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Original Research Paper

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EVALUATION OF THE ANTERIOR CHAMBER PARAMETERS AFTER LASER IRIDOTOMY IN PRIMARY ANGLE CLOSURE SUSPECT: PENTACAM AND GONIOSCOPY STUDY.

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ABSTRACT

Laser peripheral iridotomy (LPI) is a standard prophylactic procedure for primary angle closure suspect (PACS) This prospective interventional study was done on 60 randomly selected PACS to evaluate the effect of LPI on anterior chamber parameters (ACP) using pentacam and gonioscopy. Anterior chamber(AC) angle (ACA), AC depth(ACD), AC volume (ACV), central corneal thickness (CCT) and pupil diameter (PD) were estimated using pentacam whereas ACA grading was done by gonioscopy before and one month after LPI. The paired samples t-test was used to compare the difference in ACP while Wilcoxson signed- rank test was used to assess the ACA grading before and after LPI. ACA and ACV increased significantly ($p=0.00$) while the changes in ACD, CCT and PD were insignificant ($p>0.05$). Gonioscopy showed significant widening of the angle in four quandrants ($p<0.001$).

Conclusion : Noninvasive pentacam can provide valuable information in assessing the efficacy of LPI.

KEYWORDS : laser iridotomy, pentacam, gonioscopy.

INTRODUCTION:

Glaucoma is the leading cause of irreversible blindness worldwide and is second only to cataract as the most common cause of blindness overall.1 The International Society of Ophthalmic Epidemiology developed a classification based on the natural history of the disease.[2]

A) Primary angle closure suspect (PACS)- an eye in which appositional contact between the peripheral iris and posterior trabecular meshwork is present or considered possible, in the absence of elevated intraocular pressure (IOP), peripheral anterior synechiae (PAS), disc or visual field changes.

B) Primary angle closure (PAC)- PACS with statistically raised IOP and/or primary PAS, without disc or visual field changes.

C) Primary angle closure glaucoma (PACG)- PAC with glaucomatous optic neuropathy and corresponding visual field loss. The Goldmann gonioscopy is the gold standard in assessment of the anterior chamber angle and one of its most popular classifications was introduced by Shaffer 3 which are :

1) Grade 4 (35-45o) is the widest angle; ciliary body can be visualized without tilting the lens.

2) Grade 3 (25-35o) is an open angle in which the sclera spur is visible.

3) Grade 2 (10-20o) is an angle in which the trabeculum but not the sclera spur can be seen.

4) Grade 1 (10o) ia a very narrow angle in which only schwalbe line can be seen.

5) Grade 0 (0o) is closed angle due to iridocorneal contact.

Pentacam is a Scheimpflug based system for imaging the anterior segment of eye. Non-contact measuring process takes 2seconds and performs 12 to 50 single capture.4 Morphometric variables such as the anterior chamber angle (ACA), anterior chamber volume (ACV) and anterior chamber depth (ACD) can be derived repeatedly using the software.5,6

Nowdays, Laser peripheral iridotomy (LPI) has been proposed as the standard prophylactic option for PACS and a treatment option PACG.7-9 It creates an opening hole on the peripheral iris to eliminate the pupillary block. Thus, flattens iris convexity, increases ACA, and reduces appositional angle closure.Although prophylactic efficacy of the LPI has been proven in different studies, yet the outcome in asymptomatic cases highly depends on the nature of the closed angle and the stage of the disease.[10]

The proposed study is an endevoure to find out the efficacy of laser iridotomy as a newly emerging method for the prophylaxis in glaucoma suspects.

AIMS AND OBJECTIVES

1. To evaulate the anterior chamber parameters after laser iridotomy in primary angle closure suspect using pentacam and Goldmann gonioscopic contact lenses.

2. To study whether pentacam can serve as the objective instrument in assessing the efficacy of laser iridotomy.

MATERIAL AND METHODS

A total of 60 PACS cases visiting the RIO, GMC, Amritsar, from January 2016 to December 2016 were randomly selected after informed consent for the study .A detailed history and clinical examination was done in respect of:

1. Best corrected visual acuity (BCVA)
2. Slit lamp biomicroscopic examination.
3. Intraocular Pressure (IOP) by Goldmann applanation tonometer.
4. Fundus examination
5. Visual field examination (Humphery, Zeiss).
6. Anterior segment parameters by pentacam.

7. Status of angle of anterior chamber by Goldmann gonioscopic contact lenses.

INCLUSION CRITERIA:

a) Criteria for PACS :

1. 180 degrees or more of the posterior trabecular meshwork was not visible on gonioscopy.
2. IOP < 21 mmHg.
3. No peripheral anterior synechiae .
4. Normal cup disc ratio and visual field.

b) Patient fit to undergo LPI irrespective of age and sex.

EXCLUSION CRITERIA:

1. Patients with past history of glaucoma, ocular hypertension, trauma, corneal disease e.g. keratoconus, pterygium or corneal opacity,or previous laser treatment.

Each of the suspected cases was subjected to estimation of anterior chamber angle (ACA),central anterior chamber depth anterior chamber volume (ACV), central corneal thickness (CCT) and pupil diameter (PD) by pentacam. Anterior chamber angle (ACA) was recorded in 4 quadrants (superior, inferior,nasal and temporal) using the Goldmann gonioscopic contact lens and graded according to Shaffer grading system before laser iridotomy. Then YAG laser iridotomy with 4-5mj pulse was delivered to treatment site and repeated until patency was achieved. The assessment of similar parameters were evaluated one month after laser iridotomy.

STATISTICAL ANALYSIS:

All the statistical analysis was done using statistical software (SPSS version 21.0). The paired samples t-test was used to compare the difference in anterior segment parameters (pentacam) before and after LPI. Wilcoxson signed- rank test was used to assess the difference in Shaffer's gonioscopic angle before and after LPI. The $p<0.05$ was considered statistically significant.

RESULTS:

A total of 60 cases of PACS were included in this study. 55% were females and 45% were males [Fig 1]. Mean age was 54.10±8.92 years. Majority of them (38.3%) were between 51-60 years age group [Fig 2].

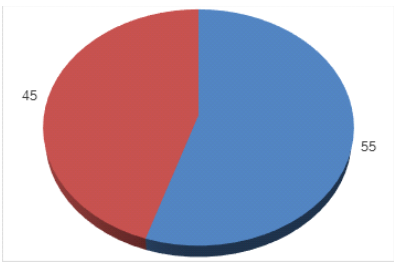


Fig 1) Gender wise distribution showed that 55% were females and 45% were males.

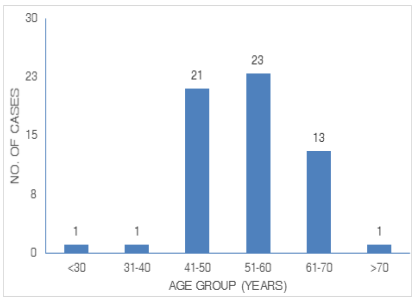
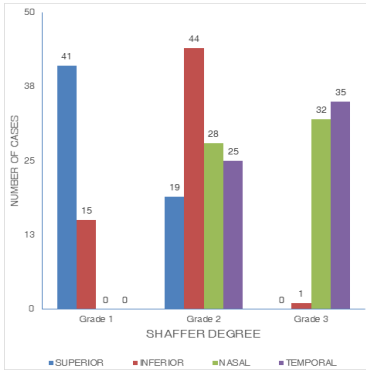


Fig 2) Age group distribution

Parameter	Pre laser iridotomy		Post laser iridotomy		p-value
	Mean	SD	Mean	SD	
Anterior chamber angle (degrees) ACA	24.29	2.19	24.99	1.99	0.00
Anterior chamber depth (mm) ACD	2.02	0.17	2.03	0.18	0.17
Anterior chamber volume(mm)3 ACV	103.87	12.12	109.83	7.97	0.00
Central corneal thickness (µm) CCT	522.98	17.86	522.98	16.98	1.00
Pupil diameter (mm) PD	3.19	0.41	3.15	0.40	0.52

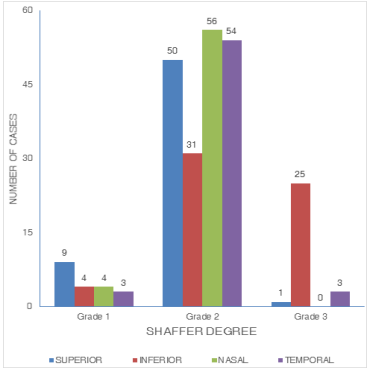
TABLE 1: ANTERIOR SEGMENT PARAMETERS RECORDS BEFORE AND AFTER 1 MONTH OF LASER IRIDOTOMY

The mean ACA increased significantly from 24.29±2.19 to 24.99±1.99 degrees (p=0.00),however, increase in ACD from 2.02±0.17mm to 2.03±0.18mm was insignificant.On the other hand, ACV increased significantly after 1 month of LPI from 103.87±12.12mm3 to 109.83±7.97mm3 (p=0.00), but the change in mean CCT and PD after LPI were not statistically significant (p=1.00) and (p=0.52) respectively.



PRE- LASER IRIDOTOMY

Fig 3) No. of cases in each quadrant according to Shaffer classification before LPI (There were no cases with grade 0 and grade 4).



POST- LASER IRIDOTOMY

Fig 4) No. of cases in each quadrant according to Shaffer classification after LPI (There were no cases with grade 0 and grade 4).

TABLE 2: GONIOSCOPIC SHAFFER GRADING BEFORE AND AFTER 1 MONTH OF LASER IRIDOTOMY.

Quadrants	Pre-laser iridotomy		Post-laser iridotomy		Change	p-value (wilcoxon)
	Mean	SD	Mean	SD		
Superior	1.32	0.46	1.87	0.38	0.55	0.00
Inferior	1.77	0.46	2.35	0.60	0.58	0.00
Nasal	1.53	0.50	1.93	0.25	0.40	0.00
Temporal	1.58	0.49	2.00	0.31	0.41	0.00

The mean ACA grade before LPI was 1.32±0.46, 1.77±0.46, 1.53±0.50 and 1.58±0.49 in superior, inferior, nasal and temporal quadrant respectively which following LPI, increased significantly to 1.87±0.38, 2.35±0.60, 1.93±0.25 and 2.00±0.31 in superior, inferior, nasal and temporal quadrant respectively ($p<0.001$, according to Wilcoxon signed-rank test).

DISCUSSION :

In the current study the mean age of PACS was 54.10± 8.92 years which is comparable to earlier studies carried out by Kansara S et al,11 Jong Rak Lee et al12 and Yakup Acet et al.13 55 % of them were females which is in accordance with Jong Rak Lee et al12 study (83.33%) .

The Pentacam is a non-invasive imaging technology that records anterior segment parameters faster than the conventional gonioscopy. In our study, the ACA showed significant widening of the angle from 24.29±2.19 to 24.99±1.99 degrees (p=0.00) and ACV significantly increased from 103.87±12.12 mm3 to 109.83±7.97mm3 (p=0.00) but the change in ACD was insignificant (p=0.17) which agree with the studies conducted by Lopez Caballero et al14, Jain et al15 and Antoniazi et al.[16]

Talajic et al17 in 2013 also concluded that ACV increased significantly in PACS after LPI from 94.6±3.6mm3 to 108.8±3.4mm3 (p=0.001) and ACA increased significantly from 26.7±0.9 degrees to 28.2±0.8 degrees ($p<0.001$) while central anterior chamber depth (CACD) change was insignificant(p=0.109).

In our study, change in PD after LPI was not statistically significant (p=0.52). Pupil diameter could affect the measurements of anterior chamber parameters. Therefore, we tried to control the lighting and fixation to ensure pupil diameter remained the same in 2 sessions of the measurements.

In our study,CCT showed no static difference (p=1.00) after LPI which is consistent with Mohammad Reza et al18 study (p=0.2) whereas, in contrast, Talajic et al17 showed significant decrease (p=0.018).

Gonioscopic angle grading has been shown to be reliable, however, the angle opening in degrees is difficult to define, because of anatomic variations of angle. Being subjective in nature, gonioscopy is also limited by inter-observer variation in the angle assessment and diagnosis.

In the present study, angle width on gonioscopy increased significantly in all the quadrants ($p<0.001$) after LPI according to the Wilcoxon signed-rank test.There was an overall 0.5 increase in Shaffer angle grade (average of 4 quadrants) that was smaller in magnitude than the one reported by Lackner B et al.[19]

Winifred P Nolan et al10 in 2000 also concluded that LPI was effective in widening the drainage angle of primary angle closure suspects (PACS) and primary angle closure(PAC).

Hsiao et al20 in 2003, found that 97% eyes had quantitatively wider angles after LPI and gonioscopy was useful in predicting the outcome after LPI.

Lopez Caballero et al14 in 2010 also observed that gonioscopy showed statistically significant Shaffer angle widening in all quadrants after LPI.

CONCLUSION:

After LPI in PACS where pentacam shows significant increase in ACA and ACV, gonioscopy shows significant widening of the Shaffer angle which concludes that pentacam can provide valuable information concerning the efficacy of LPI.

REFERENCES

1. Quigley HA. Number of people with glaucoma worldwide. Br J Opthalmol 1996;80:389.
2. Quigley HA, Broman AT. The number of people with glaucoma world wide in 2010 and 2020. Br J Opthalmol 2006;90:262-7.
3. Li H, Leung CK, Cheung CY et al. Repeatability and reproducibility of anterior chamber angle measurement with anterior segment optical coherence tomography. Br J Opthalmol 2007;91(11):1490-2.
4. Radwan AA. Comparing surgically induced astigmatism through change of incision site in manual small incision cataract surgery. J Clin Exp Opthalmol 2011;2:1-5.
5. Rabsilber T, Khoramnia R, Auffarth G. Anterior chamber measurements using Pentacam rotating Scheimpflug camera. J Cataract Refract Surg 2006;32:456-9.
6. Savini G, Barboni P, Carbonelli M. Repeatability of automatic measurements by a new Scheimpflug camera combined with Placido topography. J Cataract Refract Surg 2011;37:1813-5.
7. Snow JT. Value of prophylactic peripheral iridectomy on the second eye in angle-closure glaucoma. Trans Ophthalmol Soc UK. 1977;97(1):189-91.
8. Edwards R. Behaviour of the fellow eye in acute angle-closure glaucoma. Br J Ophthalmol 1982;66(9):576-9.
9. Lowe RF. Persistent symptoms after peripheral iridectomy for angle closure glaucoma. Aust NZJ Opthalmol 1987;15(1):83-7.
10. Nolan WP, Foster PJ, Devereux JG et al. YAG laser iridotomy treatment for primary angle closure in east Asian eyes. Br J Opthalmol 2000;84(11):1255-9.
11. Kansara S, Blieden LS, Chuang AZ et al. Effect of laser peripheral iridotomy on anterior chamber angle anatomy in primary angle closure spectrum eyes. J Glaucoma 2016;25(5):469-74.
12. Lee JR, Choi JY, Kim YD et al. Laser peripheral iridotomy with iridoplasty in primary angle closure suspect: anterior chamber analysis by pentacam. Korean Journal of Ophthalmology 2011;25(4):252-6.
13. Yakup Acet, Fadime U. Yigit, Ismail U et al. The course of the changes in anterior chamber parameters after laser peripheral iridotomy: follow-up for 6 months with a Scheimpflug-Placido disc topographer. J Glaucoma 2016;25:14-21.
14. Lopez-Caballero C, Puerto-Hernandez B, Munoz-Negrete FJ et al. Quantitative evaluation of anterior chamber changes after iridotomy using pentacam anterior segment analyzer. European Journal of Ophthalmol 2010;20(2):327-32.
15. Jain R, Grewal D, Grewal SP. Quantitative analysis of anterior chamber following peripheral laser iridotomy using pentacam in eyes with primary angle closure. European Journal of Ophthalmol 2012;2:15-7.
16. Antoniazzi E, Pezzotta S, Delfino A et al. Anterior chamber measurements taken with pentacam: an objective tool in laser iridotomy. European Journal of Ophthalmol 2010;20(3):517-22.
17. Julia C. Talajic, Mark R et al. Harasymowycz. Anterior segment changes after pilocarpine and laser iridotomy for primary angle closure suspects with Scheimpflug photography. J Glaucoma 2013;22:776-9.
18. Razeghinejad MR, Lashkarizadeh H, Nowroozzadeh MH et al. Changes in ocular biometry and anterior chamber parameters after pharmacologic mydriasis and peripheral iridotomy in primary angle closure suspects. Journal of Optometry 2016;9(3):189-95.
19. Lackner B, Schmidinger G, Skorpik C. Validity and repeatability of anterior chamber depth measurements with pentacam and orbscan. Optom Vis Sci. 2005;82(9):858-61.
20. Hsiao CH, Hsu CT, Shen SC et al. Mid-term follow-up of Nd: YAG laser iridotomy in Asian eyes. Ophthalmic Surgery, Lasers & Imaging Retina 2003;34(4):291.