Material And Methods
MATERIAL AND METHODS

The present study was carried out in the department of Ophthalmology, M.L.B. Medical College and Hospital, Jhansi. The patients had marked visual defect because of advanced lenticular opacity and raised intraocular pressure. The patients suffering from lens induced glaucoma were taken up for the study.

The patients were of both sex and age and ranged from 20 to 80 years. The numbers of eyes undergoing surgery were 36. The minimum follow up period was six weeks to a maximum of 6 months. The consultant surgeons of the department did the surgeries.

The following pattern was adopted for almost all the patients.

History:

A meticulous recording of history was done in each case. History of headache and eye ache, its severity, duration and association with vomiting, diminution of vision, redness and watering of eye. History of antiglaucoma therapy was taken and noted if any. Past history regarding previous attack of visual disturbance, vomiting diabetes and trauma was
recorded. Symptoms relating to diabetes and hypertension were asked and addiction to any drug especially marijuana (ganja) was noted.

**Examination:**

Complete systemic examination was done in all the cases and expert opinion was sought for as and when needed. A record of pulse rate, blood pressure, temperature and examination of cardio-vascular system, respiratory system and central nervous system was done.

The local examination was done under bright illumination and a general opinion was drawn regarding the condition of conjunctiva, cornea, anterior chamber, iris pupil and lens. The slit lamp examination was done routinely particularly to examine transparency of cornea, depth of anterior chamber (>1/4 of the peripheral corneal thickness at the periphery of the anterior chamber was taken to be deep) aqueous flare, keratic precipitates, extent of lenticular opacity and pigmentary dispersion over the lens and to elicit pupillary reaction in doubtful cases.

**Investigation:**

**Routine:**

It included urine examination particularly for albumin and sugar in all cases and when indicated, total leucocyte
count, differential leucocyte count, haemoglobin in gram% and erythrocytic sedimentation rate were done.

Special:

1) **Visual acuity**

   This was recorded in terms of Snellen’s test type, finger counting, hand movement, perception of light and projection of rays depending upon the visual status of the patient. The best-corrected visual acuity was recorded in the post operative and follow up period. In a few cases Nd: YAG laser capsulotomy was done to improve the vision.

2) **Pupillary examination**

   Pupils of both eyes were seen for:
   
   - Pupillary reaction
   
   - Size of the pupil
   
   - Shape of the pupil.

   Pupillary reactions, both direct and consensual were seen with the help of a spotlight. Size and shape were assessed by the help of the same.

**Tonometry**

   It was performed by the help of the Schiot’z tonometer with standard technique. Almost in all cases one particular
tonometer was used preoperatively, postoperatively and in follow-up period. The technique by which intraocular pressure was recorded is as follows:

- Patient was asked to lie down in supine position looking straight at the ceiling of the examination room.

- Xylocaine 4% was instilled in both the eyes until local anesthesia was complete.

- Both eyelids were separated with the finger without pressing on the eyeball and then the tonometer was placed vertically on the cornea so that it rests by its own weight.

- Depending on the tension of the eye there was a deflection of the recording needle on the scale.

- The reading on the scale was then translated from the conversion chart into mm of Hg.

3) **Funduscopy**

Both distant direct and direct ophthalmoscopies were done pre and post operatively by Hiene beta 200 ophthalmoscope. Indirect ophthalmoscopy was also done in cases where media was very hazy. The condition of the optic
disc such as size, shape, colour, cupping, nasal shifting of vessels and cup disc ratio were noted. Besides this, any other abnormality of the fundus was also recorded.

4) **Gonioscopy**

It was done in co-operative patients by Goldman’s three-mirror gonioscope to assess mainly the angle status (open or closed). Besides these the peripheral anterior synechiae and neo-vascularization if any were noted.

The angle was graded as:

<table>
<thead>
<tr>
<th>Angle</th>
<th>Degree</th>
<th>Grade</th>
<th>Clinical interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wide angle</td>
<td>30 - 40</td>
<td>3-4</td>
<td>Closure impossible</td>
</tr>
<tr>
<td>Moderately narrow</td>
<td>20degree</td>
<td>2</td>
<td>Closure possible</td>
</tr>
<tr>
<td>Extremely narrow</td>
<td>10 degree</td>
<td>1</td>
<td>Eventual closure</td>
</tr>
<tr>
<td>Slit angle</td>
<td>&lt;10degree</td>
<td>S</td>
<td>Partially closed</td>
</tr>
<tr>
<td>Closed angle</td>
<td>-</td>
<td></td>
<td>Closed angle</td>
</tr>
</tbody>
</table>
Shaffer’s system:

a) Grade 4 –ciliary body seen  (angle 35-45 degree)
b) Grade 3 –scleral spur seen  (angle 25-35 degree)
c) Grade 2 – trabeculum seen  (angle 20 degree)
d) Grade 1- schwalbe’s line seen  (angle 10 degree)
e) Grade 0- no structure seen   (angle 0 degree)

However there were some difficulties experienced during gonioscopy. They are as follows:

a) Scleral lip of Goldmann lens may indent to produce a narrow angle.

b) Pressure of the lens should not induce folds upon Descemet’s membrane.

5) **Field charting**

It was done in co-operative patients (where the visual acuity permitted) to assess the extent of glaucomatous field changes. It was done by Goldmann perimeter. It is the first of its kind, which provides standardized background and stimulus intensity. It has a facility for telescopic fixation monitoring. It was calibrated daily by the help of a light meter provided in such a way that the maximum stimulus V4e was equal to 1000 apostilbs. The background stimulus should be
31.5 apostilbs. The object size is designated by Roman I-V whereas the luminescence is designated by Arabic 1-4 followed by a-e. I2e is the established standard test stimulus for central visual field and provides a comparison for other patients and eyes. I4e is the test object for far periphery.

**Diagnostic criteria**

Lens induced glaucoma may be classified as:

1. Phacolytic glaucoma.

2. Phacomorphic glaucoma.

3. Phacoanaphylactic glaucoma.

4. Glaucoma due to dislocated lens.

5. Lens particle glaucoma.

The diagnostic criteria were as follows:

1. **Phacolytic glaucoma**

   IOP of more than 21 mm of Hg.

   Pain.

   Hypermature cataract.

   Corneal oedema +/-

   Floating lens particle or pseudohypopeon. +/-

   Anterior chamber depth normal/deep.
2. *Phacomorphic glaucoma.*

IOP of more than 21 mm of Hg.

Pain.

Intumescent cataract

3. *Phacoanaphylactic glaucoma.*

IOP of more than 21 mm of Hg.

Pain.

Corneal oedema

History of E.C.C.E. or penetrating injury.


IOP of more than 21 mm of Hg

Pain.

Corneal oedema

Chunky Corneal oedema  +/-

Anterior chamber depth  <1/4 of the peripheral corneal thickness.

White particles in aqueous with heavy cell flare.
5. **Dislocated lens**

IOP of more than 21 mm of Hg

Pain.

Corneal oedema

Dislocated or subluxated lens.

Once the condition was diagnosed horizontal and vertical meridians of the cornea were measured in terms of their diaopteric strength. They were designated as K1 and K2. This was done by using a Bosch and Lomb optical keratometer. The axial length of the eyeball was measured by A-scan ultrasonography in mm. The two values were put in S R K II formula and exact power of the posterior chamber intraocular lens was calculated.

After obtaining informed consent and explanation of a relatively guarded prognosis, the patients irrespective of diagnosis were subjected to planed extracapsular cataract extraction and posterior chamber intraocular lens implantation.

**Pre-operative preparation.**

The patients were mentally prepared to undergo cataract extraction and were advised to instill ciprofloxacin 0.3% eye
drops in order to make the sac sterile. The eyelashes were cut a day before and lignocaine sensitivity was done. To relieve the apprehension, anxiety and to have a good sleep night before the operation, alprazolam .25 mg tablet H.S. and another in the morning were given. The intraocular pressure was controlled by acetazolamide 250 mg two tablets H.S. and another two tablets C.M. Proper dilatation of pupil was ensured by instilling phenylephrine + tropicamide ophthalmic solution along with flurbiprofin eye drops.

**Anaesthesia.**

Topical – by instillation of 4% lignocaine eye drops 2-3 times at an interval of 2 minutes.

Regional- by parabulbar injection of 2% lignocaine along with adrenaline after mixing sodium hyluronidase. Intraocular pressure was lowered further by digital massage or by putting a weight as and when needed.

**Steps of operation**

The operation was done under 7x magnification obtained by a co-axial Lieca microscope. After superior rectus suturing, lids were retracted by putting a wire speculum A fornix-based flap was formed and the superficial vessels cauterized by a bipolar electrical cautery or by a thermal cautery. Then with a help of a blade incision was marked on
the limbus and anterior chamber was perforated at 12 o’clock. Methylcellulose was now injected in the anterior chamber mainly to prevent the corneal endothelium from being damaged. Anterior capsulotomy was now done by can opener method using a cystitome made out of a 26-gauge needle. Proper hydrodesection and hydrodelenation was done and nucleus was delivered by pressure and counter pressure technique. Anterior chamber was now washed by Ringer lactate irrigating solution and all the excess lenticular matter and capsule tags were now removed till the proper fundus glow was visualized. It was now doubly assured that the posterior capsule is intact. Anterior chamber was now reformed by using methylcellulose intracameral injection. Posterior chamber intraocular lens was implanted ‘in the bag’ by either flexion or dialing method. Small peripheral iridectomy was done in selected cases. Anterior chamber was again washed by ringer lactate solution to remove the excess methylcellulose and sterilized air was injected to reform the collapsed chamber. Proper corneo-scleral stitches were applied by using 10-0 monofilament and the knots were buried under the conjunctival flap. Sub-conjunctival injection of dexamethasone and gentamycin was given and the eye was bandaged after putting combined eye ointment.
Post-operative management:

The patients were kept 'nil orally' for at least two hours post-operatively. 80 mg of gentamycin was given intramuscularly to each patient twice daily for three days along with a single stat dose of 3 ml of diclofenac sodium. A suitable systemic antibiotic usually ciprofloxacin 500 mg twice a day for five days was administered to each case. Furthermore to alleviate the rise in intraocular pressure timolol 0.5% was administered twice a day for fifteen days along with combined eye drops which was given six times a day to nullify the damage caused to iris if any. On the first post-operative day the operated eye was examined thoroughly and green eye shield or dark glasses were provided. Particular attention was paid to the condition of section wound, strnate keratopathy, depth of anterior chamber, hyphema and any sign of iritis were managed accordingly. In uncomplicated cases the patient was discharged with the follow up treatment and advice on the second post-operative day.

Follow-up:

The patients were advised follow-up examination at the seventh day after discharge. They were examined meticulously for any infection, haziness of cornea, depth of
anterior chamber and condition of the iris. Funduscopy was done to evaluate the condition of the disc. Special attention was paid to the vision and intraocular pressure. The second follow-up examination was done after an interval of one month. This was the time when stitches, if needed, were removed. Pseudophakic correction was done after a week and final examination was done after another one month. All significant findings were recorded for the final assessment.