Different Modalities in Anterior Chamber Angle Imaging

Essay

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Summary and Conclusion

With proper detection and prophylaxis, angle closure glaucoma appears to be a potentially preventable disease. Identifying persons at risk for acute angle closure attacks, as well as those prone to develop more chronic forms of angle closure remains a challenge.

A key element in this decision-making process is the assessment of the anterior chamber angle. The current reference standard is gonioscopy, which offers a detailed view of angle structures. Gonioscopy is subjective and difficult to learn. Furthermore, skill is needed to perform gonioscopy properly, particularly in older individuals who are frequently less able to sit comfortably at the slit lamp. Studies generally report moderate reproducibility, but these studies employ trained persons with extensive gonioscopy experience. The real-world situation is likely not as good. Ultrasound biomicroscopy has allowed a much deeper understanding of anterior chamber dynamics and the role of the ciliary body in angle closure. It provides high quality images of anterior segment structures, but is cumbersome to perform, requires a trained technician, and involves placing an eyecup on the eye, all of which limit its usefulness in the clinical setting. Questions still remain about reproducibility with UBM, although most reports of analyses on a single image indicate that images analysis is highly

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Introduction

Primary angle-closure glaucoma (PACG) is a leading cause of blindness throughout the world ***(Quigley et al., 2006)***.

Although acute forms of angle closure are preventable through prophylactic treatment of the eye with laser peripheral iridotomy (LPI) ***(Spaeth et al., 1995)*** it remains uncertain whether or not more chronic forms of PACG can be prevented in the same way. A major challenge to developing a systematic approach to screening for angle closure and adopting universal approaches to prophylaxis remains the assessment of the anterior chamber angle (ACA). The current reference standard is gonioscopy, a technique that has substantial inter-observer variability and relies on subjective assessment of ACA findings in real time. Verifying gonioscopic findings reported in the clinical and research setting remains problematic due to the difficulty of obtaining good images of the ACA photographically ***(Friedman et al., 2008).***

Other approaches have been developed to aid in the assessment of the ACA. Ultrasound biomicroscopy (UBM), Scheimpflug photography, and optical coherence tomography of the anterior segment (AS-OCT) all provide some insight into the configuration of the ACA and techniques like these promise to provide more objective measures of the ACA, which may

allow for more accurate determination of risk related to angle findings. This is a review of techniques for assessment of the ACA. Each technique will be discussed along with currently used grading schemes. An assessment of the strengths and limitations of each approach will also be provided. Finally, comparisons of findings using the various techniques will be detailed.

Anatomy

Anatomical Consideration:

Anterior chamber and drainage angle:

The anterior chamber is bounded anteriorly by the inner surface of the cornea, except at its far periphery where it is related to trabecular meshwork .posteriorly: it is bounded by the lense within the pupillary aperture by the anterior surface of the iris, and peripherally by the anterior face of the ciliary body. the anterior and posterior boundaries meet at the drainage angle of the chamber. The anterior chamber communicates with the extracellular spaces of the iris, ciliary body and trabecular meshwork and, through the papillary aperture, with the posterior chamber of the eye ***(Tripathi and Tripathi, 1984).***

Anterior chamber volume is in the region of 220 microlitre and the average depth is 3.15 (range of 2.6-4.4) mm.Chamber diameter varies from 11.3 to12.4 mm ***(Tripathi and Tripathi, 1982).***

Chamber depth decreases by 0.01mm per year of life, and is shallower in the hypermetropic than the myopic eye (the chamber deepens by 0.06mm for each dioptre of myopia.

Anterior chamber volume decreases by 0.11 μm/year of life, but is 0.69 μm larger per dioptre of myopia ***(Brubaker et***

al., 1981). Chamber depth is diminished slightly during accommodation, partly by increased anterior lens curvature, and partly by forward translocation the lens ***(Brown, 1973).***

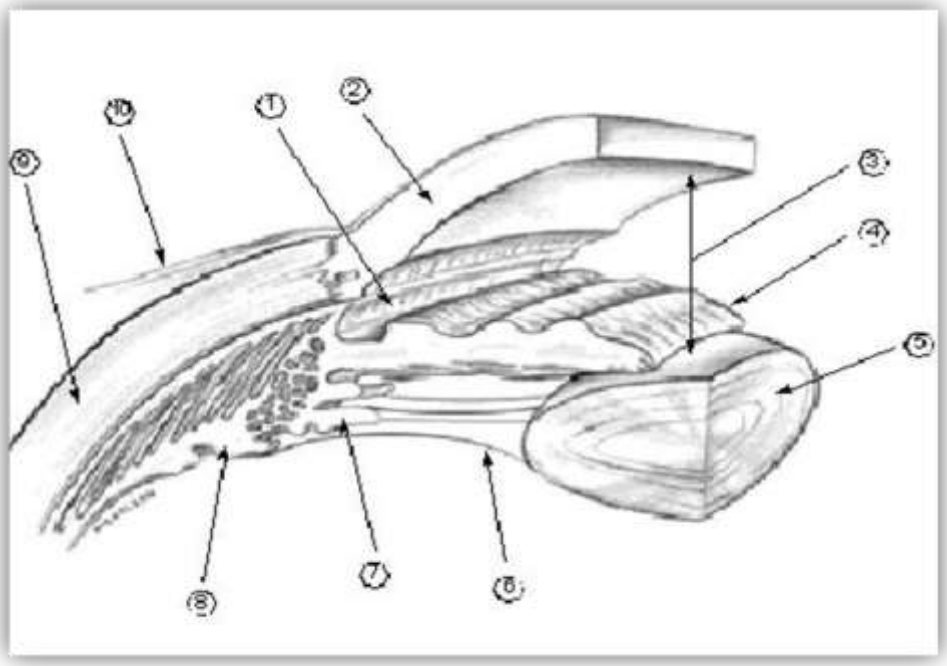

Figure (1): 1. Anterior chamber angle **2.**Cornea **3.**Anterior chamber **4.**Iris **5.**Lens **6.**Zonules **7.**Ciliaryprocesses **8.** Ciliarybody **9.**Sclera ***(Orbistelemedicine, 2003).***

Aqueous outflow:

1. **The trabecular meshwork** (trabeculum) is a sieve-like structure at the angle of the anterior chamber, through which 90% of the aqueous humour leaves the eye (Fig.2) it is made up of the following three portions: