



ROLE OF ANTERIOR SEGMENT SPECTRAL DOMAIN OCT VS GONIOSCOPY IN DETECTING PRIMARY ANGLE CLOSURE IN A TERTIARY CARE CENTER IN UPPER ASSAM.

Ophthalmology

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ABSTRACT

Objective- To evaluate anterior chamber angle to detect primary angle closure using anterior segment SD OCT vs Gonioscopy in a Tertiary Care Centre in upper assam. **Materials and methods-** 30 eyes of 20 patients were examined. All patients underwent comprehensive ocular examination, which included best corrected visual acuity, slit lamp examination, dilated fundus examination, intraocular pressure (IOP) measurement by Goldmann applanation tonometer, and gonioscopy. Consecutive patients fulfilling the inclusion and exclusion criteria were selected. After this, AS SD OCT was performed. **Results** A total of 30 eyes of 20 patients were examined over a period of six months. The mean age was found to be 50.75 ± 12.05 years. Out of 120 quadrants examined, primary angle closure was found in 75 quadrants in the gonioscopy (PTM not visible) and in 85 quadrants in the anterior segment OCT (Iridotrabecular contact). Overall sensitivity was found to be 95%, and specificity was found to be 70%. The mean trabecular iris angle and angle opening distance at 500 μ m were found to be 10 degrees and 185 μ m respectively. **Conclusion** Anterior segment SD OCT is a very sensitive tool that can act as a good screening tool for detecting angle closure.

KEYWORDS

Anterior segment OCT, Gonioscopy, Primary angle closure, Iridotrabecular contact, Angle opening distance, Trabecular iris angle

INTRODUCTION

An important first step in the diagnosis of glaucoma, particularly for angle-closure variations, is the visualisation of the anterior chamber (AC) angle. The clinical gold standard for the diagnosis of narrow angles is still gonioscopy, however, there are many limitations to this procedure. Gonioscopy is a subjective procedure that largely depends on the cooperation of the patient, the examiner's ability, and interpretation. A closed or narrow angle could mistakenly appear open if the examiner applies too much pressure during the dynamic gonioscopy test or if too much light is thrown into the patient's eye^{1,2}

MATERIALS AND METHODS

AIM AND OBJECTIVE

To evaluate anterior chamber angle to detect primary angle closure using anterior segment SD OCT vs Gonioscopy in a Tertiary Care Centre in upper assam.

Inclusion criteria

Age > 18 years and posterior TM not visible on gonioscopy in ≥ 1 quadrant (superior, inferior, nasal, or temporal)

Exclusion criteria

Pseudophakia, Previous glaucoma surgery, Intumescent cataract, Mature and Hyper mature cataract, High myopia, Ocular trauma, and Major intra ocular eye disease.

MATERIALS AND METHODS

30 eyes of 20 patients were examined. All patients underwent comprehensive ocular examination, which included best corrected visual acuity, slit lamp examination, dilated fundus examination, intraocular pressure (IOP) measurement by Goldmann applanation tonometer, and gonioscopy. Consecutive patients fulfilling the inclusion and exclusion criteria were selected. After this, AS SD OCT was performed. The results were tabulated below. The duration of the study was six months. The data were analysed using Microsoft excel 2021. Informed consent was obtained. This study was approved by the research and ethics committee of the institute.

Method of Gonioscopy Examination

Gonioscopy was performed in the dark room. A 1-mm light beam was reduced to a very narrow slit and was cast over the angle, avoiding direct illumination over the pupil. Gonioscopy was performed using a Sussman 4-mirror lens at high magnification, with the eye in the primary position of gaze. The anterior chamber angle in each (superior, inferior, nasal, and temporal) quadrant was graded using the Shaffer's grading system according to the anatomic structures observed during

gonioscopy. Primary angle closure was defined as any quadrant where pigmented trabecular meshwork was not visible.

Method of Anterior Segment Optical Coherence Tomography Examination

Anterior segment imaging was obtained using a commercially available AS SD OCT (Topcon Maestro 2). The examination was done in a sitting position in a dark room. AS OCT of the anterior chamber angle of each eye was obtained in the 12 o'clock, 3 o'clock, 6 o'clock, and 9 o'clock positions. The scleral spur was used as a reference point for the anterior segment assessment of the angle. Any iridotrabecular contact anterior to the Scleral Spur was considered a primary angle closure when utilising SD OCT. The biometric analysis of the AC angle requires a reference landmark from which the angle measurements are derived. Typically, the scleral spur is used as a reference point for parameters such as the iris area and volume,^{3,4} angle opening distance (AOD) and Trabecular Iris Angle (TIA)⁵

Angle opening distance (AOD) is the linear distance between the point of the inner corneoscleral wall and the iris. Angle-opening distance (AOD 500) - is calculated as the perpendicular distance measured from the trabecular meshwork at 500 μ m anterior to the scleral spur to the anterior iris surface and Trabecular iris angle (TIA) is defined as an angle measured with the apex in the iris recess and the arms of the angle passing through a point on the trabecular meshwork 500 μ m from the scleral spur and the point on the iris perpendicularly¹.

RESULTS AND OBSERVATIONS

The case selection, investigations, and documentation of results were carried out as per the materials and methods of the study. A total of 30 eyes of 20 patients were examined over a period of six months. The following observations were made from the present study, and the results are tabulated.

Table-1 Frequency distribution-age wise

Age group (in years)	No. of patients	Percentage
18-30	1	5
31-40	3	15
41-50	6	30
51-60	5	25
>60	5	25
Total	20	100
Mean $\pm$ S.D	50.75 $\pm$ 12.05 years	

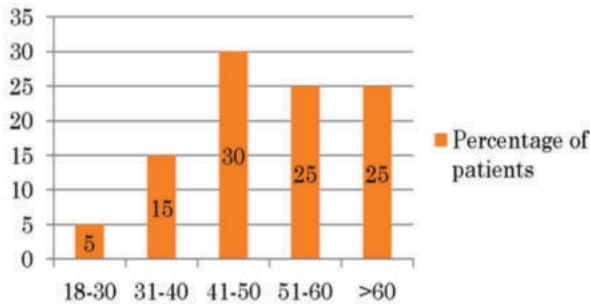


Figure-1 Distribution of study group based on age (years)

Table-2 Frequency distribution – sex-wise

Sex	NO. OF PATIENTS	PERCENTAGE	RATIO (MALE:FEMALE)
Male	9	45	1
Female	11	55	1.2
Total	20	100	1:1.2

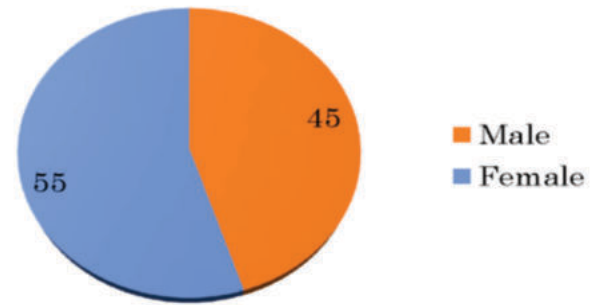


Figure-2 Distribution of study group based on gender

Table-3 Frequency distribution of primary angle closure as observed in number of quadrants during Gonioscopy and Anterior Segment OCT

No. of Quadrants	Gonioscopy (PTM not visible) No. of eyes	Percentage	AS-OCT- Iridotrabecular Contact	Percentage
4	7	23%	10	33%
3	6	20%	10	33%
2	12	40%	5	17%
1	5	17%	5	17%
Total	30	100	30	100

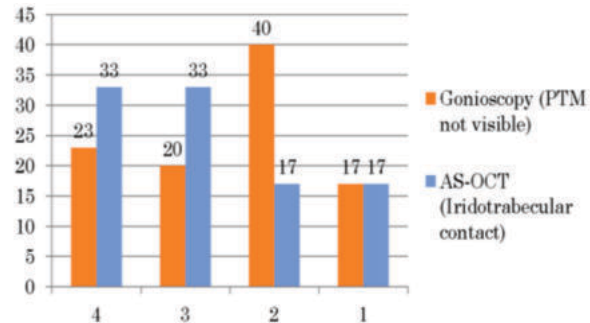


Figure-3 Distribution of primary angle closure as observed in number of quadrants during Gonioscopy and Anterior Segment OCT

Table-4 Frequency of Distribution of Agreement in demonstrating primary angle closure as observed in each quadrant during Gonioscopy and Anterior Segment OCT

Angle Quadrant	Gonioscopy (PTM not visible)	AS OCT (Iridotrabecular contact)
Superior	21	21
Inferior	21	23
Nasal	18	18
Temporal	15	18
Total	75	85

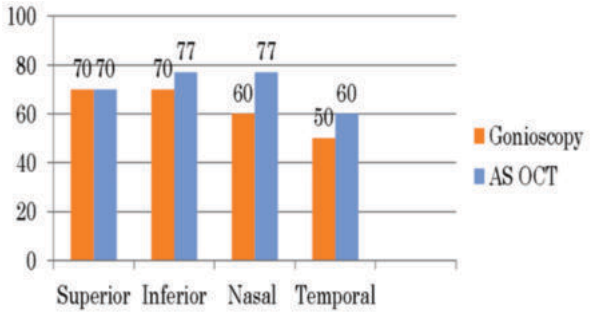


Figure-4 Distribution of Percent Agreement in demonstrating primary angle closure as observed in each quadrant during Gonioscopy and Anterior Segment OCT

Table-5 Sensitivity (%) and Specificity (%) of Anterior Segment OCT (Quadrantwise)

Quadrant	Sensitivity (%)	Specificity (%)
Superior	90	78
Inferior	95	75
Nasal	94	50
Temporal	100	80

Table-6 Sensitivity (%) and Specificity (%) of Anterior Segment OCT (Overall)

Quadrant	Sensitivity (%)	Specificity (%)
Superior	95%	70%
Inferior		
Nasal		
Temporal		

Table-7 Mean Trabecular iris angle 500 in degrees and angle opening distance 500

No. of Quadrants	AS OCT- Trabecular Iris Angle 500 in Degrees Mean	AS OCT- Angle opening distance 500 µm Mean
Superior	11	174
Inferior	8	169
Nasal	8	180
Temporal	15	220
Total	10	185

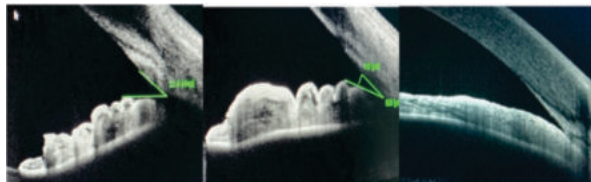


Figure-5 Trabecular iris angle (32.6 degrees), Angle opening distance (118 μ m) and Trabecular iris contact in anterior segment spectral domain oct (left to right).

DISCUSSION

The present study was a hospital based cross-sectional study conducted in tertiary care hospital to evaluate the anterior chamber angle to detect primary angle closure using anterior segment spectral domain OCT vs gonioscopy in a tertiary care centre in upper Assam. A total of 30 eyes of 20 patients were examined over a period of six months. The mean age was found to be 50.75 ± 12.05 years, with the maximum number of patients in the age group of 41–50 years. The male-to-female ratio was found to be 1:1.2 (males were 45% and females were 55%). Out of 120 quadrants examined, primary angle closure was found in 75 quadrants in the gonioscopy (PTM not visible) and in 85 quadrants in the anterior segment OCT (Iridotrabecular contact). The sensitivity of anterior segment OCT against gonioscopy in detecting primary angle closure was found to be 90% in the superior quadrant, 95% in the inferior quadrant, 94% in the nasal quadrant, and 100% in the temporal quadrant, whereas the specificity was found to be 78% in the superior quadrant, 75% in the inferior quadrant, 50% in the nasal quadrant, and 80% in temporal quadrant. Overall sensitivity was found to be 95%, and specificity was found to be 70%. The mean trabecular iris angle and angle opening distance at 500 μ m were found to be 10 degrees and 185 μ m respectively. Similar gonioscopic and anterior segment criteria for primary angle closure were used by Wong *et al*⁶, Khor *et al*⁷ and Sakata *et al*⁸ previously in their studies. Shaffers' grading for gonioscopy was also used by Radhakrishnan *et al*⁹. AOD 500 was used by Li *et al*¹⁰, Melese *et al*¹¹, Grewal *et al*¹² and Narayanaswamy *et al*¹³. Sakata *et al*⁸ in their study found sensitivity of 97% and specificity of 51% whereas Nongpiur *et al*¹⁴ found sensitivity of 96% and specificity of 75%. Sensitivity of these two studies were near to our (95%) study. Higher sensitivity in our study might be due to the inclusion of only those patients where the scleral spur was localised on the anterior segment oct. Many other studies that were done previously found a sensitivity of less than 90%. Angles that were open on gonioscopy but closed on AS OCT imaging have also caused some discrepancy, which may be related to the enhanced illumination conditions or an unintentional indentation during gonioscopy that could cause artificial angle opening.

CONCLUSION

Anterior segment SD OCT is a very sensitive tool that can act as a good screening tool for detecting angle closure. It is a non contact method that is faster than gonioscopy and detects angle closure in more patients than gonioscopy. It is an objective tool that uses a quantitative method of analysing the AC angle.

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