

Combined Mechanism Glaucoma

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Definition :

Eyes that have an occludable angle but fewer signs of angle closure not corroborating with the degree of raised intraocular pressure (IOP) and glaucomatous optic neuropathy are diagnosed as having 'combined mechanism' glaucoma (CMG). In other words, CMG is defined as a combination of

both the primary types of glaucoma, the primary open angle glaucoma (POAG) and the primary angle closure glaucoma (PACG).^{1,2}

Clinical Features :

The patients may present with non-specific symptoms, and it is more often detected incidentally, or as a part of screening programs.

- Age group: Commonly between 50-60 years of age
- Laterality: Usually bilateral.
- Baseline IOP: May vary from 23-28 mmHg.
- Anterior chamber depth: Usually normal centrally or slightly shallow, but may have narrow recess (Figure 1).



Figure 1 : Slit-lamp diffuse photograph showing a mildly shallow anterior chamber, patchy pupillary ruff atrophy and immature senile nuclear sclerosis.

- Gonioscopy: There would be an occludable angle (posterior trabecular meshwork not visible in at least 180°) which on manipulative/indentation gonioscopy show up limited signs of angle closure, i.e, goniosynechiae < 90° and sparse blotchy pigmentation (Figure 2 & 3).

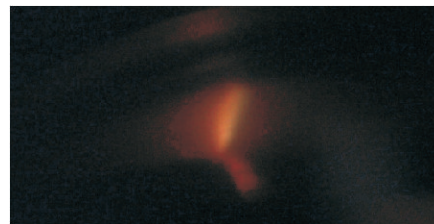
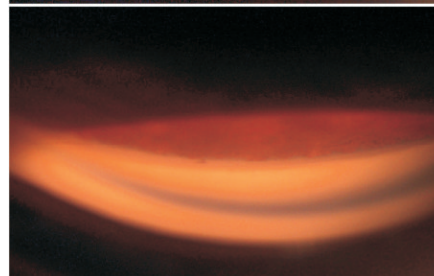


Figure 2 : Goniophotograph showing occludable angle



Figure-3 : On manipulation gonioscopy, the angle opens up to reveal the posterior trabecular meshwork and few goniosynechia.



- Pupillary ruff: May show patchy ruff atrophy
- Iris pattern: May be decreased.
- Optic disc: Features consistent with glaucomatous optic neuropathy (Figure 4).

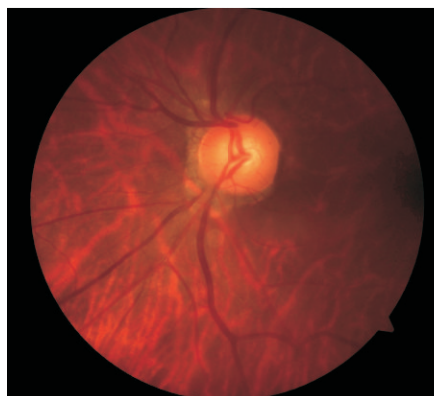


Figure 4 : Stereoscopic fundus photograph showing CDR 0.8:1

The sparse goniosynechia and blotchy pigmentation imply that the patient has had fewer episodes of angle closure attacks in the past than of that which would be expected in a PACG eye with equal amount of optic neuropathy. Therefore, with the anterior segment picture not corroborating with the degree of optic neuropathy to either label a POAG or PACG, this condition presents as a combination of both of the primary types, and therefore referred to as the 'combined mechanism glaucoma'.

Investigations

- Central corneal thickness (Pachymetry)
- Biometry (axial length, anterior chamber depth, lens thickness, white-to-white)
- Angle AS-OCT (angle opening distance, trabecular iris space area, angle recess area, trabecular iris angle, iridotrabecular contact)
- Visual field analyser
- Retinal nerve fibre layer OCT

Sihota et al¹ in their study on CMG patients showed that their mean corneal diameter was 12.11 ± 0.54 mm, axial length 23.48 ± 0.95 mm, anterior chamber depth was 3.06 ± 0.26 mm and lens thickness 4.44 ± 0.29 mm. On angle anterior segment optical coherence tomography (AS-OCT), the mean angle opening distance (AOD 500) was 0.32 mm and trabecular iris space area (TISA 500) was 0.13 mm^2 . The mean circumferential iridotrabecular contact (ITC) in CMG eyes was 15% as against PACG whose mean ITC was 87% and POAG 0%. All these parameters fell in the mid-range between those of POAG and PACG.

Differential Diagnosis :

The closest differential diagnosis to CMG is primary open angle glaucoma. A CMG could be missed if gonioscopy were not done in presumed POAG. It is important to differentiate CMG from the latter because the pathogenesis and management strategy differ for both. While POAG is primarily due to age related trabecular meshwork changes, CMG has an overlap of the angle closure component.

Secondary glaucomas such as pseudophakic glaucoma, aphakic glaucoma, post-uveitic glaucoma and pseudoexfoliation glaucoma may have a normal central chamber depth and blotchy pigmentations and goniosynechia on the angles. Hence, secondary glaucomas must be ruled out before making a diagnosis of CMG.

A confounder by name is the 'mixed mechanism glaucoma' which can be confused for CMG.^{3,4} While CMG is a combination of the two primary glaucomas (POAG+PACG), mixed mechanism glaucoma is referred to when there is a

combination of a primary and a secondary glaucoma (or) > 1 secondary glaucomas (eg, POAG + steroid induced glaucoma; post-uveitic + steroid induced glaucoma respectively).

The treatment of secondary and mixed glaucomas differ from primary glaucomas in that, they focus not only on the management of intraocular pressures, but also on the control of the inciting factor.

Treatment :

The management of combined mechanism glaucoma is distinctly different from that of POAG. In contrast to the latter, CMG eyes require a peripheral iridotomy in order to circumvent the existing relative pupillary block owing to their occludable angle status. This should be followed by medical management and measurement of diurnal variation of IOP four weeks later. Based on the highest reading recorded, a target IOP should be set and treatment titrated accordingly.

Selective laser trabeculoplasty can be attempted in areas of visible trabecular meshwork, however results are not known at present.

In the event of failure to achieve target IOP or disease progression despite maximal therapy, filtering surgeries may be proceeded with.

Take home messages :

- Combined mechanism glaucoma is a distinct entity which is a combination of both the primary type of glaucomas, the POAG and the PACG.
- Eyes which have an occludable angle but goniosynechia $< 90^\circ$ not consistent with PACG fall into this category.
- Management includes a peripheral iridotomy followed by the medical/laser/surgical procedures as per the severity.
- Mixed mechanism glaucoma differs from CMG in being a combination of a primary and a secondary glaucoma (or) > 1 secondary glaucomas.

References :

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