**Aetiology**

Primary angle closure (PAC) is defined as appositional or synechial closure of the anterior chamber angle which can lead to aqueous outflow obstruction and raised IOP, in the absence of glaucomatous optic neuropathy. It is caused by a variety of mechanisms although pupil block, in which aqueous is impeded on its passage between the lens and posterior surface of the iris, is considered to be a key element in its pathogenesis. PAC is generally bilateral. Patients with angle closure and those at risk of closure may be categorized as follows:

<table>
<thead>
<tr>
<th></th>
<th>PAC Suspect</th>
<th>PAC</th>
<th>PACG</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥180 degrees ITC</td>
<td>Present</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Elevated IOP and/or PAS</td>
<td>Absent</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Optic nerve damage</td>
<td>Absent</td>
<td>Absent</td>
<td>Present</td>
</tr>
</tbody>
</table>

(ITU = iridotrabecular contact, PAS = peripheral anterior synechiae)

Acute angle closure (AAC): typically PAC and PACG develop chronically without symptoms, however an acute rise in IOP (unilateral in 90% of cases) can present as a clinical emergency

**Predisposing factors**

**Anatomical**

Associated with:
- sex (F:M ratio 3:1)
- ethnicity (e.g. Chinese, Vietnamese, Inuit). PACG is recognized as a leading cause of blindness in East Asia
- family history
- short axial length (hypermetropia)
- shallow AC (F>M)
- increasing age (AC becomes shallower as lens thickness increases)
- small corneal diameter

**Iatrogenic**

- Drug induced (topical and systemic, see Evidence Base)
  Adrenergic agents e.g. phenylephrine
  Drugs with anticholinergic effects e.g. tricyclic antidepressants
  Drugs that may cause ciliary body oedema, e.g. topiramate, sulphonamides
- Surgery induced
  Angle closure may follow a number of surgical procedures, for example vitreo-retinal surgery with intraocular gas, especially in aphakic eyes

**Symptoms**

Patients with PAC are usually asymptomatic. AAC is associated with sudden onset of symptoms and signs:
- rapid progressive impairment of vision of one or both eyes
- ocular and periorbital pain which can be severe
- nausea and vomiting
- ocular redness

50% of patients with an acute angle closure attack give history of previous intermittent attacks, e.g. episodes of blurring of vision lasting 1-2 hours, associated with haloes around lights, eye ache or frontal headache

**Signs**

The eye may appear normal (with the exception of a narrow angle, as
### Glaucoma (primary angle closure) (PACG)

<table>
<thead>
<tr>
<th>Differential diagnosis</th>
<th>Neovascular glaucoma</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Phakolytic glaucoma</td>
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<tr>
<td></td>
<td>Phakomorphic glaucoma</td>
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<tr>
<td></td>
<td>Acute anterior uveitis</td>
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<tr>
<td></td>
<td>Uveitis with raised IOP</td>
</tr>
<tr>
<td></td>
<td>Cilio-lenticular block (malignant glaucoma)</td>
</tr>
</tbody>
</table>

### Management by Optometrists

**Potentially occludable angle as judged by van Herick test**

Patients with peripheral anterior chamber width of one quarter or less of the corneal thickness (van Herick Grade 2) should be referred to secondary eyecare services (SIGN recommendation)

(GRADE*: Level of evidence=low, Strength of recommendation=strong)

**PAC Suspect**

Can only be diagnosed by gonioscopy. The decision to refer for further treatment should be based on the risk of developing PAC/PACG or AAC. If not referring, patients with PACS require close monitoring and serial gonioscopy. Patients should be aware that they are at risk of occlusion and that certain medications could induce angle closure

(GRADE*: Level of evidence=low, Strength of recommendation=strong)

**PAC**

The current clinical consensus is that patients with PAC/PACG should be treated surgically (peripheral iridotomy or cataract extraction) to relieve pupillary block together with pharmacological therapy to reduce elevated IOP

(GRADE*: Level of evidence=low, Strength of recommendation=strong)

<table>
<thead>
<tr>
<th>Pharmacological</th>
<th>AAC</th>
</tr>
</thead>
</table>
| Prior to referral, commence first aid treatment with a drop of pilocarpine 2% eye drops in blue eyes and 4% eye drops in brown eyes (although this is likely to be ineffective when IOP is over 40mmHg and paradoxically pilocarpine can exacerbate angle closure)

(GRADE*: Level of evidence=low, Strength of recommendation=weak)

Where the IOP is 40mmHg or higher and the patient is not vomiting, give a single dose of oral acetazolamide (Diamox) 500mg (not slow release formulation). (NB: Diamox may be hazardous in an elderly frail patient.) Then refer as an emergency to ophthalmologist. (In view of potential
Glaucoma (primary angle closure) (PACG)

Management Category

Acute Angle Closure
A2: first aid measures and emergency (same day) referral to ophthalmologist
PAC/PACG
A3: urgent (within one week) referral to ophthalmologist; no intervention
PAC Suspect
A3 (modified): routine referral to ophthalmologist; no intervention

Possible management by Ophthalmologist

Acute Angle Closure: treatment directed to breaking the pupil block and reducing IOP
Medical
• miotics (e.g. gutt. pilocarpine 2-4%)
• systemic agents (e.g. acetazolamide, glycerol)
• topical antihypertensives (e.g. gutt. timolol, gutt. dorzolamide, gutt. brimonidine)
Urgent interventions
• anterior chamber paracentesis (occasionally used in advance of peripheral iridotomy)
• argon laser peripheral iridoplasty (occasionally used in advance of YAG laser peripheral iridotomy, LPI)
• LPI
Less urgent interventions
• lens extraction
• selective laser trabeculoplasty, post LPI

Evidence base

*GRADE: Grading of Recommendations Assessment, Development and Evaluation (see http://www.gradeworkinggroup.org/index.htm)

Sources of evidence


Friedman D, Vedula SS. Lens extraction for chronic angle-closure glaucoma. Cochrane Database of Systematic Reviews 2006;3:CD005555

Hui X, Michelessi M. Medical interventions for treating primary angle-closure glaucoma. Cochrane Database of Systematic Reviews
<table>
<thead>
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<th>Date of publication</th>
<th>Date for review</th>
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Lay Summary

Primary Angle Closure Glaucoma (PACG) is rarer in this country than Primary Open Angle Glaucoma, and in its acute form differs in that the drainage route for the fluid inside the eye is closed off, rather than gradually blocked. It affects women more often than men, is commoner in long-sighted people and people of East Asian ancestry, and becomes more likely to occur as people age. Certain drugs and eye operations can also cause the drainage angle to close.

A sudden complete closure of the drainage route (known as acute angle closure crisis), which usually affects just one eye, causes rapidly progressing impairment of vision, redness of the eye, and pain in and around the eye which may be so severe as to cause nausea and vomiting. The eye pressure may be very high, because the aqueous fluid continues to be formed within the eye but cannot drain away. Various other changes will be seen in the eye by the examining optometrist.

An attack of angle closure is an emergency which needs same-day referral to the ophthalmologist. There are drugs that the optometrist can use as first aid. The ophthalmologist will also prescribe drugs and may advise laser treatment to create a tiny hole in the iris (the coloured part of the eye) through which the fluid can drain.

If at a routine eye examination there are signs that there have been earlier, milder attacks of angle closure, or if it appears that a patient could develop PACG, the referral can be urgent, or may be made with less urgency.