depth. Excessive chamber depth fluctuation should be avoided. Direct phaco chop would be an ideal technique to remove the nucleus since it is less traumatic to the zonules. Vitreous if present should be managed by automated anterior vitrectomy. A foldable hydrophobic or hydrophilic acrylic intraocular lens should be implanted in the capsular bag. After nucleus removal, it may be a good idea to implant a capsular tension ring within the capsular bag. A double eyelet Cionni ring sutured to the sclera may have to be considered if there is extensive zonular loss.

If the capsular bag stability is inadequate for safe phacoemulsification, one should think of converting to a non phaco technique. In that case, the PCIOL may have to be sutured to the ciliary sulcus (scleral fixation). There are several techniques available for scleral fixation and the surgeon can choose a technique he is comfortable with.

Postoperative evaluation should be intensive since more than usual post operative inflammation is to be expected. A thorough evaluation of the posterior segment should be performed. The postoperative course may be complicated by retinal detachment as a result of the prior trauma and the patient should be informed about it.
Management of hypotony

Patient has to be watched carefully in the postoperative period. Hypotony is known to have deleterious effects in the posterior segment including hypotonous maculopathy. In such a case, the condition may have to be managed surgically. There are various procedures described in literature for the treatment of cyclodialysis clefts which implies that the condition is difficult to treat. Direct Argon laser photocoagulation through a gonioprism (in cases with good visualization) has been found to be successful by several investigators. Confluent applications of 100 mm spots at 0.1 to 0.2 sec and 500-1000 mW are delivered to the base of the cleft followed by postoperative cycloplegics. Repeat treatment may be required in some cases to progressively close the cleft. In cases with poor visibility, the cleft can be treated indirectly from outside by cryotherapy or photocoagulate it with either a diode or transcleral Yag laser. All these indirect approaches require a peribulbar anesthesia for comfort, as well as post operative cycloplegics.

More aggressive surgical therapy has been described and involves external diathermy to the bed of the scleral flap that is created over the cleft. This can be combined with suturing the cleft with 9-0 or 10-0 nylon through the scleral bed, either with or without direct visualization. Recalcitrant clefts may require pars plana vitrectomy, cryotherapy and tamponade with SF6 gas.

The patient can experience a period of extremely high pressure and acute pain once the cleft is closed. The patient should always be warned of this possibility and prophylactic aqueous suppressants may have to be prescribed.

In summary, management of this complicated case is quite complex. Difficulties are expected during cataract surgery in view of the mature state of cataract, subluxation and very soft eye. Inspite of a well done cataract surgery, visual success may not be satisfactory in view of the posterior segment complications induced by the blunt trauma. In the event of a persistently low post operative intraocular pressure affecting structure and function, cyclodialysis cleft will have to be dealt with surgically using one of the techniques described.

Compilation

As opined by our expert panel, this is a difficult, intriguing problem.

Our approach to the problem was, two pronged

1. Tackle the hypotony
2. Visual rehabilitation

In a primary sitting, we planned to take care of the hypotony. Being a large cyclodialysis cleft, of long standing, we planned a surgical cyclopexy. Under a partial thickness sclera flap we did a continuous – 10-0 nylon(curved needle) suturing of the ciliary body to its scleral bed. As indicated by our panelists this procedure, is to a good extent a blind procedure. The appositioning of the CB to its scleral bed should be full, to get a desired effect but you can easily cheese wire through delicate ciliary / uveal tissue. Even a small cyclodialysis cleft remaining open shall keep the IOP low and in the other hand you can have raised IOP post operatively. The balance is delicate. In our case, the post op IOP was around 8mm of Hg (1 week and 3 weeks post op). Post-op evaluation revealed cyclodialysis persisting in one clock hour. Though our intention was to close the cleft fully, it has not worked out in one sitting.

Regarding the cataract we planned to deal with it 3 weeks post cyclopexy, but the patient disclosed chicken pox during this period, which delayed the second surgery by more than 6 weeks. SICS through a scleral tunnel made close to the limbus (to avoid the cyclopexy site) was done. Through the patient developed a phacodonesis, intraoperatively, capsulorhexis, lens nucleus delivery and IOL implantation were uneventful. The dilated non reacting pupil (traumatic mydriasis) is persisting. Seen 10 days post op the patient had a UCVA of 6/36. Fundus examination revealed, normal disc and vessels with a dull fovea. Post cataract surgery also, the IOP is in the range of 8mm of Hg.

On 16/9/09 (last follow up, when the patient is reviewed by her local ophthalmologist at Cochin), the visual acuity in the operated eye is 6/12 improving to 6/6p with glasses and the IOP is 8.5mm Hg.

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