Case 2 - Acute Angle Closure

A 64-year old Chinese woman presented to her optometrist with a 12-hour history of sudden-onset blurred vision in the left eye. In the practice waiting area she complained of eye pain and nausea. She has a background of hypertension, atrial fibrillation and ischaemic heart disease. She reports that her mother lost vision suddenly in one eye when she was in her 60s, in China. She was unsure of the cause, although there was no history of trauma. There was otherwise no family ocular history of note.

<table>
<thead>
<tr>
<th></th>
<th>Right eye</th>
<th>Left eye</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCVA</td>
<td>6/7.5</td>
<td>6/60</td>
</tr>
<tr>
<td>Pupils</td>
<td>Reactive</td>
<td>Mid dilated and fixed</td>
</tr>
<tr>
<td>Eye movements</td>
<td>Full</td>
<td>Full</td>
</tr>
<tr>
<td>Refraction</td>
<td>+3.75/-1.00 x 085</td>
<td>+5.00/-0.75 x 070</td>
</tr>
<tr>
<td>Goldmann IOP</td>
<td>14 mmHg</td>
<td>53 mmHg</td>
</tr>
<tr>
<td>Slit lamp exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitreous/retina</td>
<td>Clear view, vitreous clear. Macula and peripheral retina clear and flat</td>
<td>Poor view. Retina appeared clear and flat, no apparent vitritis or vasculitis</td>
</tr>
</tbody>
</table>

Question 1: Given the above findings, what is the most likely diagnosis? And what are your differential diagnoses?

Answer 1:

Our patient displays multiple risk factors for acute angle closure, including:

- Hyperopia (refraction of approximately +5 DS in the affected eye and low-moderate hyperopic refractive error in the fellow eye).
- Shallow anterior chamber in both eyes
- Older age. Average age of presentation is usually between 50-60 years old and prevalence increases with age. With older age, there is increased crystalline lens thickness, decreased anterior chamber depth and a more anteriorly displaced lens.
- Female gender. Women are 2-4 times more likely than males to have an acute angle closure attack.
- Race. Acute angle closure is more common in Southeast Asian, Chinese and Inuit populations. It is less frequently encountered in Black and Caucasian populations. Acute primary angle closure is almost three times more common in Asian populations compared with European populations (Chan et al., 2019).
- Family history. We cannot be certain with our patient, but it is possible that our patient’s mother may have lost vision from acute angle closure glaucoma. If this was the case, it would be another risk factor for our patient as there is a tendency for this disease to be
inherited.

Other anatomical features such as shorter axial length, smaller corneal diameter and greater crystalline lens thickness are seen more commonly in the eyes with acute angle closure. Biometry was not performed at this patient’s initial examination. It would be less reliable through a hazy cornea, although the fellow eye could be assessed if needed.

The next step would be to perform gonioscopy to assess the anterior chamber angle. In our patient, this showed a closed angle in the left eye, and a narrow angle (pigmented trabecular meshwork visible in two quadrants) in the right eye. The view of the angle in the affected eye was impaired due to corneal haze.

Differential diagnoses (other causes of unilateral painful loss of vision) include:

- Giant cell arteritis. Symptoms include scalp tenderness, jaw claudication, muscle aches and pains, weight loss and night sweats. Our patient did not have these symptoms.
- Optic neuritis, although this usually presents in women 40 years old or younger. They generally report pain on eye movements and colour vision changes.
- Uveitis. The most common age of presentation is around 40 years. Symptoms include redness, eye pain, blurred vision and photophobia. Uveitis can mimic primary acute angle closure, particularly because elevated IOP can also be encountered in uveitis, as a result of the disease itself or secondary angle closure. In our patient, there were no synechiae, and the anterior chamber angle of the fellow eye was narrow.
- Posner-Schlossman Syndrome. Patients have unilateral, acute, recurrent episodes of significantly elevated intraocular pressure and mild anterior chamber inflammation. Angles are open on gonioscopic examination. Attacks can last from several hours to weeks with normal intraocular pressure and no signs of uveitis between attacks. In Posner-Schlossman syndrome, the IOP elevation is out of proportion to the pain experienced by the patient.
- Microbial keratitis or other corneal pathology, particularly with a history of trauma or contact lens use. Patients will present with an epithelial defect.
- Endophthalmitis. Our patient did not have a recent history of trauma, intraocular injection, recent surgery or septicaemia.

Question 2 What are the mechanisms of acute angle closure?

Answer 2:

Angle closure occurs when the peripheral iris comes into contact with the trabecular meshwork. This can involve either the iris being pushed from behind, or the iris being pulled into contact with the trabecular meshwork. This can occur intermittently as in appositional closure or can be permanent due to synechiae.

Primary angle closure

- Pupil block mechanism. The most common cause of primary angle closure. The aqueous humour faces increased resistance when traveling from the posterior chamber to the
anterior chamber between the iris and lens. The increased pressure gradient across the pupil causes the peripheral iris to bow forward and close off the angle.

- **Plateau iris syndrome**: More commonly seen in younger adults. There is narrowing of the angle due to insertion of the iris anteriorly on the ciliary body, or anterior displacement of the ciliary body. This alters the position of the peripheral iris in relation to the trabecular meshwork and can potentially lead to chronic angle closure. This can persist even after a peripheral iridotomy has been performed.

### Secondary angle closure

There are a number of causes of secondary angle closure glaucoma, including:

- **Neovascular glaucoma** (this can be either open angle or closed angle). In secondary angle closure glaucoma due to iris neovascularisation, the fibrovascular membrane contracts to close the angle, leading to very high IOP and a painful eye with poor vision.
- **Inflammatory glaucoma** (can also be either open angle or closed angle). Secondary angle closure glaucoma resulting from inflammation (for example, uveitis), is the result of the formation of either posterior synechiae (with subsequent iris bombé and shallowing of the anterior chamber) or peripheral anterior synechiae, leading to the obstruction of aqueous outflow. Additionally, the ciliary body can become swollen due to inflammation and rotate anteriorly causing closure of the angle.
- **Phacomorphic (lens-induced) glaucoma**. The mass effect of a thickened cataract pushes the iris forward, leading to pathological narrowing of the angle.
- **Ectopia lentis** (lens subluxation) can push the iris forward and narrow the anterior chamber angle.

**Question 3**: Which medications can cause angle closure (glaucoma)?

**Answer 3**:

A number of systemic and topical medications can (rarely) lead to narrowing or closure of the anterior chamber angle (Lai and Gangwani, 2012), and subsequently, glaucoma if not treated.

### Systemic medications, including:

- **Anticholinergics**: These act on iris smooth muscle resulting in pupil dilatation. Pupillary block can occur when the pupil is mid-dilated. Angle closure can be caused by either 1) bunching up of the peripheral iris in the drainage angle or 2) pupillary block.
  - Tricyclic antidepressants (e.g. Amitriptyline)
  - Bronchodilator inhalers/nebulisers (e.g. Ipratropium)
  - Medications used for gastrointestinal disorders such as irritable bowel syndrome (e.g. Mebeverine, hyoscine)
  - Medications used for genitourinary disorders such as an overactive bladder (e.g. Solifenacin)
- **Sulphonamides**: These medications can induce acute angle closure by causing ciliary body oedema which causes relaxation of the zonules, allowing lens thickening. There is also anterolateral rotation of the ciliary body about its attachment to the scleral spur, leading to anterior displacement of the lens and iris and subsequent anterior chamber shallowing.
  - Antiepileptics (e.g. Topiramate);
• Diuretics (e.g. Acetazolamide; hydrochlorothiazide, furosemide);
• Diabetic medications of the sulfonylurea class (e.g. Glipizide);
• Antimicrobials e.g. Cotrimoxazole

• Beta-agonists: As this class of medications are adrenergic agonists, they can cause pupil dilatation resulting in angle closure, similar to anticholinergics
  o Bronchodilator inhalers (e.g. Salbutamol)
• Selective serotonin re-uptake inhibitors: These agents cause an increase in serotonin levels which may cause mydriasis. Citalopram may have direct action on the iris or ciliary body through serotonergic mechanisms.
  o Anti-depressants (e.g. Citalopram)
• Antihistamines. These classes of medicines have a weak anticholinergic effect which can induce mydriasis.
  o Anti-nausea (e.g. Promethazine)

Topical medications:

• Mydriatic agents
  o Anticholinergic eye drops (e.g Tropicamide, atropine, cyclopentolate)
  o Alpha-adrenergic agonists (e.g. Phenylephrine)

Question 4: Primary angle closure is a disease continuum – how is it classified?

Answer 4:

• Primary angle closure suspects (PACS) are defined as having at least 180 degrees of iridotrabecular contact seen on gonioscopy without the presence of peripheral anterior synechiae and the absence of elevated IOP (Emanuel et al., 2014, He et al., 2019). Some other studies have defined angle closure suspects as having at least 270 degrees of iridotrabecular contact (Radhakrishnan et al., 2018). These patients have no evidence of permanent aqueous outflow obstruction but they may be at risk of chronic synechial closure or acute angle closure crisis in the future due to the anatomical configuration of their anterior chamber angle.
• Primary angle closure (PAC) includes patients who have at least 180 degrees of iridotrabecular contact and additionally have peripheral anterior synechiae or elevated IOP. These patients do not have glaucomatous disc changes or visual field loss.
• Primary angle closure glaucoma (PACG) patients fit the criteria for PAC, with the additional sign of evidence of glaucomatous optic neuropathy.
• Acute angle closure crisis (AACC) patients have a sudden rise in IOP due to acute and complete or near complete closure of the anterior chamber angle. This is a potentially blinding event. Patients will present with eye pain, headache, corneal oedema, decreased vision, vascular congestion and a mid-dilated pupil. (Emanuel et al., 2014)

Question 5: What is the management for our patient?
Our patient was immediately referred to the acute eye service. In order to lower IOP as quickly as possible, they were started on maximal topical therapy, brimonidine 0.2%, brinzolamide 1%, latanoprost 0.005% and timolol 0.5% eye drops after confirming no allergies or contraindications. Our patient was also given 500mg acetazolamide intravenously after ensuring adequate kidney function. Acetazolamide was administered intravenously as the patient was nauseous and taking the medication orally may have resulted in incomplete absorption. One hour after the initiation of treatment, IOP was 19mmHg.

In addition to the above, other medical agents may be used to control IOP. Pilocarpine acts on muscarinic receptors on the iris sphincter muscle and causes the muscles to contract. This leads to miosis and pulls the iris away from the trabecular network and facilitate outflow of aqueous humour. Pilocarpine does not work with very high pressures (IOP >40mmHg); the pupil becomes unresponsive to miotics due to ischaemia and paralysis of the iris sphincter. Hyperosmotic agents (mannitol) are a last resort when other medical treatment has failed. These require hospital admission with intravenous line insertion, monitoring of electrolytes. Some hospital protocols require insertion of an indwelling catheter to monitor fluid output, and hypotension is possible in volume-depleted patients. It is also contraindicated in patients with renal failure.

Our patient later received bilateral laser peripheral iridotomy by Nd:YAG laser. The affected eye needs to be treated as soon as possible (once the treating surgeon has a clear view through the cornea). Additionally, the contralateral eye is treated in order to avoid an attack of acute angle closure, as it is also at risk due to similar ocular anatomy. If untreated, the fellow eye has a 40-50% chance of developing an acute angle closure attack over the next 5-10 years (Lowe, 1962).

A surgical incisional iridectomy may be required for patients who have cloudy corneas, flat anterior chamber, poor co-operation during laser treatment or failure to control IOP with medications after a laser peripheral iridotomy.

Anterior chamber paracentesis is an alternative procedure that can be performed in the acute setting where pressure control cannot be achieved swiftly with medical treatment. It is difficult to perform in a phakic eye with a shallow anterior chamber as there is a risk of damaging surrounding structures. Complications include endophthalmitis and choroidal haemorrhage from rapid drop in intraocular pressure. The effects tend to be short-lasting.

Finally, prednisolone acetate 1% can be given to decrease inflammation associated with acute angle closure.

Prior to discharge, our patient was started on prednisolone acetate 1% four times per day, combigan (combined brimonidine 0.2% and timolol 0.5%) twice a day and brinzolamide 1% twice a day and was scheduled for a review two days later. Our patient recovered well and subsequent follow-up visits showed open angles, patent iridotomies and no evidence of any glaucomatous damage on clinical examination, visual field testing or OCT.

Question 6: What are the potential complications of laser peripheral iridotomy?

Answer 6:
Laser peripheral iridotomy (LPI) is considered a safe and effective procedure for treating the initial acute angle closure event and preventing future attacks. However, as with any procedure, there is a risk of complications, including:

- Bleeding at the site of laser, with possible secondary hyphaema
- Pressure spike post-procedure
- Anterior chamber inflammation
- Cataract formation
- Failure or occlusion of the iridotomy
- Visual disturbance (for example image ghosting or dysphotopsia) occurs when the PI lies behind the tear meniscus of the upper or lower lid. Iridotomies not covered by the eyelids and well clear of the meniscus do not tend to cause visual symptoms (Vera et al., 2014).
- Aqueous misdirection (rare)
- Injury to the cornea, lens or retina (rare)

Question 7: Discuss about the evidence for the role of prophylactic laser peripheral iridotomy in preventing primary angle-closure disease in primary angle closure suspects, based on the findings from the ZAP study (He et al., 2019).

Answer 7:

A large randomised controlled trial (ZAP study) conducted at the Zhongsan Ophthalmic Center in Guangzhou, China was the first to provide robust evidence regarding the role of laser peripheral iridotomy as a prophylactic procedure against primary angle-closure glaucoma in a Chinese population (He et al., 2019). A total of 889 Chinese patients aged between 50-70 years, considered to be bilateral primary angle closure suspects, received laser peripheral iridotomy in one randomly selected eye and the contralateral eye remained untreated.

Primary angle closure suspects were those with:

- ≥6 clock hours of angle circumference, in which the posterior trabecular meshwork was not visible under non-indentation gonioscopy in the absence of POAG or PACG
- No peripheral anterior synechiae observed on gonioscopy
- IOP 21mmHg or less
- Optic nerve vertical CD ratio less than 0.7
- Cup to disc asymmetry was no greater than 0.2
- Normal or borderline glaucoma hemifield test on standard automated perimetry

Exclusion criteria included:

- Severe health problems with life expectancy of less than 1 year
- Previous intraocular surgery or penetrating eye injury
- Media opacity preventing laser PI
- BCVA worse than 20/40 (6/12)
- IOP increase greater than 15 mmHg post dilation or after 15-minute dark room prone provocative test
They were followed up for 72 months, and the primary outcome measure was the incidence of primary angle closure disease (elevation of IOP, presence of PAS or acute angle closure). They found that laser peripheral iridotomy had a modest, but statistically significant prophylactic effect (4.19 cases of PACG per 1000 eye-years in LPI eyes vs 7.97 per 1000 eye-years in untreated eyes. However, given the low incidence rate of progression to angle closure disease (less than 1% per year), the conclusion from this study was that prophylactic laser peripheral iridotomy has limited benefit in this population, and its use as a widespread prophylactic procedure was not recommended. It should be noted that all participants in this study were Chinese, and that the results may not be generalisable to patients from other populations.

Question 8: Our patient was seen in the glaucoma clinic for follow up. She was waitlisted for cataract surgery in the left eye (as a preventative measure due to narrow angles and pre-existing mild cataract in the both eyes). What is the role of cataract surgery in this situation?

Answer 8:

Given that the majority of cases of primary angle closure are caused by pupillary block, the lens is an important structure to address. Cataract extraction has been shown to reduce IOP by approximately 2mmHg in POAG and non-glaucoma patients (Vizzeri and Weinreb, 2010). Of these patients, 75-85% maintain this reduction in pressure for 5 years. Removing the lens from a shallow anterior chamber facilitates the opening of the angle and can reduce formation of peripheral anterior synechiae. A study has also demonstrated that early cataract surgery by phacoemulsification has better results than LPI at reducing intraocular pressure (Lam et al., 2008). Performing cataract surgery during an acute attack is difficult as the corneal oedema means the surgeon has a poor view. Additionally, the anterior chamber is shallow and the pupil is fixed and mid-dilated, and the zonules may be weakened. Cataract surgery is therefore reserved until after the initial attack has been successfully managed.

Between 2009 and 2011, the EAGLE study group conducted a 419-patient, multicentre (five countries), randomised control trial (Azuara-Blanco et al., 2016). Of these patients, 155 had PAC and 263 had PACG and the patients were randomized into either clear-lens extraction or standard care (e.g. laser peripheral iridotomy and topical ocular antihypertensive treatment). The group that had clear-lens extraction had greater quality of life scores (p=0.005) and a lower mean intraocular pressure (1.18 mmHg lower, 95% CI −1.99 to −0.38, p=0.004) compared with standard care at 36 months. Because both groups were aiming for target IOPs, the IOP difference between the groups has little meaning. Only 21% of the participants in the clear-lens extraction group received any further treatment to control IOP compared with 61% in the laser peripheral iridotomy group (p<0.0001). Glaucoma surgery was required in 1 clear lens extraction patient and 24 patients in the standard care group. The study also showed that it was more cost-effective to perform a clear-lens extraction compared with standard care. Because of the greater IOP-lowering effect and cost effectiveness, clear-lens extraction may be considered more frequently as a first-line treatment option in patients with PACG and PAC. In patients with phacomorphic glaucoma, the definitive treatment is to address the cause with a lensectomy.
Question 9: What is the risk of inducing acute angle closure when administering dilating drops to a patient?

Answer 9:
In Caucasian patients over the age of 55 years, the incidence is reported to be around 1 in 3000 dilations from a 6760 patient study in the Netherlands (Wolfs et al., 1997). In the Baltimore Study (4870 African American and Caucasian participants), there were no cases of angle closure resulting from pupil mydriasis (Patel et al., 1995). The greatest risk of pupillary block occurs when the pupil is returning to its normal size; there is maximum contact between the iris and the lens when the pupil is in the mid-dilated state. The likelihood of precipitating AAC from the instillation of mydriatic drops is low and this concern should not discourage practitioners from performing pupil dilation to complete their assessment. Patients, particularly those at higher risk, should still be advised of the warning signs of acute angle closure and to seek immediate medical attention should they occur.

Question 10: What is the visual prognosis after treatment and pressure is restored after acute angle closure?

Answer 10:
In a Singaporean study of 42 eyes of 41 patients who presented with acute primary angle closure, 90.5% had a best corrected visual acuity of 6/6 to 6/12 after mean follow-up period up 27 months (Tan et al., 2009). Of these patients, 38 eyes had a prophylactic laser PI performed, the remaining 3 fellow eyes did not receive LPI as they were pseudophakic at the time of presentation. 21.4% of eyes progressed to primary angle closure glaucoma and required further treatment with a mean duration to progression of 11.9 months.

Two predictive factors for progression from acute angle closure to angle closure glaucoma were found:
1) The duration of symptoms before initial presentation (The group that developed PACG mean duration: 56.3 hours vs 20.5 hours in the non-progressive group)
2) The duration of time taken to break the acute attack (mean of 21.7 hours in the group that developed PACG vs 6.4 hours in the non-progressive group)

Similar results were found in a study examining a United Kingdom-based Caucasian population: 15% of eyes (7/48) developed PACG after an acute primary closure event (Andreatta et al., 2015). Primary angle closure glaucoma leading to visual impairment (BCVA worse than 6/18 but at least 3/60 and/or VF loss less than 10 degrees from fixation) was found in 4% of eyes but no eyes became blind due to PACG. The two same risk factors predicting progression to PACG were also found in this study.
Recommended reading:


References


Case 2 Exam:

Question 1: Which anatomical variation does not contribute towards greater risk of acute angle closure?

Answer A: Shorter axial length
Answer B: Shallower anterior chamber
Answer C: Greater corneal diameter
Answer D: Greater lens thickness
Answer E: None of the above

Question 2: Which of the following is not a mechanism of angle closure?

Answer A: Pupillar y block
Answer B: Posterior displacement of the ciliary body
Answer C: Plateau iris syndrome
Answer D: Neovascularisation of the peripheral iris
Answer E: Uveitis with peripheral anterior synechiae

Question 3: Which of the following eye drops would not be indicated when a patient presents with acute angle closure crisis, and intraocular inflammation, with IOP of 61mmHg?

Answer A: Pilocarpine 2%
Answer B: Prednisolone acetate 1%
Answer C: Brimonidine 0.2%
Answer D: Brinzolamide 1%
Answer E: Timolol 0.5%

Question 4: Which of the following is not a potential complication of laser peripheral iridotomy?

Answer A: Cataract formation
Answer B: Hyphaema
Answer C: Anterior chamber inflammation
Answer D: Optic neuropathy
Answer E: Ghost images being reported by the patient

Question 5: Which of these medications is least likely to contribute to angle closure glaucoma?

Answer A: Bronchodilator inhaler
Answer B: Sulphur-based antibiotics
Answer C: SSRI anti-depressants
Answer D: Tricyclic anti-depressants
Answer E: Statins
Question 6: With respect to the Zhongsan Study (He 2019), how many degrees of irido-trabecular contact were required before a patient was classified as a primary angle closure suspect?

Answer A: 90
Answer B: 120
Answer C: 180
Answer D: 270
Answer E: 360

Question 7: Which of the following statements is false with regard to performing anterior chamber paracentesis on a patient during an acute angle closure crisis?

Answer A: Choroidal haemorrhage can result from the rapid drop in intraocular pressure
Answer B: There is a risk of endophthalmitis
Answer C: A shallow anterior chamber makes the procedure technically challenging
Answer D: The procedure is more difficult in phakic eyes
Answer E: Laser peripheral iridotomy is not required after performing paracentesis

Question 8: What is the expected drop in intraocular pressure 1 year after cataract extraction? (Vizzero 2010)

Answer A: None
Answer B: 1 mmHg
Answer C: 2 mmHg
Answer D: 4 mmHg
Answer E: 5 mmHg

Question 9: Which of the following statements about pilocarpine is false?

Answer A: It acts on muscarinic receptors
Answer B: It causes miosis which pulls the iris away from the trabecular meshwork
Answer C: It causes sphincter muscle contraction
Answer D: It works to reduce IOP in patients with very high IOP
Answer E: None of the above

Question 10: Which of the following is not a reason why cataract surgery is difficult during an acute angle closure crisis?

Answer A: Hazy view due to corneal oedema
Answer B: Floppy iris
Answer C: Potential zonular weakness
Answer D: Very shallow anterior chamber
Answer E: Nauseous/vomiting patient rendering topical block inappropriate
Question 11: In Caucasian patients age 55 or older, what is the rate of inducing acute angle closure with dilating drops (Rotterdam Study, Wolfs 1997)

Answer A: 1 in 50
Answer B: 1 in 250
Answer C: 1 in 1000
Answer D: 1 in 2000
Answer E: 1 in 3000

Question 12: Which of the following is not a risk factor for primary angle closure?

Answer A: Hyperopia
Answer B: Female sex
Answer C: Older age
Answer D: African heritage
Answer E: Sibling with PAC

Question 13: Which of the following is not a symptom of acute angle closure?

Answer A: Headache or severe pain around eye
Answer B: Haloes or rainbows around lights
Answer C: Blurred vision
Answer D: Nausea
Answer E: Scalp tenderness

Question 14: How long is the IOP reduction expected to last for after cataract surgery alone in patients with non-glaucomatous eyes? (Vizzeri 2010)

Answer A: 6 months
Answer B: 1 year
Answer C: 2 years
Answer D: 5 years
Answer E: 10 years

Question 15: Prednisolone acetate 1% should not be given as treatment for angle closure. True or false?

Question 16: At what point does the iris have the most contact with lens, maximising the risk of developing pupillary block?

Answer A: Miotic pupil
Answer B: Standard pupil size in ambient lighting
Answer C: Mid-dilation
Answer D: Maximal dilation
Answer E: None of the above

Question 17: In a patient with acute angle closure in one eye, what is the risk of developing angle closure in the contralateral eye in the next 5-10 years if left untreated? (Lowe 1962)

Answer A: 5-10%
Answer B: 10-20%
Answer C: 25-35%
Answer D: 40-50%
Answer E: 60-70%

Question 18: How much more common is primary angle closure in Asian populations compared with European populations? (Chan 2019)

Answer A: No difference
Answer B: 1.5x
Answer C: 3x
Answer D: 5x
Answer E: 10x

Question 19: What is the primary aim of the first step in treatment of acute angle closure?

Answer A: Treat nausea/vomiting
Answer B: Reduce intraocular pressure
Answer C: Reduce corneal oedema
Answer D: Restore normal configuration of the angle
Answer E: Treat inflammation

Question 20: Corticosteroid eye drops can precipitate acute angle closure. True or false?

Question 21: Which racial group has the highest rate of angle closure?

Answer A: African
Answer B: Caucasian
Answer C: Middle Eastern
Answer D: Inuit
Answer E: Pacific People

Question 22: What is the relative risk of having narrow angles compared to the general population if you have a sibling with narrow angles? (Lai 2012)
Question 23: Which of the following combinations of drug and route of administration is correct in the treatment of acute angle closure?

Answer A: Oral mannitol
Answer B: IV beta blocker
Answer C: IV corticosteroids
Answer D: IV acetazolamide
Answer E: Oral anti-histamine

Question 24: Which of the following best describes the mechanism by which laser peripheral iridotomy treats acute angle closure?

Answer A: Reduces IOP by applying direct laser burns to the trabecular meshwork
Answer B: Direct lysis of peripheral anterior synechiae
Answer C: Re-establishing communication between the posterior and anterior chambers
Answer D: Decreasing aqueous secretion by destroying the ciliary epithelium
Answer E: Shrinkage of the crystalline lens via laser energy

Question 25: The results of the EAGLE Trial (Azuara-Blanco 2016), showed that patients who had clear-lens extraction required less medical treatment to control IOP post-procedure compared with those who had laser peripheral iridotomy. True or false?