Shallow A.C. 1 year after trabeculectomy

By
Heba Magdy MD FRCS(Glasg)
Assistant Professor of Ophthalmology, Cairo University

One year ago, a 27 yrs old female presented to our glaucoma subspecialty clinic by

Left ocular discomfort and diminution of vision
Examination of the patient showed

<table>
<thead>
<tr>
<th></th>
<th>OD</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCVA</td>
<td>6/36</td>
<td>6/60</td>
</tr>
<tr>
<td>Refraction</td>
<td>+10.00/-0.5@30</td>
<td>+11.5/+0.25@65</td>
</tr>
<tr>
<td>Pupil</td>
<td>RRR</td>
<td>RRR</td>
</tr>
<tr>
<td>IOP</td>
<td>24 mmHg</td>
<td>28 mmHg</td>
</tr>
<tr>
<td>Pachymetry</td>
<td>540 microns</td>
<td>545 microns</td>
</tr>
</tbody>
</table>

Bilateral shallow anterior chambers
Examination of the patient showed

<table>
<thead>
<tr>
<th>OD</th>
<th>Fundus</th>
<th>OS</th>
</tr>
</thead>
<tbody>
<tr>
<td>C/D ratio 0.4 (Vertically elongated cup)</td>
<td>Fundus</td>
<td>C/D ratio 0.6 with inferior notch</td>
</tr>
<tr>
<td>Grade II in all quadrants</td>
<td>Gonioscopy</td>
<td>Closed angle with PAS</td>
</tr>
<tr>
<td>Nasal step</td>
<td>VF</td>
<td>Superior arcuate scotoma Nasal step</td>
</tr>
<tr>
<td>Border line reduction of the average RNFL thickness</td>
<td>OCT ONH</td>
<td>Significant reduction of the average RNFL thickness</td>
</tr>
</tbody>
</table>

Ultrasound was done to the patient to detect the Axial length

- The AXL in the right eye was 18.5 mm
- The AXL in the left eye was 17 mm
What to do to that patient????

Antiglaucoma medications (PGs analogues+Alpha agonist were prescribed)

Also bilateral laser iridotomies were done
One week later

• The IOP in the right eye was controlled (14 mmHg)

**BUT**

• In the left eye the IOP was still high (26 mmHg)

Left SST with MMC

Was done
Day one post operative

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>IOP</td>
<td>8 mmHg</td>
</tr>
<tr>
<td>BCVA</td>
<td>6/60</td>
</tr>
<tr>
<td>AC</td>
<td>Well Formed A.C.</td>
</tr>
<tr>
<td>Fundus</td>
<td>C/D ratio 0.6 (No edema or hge)</td>
</tr>
<tr>
<td>Bleb</td>
<td>Diffuse posterior bleb</td>
</tr>
</tbody>
</table>

The patient was followed up

The IOP was controlled in both eyes over a year
After one year

The patient came presented with:
Lost AC mainly centrally
Vascularized pupillary membrane

IOP
16 mmHg
The bleb

Localized posterior bleb (Negative Siedle test)

- Shallow AC
- No bleb leak
- IOP 16 mmHg

- Malignant glaucoma
- Pupillary block
- Choroidal detachment
- Suprachoroidal hge
<table>
<thead>
<tr>
<th></th>
<th>Malignant Glaucoma</th>
<th>Choroidal Separation</th>
<th>Pupillary Block</th>
<th>Suprachoroidal Hemorrhage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior chamber</td>
<td>Flat or shallow</td>
<td>Flat or shallow</td>
<td>Flat or shallow</td>
<td>Flat or shallow</td>
</tr>
<tr>
<td>Intraocular pressure</td>
<td>Normal or elevated</td>
<td>Subnormal</td>
<td>Normal</td>
<td>Normal or elevated</td>
</tr>
<tr>
<td>Fundus appearance</td>
<td>Normal; no choroidal Elevation</td>
<td>Large, smooth, light brown choroidal elevations</td>
<td>Normal; no choroidal elevation</td>
<td>Dark brown or dark red choroidal elevations</td>
</tr>
<tr>
<td>Patent iridectomy present</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**UBM**

- Shallow AC
- PAS
- Forward rotation of the ciliary processes
Malignant glaucoma

Is there a late malignant glaucoma?
The term was given by von Graefe in 1869 to describe an aggressive form of postoperative glaucoma that was resistant to treatment.

Reported to occur in 0.4–6% cases of incisional surgery for angle-closure glaucoma.

Onset: Variable, ranging from the immediate postoperative period to many years after surgery.
Pathogenesis

- Abnormal anatomical relationship between Ciliary processes, lens, and Anterior hyaloid

Risk factors

- Axial hyperopia
- Old age
- High IOP
- Post operative hypotony
- Hypertension
Pathogenesis

Several theories are postulated but there is an agreement about:

- Anterior rotation of the ciliary body
- Increased contact of the ciliary process with the lens equator
- Posterior flow of the aqueous humor
- Increase in the vitreous pressure
- Forward movement of iris lens diaphragm
- Shallow AC

Anterior rotation of the ciliary body
Pathogenesis

Why there is anterior rotation of the ciliary body?

• Over-filtration postoperatively leads to shallowing of the anterior chamber and anterior rotation of the ciliary body as a result of posterior pressure

• Spasm of the ciliary muscle, leading to laxity of zonules and increased contact between ciliary processes and equator

• Inflammation and congestion of the ciliary body leading to supraciliary effusion and forward rotation of the ciliary body

Pathogenesis

• A) Shaffer and Hoskins suggested that posterior diversion of aqueous flow causes accumulation of aqueous behind a posterior vitreous detachment with secondary forward movement of the iris-lens diaphragm
Pathogenesis

B) Chandler

Proposed that laxity of lens zonules coupled with pressure from the vitreous leads to forward lens movement.

The higher the pressure in the posterior segment, the more firmly the lens is held forward.

Pathogenesis

C) Choroidal expansion:

Is the precipitating event which increases vitreous pressure.

With a 20% increase in choroidal thickness, there is 100 µL in volume displacement—equal to the volume of the anterior chamber in eye with angle closure. If there is no anterior wound, the pressure–volume relationship of the human eye suggests that IOP would rise to 60 mm Hg with a similar expansion.
D) Decreased vitreous permeability

- The fluid that must traverse the vitreous body from posterior to anterior can only exit the vitreous gel from an anterior surface that is limited by the vitreous base peripherally and the vitreous–lens contact zone centrally.
- If this doughnut shaped diffusional surface area is smaller (As in shallow AC), the less the permeability of the vitreous and the more the fluid accumulation.

What ever the mechanism, there is aqueous misdirection resulting into trapped fluid posterior to the vitreous and may be inside the vitreous gel as well.
Closed angle
Forward rotation of the ciliary processes

Forward movement of iris lens diaphragm

Aqueous misdirection
Increased vitreous volume

Intravitreal fluid accumulation
Increased vitreous pressure

Decrease anterior vitreous area
Decreased anterior hyaloid permeability

How to manage a case of malignant glaucoma?
Medical therapy
(Reported to be curative in 50% of the cases)

**Cycloplegics:**
- Mydriatics (atropine and phenylephrine) should be given immediately in order to tighten the lens zonules and pull the anteriorly displaced lens backwards

**Reduction of IOP:**
- Oral acetazolamide
- Topical beta-blockers and alpha agonists are used to reduce aqueous production.

---

Medical therapy

**Decrease vitreous volume**
- Osmotic agents (mannitol or glycerol) are used to reduce vitreous volume, deepen the anterior chamber, and possibly increase vitreous permeability

**Anti-inflammatory**
- Topical steroids can help to reduce inflammation
Laser therapy
Aims to restore a normal aqueous flow pattern by establishing a direct communication between the vitreous cavity and anterior chamber.

**Disruption of Anterior Hyaloid Face**
An intact hyaloid face is an important pathogenic factor in malignant glaucoma and in pseudophakic or aphakic patients,

Nd:YAG laser capsulotomy with disruption of the anterior hyaloid face is often effective

---

Surgical treatment

- Core vitrectomy
- Phacoemulsification and IOL implantation

And this is what was done to our patient
Core vitrectomy  Entry of AC  Reformation of the AC

Anterior and posterior synechiolysis
Phacoemulsification and implantation of PC IOL

Postoperatively the patient was on:

- Topical steroids and antibiotics
- Topical atropine
- Topical combined timolol and brimonidine (Combigan)
- The medications were withdrawn gradually over 5 weeks.
Now after 2 months

Deep anterior chamber
IOP: 12 mmHg (No medications)
BCVA 6/60

What about the other eye??

The IOP is 14 on a single medication
Refraction is: +10.00/-0.5@30
What to be done?

SST

Phaco

Phacotrab

Prophylactic measures:

- Preoperative atropine eye drops
- Phacoemulsification and IOL implantation
- Core vitrectomy
- Posterior capsulotomy by vitrectomy probe
- Postoperative atropine eye drops.

Phacoemulsification
Take home message

- Consider lens extraction in the hyperopic eyes
- Consider core vitrectomy in the hyperopic eyes
- Malignant glaucoma can affect the eye years after the surgery
- Malignant glaucoma can be presented with a normal IOP
- Malignant glaucoma occurs only with an intact anterior hyaloid

Take home message

Always keep an eye on the glaucoma patient and never give your back to glaucoma