Phacolytic Glaucoma

Phacolytic Glaucoma due to Morgagnian Cataract

Authors: Spenser J. Morton, MD (../bio/authors/Morton-Spenser.htm), Thomas Meirick, BA, William E. Flanary II, MD (../bio/authors/Flanary-William.htm), Thomas A. Oetting, MD (../bio/authors/Oetting-Thomas.htm)

Posted April 25, 2018

INITIAL PRESENTATION

Chief Complaint

65-year-old male presented with a painful and red right eye.

History of Present Illness

A 65-year-old male presented with acute onset of pain and redness in his right eye (OD), which had long-standing light perception vision after an explosive injury resulted in a penetrating shrapnel wound and large macular scar. His intraocular pressure (IOP) had previously been elevated over 50 mmHg without any pain or ocular injection. After being placed on topical glaucoma medication, his IOP had been very well controlled in the 15-20 mmHg range. He never experienced any discomfort in this eye prior to this presentation. He denied any recent trauma.

Past Ocular History

- Light perception (LP) vision OD due to penetrating explosive injury in 1970
- Ocular hypertension OD
- Phacoemulsification in left eye (OS) 2 years prior
- Fuch's dystrophy, status post descemet's membrane endothelial keratoplasty (DMEK) OS
- Ocular Medications
    - Brimonidine tartrate 0.2% twice daily OU
    - Dorzolamide/timolol (22.3/6.8 mg/mL) twice daily OU

    - Prednisolone acetate 1% every four hours OS

Past Medical History

- Aortic aneurysm
- Pulmonary hypertension
- Obstructive sleep apnea
- Hyperlipidemia
- Obesity
- Migraines
- Benign prostatic hyperplasia

Medications

- Metoprolol 37.5 mg twice daily
- Furosemide 20 mg three times daily
- Terazosin 10 mg twice daily
- Atorvastatin 10 mg daily
- Aspirin 81 mg daily

Allergies

No known allergies

Family History

Non-contributory

Social History

Works as a truck driver (still has peripheral vision OD and would like to preserve this sight)

Review of Systems

Negative except for what is detailed in the history of present illness.

OCULAR EXAMINATION

Visual Acuity without correction (Snellen)

- OD: LP
- OS: 20/25-2

Ocular Motility

Full

Intraocular Pressure (Applanation)

- OD: 53 mmHg

- OS: 12 mmHg

Pupils

Relative afferent pupillary defect present OD

Slit lamp exam OD

- Lids/lashes:Normal
- Conjunctiva/sclera: Diffuse 3+ injection
- Cornea: 3+ guttata with microcystic corneal edema throughout, no frank bullae present
- Anterior chamber: Obstructed view due to corneal edema, deep and formed, no obvious cell or flare
- Iris: Normal without rubeosis, normal constriction, reacts to light
- Lens: Dense brunescent morgagnian cataract, no phacodonesis

Slit lamp exam OS

- Lids/lashes:Normal
- Conjunctiva/sclera: Normal
- Cornea: DMEK graft present, clear and compact
- Anterior chamber: Deep and quiet
- Iris: Normal without rubeosis
- Lens: Intraocular lens present, clear

Dilated fundus examination (DFE)

OD: No view
OS: Normal

Differential Diagnosis

- Morgagnian cataract (146-Morgagnian-Cataract.htm)
- Other lens-induced glaucomas
    - Lens particle glaucoma
    - Phacoanaphylactic glaucoma
    - Phacomorphic glaucoma
    - Ectopia lentis

B-Scan

OD: Very thick cataractous lens (~7 mm). Mild to moderately dense vitreous opacities. Total, mobile posterior vitreous detachment (PVD). Large excavation of the optic disc. No mass lesion or retinal detachment detected.

CLINICAL COURSE

Upon first presentation, the view through the edematous cornea was too poor to appreciate any anterior chamber cell or flare. Likewise, examination of the angle was attempted, but a satisfactory view was not possible. In light of the sudden elevation in IOP, the patient was placed on maximum pressure lowering topical

therapy, given a bandage contact lens to provide comfort from epithelial bullae, and scheduled to return to clinic in 10 days to see a glaucoma specialist. In the meantime, a b-scan ultrasound was obtained, which showed no mass in the right eye, but did reveal a mature, 7 mm thick lens.

Upon return to clinic, the patient's IOP had decreased from 53 mmHg to 45 mmHg. His corneal epithelium was much improved, but his symptoms of pain remained. In addition, large clumps of cellular material and 2+ cell were now visible in the anterior chamber. At this point, phacolytic glaucoma due to a morgagnian cataract was diagnosed.

The three primary treatment options included phacoemulsification with possible worsening of endothelial decompensation, extracapsular cataract extraction to minimize damage to the endothelium, or combined phacoemulsification and descemet membrane endothelial keratoplasty (DMEK). It was felt that a combined procedure would have a high likelihood of graft failure due to the level of inflammation and elevated IOP. The patient understood that the visual potential OD was very poor due to his previous trauma and resultant macular scar. After a discussion of the risks and benefits of the various treatment options, the patient stated that he was interested in pursuing extracapsular cataract extraction alone. A detailed narrated surgical video is included below.

On post-operative day 5, the patient was able to count fingers at 1 foot OD. By post-operative day 11, his vision was count fingers at 4 feet, though there was hemorrhage noted along the inferior arcade and overlying disc without neovascularization. Inflammatory debris was present in the anterior chamber. His IOP was 7 mmHg, and he complained of only mild discomfort.

DIAGNOSIS

Phacolytic glaucoma due to a Morgagnian cataract

DISCUSSION

Epidemiology

Phacolytic glaucoma is rare in developed countries with adequate access to ophthalmologic care and more common in under-developed countries. One study from Nepal diagnosed phacolytic glaucoma in 0.4% of presenting cataracts [1].

Pathophysiology

Phacolytic glaucoma is characterized by a rise in IOP in the setting of a hyper mature cortical cataract with an open iridocorneal angle. Over time, the cortical fibers degenerate into liquid protein aggregates. These proteins leak through a grossly intact lens capsule into the anterior chamber, where they induce macrophage activity. The combination of protein-laden macrophages and high molecular weight proteins in the anterior chamber lead to an obstructed trabecular meshwork and open-angle glaucoma.

Gifford first noted the potential danger of glaucoma in a hyper mature cataract in 1900 [2]. The term "phacolytic glaucoma" was proposed by Flocks *et al.* in 1955 [3]. Flocks noted that the new term more accurately described the understanding of the pathology at the time – that proteins which had escaped through an intact capsule led to a state of inflammation in the anterior chamber, leading to obstruction of the trabecular meshwork by macrophages. This hypothesis is still accepted by some today. However, later studies by Epstein demonstrated

that high molecular weight proteins are able to obstruct the trabecular meshwork in the absence of macrophages [4], and that these proteins are found in sufficiently high concentration in patients with phacolytic glaucoma [5].

Traditionally, a key defining feature of phacolytic glaucoma has been the presence of an intact lens capsule. However, a 2014 study which used electron microscopy to evaluate the capsule of a patient found multiple full thickness dehiscences and holes despite an intact appearance both macroscopically and histologically [6]. These findings may potentially blur the diagnostic line between lens particle glaucoma and phacolytic glaucoma.

Signs/Symptoms

Phacolytic glaucoma typically presents in an elderly patient who complains of an acute onset of pain, redness, and worsening vision. The patient will likely have a significant contributing factor in their history that led to a delay in cataract extraction (low vision potential, difficulty in obtaining healthcare, etc.). On exam, flare will be noted in the anterior chamber along with macrophages which appear as abnormally large or clumped cells. Gonioscopy will show an open angle, and corneal edema will likely be present.

Treatment/Management/Guidelines

Although control of IOP with topical medications is included in the treatment of phacolytic glaucoma, the definitive treatment is removal of the cataract. Please see the following video, which shows the cataract surgery performed in this case.

Other surgical options and considerations for treating morgagnian cataracts in the absence of corneal endothelial pathology include techniques to improve visualization and create a successful curvilinear capsulorhexis. These techniques are outlined in the following EyeRounds Case Report: Morgagnian Cataract (146-Morgagnian-Cataract.htm)

EPIDEMIOLOGY OR ETIOLOGY	SIGNS
• Rare in developed countries • Observed in patients with reason for delayed cataract extraction	• Macrophages in the anterior chamber (large or clumped appearing cells) • Anterior chamber flare • Open angle on gonioscopy • Hyper mature cataract • Corneal edema • Elevated IOP
SYMPTOMS	**TREATMENT/MANAGEMENT**
• Acute pain • Acute conjunctival hyperemia • Acute decline in vision	• Cataract extraction • Pressure controlling measures until surgery can be completed

References

1. Pradhan D, Hennig A, Kumar J, Foster A. A prospective study of 413 cases of lens-induced glaucoma in Nepal. Indian J Ophthalmol. 2001;49(2):103-7.
2. Gifford, H.: Danger of the Spontaneous Cure of Senile Cataract, Am. J. Ophth. 17:289-293, 1900.
3. Flocks M, Littwin CS, Zimmerman LE. Phacolytic glaucoma; a clinicopathologic study of one hundred thirty-eight cases of glaucoma associated with hypermature cataract. AMA Arch Ophthalmol. 1955;54(1):37-45.
4. Epstein DL, Jedziniak JA, Grant WM. Obstruction of aqueous outflow by lens particles and by heavy-molecular-weight soluble lens proteins. Invest Ophthalmol Vis Sci. 1978;17(3):272-7.
5. Epstein DL, Jedziniak JA, Grant WM. Identification of heavy-molecular-weight soluble protein in aqueous humor in human phacolytic glaucoma. Invest Ophthalmol Vis Sci. 1978;17(5):398-402.
6. Yoo WS, Kim BJ, Chung IY, Seo SW, Yoo JM, Kim SJ. A case of phacolytic glaucoma with anterior lens capsule disruption identified by scanning electron microscopy. BMC Ophthalmol. 2014;14:133.
7. Maltry AC, Kitzmann AS. Morgagnian Cataract. EyeRounds.org. January 13, 2012; Available from: http://EyeRounds.org/cases/146-morgagnian-cataract.htm

Suggested Citation Format

Morton SJ, Meirick T, Flanary WE, Oetting TA. Phacolytic Glaucoma due to Morgagnian Cataract. EyeRounds.org. posted April 25, 2018; Available from https://EyeRounds.org/cases/258-phacolytic-glaucoma.htm

last updated: 04/25/2018

University of Iowa Carver College of Medicine
Department of Ophthalmology & Visual Sciences
200 Hawkins Dr.
Iowa City, IA 52242