SJIF Impact Factor: 5.464

WORLD JOURNAL OF ADVANCE HEALTHCARE RESEARCH

ISSN: 2457-0400
Volume: 5.
Issue: 2.
Page N. 298-300
Year: 2021

Original Article www.wjahr.com

COMPARISON OF ANTERIOR CHAMBER DEPTH (ACD) USING CONTACT ULTRASOUND A-SCAN AND CORNEAL TOPOGRAPHY

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Received date: 20 February 2021 **Revised date:** 11 March 2021 **Accepted date:** 31 March 2021

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ABSTRACT

Purpose: To compare the anterior chamber depth (ACD) using contact ultrasound A-scan and optical measurements (SIRIUS). **Methods:** 105 eyes of 55 patients were included in this study, ACD estimation was measured using contact ultrasound A-scan (AVISO) and then using corneal topography (SIRIUS). the Intra Ocular Lens (IOL) power was calculated using Haigis formula with anterior chamber depth measured by SIRIUS and AVISO and the results were compared. we also studied the correlation between central corneal thickness and the differences in ACD between the two devices was studied using Pearson Correlation. **Results:** Mean anterior chamber depth (ACD) using contact ultrasound A-scan and corneal topography (SIRIUS) was 3.3±0.3 and 3.6±0.3 respectively (p=0.0001). Mean IOL power (Haigis) using contact ultrasound A-scan and corneal topography (SIRIUS) was 22.01±3.3 and 21.3±3.3 respectively (p=0.01). negative correlation was found between central corneal thickness and the differences in ACD measurements. **Conclusion:** Contact ultrasound A-scan(AVISO) gives consistently lower measurements for ACD compared to corneal topography (SIRIUS) and Such a difference between the measurement systems also does not significantly affect the IOL power.

KEYWORDS: Using contact Ultrasound A-scan, the anterior chamber depth (ACD), corneal topography, IOL power.

1. INTRODUCTION

Anterior chamber depth (ACD) measurement gives important details in cataract surgery (biometric formulas) or in glaucoma (epidemiological studies, laser or surgical procedures). This quantitative measurement is also strictly required to perform phakic anterior chamber lens (PACL) implant.[1]

An anterior chamber depth (ACD) of less than 2.5 mm predisposes patients to Primary Anterior Camber Closer (PAC); in fact, in most patients with PAC, the ACD is less than 2.1 mm. Improvements in ocular biometry techniques have allowed researchers to demonstrate a clear association between ACD and Primary Anterior Chamber suspected (PAS). While primary PAS seem to be uncommon in eyes whose ACD is greater than 2.4mm, there is a strong correlation of increasing PAS formation with an ACD of less than 2.4 mm.[2]

Intraocular lens (IOL) power calculation formulas have evolved over the past 30 years to improve the refractive outcome of modern cataract surgery. Studies have reported that every 1 mm deviation of the corneal diameter, Axial Length, and ACD can result in 5.7 D, 2.7 D, and 1.5 D of refractive error, respectively.[3]

Contact ultrasound is the most common method currently used but it can be affected by various factors such as experience of the operator, and it increase the chance of corneal abrasion and infections, and the difficulty in quickly sterilizing the contact probe to an acceptable degree make non-contact optical devices a popular alternative.[4]

2. MATERIALS AND METHODS

ACD were measured in 105 eyes of 55 patients (18 males, 37 females) using the SIRIUS Scheimpflug system (CSO, Italy) and ultrasound measurements (AVISO, Italy) respectively.

Inclusion criteria were no corneal pathology or corneal scarring, no previous ocular surgery, no ocular pathology affect the accuracy of topography. After the purpose and procedures used in the study were fully explained, each

subject gave their informed consent. The same observer performed all measurements.

The Intra Ocular Lens (IOL) power was calculated using Haigis formula with anterior chamber depth measured by SIRIUS and AVISO and the results were compared.

All data were collected in an Excel database and transferred to SPSS (SPSS for Windows, version 15.0, SPSS Inc, Chicago, IL, USA) for data analysis. A paired T-test was used to compare the mean values of the studied variables and Pearson Correlation was used to find the Correlation between the Central Corneal thickness and the difference in ACD between the two devices. A P-value was considered statistically significant. The power of the study = 90%. α=5%.

3. RESULTS

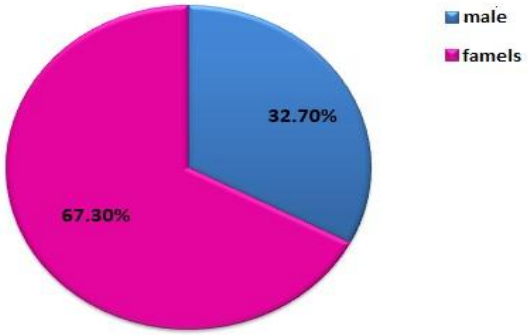

Figure 1: The distribution of the sample between the two sexes.

There were 18 males (32.7%) and 37 females (67.3%). The mean age of the patients was 36.3 ± 9.6 years (range 21 – 53 years). The mean CCT of patients was 535.6 ± 31.2 (range 459 – 595 µm). (Table 1)

Table 1: the mean age and CCT of the sample.

The variant	Mean ± SD	Range
Age(year)	36.3 ± 9.6	21 – 53
CCT(µm)	535.6±31.	459 – 595

Table 2: the Mean of the ACD using SIRIUS and A- scan

The Device	Mean ± SD(ACD) (mm)	Range	P-value(mm)
topography	**3.6±0.3**	**2.86 – 4.30**	**0.0001**
A-scan	**3.3±0.3**	**2.51 – 4.13**	

A negative Correlation between the Central Corneal thickness and the difference in ACD between the two devices was found (p-value=0.01) (r= - 0.4) (Figure 2.

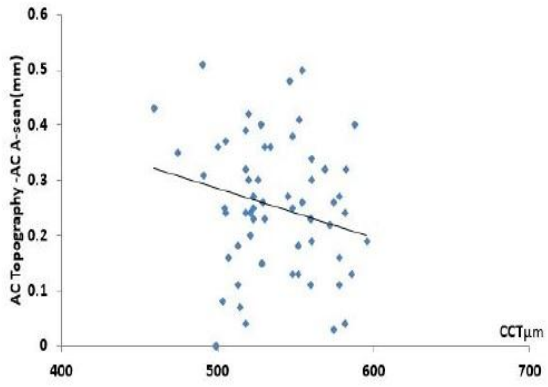

Figure 2: Negative Correlation between the Central Corneal thickness and the difference in ACD between the two devices.

4. DISCUSSION

We found statistically significant difference between the ACD measurement by the two methods and the ACD using the contact A-scan were 0.3mm shorter than the ACD measured by the topography (Table 2).

We also found that mean IOL power (Haigis) using contact ultrasound A-scan and corneal topography (SIRIUS) was 22.01±3.3 and 21.3±3.3 respectively (p=0.01) so the difference was 0.71 Diopter.

This results are in agreement with <Aravind R. Reddy et al> study where they found Mean contact.

A-scan measurements were 0.40 mm and 0.43 mm lower than by Orbscan II (*P*=.01).[4] <Winai Chaidaroon et al> also found that The difference of mean ACD values between the ultrasound (3.02 +/- 0.37 mm) and Orbscan (3.56 +/- 0.42 mm) method was statistically significant difference (p < 0.0001).[5]

We think that the cause of this difference is the compression of the eye using applanation A-scan so this difference may disappear if we use immersion technique <Giers, Ulrich et al> found that A-scan with applanation technique is always shorter than immersion technique.[6]

We have not found any study that compared the IOL power using the two methods except < Michele V et al's> where they concluded that Such a difference between the measurement systems does not affect the safety of the implant: in fact, it does not significantly change the power of intraocular lens.[1]

As for the relationship between the difference found in ACD between the SIRIUS and A-scan and the CCT, our results matched those of the studies that found that rise in CCT causes elevation in IOP using Goldmann applanation technique due to the need for more indentation.[7]

5. CONCLUSION

Applanation ultrasound gives consistently lower measurements for ACD compared to SIRIUS and this difference does not significantly change the power of intraocular lens.

6. REFERENCES

1. Vetrugno M. , Cardascia N. ,and Cardia L. .[Anterior chamber depth measured by two methods in myopic and hyperopic phakic IOL implant].Br J Ophthalmol, 2000; 84(10): 1113–1116.
2. American Academy of Ophthalmology. From BCSC Section 10, Glaucoma, 2016-2017.
3. Miraftab M., Hashem H. [Effect of anterior chamber depth on the choice of intraocular lens calculation formula in patients with normal axial length**]** Middle East Afr J Ophthalmol, 2014 Oct-Dec; 21(4): 307–311.
4. Reddy A., pande M., Finn P., El-Gogary. H. [Comparative estimation of anterior chamber depth by ultrasonography, Orbscan, and IOL Master].Cataract Refract Surg, 2004 Jun; 30(6): 1268-71.
5. Chaidaroon W, Jengjalern A .[Comparison of anterior chamber depth in healthy myopic Thai eye using Orbscan and ultrasound]. J Med Assoc Thai, 2005 Oct; 88(10): 1362-6.
6. Ulrich G. Claudia E. [Comparison of A-scan device accuracy]. Journal of Cataract & Refractive Surgery, 1990 Mar; 16(2): 235-42.
7. Hoffmann E. et al.[Distribution of central corneal thickness and its association with ocular parameters in a large central european cohort]. PLoS One, 2013 Aug 1; 8(8): e66158.