

## Case Record 10

# Possible 'Combined' Mechanism Glaucoma with Occludable Angles and Phacomorphic Component.



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## INTRODUCTION

### Pro-active Early Detection of Closable Angles – a Primary Care Necessity.

‘Acute Angle Closure Glaucoma’ (AACG) represents a distressing ocular emergency. Aherne (2010) suggests a combination of signs and symptoms to make the diagnosis, however the presentation is so severe, with monocular, deep boring pain, corneal oedema with associated poor acuity, fixed mid-dilated pupil, conjunctival hyperaemia and extremely high intra-ocular pressure that objective categorisation is unlikely. Angle closure glaucoma, however, can be divided into acute and chronic forms (EGS 2003). ‘Chronic Angle Closure Glaucoma’, may not necessarily manifest in an acute event (Ritch and Lowe 1996a), but should not be considered a prodrome but rather a separate entity as defined by treatment modalities (EGS 2003).

The mechanisms of angle closure are varied and an understanding of risk factors and subtle signs is essential. Ritch and Lowe (1996b) describe four general mechanisms; pupillary block, plateau iris, lens-induced angle closure and malignant glaucoma; all have several subcategories.

Within primary care the goal should be to identify those patients at risk of angle closure and are perhaps manifesting sub-acute episodes and refer for prophylactic treatment to prevent an acute attack.

Ritch and Lowe (1996a) describe ‘Intermittent Angle Closure’, with partial or weak circumferential closure, without peripheral anterior synechiae (PAS). ‘Creeping Angle Closure’, primarily confined to dark irides, consists of circumferential, uniform, closure with PAS (Ritch and Lowe 1996a); this is considered a primary event (EGS 2003). In contrast, the PAS seen in ‘Chronic Angle Closure’ is considered a secondary response to repeated intermittent closure events (Clement 2010). This author considers the term ‘Chronic Appositional Closure’ a better descriptor when PAS have not yet formed. ‘Sub-acute Angle Closure’, with more prolonged and severe transient episodes compared to ‘Intermittent Angle Closure’ and usually demonstrating PAS is a further entity (Ritch and Lowe 1996a), and suggests an imminent acute phase.

Salient information taken from electronic records

DATE: 10/8/11

Mrs Age : 75.

Address

Presenting Symptoms

Routine check for cataract progression. Distance and Near vision getting worse. Non-Driver. Night vision poorer and Glare a problem  
No Headaches, no ocular discomfort.

POH

2 pairs.

Aware of Cataracts

FOH

None

General Health and Medications

Levothyroxine

BP - Bendroflumethiazide,

Simvastatin

No Allergies. No Hayfever

Non-Smoker

Refraction

R +5.00/-1.25x100 (6/9.5)

Add +2.50 N5

L +4.00/-1.25x100 (6/9.5)

Add +2.50 N5

Tensions

(8.35am)(Icare)(pre-dilation) R 23

L 23

(9.08am)(Perkins)(post-dilation)R 24

L 29

Glaucoma Fast Threshold

Attached

Pupils

E&A D,C& N

Slit Lamp

VH 1. Very Narrow Iris configuration bowed. Corneas clear, no pigment,  
Iris clear.

Dilated Fundsocopy (0.5% Tropicamide)

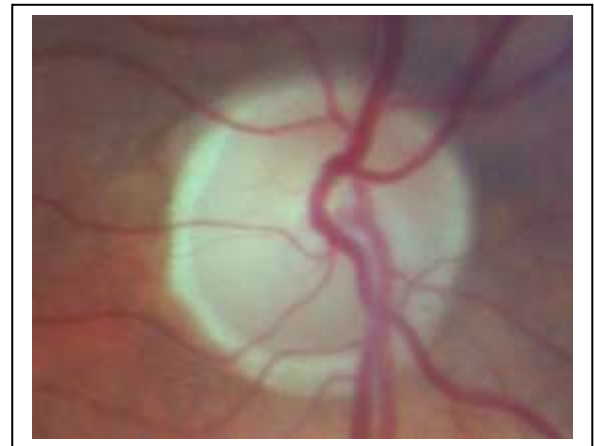
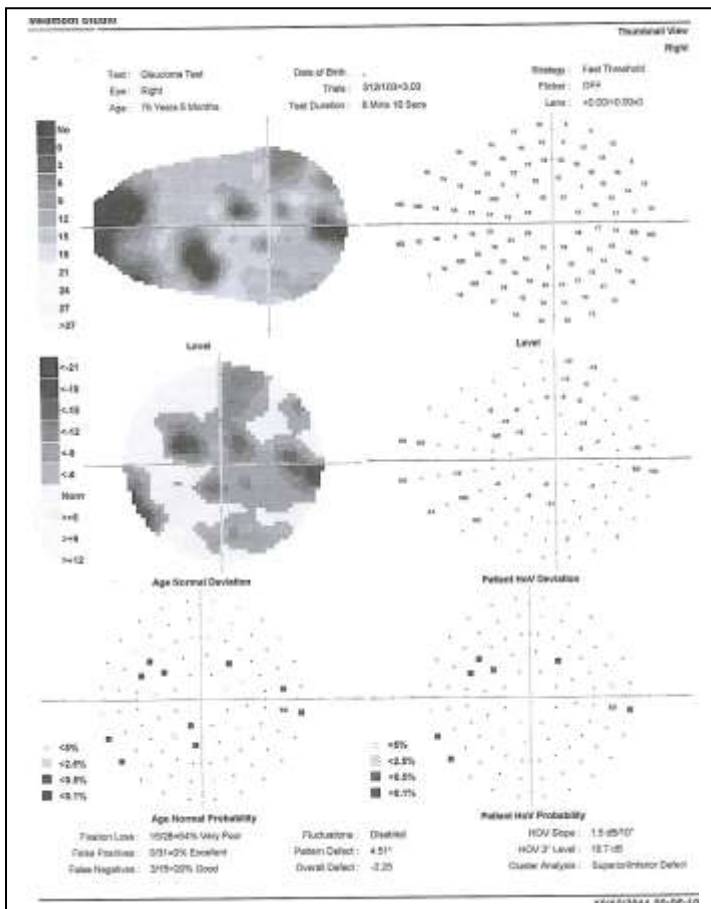
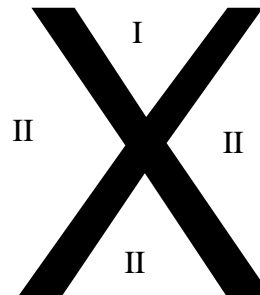
Saucerised discs with peripapillary atrophy. No barring, no bayoneting,  
(Photographed)

No RNFL defects noted

Nuclear Sclerosis ou

Goniocopy (Zeiss 4 Mirror)

No PAS Visible



Glaucoma Fast Threshold

Pattern Defect: 4.54\*

Overall Defect : -2.25

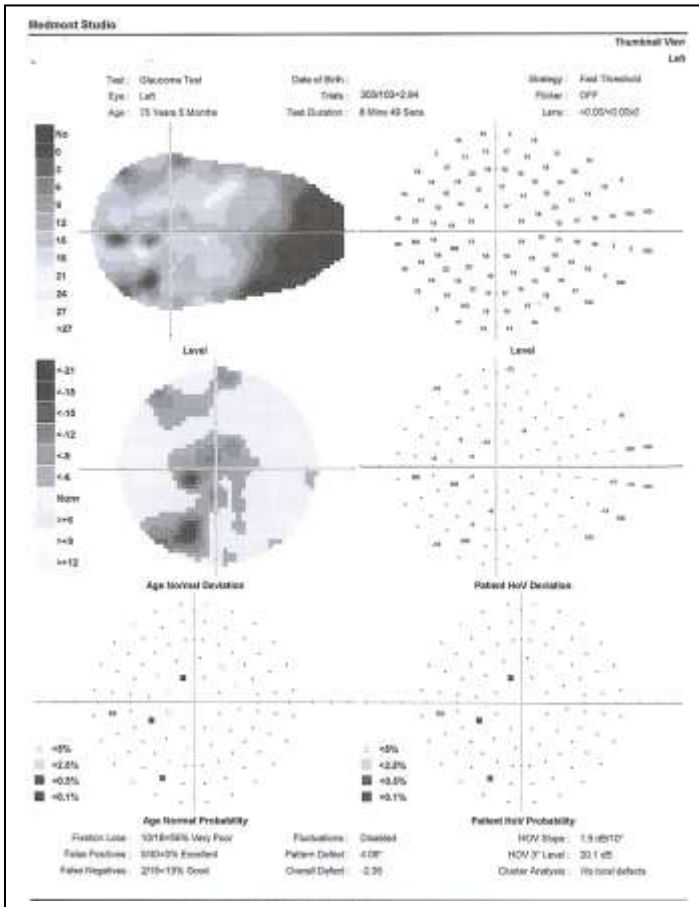
Cluster analysis : Sup/Inf Defect

Reliability Indices :

Fixation Losses: Very Poor

False Positive: Excellent

False Negatives: Good



## Glaucoma Fast Threshold

Pattern Defect : 4.06\*

Overall Defect : -2.35

Cluster analysis : No local Defects

Reliability Indices :

Fixation Losses: Very Poor

False Positive: Excellent

False Negatives: Good

Tensions

Icare (12.30)

R 22 L 23

## Ongoing Case History

Post IOP rise, disc and anterior chamber evaluation re-questioned about possible prodromal symptoms, particularly during the evenings. Px re-confirmed that no symptoms had been noted.

Advice and CMP

Drainage and Angle closure and explained. Advised on possibility of Glaucoma and benefit of intervention. Cataract extraction may help.



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INDEPENDENT  
Prescribing  
OPTOMETRISTS

Dr  
Lintonville

re Mrs                                  DOB

10/8/11

Dear Dr

Mrs                had a routine eye examination today. Refraction gave:

R +5.00/-1.25x100 (6/9.5)	Add +2.50 N5
L +4.00/-1.25x100 (6/9.5)	Add +2.50 N5

Undilated tensions were R23 and L23. Van Herrick showed the angle to be very narrow (Grade 1). Post dilation IOP was R 24 and L 29 (Perkins). The TM was not visible in the superior quadrant on gonioscopy and I believe the angle to be closeable. No PAS were noted.

Disc appearance and fields (attached) are also suggestive of glaucoma. I suspect a phacomorphic component with the developing cataract and I feel Mrs                requires urgent referral for an ophthalmologist's opinion.

I would request feedback on my angle interpretation please.

Yours faithfully

Peter Frampton



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Winner  
Outstanding Optometrist

Winner  
Innovation in Practice Awards

Winner  
Technology Practice of the Year

Clement (2010) and Ritch and Lowe (1996a) describe 'Mixed' mechanisms of angle closure where multiple 'Angle Closure' situations co-exist; often not recognised as such until remedial surgery for one identified entity has been completed. Except in countries where cataract surgery is not routine and hypermature cataracts are common (Harpreet 2010), phacomorphic angle closure is likely to be part of a mixed presentation. Hyperopia, female gender and age are risk factors for Primary Angle Closure (Subak-Sharpe et al 2009, Noecker 2011, EGS 2003). In the case presented, while referral explicitly implicated lens intumescence as a pathological risk, the patient was certainly in a high risk group regardless.

Van Herrick was estimated as 1 but the trigger to follow with gonioscopy and then refer was based largely on the increase in IOP post dilation. Drug induced angle closure falls into three categories; the concertina effect of the iris crowding the anterior chamber on pupil dilation, pupil block as the dilated pupil re-constricts and idiosyncratic drug reactions changing the irido-corneal angle (Sabuk-Sharpe et al 2009). Pupil block takes several hours to manifest (Sabuk-Sharpe et al 2009). The same authors report Thiazide diuretics as potential triggers for idiosyncratic angle closure. The Summary of Product Characteristics for Bendroflumethiazide (electronic medicines compendium 2011) and the British National Formulary (bnf 2011) however, do not list angle closure as a risk for this drug and Rhee (2009) describes this anterior rotation of the ciliary body as rare. Angle crowding would be the most likely mechanism in this case; the tensions certainly returned to pre-dilation level with loss of mydriasis.

There are several gonioscopic classification systems (EGS 2003) and some confusion in how they are presented in texts. The most descriptive is that of Spaeth which aims to succinctly describe Iris Insertion Point, Geometrical Angle, Iris Shape and Trabecular Meshwork Pigmentation (Marsh and Cantor 2005, EGS 2003, Palmberg 1996). Palmberg and the European Glaucoma Society describe an earlier nomenclature, now superseded with newer and more memorable descriptors for iris configuration (Marsh and Cantor 2005). While the Spaeth descriptors for iris configuration are routinely utilized as an adjunct to recording Van Herrick ratio the system is not used within this practice.

A simpler system for optometrists gaining experience with gonioscopy is one based on the number of structures observed. The Shaffer-Etienne classification is one example; Grade 0 is closed and no structures are visible, Grade I Schwalbe Line is visible and the angle is closable, Grade

II Schwalbe Line and Trabecular Meshwork are visible and the angle is considered narrow, Grade III three structures up to Scleral Spur are visible and Grade IV all structures are visible. This represents a simple and logical progression, increasing numbers correlate to increasingly open angles and the number itself corresponds to the number of structures visible. The superior quadrant is often the narrowest (Subak-Sharpe et al 2009) and for the patient involved, the trabecular meshwork was not visible in this quadrant and the others were narrow.

The decision to refer with some urgency was based on tension variations and gonioscopy; regardless of visual field outcome. The fields however did suggest a probable glaucomatous loss. Overall Defect was down as would be expected with cataract. Pattern Defect and Cluster Analysis for the right eye did suggest a possible hemifield discrepancy. Fixation losses were very poor and can suggest an unreliable field; but this is less likely if all other indices are good (Anderson 1993). False Positives (FP) were excellent and False Negatives (FN) were good; unfortunately in the Fast Threshold strategy the Fluctuations are disabled. Anderson (1993) does suggest that if FP, FN and Short Term fluctuations (equivalent to Fluctuations on the Medmont) are all small then the fields could still be reliable.

If unreliable the FP could still be excellent but FN would be expected to be poorer as the patient would not respond to suprathreshold stimuli.

The fields did suggest a glaucomatous loss.

## Ophthalmological Care

In Acute Angle Closure Glaucoma the angle is closed by iridocorneal apposition and is reversible, whereas Chronic Closed Angle Glaucoma the angle closure may not be reversible due to the formation of PAS (EGS 2003). Treatment choice is contingent on the potential closure mechanism and must be assessed individually (EGS 2003). Iridotomy is the procedure of choice to eliminate the pupil block (EGS 2003). In this case the angles were assessed and considered occludable, but no PAS were present.

Aherne (2010) suggests an alternative is lens extraction, especially when there is a visual advantage for individuals with coexisting cataracts. This procedure was carried out which effectively opened the angles and eliminated the need for any further angle closure procedures.



As distinct from the 'Mixed' mechanism, Clement (2010) and Ritch and Lowe (1996a) also describe a 'Combined' mechanism, involving open angle glaucoma co-existing with those of angle closure. The absence of PAS would suggest that the glaucomatous disc and field appearance, if not due solely to chronic sub-clinical intermittent angle closure events, may indicate co-existing POAG. This supposition would be supported by the lack of prodromal symptoms experienced by the patient; symptoms that need to be pro-actively elicited once suspicion is aroused as many patients do not equate the sometimes mild ocular discomfort in the evenings as suggestive of an ocular morbidity.

In these situations, post cataract extraction, close monitoring for progression is required to ensure that no other glaucoma mechanism is present.

### Post IOL Review for HES Audit

At her post cataract refraction for the HES:

Angles were graded as Van-Herrick's Graded as 4+.

Tensions were R & L 16mmHg (Perkins)

Refraction gave:

R +0.50/- 0.75x90 (6/6-) Add +2.50 N5

L +0.75/-1.00x100(6/6+) Add +2.50 N5

No medical treatment for POAG has been instigated yet but the patient is being monitored very closely.

### REFERENCES

1. Aherne A. (2010). Acute Angle Closure Glaucoma. Accessed Emedicine/Medscape  
<http://emedicine.medscape.com/article/798811>
2. Anderson DR. (1992). Automated Static Perimetry. Mosley. USA.
3. BNF 62 (September 2011). British National Formulary. Accessed [www.bnf.org](http://www.bnf.org)
4. Clement C. (2010). Glaucoma, Angle Closure, Chronic. Accessed Emedicine/Medscape  
<http://emedicine.medscape.com/article/1205154>

5. Electronic Medicines Compendium. (2011). Summary of Product Characteristics for Prestim Tablets (Bendroflumethiazide) Accessed [www.emc.medicines.org](http://www.emc.medicines.org)
6. European Glaucoma Society. (2003). Terminology and Guidelines for Glaucoma Edition II. Dogma. Accessed [www.eugs.org](http://www.eugs.org)
7. Harpreet G. (2010). Glaucoma, Phacomorphic. Accessed Emedicine/Medscape. <http://emedicine.medscape.com/article/1204917>
8. Marsh B and Cantor L. (2005). The Spaeth Gonioscopic Grading System. *Glaucoma Today*. May/June; 22-25
9. Noecker R. (2011). Glaucoma, Angle Closure, Acute. Accessed Emedicine/Medscape. <http://emedicine.medscape.com/article/1206956>
10. Palmberg P. (1996). Gonioscopy. In Ritch R, Shields MB and Krupin T (eds). *The Glaucomas (second edition) Vol I Basic Sciences*. Mosby. USA.
11. Rhee D. (2009). Glaucoma, Drug Induced. Accessed Emedicine/Medscape. <http://emedicine.medscape.com/article/1205298>
12. Ritch R and Lowe R. (1996a). Angle-Closure Glaucoma: Clinical Types. In Ritch R, Shields MB and Krupin T (eds). *The Glaucomas (second edition) Vol II Clinical Science*. Mosby. USA.
13. Ritch R and Lowe R. (1996b). Angle-Closure Glaucoma: Mechanisms and Epidemiology. In Ritch R, Shields MB and Krupin T (eds). *The Glaucomas (second edition) Vol II Clinical Science*. Mosby. USA.
14. Sabuk-Sharpe I, Low S, Nolan W and Foster T. (2009). Pharmacological and Environmental Factors in Primary Angle closure Glaucoma. *British Medical Bulletin*; 93: 125-143.