

**M. Sudha Devi****Abstract**

Pseudophakic bullous keratopathy refer to the development of irreversible corneal edema as a complication of cataract surgery. As corneal edema progresses and worsens, first stromal and then intercellular epithelial edema develops. This can cause disrupt vision and create pain sensation. Treatment can include hyperosmotic eye drops to reduce swelling, bandage contact lenses to reduce discomfort, glaucoma medication to reduce the flow of fluid to the cornea, and surgical procedures to replace the damaged tissue.

**Keywords:** Pseudophakic Bullus Keratopathy; Sensitivity; Corneal Edema; Phakodonesis; Bandage Contact Lens; Intraocular Lens; Cataract Surgery; Sequelae; Endothelial Tissue.

**Introduction**

A 60 years female patient reported that she has eventually experienced progressive decline in her vision in the left eye. The patient began to notice increasing tearing and light sensitivity. Vision deteriorated rapidly in 3 months. Her best corrected visual acuity (BCVA) was 6/3 and with pinhole 6/9 in right eye and in the left eye, only she was able to count the fingers close to face. Her intra ocular pressure through Non contact tonometry was about 10mmHg. She has the history of cataract surgery with posterior chamber intraocular lens (PCIOL) placement in both eyes (OU) nearly 20 years before.

Further ocular examination shows that there was corneal vascularization, presence of posterior chamber intraocular lens in pupil flare and pseudophacodonesis and diagnosed as having pseudophakic bullous keratopathy.

She was advised to take medications such as Myticom and Hypersol eye drops 2 times a day and Lubrex eye drops 3 times a day for 2 days and after

that ophthalmic surgeon done a Descemet's membrane Endothelial Keratoplasty (DMEK) under peripheral block anesthesia.

On the first postoperative day, slit lamp examination of left eye shown that there was bandage contact lens implantation, deep vascularisation, haptic in anterior chamber and advised for Tab.Wysolon 40mg od for 5days, Tab.Dolo 650 mg SOS, Tab. Cefimint 1bd for 3 days, Myticom eye drops 6 times a day, Moxigram and Lubrex eye drops for 3times a day.

On the third post operative day air bubble done under topical anesthesia as well as advised to come for review after 45 days. 60 days after the DMEK the patient came for review with the complaints of pain, watering, discharge and photophobia, tensed eye ball in left eye and its confirmed that graft rejection.. Visual acuity in left eye found to be 1/60 and planned for Penetrating keratoplasty(PKP) under peripheral block anesthesia. On 6<sup>th</sup> postoperative day of PKP, visual acuity is improved to 2/60 in left eye.

**Definition**

Bullus Keratopathy is characterized by corneal edema with formation of epithelial bullae. It is secondary to loss or dysfunction of the corneal endothelial cells which usually maintain the cornea's dehydrated state. This patient's edema resulted as a sequelae of cataract surgery thus it is called pseudophakic keratopathy.

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**Received on** 14.12.2017, **Accepted on** 18.01.2018

### Etiology

- Fuch's Dystrophy
- Trauma during cataract removal, endothelial cells suffer mortality or damage.
- Progressive stromal edema.
- Multiple glaucoma rprocedures.
- Retinal detachment repair with silicone oil.

### Pathophysiology

The epithelium and endothelium are both semipermeable membranes that create a barrier to the flow of water and other electrolytes into the cornea.

The corneal endothelial cells normally do not undergo mitotic cell division and cell loss results in permanent loss of function when endothelial count drops too low, the metabolic pump in the endothelium starts failing to function and fluid moves anterior into the stroma and epithelium. The excess fluid precipitates swelling of the cornea.

As fluid accumulated between the basal epithelium cells, blister like formations form (bullae) and they undergo painful ruptures releasing their content to the surface. These characteristics malformations disrupt the vision and create pain sensations.

### Clinical Manifestations

**Signs:** Corneal edema (epithelial, stromal, endothelial), subepithelial bullae or erosions, superficial punctate keratitis, Descemet's folds, subepithelial haze or scarring, corneal neovascularization, increased corneal thickness, infectious keratitis, +/- guttata, CME (rare)

**Symptoms:** Asymptomatic, decreased vision, pain, tearing, foreign body sensation, photophobia, red eye, halos around lights.

### Diagnostic Evaluation

- *Slit lamp, specular microscope or confocal microscope:* To examine the cornea to look for subtle changes in the appearance of cells in the endothelium that are characteristic of the disease.
- *Pachymetry:* To detect increased corneal thickness that might indicate corneal swelling from the disease.
- *Visual acuity testing:* Reveal decreased vision due to corneal swelling.

### Treatment

- Hyperosmotic eye drops (5% Sodium Chloride)- To reduce swelling
- Bandage contact Lens to reduce discomfort
- Glaucoma Medications - to reduce the flow of fluid into the cornea. E.g.: Beta-blockers and alpha-agonists (timolol 0.5% QAM or brimonidine 0.2% BID).

### Surgical Management

#### *Desimet's Stripping Automated Endothelial Keratpolasty*

DSAEK is a partial thickness cornea transplant procedure that involves selective removal of the patient's Descemet membrane and endothelium, followed by transplantation of donor corneal endothelium in addition to donor corneal stroma. A tunneled corneoscleral incision is created, the recipient endothelium and Descemet membrane is removed, the graft is folded and inserted with non-coapting forceps (forceps that do not meet at the tips), and an air bubble is placed in the anterior chamber to support graft adherence.

#### *Descimet's membrane Endothelial Keratoplasty*

DMEK is a partial thickness cornea transplant procedure that involves selective removal of the patient's descemet's membrane and epithelium followed by transplantation of donor corneal epithelium and descemet membrane without additional stroma tissue from the donor.

A clear corneal incision is created, the recipient endothelium and descemet membrane are removed, the graft id loaded into an insertor. After injecting the tissue into the anterior chamber, the surgeon orients and unscrolls the graft and a bubble of 20% Sulfur hexafluoride (SFG) is placed in the anterior chamber to support graft adherence.

#### *Penetrating Keratoplasty (PK)*

PK is a full-thickness transplant procedure, in which a trephine of an appropriate diameter is used to make a full-thickness resection of the patient's cornea, followed by placement of a full-thickness donor corneal graft. Interrupted and/or running sutures are placed in radial fashion at equal tension to minimize post-operative astigmatism. Later, the sutures are removed selectively to reduce the amount of astigmatism present.

PKs are performed primarily for visually significant stromal scarring, opacities with an

uncertain status of the endothelium or significant posterior corneal involvement, corneal ectasia such as keratoconus and pellucid marginal degeneration, especially if there is history of hydrops, combined stromal and epithelial disease, infectious or non-infectious corneal ulcerations or perforations and re-graft related to allograft rejections.

#### *Postoperative Complications*

- Wound leak
- Glaucoma
- Endophthalmitis
- Primary Endothelial failure
- Persistent epithelial defect
- Microbial Keratitis
- Late failure

#### *Preoperative Preparation*

- Instructed to stop taking Aspirin, Coumadin or other blood thinners before surgery.
- no eating and drinking after midnight on the night before surgery.
- wearing loose, comfortable clothing on the day of the procedure.
- keeping your face free of makeup, creams, lotions, and jewelry.
- arranging for someone to drive you home after the procedure.

#### *Immediate Postoperative Care*

- A short-acting mydriatic (cyclopentolate 1%) is instilled topically and the eye is patched with a gauze pad and a rigid metallic or plastic eye shield.
- Patients are generally encouraged to have a normal diet and change over to comfortable body posture soon after the surgery.
- As soon as patients recover from the effects of anaesthesia they are permitted regular activities.
- It is important to instruct the patient to avoid direct trauma to the eye.
- In any activity where the patient is not comfortable because of poor vision in the fellow eye or systemic disability, assistance should be taken to prevent any injury to the operated eye.
- In the eyes suspected to have postoperative rise of intraocular pressure (IOP) including when

viscoelastic substances such as sodium hyaluronate have been left in the anterior chamber during surgery, systemic oral acetazolamide 250 mg is administered.

#### *Follow-up visits*

- It is mandatory to evaluate the eye on slit-lamp for wound integrity, epithelial defects, corneal oedema, IOP, iritis, and the possibility of infection on the first postoperative day.
- If any of these complications manifest or persist, evaluation of the operated eye should be continued on a daily basis for a few more days.
- As soon as the condition becomes normal, further evaluation may be at the end of a week followed by every two weeks for one month and then every month for the first year.
- In the absence of any complications, scheduled evaluations at increasing intervals of once or twice a year are adequate.

#### *Follow up care*

- Wash your hands before touching your eye
- Patient may also experience "sandy" sensations due to the presence of sutures in the operated eye. Do not touch or rub the eye. Sutures may be removed by the doctors at the doctors' discretion any time from three (3) months to one (1) year postoperatively.
- Use a fresh facial tissue for your eye each time. Gently blot any tears. Never use the same tissue for your nose and eye.
- Moisten a cotton ball with Saline solution to gently remove any crusting on your lashes.
- Do not irrigate your eye.
- Wear your glasses or eye shield (without the pad) while awake for 1 month after surgery for protection.
- Wear your eye shield (without the pad) for sleep for 1 month after surgery for your protection
- Wear your eye shield (without the pad) when taking a shower or washing your hair for 1 month after surgery for your protection
- Your eye will be sensitive to light and glare, you can wear your sunglasses
- Rest both eyes for 10 seconds every 5 minutes for the first week after surgery
- Limit your time reading, working on the computer and riding in an automobile.

- Stay away from dusty and crowded environments.
- Avoid strenuous exercises for four to six (4 – 6) weeks and swimming and contact sports for six to nine (6 – 9) months.
- No sexual activity for 3 weeks after surgery.
- Avoid constipation, bending and lifting heavy objects.
- Patient should seek medical treatment right away if you have any of the following Symptoms-
  - Redness of the eye
  - Pain and discomfort of the eye
  - Sudden drop in vision
  - Increased tearing
- Instructed to stop taking Aspirin, Coumadin or other blood thinners before surgery, may resume taking these medications the day after surgery.

### Conclusion

Any type of intraocular surgery, especially cataract surgery, may damage endothelial cells and hasten the decline in endothelial cell count. Pseudophakic bullous keratopathy (PBK) is a postoperative condition that can occur as a complication of cataract extraction surgery and intraocular lens placement. Both intraoperative insult to the endothelium and long-term cell damage as a result of the lens implant can lead to PBK. Mild PBK may be managed with hypertonic saline drops and ointments that help to dehydrate the edematous cornea. However, the endothelium may need to be replaced. So, it is essential that we properly respect and protect the endothelial cell layer during intraocular surgery.

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