PRIMARY ANGLE CLOSURE GLAUCOMA

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QUESTION 1: WHICH OF THE FOLLOWING IS A MAJOR RISK FACTOR FOR DEVELOPING PUPILLARY BLOCK ANGLE CLOSURE GLAUCOMA?

A. Male gender

B. Hyperopia

C. Caucasian race

D. High body mass index
QUESTION 2: WHICH OF THE FOLLOWING IS THE MOST DEFINITIVE TREATMENT FOR PUPILLARY BLOCK ANGLE CLOSURE?

A. Phacoemulsification

B. Iridoplasty

C. Chronic pilocarpine

D. Baerveldt seton
QUESTION 3:
IN NANOPHTHALMOS WHAT STRUCTURAL ABNORMALITY PLACES THE PATIENT AT RISK FOR POST-OPERATIVE COMPLICATION??

A. Small pupil

B. Liquid vitreous

C. Thin and floppy iris

D. Thick sclera
LECTURE OBJECTIVES

To recognize primary pupillary block angle closure as a common form of glaucoma

To recognize primary pupillary block angle closure as a leading cause of blindness – especially in Asia

To recognize the major risk factors: hyperopia, female gender, older age, family history

Pupillary block treated with iridotomy

Phacoemulsification may be a more definitive therapy

Warn family members of their increased risk
INTRODUCTION

A form of glaucoma caused by the iris coming forward to lie over the trabecular meshwork
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INTRODUCTION

A form of glaucoma caused by the iris coming forward to lie over the trabecular meshwork.

This can cause an abrupt elevation of the intraocular pressure (acute angle closure).

Can also cause intermittent or chronic pressure elevation.
A relative seal forms between the iris and the lens, trapping aqueous behind the iris, driving it forward.
Race
EPIDEMIOLOGY

Race

• much more prevalent in Asians
  – in China it causes 91% of bilateral blindness
  – Asian angle closure responds less well to LPI
EPIDEMIOLOGY

Hyperopia

- small eye
- shallow AC (<2.5mm)
EPIDEMIOLOGY

Hyperopia

• small eye
• shallow AC (<2.5mm)

Older age

• the lens thickens and pupil becomes smaller with age
EPIDEMIOLOGY

Hyperopia

- small eye
- shallow AC (<2.5mm)

Older age

- the lens thickens and pupil becomes smaller with age

Women (2-4x risk)
Hyperopia
• small eye
• shallow AC (<2.5mm)

Older age
• the lens thickens and pupil becomes smaller with age

Women (2-4x risk)

Family history
FAMILY RISK

The first-degree relatives of patients with angle closure are at high risk for developing the disease (on the order of 35%) and should be screened.
PREcipitating Factors for ACG

Dim illumination

Emotional stress

Mydriasis

• this is where all the warning labels comes from
  – anticholinergics, antihistamine, antidepressant, adrenergics, CNS stimulants, bronchodilators

• not during full mydriasis

Intense miosis

• cholinergics
THREE FORMS OF PRIMARY PUPILLARY BLOCK ANGLE CLOSURE

Acute

Intermittent (sub acute)

Chronic
THREE FORMS OF PRIMARY PUPILLARY BLOCK ANGLE CLOSURE

Acute

Intermittent (sub acute)

Chronic
SYMPTOMS - ACUTE

Eye pain (often severe)
Headache
Blurred vision
Colored haloes around lights
Nausea & vomiting
CASE

49 yo man presents with acute loss of vision and pain OD

4 day h/o of intermittent R-sided headache and pain OD with blurry vision

Gradually got worse
CASE

On day of presentation, pain is constant and headache severe, feeling of nausea

No history of trauma
• What two questions should you ask yourself when you see a patient like this?
What is the refractive error?
CASE

- What does the other angle look like?
CASE

<table>
<thead>
<tr>
<th></th>
<th>OD</th>
<th>OS</th>
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<tbody>
<tr>
<td>Va</td>
<td>CF</td>
<td>20/20</td>
</tr>
<tr>
<td>IOP</td>
<td>50 mmHg</td>
<td>10 mmHg</td>
</tr>
<tr>
<td>Refraction (SE)</td>
<td>+4.25 D</td>
<td>+4.75 D</td>
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SIGNS - ACUTE

Injection
Cloudy cornea
Mid-dilated pupil, fixed
Very high IOP
Iris bombé
IRIS BOMBÉ
IRIS BOMBÉ ON GONIOSCOPY
If the attack breaks spontaneously the patient may have flare, cell and transient hypotony.
SEQUELA - ACUTE

Sector iris atrophy
Glaukomflecken
Peripheral anterior synechiae
Pigment deposit on iris and cornea
Disc hyperemia
Disc pallor and cupping
SECTOR IRIS ATROPHY / SPIRALING
IRIS ATROPHY
GLAUKOMFLECKEN
GLAUKOMFLECKEN
THREE FORMS OF PRIMARY PUPILLARY BLOCK ANGLE CLOSURE

Acute

Intermittent (sub acute)

Chronic
SYMPTOMS – INTERMITTENT (SUB ACUTE)

Intermittent eye pain and/or headache

May be associated blurred vision

Sometimes colored haloes around lights
CASE

- 48 yo female radiologist
- Intractable headaches for years
CASE

- 48 yo female radiologist
- Intractable headaches for years
- Several neurological work-ups
  - MRI x 2
  - CT
  - Lumbar Puncture
CASE

Had gonioscopy in the Neuro-Ophthalmology clinic

Found to have critically narrow angles

Iridotomy was curative (with nine year follow-up)
Often only occludable angles on gonioscopy
THREE FORMS OF PRIMARY PUPILLARY BLOCK ANGLE CLOSURE

Acute

Intermittent (sub acute)

Chronic
SYMPTOMS - CHRONIC

Like primary open angle glaucoma there are no symptoms until late

Gradual decrease in peripheral and night vision

Late loss of central vision
Elevated intraocular pressure
± Optic nerve cupping
± Visual field loss
Narrow angles on gonioscopy
• often with extensive peripheral anterior synechiae
DIFFERENTIAL DIAGNOSIS
Plateau iris
Phacomorphic
Nanophthalmos
Aqueous misdirection
Ciliary body swelling or inflammation following PRP, SB, drugs (topiramate, cold meds)
Tumors
DIFFERENTIAL DIAGNOSIS

Plateau iris (often has pupillary block)
Phacomorphic (has pupillary block)
Nanophthalmos (has pupillary block)
Aqueous misdirection
Ciliary body swelling or inflammation following PRP, SB, drugs (topiramate, cold meds)
Tumors
Laser iridotomy or (rarely) surgical iridectomy

- to break the pupillary block
LASER PERIPHERAL IRIDOTOMY
LASER PERIPHERAL IRIDOTOMY
Laser iridotomy or (rarely) surgical iridectomy

- to break the pupillary block
- after the iridotomy the angles should be deeper, but are rarely deep
TREATMENT OF AACG

Medications

• all of the drops
• hold cholinergics while IOP until IOP <35 or so
• systemic CAI, hyperosmotics
TREATMENT OF AACG

Medications

- all of the drops
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Mechanical

- corneal indentation
TREATMENT: CORNEAL INDENTATION
TREATMENT OF AACG

Medications
• all of the drops
• hold cholinergics while IOP until IOP <35 or so
• systemic CAI, hyperosmotics

Mechanical
• corneal indentation

Surgical
• iridotomy / surgical iridectomy
• iridoplasty if the view is inadequate
Surgical iridectomy

- rarely done
- uncooperative for Laser PI
- if following attack, consider trabeculectomy at the same time
SURGICAL TREATMENT

Goniosynechiolysis

• To break PAS
• Usually with cataract surgery
• Only works for “fresh” PAS (<12 months)
SURGICAL TREATMENT

Trabeculectomy

• these patients are at increased risk for aqueous misdirection

• use long-term atropine post-operatively
MANAGEMENT OF AACG

Don’t forget the other eye

- Untreated fellow eye has 40-80% chance of having AAC in 5-10 yrs.

- Some risk to the fellow eye during the acute attack because of the sympathetic stimulation
PROPHYLACTIC IRIDOTOMY INDICATIONS

- Elevated IOP with appositional closure
- ≥ 180 degrees of apposition
- Narrow angle with PAS
- Increased segmental pigmentation from recurrent contact
- History of AACG in fellow eye
- Iridotomy in the fellow eye
PROPHYLACTIC IRIDOTOMY

Do serial gonioscopy to monitor angle even after the LPI
PROPHYLACTIC IRIDOTOMY INDICATIONS

If you worry enough that the patient will have an attack of pupillary block angle closure that you warn them about symptoms and tell them to avoid cold medications and dark restaurants – you should do an LPI.
“MIXED MECHANISM” GLAUCOMA

A patient with narrow angles who continues to have high IOP despite angles deepening after iridotomy
“MIXED MECHANISM” GLAUCOMA

A patient with narrow angles who continues to have high IOP despite angles deepening after iridotomy

A patient who starts as POAG, but whose angles narrow (lens growth, exfoliation, cholinergics)
There is evidence that clear lens extraction may be superior to iridotomy – especially in Asian populations.

Randomized comparison of iridotomy vs. clear lens extraction in patients with primary angle closure and primary angle closure glaucoma

30 centers in five countries

419 patients (>50 y.o., no symptomatic cataracts)

~30% of Chinese origin

Those assigned to phacoemulsification had:

- better quality of life indices (despite no symptomatic lens opacities)
- lower IOP (by 1 mmHg)
- far fewer medications (21% vs 61%)

Azuara-Blanco A et.al. Lancet 2016: 388; 1389-1307
THE EAGLE STUDY

“Clear-lens extraction showed greater efficacy and was more cost-effective than laser peripheral iridotomy, and should be considered as an option for first-line treatment.”

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NANOPHTHALMOS

Small eye that is structurally mostly normal – unlike microophthalmos
NANOPHTHALMOS

Short eye <~20 mm, high hyperopia
NANOPHTHALMOS

Short eye $\leq 20$ mm, high hyperopia

Angle closure at early age
NANOPHTHALMOS

Short eye \(<\sim 20 \text{ mm}, \text{ high hyperopia}

Angle closure at early age

Thick and impermeable sclera
NANOPHTHALMOS

21.04 mm AEL
2.4 mm thick sclera
51.5 D calculated IOL

Courtesy of A. Tim Johnson, MD, PhD - the University of Iowa.
NANOPHTHALMOS

Short eye <~20 mm, high hyperopia
Angle closure at early age
Thick and impermeable sclera
Dominant
Try to avoid intraocular surgery

Early LPI and perhaps iridoplasty

Do scleral windows with intraocular surgery
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THANK YOU

iBook store

http://curriculum.iowaglaucoma.org/