IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 19, Issue 4 Ser.5 (April. 2020), PP 41-44
www.iosrjournals.org

Anterior Chamber Architectural Changes and Ocular Biometry Following Laser Iridotomy in Primary Angle Closure Suspects

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Abstract:
Background*: Angle closure glaucoma is one of the leading causes of blindness in the world.Prophylactic peripheral iridotomy widens the already narrow angle which makes the eye susceptible to sudden rise in intraocular pressure. The aim of this study was to study the change in refractive error,axial length(AXL),central anterior chamber depth(CACD) and intraocular pressure(IOP) following Nd-YAG peripheral iridotomy (PI) in primary angle closure suspects(PACS).*
Materials and Methods*:100 eyes of 50 patients were included in the study conducted in a tertiary eye care hospital in Coimbatore. IOP was recorded using Goldmannapplanation tonometer, AXL and CACD were recorded using Tomey OA2000.Gonioscopy was done using Goldmann 3 mirror lens.Changes in Best corrected visual acuity, IOP,axial length(AXL),and central anterior chamber depth(ACD) were analysed,prior to and 1 week after the laser procedure.*
Results*:The mean age of the subjects was 54.62years.A significant fall in mean IOP was noted following laser.Significant increase in mean CACD,decrease in mean axial length and a small hyperopic shift in the refraction were noted.*
Conclusion:*IOP reduction after Nd-Yag PI causes a significant increase in central anterior chamber depth..*
Key Word*: Laser Peripheral Iridotomy, Angle Closure disease*

Date of Submission: 02-04-2020 Date of Acceptance: 18-04-2020

I. Introduction

Primary angle closure disease is a group of disorders characterised by a shallow anterior chamber with a predisposition to appositional or synechial angle closure resulting in raised IOP and optic neuropathy. Primary angle closure disease is a preventable cause of irreversible blindness. Approximately 3 million people suffer from Primary angle closure glaucoma and 10% are blind due to it.

Laser peripheral Iridotomy (LPI) is a well-known preventive measure against acute primary angle closure and is routinely performed in primary angle closure suspect (PACS) eyes. The mechanism of action is relief of relative pupillary block and widening of the anterior chamber angle.

The aim of our study is to evaluate the change in Refractive error, Axial length (AXL),Central Anterior chamber depth (CACD) and IOP following following Nd-YAG peripheral iridotomy (PI) in primary angle closure suspects (PACS) eyes .

II. Material And Methods

Institutional ethical committee approval was obtained. This cross sectional observational study was conducted at a tertiary eye care centre in South India from September 2018 to January 2020, in accordance with the tenets of the Declaration of Helsinki.

100 eyes of 50 patients were included in the study.Basic demographic profile was documented.IOP was recorded using Goldmannapplanation tonometer, Axial length (AXL) and central Anterior Chamber depth (ACD) were recorded using optical biometer (Tomey OA 2000- Axis Medical Canada Inc.). Gonioscopy was done using Goldmann 3 mirror lens.Primary angle-closure suspects (PACS) were identified as having iridotrabecular contact in more than 180 degrees with normal IOP(defined as more than 21 mmHg), optic disc and visual fields.

The angle configuration was graded in all 4 quadrants according to the Shaffer grading system.

Written informed consent was obtained after carefully explaining the potential side effectsand benefits of LPI in detail. 2% pilocarpine was instilled every 10 minutes in the eyes, half an hour prior to the procedure to constrict the pupil. Laser peripheral iridotomy was performed using a neodymium: yttrium–aluminum–garnet (Nd:YAG) laser (Visulas YAG III; Carl Zeiss Meditec, Dublin, CA). Patients were treated in the peripheral superonasal or superotemporal region. One drop of Brimonidine was instilled post laser to prevent IOP spike.

Changes in Best corrected visual acuity (BCVA), Intraocular pressure, Axial length and central Anterior chamber depth were analysed, prior to and 1 week after the laser procedure.

Exclusion criteria:
1. Pre existingIridotomies
2. Prior filtering surgery done
3. Patients on anticoagulants

Statistical analysis
SPSS software for Windows version 17.0.0 (IBM Cor.,Amonk,NY) was used for statistical analysis.All values were expressed as Mean±Standard deviation(SD).Paired t-test was used for comparison of pre and post laser mean values. A p-value of 0.05 or less was considered statistically significant.

III. Result

Data of hundred eyes of fifty patients were included in the study. Mean age of the patients was 54.62 years.7 were male (14%) and remaining 43 were females (86%).The Mean spherical equivalent for Right eye prior to the laser was +1.25±1.58 Dioptre and after LPI was +1.29±1.59 Dioptre with no statistical significance(p=0.39) . The Mean spherical equivalent for Left eye prior to the laser was +1.15±1.40 dioptres , and after LPI was +1.17±1.38 dioptre,with no statistical significance (p=0.314)

Mean CACD for right eye was 2.67±0.34mm before LPI and 2.78 ±0.37mm afterward (p = 0.00). Mean CACD for left eye was 2.69±0.36mm and 2.77±0.35mm afterward(p=0.00).Mean Axial length for right eye was 22.20±0.89mm before LPI and 21.82 ±1.9mm after LPI (p =0.315).Mean Axial length for left eye was 22.14±1.28mm before LPI and 22.13±1.28mm after LPI (p=0.131).

Mean IOP for right eye before and after 1 week following LPI were 17.81 ± 3.5 and 14.68 ± 2.7 mm Hg, respectively (p = 0.00). Mean IOP for left eye before and 1week after LPI was 18.29±4.1 and 14.31±2.6 mmHg respectively(p=0.00).

Table 1 summarises the biometric parameters measured by Tomey OA2000 before and after LPI.

Variable		Before Laser PI	After Laser PI	P
Refractive Error	RE	1.25±1.58 D	1.29±1.59 D	0.39
	LE	1.15±1.40	1.17±1.38	0.31
Axial Length	RE	22.20±0.89mm	21.82 ±1.9mm	0.31
	LE	22.14±1.28mm	22.13±1.28mm	0.13
Central ACD	RE	2.67±0.34mm	2.78 ±0.37mm	0.00
	LE	2.69±0.36mm	2.77±0.35mm	0.00
IOP	RE	17.81 ± 3.5 mmHg	14.68 ± 2.7 mmHg	0.00
	LE	18.29±4.1 mmHg	14.31±2.6 mmHg	0.00

IV. Discussion

Angle closure glaucoma is one of the leading causes of blindness in the world [1]. Studies suggest that a prophylactic peripheral iridotomy is advisable as the increase in intraocular pressure is mainly because of closure of an already narrow angle.[2]

Many studies have described the outcomes of laser PI on progression of glaucoma and maintainance of IOP.However there is not much literature on the morphology of anterior chamber angle following LPI. Our study showed that laser PI showed no significant change in refraction and axial length.However,there was a significant deepening in the central anterior chamber depth and significant reduction in intraocular pressure.

Many studies have concluded that large IOP changes influence ocular biometrics. All these studies showed significant lowering in IOP as they were following trabeculectomy surgery. Nemeth *et al*[14] reported decrease in axial length and an increase in the thickness of ocular wall thickness, four days following trabeculectomy.[3].Another study by Cashwell *et al*[4] showed a significant decrease in axial length at various times following trabeculectomy with the help of B-scan ultrasonography.[4]Kara et al, found that Choroidal

Thickness increased significantly after trabeculectomy which correlated with changes in IOP, Axial length, and Ocular Perfusion Pressure.[5]

Even though the accurate reason for the fall in IOP remains unknown, few studies hypothesized that a thickened choroid accompanied a lowered IOP. In our study, we did not anticipate a drastic fall in IOP which can significantly alter the axial length. We found a small hyperopic shift in refractive error following LPI, which was not significant.

Measurement of CACD can be done using noncontact techniques as well as conventional A-scan ultrasonography. Pentacam, anterior segment optical coherence tomography (AS-OCT), IOL Master, arenon contact techniques which have the advantages of being quick ,convenient with easy learning curve. Contact techniques like UBM and A-scan ultrasonography are cumbersome and lead to globe compression which can give faulty measurements.

Antoniazzi et al studied 20 PACS eyes using Pentacam and found a statistically significant difference in anterior chamber angle, anterior chamber volume, and Peripheral ACD, but not in Central ACD following Laser PI.[6]

Similar study conducted by Li et al. evaluated 37 PACS and PAC eyes with Pentacam and reported a significant change in the anterior chamber volume, anterior chamberangle, and PACD but found no significant change in CACD following Laser PI. [7]

On the contrary, Lopez-Caballero et al. reported an increase in central ACD after laser PI in patients with PACS,PAC and PACG using Pentacam.[8] In our study we found a statistically significant increase in the central anterior chamber depth using optical biometer (Tomey OA 2000- Axis Medical Canada Inc.). Faramarzi et al found no deepening of central ACD using lenstar in PACS patients after NdYAGPI.[9]

Many theories have been postulated regarding the increase in central anterior chamber depth after LPI in angle closure. One such study by Quigley et al. proposed that both, the anterior as well as posterior surfaces of lens are subjected to higher pressure of the posterior chamber except in the pupillary zone which faces the anterior chamber and its lower pressure. Iridotomy is believed to eliminate this pressure gradient between the anterior and posterior chambers, and induce slight posterior movement of the anterior lens surface in the pupillary zone. [10]Dada et al. proposed that impeded aqueous due to the pupillary block might get diverted into the vitreous and push the lens forward. Thus, LPI can relieve the pupillary block,reverse this aberrant aqueous flow, relieve the back pressure on the cystalline lens, and cause an increase in CACD. [11]

Lei et al.concluded that , the pupillary-blocking force that pushes the lens back is the main force that increases the CACD after LPI in PAC eyes.However,this force may not be enough to deepen the central anterior chamber depth after LPI in PACS eyes.[12]

As Tomey OA2000 cannot measure the dimensions of anterior chamber angle, alterations in periphery could not be measured.This was the limitation of study. A larger cohort including PAC and PACG eyes may explain the effect of LPI on different stages of angle closure disease better. Different devices may be used to compare the effect of LPI on anterior chamber biometrics.

V. Conclusion

In conclusion, our study demonstrated that LPI causes a fall in IOP and deepening of central anterior chamber depth but has no effect on the axial length and change in refractive error in PACS eyes.

References

[1]. Alsbrik PH. Anatomical risk factors in primary angle-closure glaucoma. A ten year follow up survey based on limbal and axial anterior chamber depths in a high-risk population. IntOphthalmol 1992; 16:265–272.

[2]. Kaushik S, Kumar S, Jian R, Bansal R, Pandav SS, Gupta A. Ultrasound biomicroscopic quantification of the change in anterior chamber angle following laser peripheral iridotomy in early chronic primary angle closure glaucoma. Eye 2007; 21:735–741.

[3]. Nemeth J, Horoczi Z. Changes in the ocular dimensions after trabeculectomy. IntOphthalmol. 1992;16:355–357

[4]. Cashwell LF, Martin CA. Axial length decrease accompanying successful glaucoma filtration surgery. Ophthalmology. 1999;106:2307–231.

[5]. Kara N, Baz O, Altan C, Satana B, Kurt T, Demirok A. Changes in choroidal thickness, axial length, and ocular perfusion pressure accompanying successful glaucoma filtration surgery. Eye (Lond). 2013 Aug;27(8):940-5. doi: 10.1038/eye.2013.116. Epub 2013 Jun 7. PMID: 23743533; PMCID: PMC3740312.

[6]. Antoniazzi E, Pezzotta S, Delfino A, Bianchi PE. Anterior chamber measurements taken with Pentacam: an objective tool in laser iridotomy. Eur J Ophthalmol 2010;20:517Y22.

[7]. Li S, Wang H, Mu D, Fu J, Wang X, Wang J, Wang N. Prospective evaluation of changes in anterior segment morphology after laser iridotomy in Chinese eyes by rotating Scheimpflug camera imaging. Clin Experiment Ophthalmol 2010;38:10Y4.

[8]. Lo´pez-Caballero C, Puerto-Herna´ndez B, Mun˜oz-NegreteFJ,Rebolleda G, Contreras I, Cabarga C, Corral A. Quantitative evaluation of anterior chamber changes after iridotomy using Pentacam anterior segment analyzer. Eur J Ophthalmol 2010;20:327Y32.

[9]. Faramarzi, Amir &Yazdani, Shahin&Pakravan, Mohammad. (2013). Central Anterior Chamber Depth Changes After Prophylactic Laser Iridotomy. Optometry and vision science : official publication of the American Academy of Optometry. 90.10.1097/OPX.0b013e3182968c62.

[10]. Quigley HA, Friedman DS, Congdon NG. Possible mechanisms of primary angle-closure and malignant glaucoma. J Glaucoma 2003; 12:167Y80.

[11]. Dada T, Mohan S, Sihota R, Gupta R, Gupta V, Pandey RM. Comparison of ultrasound biomicroscopic parameters after laser iridotomy in eyes with primary angle closure and primary angle closure glaucoma. Eye (Lond) 2007;21:956Y61.

[12]. Lei K, Wang N, Wang L, Wang B. Morphological changes of the anterior segment after laser peripheral iridotomy in primary angle closure. Eye (Lond) 2009;23:345Y50.

Abbagani Surabhi,etal. "Anterior Chamber Architectural Changes and Ocular Biometry Following Laser Iridotomy in Primary Angle Closure Suspects." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 19(4), 2020, pp. 41-44.