

Acute Primary Angle Closure

Disclaimer: This Clinical Practice Guideline ('CPG') was written for use in The Royal Victorian Eye and Ear Hospital Emergency Department. It should be used under the guidance of an Ophthalmology or ENT registrar. If clinical advice is required, please contact the Eye and Ear Admitting Officer for assistance: EYE: +61 3 9929 8033; ENT: +61 3 9929 8032. Links to internal Eye and Ear documents cannot be accessed from the website CPG.

See also: Laser protocols, [acetazolamide guidelines](#)

Description:

Acute elevation of intraocular pressure (IOP) as the result of a closed drainage angle.

Red Flags:

- Exclude secondary glaucoma, e.g. secondary pupil block, neovascular or uveitis
- Beware Acetazolamide use in patients with compromised renal function

How to Assess:

History:

- Symptoms: Blurred vision, haloes around lights, aching eye or brow pain, headache, red eye, nausea, vomiting

Risk factors:

- More common in the Asian population and patients with hypermetropia
- Use of topical or systemic medication which dilates pupil or causes anterior rotation of ciliary body (e.g. over-the-counter decongestants, motion sickness medication, anticholinergic agents, sulfonamides, topiramate, phenothiazines) in at-risk eyes
- Unlikely in pseudophakic eyes

Examination:

Signs:

- Intraocular Pressure (IOP) usually >35mmHg
- Corneal oedema
- Mid-dilated, poorly reactive or unreactive pupil
- Shallow central and peripheral anterior chamber (AC) depth in the affected eye. The AC depth and anterior chamber angle is usually also narrow in the fellow eye.
- Closed angle on gonioscopy (no angle structures seen – see table below)
- Anterior chamber inflammation (cells, flare)
- Signs of previous angle-closure attacks; e.g. peripheral anterior synechiae, segmental iris atrophy, glaukomflecken, posterior synechiae or irregular pupil

Gonioscopy: (should be done on both eyes)

Angle structures seen	Risk of Closure
Scleral spur and ciliary body	Impossible
Posterior trabecular meshwork	Possible
Schwalbe's line and anterior trabecular meshwork	Probable
No structures seen	Closed

Gonioscopy on affected eye may be difficult because of corneal oedema.

If gonioscopy is not able to be performed, the Van Herick limbal chamber depth (LCD) can help estimate the depth of the angle as a % of the peripheral corneal thickness (PCT). Use a very narrow slit of light on the slit lamp, projected at the limbus at an angle of 60 degrees.

Grade	Estimate LCD/PCT	Clinical interpretation
4	$> \frac{1}{2} / 1$	Closure impossible
3	$\frac{1}{2} - \frac{1}{4} / 1$	Closure impossible
2	$\frac{1}{4} / 1$	Closure possible
1	$< \frac{1}{4} / 1$	Closure likely with full dilation
0	nil	Closed

Acute Management:

Discuss with the admitting officer, glaucoma fellow or ED consultant if diagnosis in doubt.

Acetazolamide 500mg IV over 5 minutes or oral – IV administration preferred as quicker acting. NOTE: Acetazolamide- may be contraindicated or need decreased dosage in patients with decreased renal function (Risk Factors: >60 years old, diabetes, cardiovascular disease, obesity, smoking, Aboriginal/Torres Strait islander, family history). (Refer to [MM1.81 Acetazolamide Prescribing and Administration Guidelines](#))

Note: *An allergy to sulphonamides may increase the risk of an allergy to acetazolamide. The manufacturer states that cross-sensitivity between acetazolamide, sulfonamides and other sulfonamide derivatives is possible. However current expert opinion, based on the evidence, would be that a history of sulfonamide antibiotic allergy should not be considered an absolute contraindication to the use of acetazolamide.

Urgent U&Es at the time of IV cannulation. Assess renal function by estimated [creatinine clearance](#) (<https://amhonline.amh.net.au.acs.hcn.com.au/calculators/adultcreatinineclearance>).

Note estimated glomerular filtration rate (eGFR) does not take into account ideal body weight.

- Ensure patient is supine while administering IV acetazolamide
- Observations to start before IV administration and to continue every 30 minutes for an hour after administration
- Repeat observations prior to transfer to slit lamp for IOP check
- Pilocarpine 2% or 4% every 15 minutes to affected eye (note: miotic effect is reduced in the presence of iris sphincter ischaemia after prolonged raised IOP)
- Brimonidine and timolol (e.g. as Combigan®) 1 drop stat to the affected eye (avoid timolol if patient has a medical contraindication to beta blockers)
- Prednisolone acetate 1% 1 drop stat to affected eye
- Analgesics and anti-emetics as indicated
- Mannitol can be considered if the IOP is not reduced with IV acetazolamide, after consultation with the AO, glaucoma fellow or consultant, and relative contraindications have been considered. (Refer to [MM1.91 Mannitol Infusions Procedure](#)).
 - Ensure patient is supine while administering IV mannitol
 - Observations to start before IV administration and to continue every 30 minutes for an hour after administration
 - Repeat observations prior to transfer to slit lamp for IOP check. IOP should be checked approximately 1 hour after administration of topical and oral medications. IOP should be done by Goldmann applanation tonometry where possible to increase accuracy.

Be aware of therapeutic side effects:

Caution in use of acetazolamide for elderly patients with potential for electrolyte imbalances.

Acetazolamide should not be used in patients with allergy to sulphonamides*.

Beta blockers are contraindicated in patients with asthma and chronic obstructive pulmonary disease (COPD). Cardioselective agents (i.e. betaxolol) may be used with care.

Mannitol must be used with caution in patients with diabetes, heart or renal failure, or in the setting of dehydration or hypotension

Laser peripheral iridotomy (PI) See Laser Peripheral Iridotomy (LPI) Clinical Practice Guideline **should be performed to the affected eye as soon as possible once view adequate**

- The aim of laser PI is to alleviate pupil block. **One** adequately sized full-thickness PI (with gush of fluid and pigment release seen) required.
- A drop of glycerol can help to reduce the corneal oedema and improve the view of the peripheral iris to perform the PI.
- If the PI is unable to be performed, or the IOP remains elevated 60 minutes after medical treatment and a patent PI, consult with the AO, glaucoma fellow or a consultant as indentation gonioscopy, anterior chamber paracentesis or laser peripheral iridoplasty may be indicated.
- Strongly consider PI of fellow eye prior to discharge if at risk of acute angle closure. This may also be done as an outpatient, in which case consider pilocarpine 2% QID to this eye on discharge.

Follow up:

- 1 week or earlier as required
 - Acute Ophthalmology Service: uncomplicated patients with patent PI, improving intraocular pressure and no significant glaucomatous optic neuropathy where further surgical intervention is not anticipated. Fellow unaffected eyes needing PI that are unable to be done during ED visit, may be referred to SLA clinic where appropriate when acute episode resolved.
- OR
- Glaucoma Clinic: complicated patients needing subspecialty input for further management. Contact Glaucoma fellow to discuss. appropriateness of referral

Advise patient to return if symptoms return prior to the review appointment

Discharge instructions:

- Patients can only be discharged once the IOP is controlled (e.g. <21mmHg)
- Discharge medications may vary between patients and may include:
 - g. pilocarpine 2% qid
 - g. Prednefrin Forte® 1% q2h while awake for one day then qid
 - g. Prednefrin Forte® 1% qid in the fellow eye if a prophylactic PI was performed
 - g. brimonidine +/- g. timolol twice a day
 - oral acetazolamide 250 mg orally tds

Evidence Table

Author(s)	Title	Source	Level of Evidence (I – VII)
Van Herick W, Shaffer RN, Schwartz A	Estimation of width of angle of anterior chamber	American Journal of Ophthalmology 1969; 68: 626-629	VII

The Hierarchy of Evidence

The Hierarchy of evidence is based on summaries from the National Health and Medical Research Council (2009), the Oxford Centre for Evidence-based Medicine Levels of Evidence (2011) and Melynck and Fineout-Overholt (2011).

- I) Evidence obtained from a systematic review of all relevant randomised control trials.
- II) Evidence obtained from at least one well designed randomised control trial.
- III) Evidence obtained from well-designed controlled trials without randomisation.
- IV) Evidence obtained from well-designed cohort studies, case control studies, interrupted time series with a control group, historically controlled studies, interrupted time series without a control group or with case series.
- V) Evidence obtained from systematic reviews of descriptive and qualitative studies.
- VI) Evidence obtained from single descriptive and qualitative studies.
- VII) Expert opinion from clinician, authorities and/or reports of expert committees or based on physiology.

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