EVALUATION OF ANTERIOR CHAMBER ANGLE BY VARIOUS TECHNIQUES: VAN HERICK METHOD, GONIOPHOTOGRAPHY AND ANTERIOR SEGMENT- OCT

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ABSTRACT

Aim: The purpose of this study was to evaluate AC angles using gonioscopy, Van Herick technique and AS-OCT, focusing on their potential role in clinical practice.

Methods: The Cross-sectional study was conducted and patients of more than 40 years of age attending ophthalmology outpatient department at Govt. Medical College, Patiala. 100 patients were included in the study. Data was collected from the patients more than 40 years of age willing to participate in the study. Patient data was collected according to the Performa. Medical history and history of any ocular disease was also noted.

Results: 40% of the patients belonged to 60-70 years age group, followed by 50-60 years (37%), 40-50 years (12%), 70-80 years (10%), and >80 years (1%). Majority of the patients belonged to 50-70 years (77%). 56% were females and 44% were males. 53% patients had VH grading (nasal) 3 followed by grade 4 (26%), grade 2 (10%), grade 1 (8.5%), and grade 0 (2.5%). 52% patients had VH grading (Temporal) 3 followed by grade 4 (26%), grade 2 (10%), grade 1 (9.5%), and grade 0 (2.5%). The agreement value between the nasal and temporal VH grading was found to be 98%.

Conclusion: The van Herick method appears to have good sensitivity and specificity, whereas the AS-OCT method has poor sensitivity, yet high specificity. The Van Herick method, because of its high sensitivity and high negative predictive value can be used as a screening tool in detecting angle closure. ASOCT on the other hand, having a high specificity can be used to confirm angle closure and detect the mechanism of closure to some extent.

Keywords: Gonioscopy, Van Herick method, Anterior segment optical coherence tomography

INTRODUCTION

Primary angle closure (PAC) is an anatomic disorder. It is characterized by an abnormal relationship between anterior segment structures.[1,2] The mechanism of angle closure can be explained by one or a combination of the following: (1) abnormalities of the size or position of anterior segment structures; (2) abnormal forces in the posterior segment that alter the anatomy of the anterior segment.[3-5]

Primary angle closure glaucoma (PACG) is a very destructive and aggressive type of glaucoma.[1,2,4] It is caused by the appositioning of the peripheral iris against the trabecular meshwork, resulting in the obstruction of aqueous outflow.[6] Approximately 90% of patients with PACG are reported to have relative pupillary block as the underlying mechanism, and laser iridotomy can provide the definitive treatment.[7,8] Therefore, it is very important to diagnose the status of the anterior chamber angle and provide timely treatment for prevention of development of progression of either PAC or PACG.

There are several techniques by which the anatomy and function of aqueous humor dynamics can be assessed. Gonioscopy is regarded as the standard tool for determining angle status. However, gonioscopy has some limitations for assessing anterior chamber angle status. It demands considerable skill, experience and knowledge to achieve a stable, focused image at the proper viewing angle. Also, gonioscopic findings can be affected by inadvertent pressure on the gonioscopic lens and by increased illumination. Furthermore, gonioscopy is a semisubjective technique, so some studies report that even experienced cross-trained examiners achieve only moderate agreement in determining angle width using gonioscopy.[7,9]

Another technique for evaluating the angle is the Van Herick method. This is an estimation of the peripheral anterior chamber depth (ACD) by comparing it with the adjacent corneal thickness. The Van Herick method for the estimation of the chamber angle used in slit lamp examination does not require much time. Moreover, the performance of this test does not represent additional stress to the patient. Thus, the Van Herick method is suitable for a quick and easy assessment of the chamber angle. However, it is also semisubjective and affected by increased illumination.[10,11] The ultrasound biomicroscopy (UBM) and anterior segment optical coherence tonometer (AS-OCT) are imaging devices that allow quantitative analysis of the angle.[12] In comparison with AS-OCT, UBM needs direct contact with the cornea, which may compress the eye ball during examination, and the subject needs to be supine, which may also alter aqueous humor dynamics. These limitations may reduce measurement reproducibility.[13,14]

AS-OCT was designed based on low coherence interferometry, with a superluminescent diode with a wavelength of 1310 nm.[15-17] It has a higher scanning resolution than UBM (axial resolution of 18 mm in AS-OCT vs. 50 mm in UBM). It also allows an objective assessment of the anterior chamber (AC) angle by a complete noncontact approach and is easy to use after minimal training.[17-19] Without the need to position a scanning probe close to the globe, better control of eye accommodation and pupil size is attainable with AS-OCT. These characteristics compare favorably with the current gold standard, gonioscopy, which requires highly trained personnel.

The purpose of this study was to evaluate AC angles using gonioscopy, Van Herick technique and AS-OCT, focusing on their potential role in clinical practice.

MATERIALS AND METHODS

The Cross-sectional study was conducted and patients of more than 40 years of age attending ophthalmology outpatient department at Govt. Medical College, Patiala. 100 patients were included in the study. Data was collected from the patients more than 40 years of age willing to participate in the study. Patient data was collected according to the performa. Medical history and history of any ocular disease was also noted.

Inclusion criteria:

a) Both male and female aged more than 40 years were included from Outpatient Department of Ophthalmology.

b) Patients with history of ocular hypertension.

c) Patients with family history of glaucoma.

Exclusion criteria:

a) Corneal disorders.

b) Recent eye infection.

c) Ocular inflammation with in previous 6 months.

d) Previous refractive surgery.

e) Previous peripheral iridotomy or intraocular surgery.

Informed consent was obtained from all the participants after explaining them the purpose of the study. Inclusion and exclusion criteria were confirmed and assessment of the patient was done as follows:

History

Detailed history was taken including gender, age at presentation, race, health, use of medication and previous ocular history including use of optical aids. Specifically, patients were questioned regarding history of atopy, hay fever, asthma, cardiac disease and family history of glaucoma, Previous history of any refractive surgery and intraocular surgery.

Ocular Examination

a) Recording visual acuity with Snellings chart (In patients with visual acuity <1/60, acuity was recorded as counting fingers at particular distance or hand movements or projection of rays or perception of light.

b) Torch light examination was followed by slit lamp bio microscopic examination. The cornea was examined for classic biomicroscopy signs including; stromal thinning, anterior bulging of cornea, Vogt striae, Fleischer ring, Descmet breaks, apical scars, and subepithelial fibrosis.

c) Gonioscopy: Patients were positioned at the slit lamp in a dim light room as bright light can cause meiosis and open up an Occludable angle. Topical anesthetic was instilled in the both eyes (0.5% proparacaine eye drops) and coupling agent (Viscotears Gel) was applied to the gonioscopy lens. The assessment was carried out with high magnification (x16), a 1 mm beam was reduced to a narrow slit, a vertical beam was offset horizontally to assess the superior and inferior angles and offset vertically for the nasal and temporal angles. The patient was instructed to adopt the primary position. Gonioscopy was carried out in low illumination (<5 lux) and care was taken to prevent light from the slit lamp falling on the pupil during the test. The angle was graded from each quadrant using the modified Shaffer convention, in which each grade corresponds to the visibility of the different angle structures.[20] For the purposes of this study, an eye was defined as "Occludable" if posterior trabecular meshwork is visible in one or more quadrants was graded 0–1. An eye was graded as "open" if the posterior trabecular meshwork is visible in all four quadrants and was graded 2–4.The results of gonioscopy were compared with Van Herick method and AS-OCT by comparison of nasal and temporal angles only.

d) Van Herick method: The van Herick method was based on a comparison of the depth of the anterior chamber to the thickness of the cornea. A narrow vertical beam was directed at the temporal limbus, offset by 60°. The beam was positioned next to the limbus where a clear view of the anterior iris interface, posterior cornea and anterior cornea was visible simultaneously. Van Herick method was carried out in low illumination and care was taken to prevent light from slit lamp falling on pupil during test. The ACA was assessed by estimating the ratio of the peripheral anterior chamber depth to the thickness of the corneal section.[21] Measurements was taken at the temporal and nasal limbus. The angle was graded as one of four categories (van Herick angles 1–4). The eye was defined as occludable (at risk of angle closure) with Van Herick method if the grading was less than 25% for either nasal or temporal angle.

e) Anterior segment optical coherence Tomography imaging: Anterior segment OCT is non-contact and non-invasive optical imaging modality with resolution much higher than ultrasound or biomicroscopy. It is done in sitting position and requires no anaesthesia. The scan zone was centred on the limbus, and the participant was asked to look at the fixation target. Two scans were taken and the scan with the best quality view of the scleral spur was selected for analysis. Scans of the nasal and temporal quadrant images were captured. AS-OCT was carried out in a dark room. The location of the scleral spur is an important anatomical landmark for the evaluation of the anterior chamber angle using AS-OCT. This is at the junction between the inner wall of the trabecular meshwork and the sclera. The anterior chamber angle (ACA), AOD, trabecular iris space area (TISA) at 500 micrometers and 750 micrometers from scleral spur were calculated. An eye was classified as "Occludable" with AS-OCT if any iris contact was visible anterior to the position of the scleral spur for either the nasal or temporal image or both. The eye was graded as open if no iris contact was visible anterior to the scleral spur in either the nasal or temporal image. If the position of the scleral spur is too difficult to estimate for reasons relating to image quality, the angle was graded as „unsure". AS-OCT cut off value was taken less than 15 degree according to the previous study done by Guzman CP et al.[22]

Statistical Analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2010) and then exported to data editor page of SPSS version 20 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics included computation of percentages, means and standard deviations were calculated. The agreement between any two methods of the three criteria, gonioscopy, AS-OCT and the Van Herick method, was calculated using Kappa statistics. Values for specificity, sensitivity were calculated for AS-OCT parameters in all participants. As a subgroup analysis, capability of AS-OCT parameters for detecting angle closure defined by AS-OCT was assessed in narrow-angle patients based on gonioscopy. Statistical test applied for the analysis was t-test. The level of confidence interval and p-value were set at 95% and 5%.

RESULTS

Table 1: Patient characteristics

Age (In Years)	Frequency	Percent
40-50	12	12.0
50-60	37	37.0
60-70	40	40.0
70-80	10	10.0
>80	1	1.0
Gender		
Female	56	56.0
Male	44	44.0

40% of the patients belonged to 60-70 years age group, followed by 50-60 years (37%), 40-50 years (12%), 70-80 years (10%), and >80 years (1%). Majority of the patients belonged to 50-70 years (77%). 56% were females and 44% were male.

Table 2: Right eye parameters with relation to age and gender

		N	Mean	Std. Deviation	P value
Axial Length (AL)	**40-50**	12	22.9533	.65518	**0.07**
	50-60	37	23.6532	.64223	
	60-70	40	23.5085	.70031	
	70-80	10	23.4730	.98010	
	>80	1	23.5500	-	
Lens Thickness (LT)	**40-50**	12	4.0483	.83467	0.95
	50-60	37	4.0784	.69887	
	60-70	40	4.1830	.65630	
	70-80	10	4.1890	.70686	
	>80	1	4.0000	-	
Anterior chamber Depth(ACD)	**40-50**	12	2.6592	.35034	0.12
	50-60	37	2.9854	.42141	
	60-70	40	2.9708	.35455	
	70-80	10	2.9440	.31736	
	>80	1	3.0400	-	
Flat Meridian of the anterior corneal surface (K1)	**40-50**	12	43.7500	1.45384	0.52
	50-60	37	43.9822	1.75317	
	60-70	40	43.8790	1.54361	
	70-80	10	43.0450	1.73260	
	>80	1	45.0000	-	
Steep meridianof the anterior corneal surface (K2)	**40-50**	12	44.0208	1.52799	0.51
	50-60	37	44.4984	1.72677	
	60-70	40	44.4075	1.48616	
	70-80	10	43.6150	2.11516	

	>80	1	45.5000	-	
Gender					
Axial Length (AL)	Male	44	23.6218	.72528	0.11
	Female	56	23.3905	.71181	
Lens Thickness (LT)	Male	44	3.9834	.70168	0.06
	Female	56	4.2396	.66188	
Anterior chamber Depth(ACD)	Male	44	3.0043	.33763	0.12
	Female	56	2.8837	.41257	
Flat Meridian of the anterior corneal surface (K1)	Male	44	43.2216	1.42433	**0.001 (S)**
	Female	56	44.3071	1.63001	
Steep meridianof the anterior corneal surface (K2)	Male	44	43.7350	1.49214	**0.001 (S)**
	Female	56	44.7911	1.62439	

The relation of age was not found statistically significant with axial length, anterior chamber depth, lens thickness, steep and flat meridian of the anterior corneal surface of right eye. Relation of right eye with flat and steep meridian of the anterior corneal surface was found statistically significant with gender distribution but not with axial length, anterior chamber depth, and lens thickness. In males, mean flat and steep meridian of the anterior corneal surface in right eye was 43.2216+1.42433 and 43.7350+1.49214, respectively. In females, mean flat and steep meridian of the anterior corneal surface in right eye was 44.3071+1.63001 and 44.7911+1.62439, respectively.

Table 3: Left eye parameters with relation to age and gender

		N	Mean	Std. Deviation	P value
Axial Length(AL)	**40-50**	12	22.9867	.65604	0.103
	50-60	37	23.6622	.59719	
	60-70	40	23.5968	.77914	
	70-80	10	23.4470	1.14403	
	>80	1	23.5600	-	
Lens Thickness	**40-50**	12	4.3450	.67246	
	50-60	37	4.1076	.58929	

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(LT)	**60-70**	40	4.3023	.63344	0.67
	70-80	10	4.2300	.75786	
	>80	1	4.4000	-	
Anterior chamber Depth (ACD)	**40-50**	12	2.6542	.34674	0.006 (S)
	50-60	37	3.1049	.35226	
	60-70	40	2.9933	.33409	
	70-80	10	2.8750	.49758	
	>80	1	3.1200	.	
Flat Meridian of the anterior corneal surface (K1)	**40-50**	12	43.8750	1.60078	0.36
	50-60	37	44.1068	1.60599	
	60-70	40	44.0938	1.52089	
	70-80	10	43.2750	1.86879	
	>80	1	46.2500	.	
Steep meridian of the anterior corneal surface (K2)	**40-50**	12	44.2917	1.54785	0.35
	50-60	37	44.6368	1.68514	
	60-70	40	44.5283	1.43262	
	70-80	10	43.8000	1.85891	
	>80	1	46.7500	-	
Gender					
Axial Length (AL)	Male	44	23.5777	0.78040	0.6
	Female	56	23.4968	0.75214	
Lens Thickness (LT)	Male	44	4.1064	0.59870	0.08
	Female	56	4.3255	0.64170	
Anterior chamber Depth (ACD)	Male	44	3.0214	0.39868	0.37
	Female	56	2.9534	0.36703	
Flat Meridian of the anterior corneal surface (K1)	Male	44	43.3989	1.48295	**0.001 (S)**
	Female	56	44.4938	1.53650	
Steep meridian of the anterior corneal surface (K2)	Male	44	43.8764	1.42085	**0.001 (S)**
	Female	56	44.9711	1.56430	

The relation of age was found statistically significant with anterior chamber depth of left eye but not with axial length, lens thickness, steep and flat meridian of the anterior corneal surface. Relation of left eye with flat and steep meridian of the anterior corneal surface was found statistically significant with gender distribution but not with axial length, anterior chamber depth, and lens thickness. In males, mean flat and steep meridian of the anterior corneal surface in left eye was 43.3989+1.48295 and 43.8764+1.42085, respectively. In females, mean flat and steep meridian of the anterior corneal surface in left eye was 44.4938+1.53650 and 44.9711+1.56430, respectively.

Table 4: Distribution according to VH grading and Shaffer's grading

VH Grading	**Nasal**		**Temporal**	
	Frequency	**Percent**	**Frequency**	**Percent**
0	5	2.5	5	2.5
1	17	8.5	19	9.5
2	20	10.0	20	10.0
3	106	53.0	104	52.0
4	52	26.0	52	26.0
Shaffers Grading	**Nasal**		**Temporal**	
0	2	1.0	2	1.0
1	11	5.5	11	5.5
2	22	11.0	22	11.0
3	98	49.0	98	49.0
4	67	33.5	67	33.5

53% patients had VH grading (nasal) 3 followed by grade 4 (26%), grade 2 (10%), grade 1 (8.5%), and grade 0 (2.5%). 52% patients had VH grading (Temporal) 3 followed by grade 4 (26%), grade 2 (10%), grade 1 (9.5%), and grade 0 (2.5%). The agreement value between the nasal and temporal VH grading was found to be 98%. 49% patients had Shafer's grading (Nasal) 3, 33.5% had grade 4, 11% had grade 2, 5.5% had grade 1, and 1% had grade zero. Similar results were found for Shafer's grading (Temporal). On grading the nasal angle and temporal angle, 49% had grade 3 Shafer's, 33.5% had grade 4 Shafer's, and 17.5% had grade 2 or less on Shafer's grading.

Table 5: Distribution of closed and open type according to ACA 500 on AS-OCT and according to ACA750 ON AS-OCT

ACA 500	Nasal		Temporal	
	Frequency	**Percent**	**Frequency**	**Percent**
Closed angle (<15^0)	19	9.5	19	9.5
Open angle (≥15^0)	181	90.5	181	90.5
ACA 750				
Closed angle (<15^0)	20	10.0	19	9.5
Open angle (≥15^0)	180	90.0	181	90.5

90.5% patients had ≥150 angle and 9.5% had <150 angle (Nasal as well as temporal). According to ACA750 (Nasal) angle, 90% were open and 10% were close. While 90.5% were open and 9.5% were closed according to temporal angles. There was no significant difference in angle closure between temporal and nasal angles on ACA750. (P-value=1).

Table 6: Comparison of mean values of nasal and temporal components for TISA500 and TISA750

TISA 500 (mm^2)	Mean	Std. Deviation	P value
Nasal	0.1781	0.06511	**0.001 (S)**
Temporal	0.2008	0.06857	
Total	0.1894	0.06774	
TISA 750 (mm2)			
Nasal	0.3008	0.10536	0.12
Temporal	0.3180	0.11546	
Total	0.3094	0.11072	

Mean TISA500 (Nasal) was 0.1781+0.06511 and mean TISA (Temporal) was 0.2008+0.06857. Overall, it was 0.1894+0.06774. The nasal quadrant had significantly lower TISA (500) Compared for Temporal TISA P value 0.0001(S). Mean TISA 750 (nasal) was 0.3008+0.10536 and mean TISA 750 (temporal) was 0.3180+0.11546. Overall, it was 0.3094+0.11072 with a p-value of 0.12.

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Table 7: Mean values of nasal and temporal components for AOD500 and AOD750 on AS-OCT

AOD 500 (μm)	Mean	Std. Deviation	P value
Nasal	428.6550	140.28620	0.52
Temporal	437.7550	143.46206	
Total	433.2050	141.77832	
AOD 750 (μm)			
Nasal	556.12	207.91585	0.001 (S)
Temporal	631.44	220.12460	
Total	593.78	217.13788	

Mean AOD500 (Nasal) was 428.65+140.29 and mean AOD500 (Temporal) was 437.75+143.46. Overall, it was 433.20+141.78. Mean AOD 750 (nasal) was 556.12+207.91585 and mean AOD 750 (temporal) was 631.44+0220.12460. Overall, it was 593.78+217.13788 with a p-value of 0.001.

Table 8: Relation of VH grading (Nasal) and Shafer's Grading (Nasal)

Statistic	Value	95% CI
Sensitivity	89.47%	66.86% to 98.70%
Specificity	86.19%	80.29% to 90.86%
Positive Predictive Value	40.48%	31.41% to 50.24%
Negative Predictive Value	98.73%	95.45% to 99.66%
Accuracy	86.50%	80.97% to 90.91%

In this case, sensitivity was found 89.47% (95% Cl; 66.86%-98.70%) and specificity was 86.19% (95% Cl; 80.29%-90.86%) with a PPV of 40.48% and NPV of 98.73%. The accuracy was 86.50%

Table 9: Relation of VH grading (Temporal) and Shafer's Grading (Temporal)

Statistic	Value	95% CI
Sensitivity	100.00%	75.29% to 100.00%
Specificity	83.60%	77.53% to 88.58%
Positive Predictive Value	29.55%	23.31% to 36.65%
Negative Predictive Value	100.00%	
Accuracy	84.65%	78.93% to 89.33%

In this case, sensitivity was found 100% (95% Cl; 75.29%-100%) and specificity was 83.60% (95% Cl; 77.53%-88.58%) with a PPV of 29.55% and NPV of 100%. The accuracy was 84.65%.

DISCUSSION

Evaluation of the anterior chamber angle (ACA) is an essential part of the ophthalmological examination, instrumental to achieve pertinent relevant information on glaucoma patients as well as on non-glaucomatous subjects.[23] In patients with glaucoma or glaucoma suspicion, a careful assessment of the ACA should always be performed, allowing direct visualization of the main structures cause of the aqueous humor drainage, directly affecting intraocular pressure.[23,24]

In this cross-sectional study, patients of age >40 years attending the Outpatient Department of Ophthalmology, Government Medical College, Patiala were included fulfilling inclusion criteria were included. In the present study, 40% of the patients belonged to 60-70 years age group followed by 50-60 years (37%), 40-50 years (12%), 70-80 years (10%), and >80 years (1%). Mean age was 61.57±8.08 years. In the similar study done by Park SB et al.[25] Mean age was 66.0 ± 10.1 years. Of the subjects in present study, 230 (32.4%) were male and 479 (67.6%) were female. 56% were females and 44% were males in the present study i.e. females were in majority similar to studies done by Xu B.Y. et al[26] in which 32.4% were male and 67.6% were female.

Several gonioscopic grading systems have been proposed, with the goal of classifying the ACA. The Shaffer‟s and the Scheie‟s grading systems evaluate the degree of angle opening, while the Spaeths system also takes iris insertion and iris configuration into account. Shaffer‟s classification model is the most widespread in clinical practice, and differentiates among 5 grades of angle opening (0–4), 0 and 4, indicating irido-corneal contact and an identifiable CB, respectively.[27] Therefore in this study, Shaffer‟s grading system was taken as the gold standard and other grading systems were compared and analyzed.

In the present study, 49% patients had Shaffer’s grading (Nasal) 3, 33.5% had grade 4, 11% had grade 2, 5.5% had grade 1, and 1% had grade zero. Similar results were found for Shaffer’s grading (Temporal). Overall, 79% patients had VH grading (Nasal) 3- 4 i.e. open and 21% had grading 0-2 i.e. closed angle. 78% patients had VH grading (Temporal) 3-4 i.e. open angle and 12% had grading 0-2 i.e. closed angle. There was statistically significant difference between these two methods either nasally and temporally (p<0.001). In study done by Fredrik PK et al.[28] the mean ACA measured by gonioscopy and the van Herick technique differed by 0.12 nasally and by 0.04 temporally. No statistically significant difference could be found between these two methods (p = 0.45) either nasally (p = 0.20) or temporally (p = 0.68). Our finding is in good agreement with the results of the study by Foster et al.[9] where they also show good agreement between gonioscopy and van Herick technique especially for eyes having grade 4. In a study by Sakata et al. poor agreement between gonioscopy and AS-OCT is reported for superior and inferior angles, but the agreement for nasal and temporal angle is reported to be good.[29] They also stated that AS-OCT tends to detect more closed ACAs than gonioscopy which can partly be seen in our study too. When comparing the mean ACA values obtained by gonioscopy to that obtained by AS-OCT, it can be seen that AS-OCT measures the angle 0.14 nasally and 0.08 temporally narrower than gonioscopy.

Patel et al.[30] examined patients of angle closure glaucoma with gonioscopy and AS OCT, it was observed that AS-OCT is a rapid noncontact method of imaging angle structures. AS-OCT is highly sensitive in detecting angle closure when compared with gonioscopy as more persons are found to have closed angles with AS-OCT than with gonioscopy. In the study done by Nolan WP et al.[31], a closed angle in one or more of the inferior, nasal, and temporal quadrants was found in 152 eyes (44.4%) on gonioscopy (posterior trabecular meshwork not visible; Spaeth, 0°) and in 228 eyes (66.7%) on AS-OCT examination. In 143 eyes, there is agreement between the 2 methods in detecting angle closure. Using gonioscopy as a reference standard results in AS-OCT having a sensitivity of 98%. They also assessed the data using AS-OCT as the reference standard to examine the performance of gonioscopy, we find that gonioscopy has low sensitivity (68.3%) and high specificity (96.6%).

CONCLUSION

The van Herick method appears to have good sensitivity and specificity, whereas the AS-OCT method has poor sensitivity, yet high specificity. The Van Herick method, because of its high sensitivity and high negative predictive value can be used as a screening tool in detecting angle closure. ASOCT on the other hand, having a high specificity can be used to confirm angle closure and detect the mechanism of closure to some extent. At present, Gonioscopy is a mandatory tool in the evaluation of anterior chamber angle assessment and none of the above-mentioned investigations can replace it.

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