

# Prescription Rates of Laser Peripheral Iridotomy and Its Outcome in Angle Closure Suspects in a Tertiary Hospital in Dakshina Kannada - A Retrospective Study

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## ABSTRACT

### BACKGROUND

Primary angle-closure glaucoma affects 20 million people worldwide. There is a significantly high incidence of PACG in India, which forms almost half of all adult primary glaucoma seen in a hospital setting. The primary angle closure suspects (PACS) are defined as patients with narrow angles with no evidence of glaucoma or damage to the angle. Half of those blind from glaucoma are due to angle-closure disease. Not all PACS need LPI, as the incidence of acute angle closure in angle closure suspects is not very high according to a few studies. Some studies have shown that LPI may not necessarily widen the angle following iridotomy. We wanted to study the completeness of the pre- and post-procedure evaluation of PACS in terms of gonioscopy and tonometry and the prescription and treatment rate of Nd YAG LPI and its complications in a tertiary hospital.

### METHODS

This is a retrospective analysis of medical case records of patients with angle closure suspects. Data was retrieved from hospital EMR and also from the glaucoma speciality clinics registry. Only PACS were included where at least two quadrants of posterior trabecular meshwork were not visible with normal IOP and with no peripheral anterior synechiae. PAC, PACG, secondary angle closures and all open angle glaucomas were excluded.

### RESULTS

61 records were included for analysis. 38 (62%) were females and 56 (92%) were bilateral. The pre- and post-procedure IOP performed were 82% and 90% respectively, and gonioscopy performed were 87% and 77% respectively. 53 (86%) were advised LPI and 25 (71.5%) underwent the same immediately.

### CONCLUSIONS

The pre-procedure tonometry and post procedure gonioscopy rates confirming the state of angle anatomy and patency of iridotomy were not satisfactory. The rate of LPI prescription was high. Majority of patients underwent LPI immediately on prescription. Hyphema was the only complication documented.

### KEYWORDS

Primary Angle Closure Suspect, Laser Peripheral Iridotomy, Gonioscopy, Tonometry, Hyphema

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*DOI: 10.18410/jebmh/2020/96*

*Financial or Other Competing Interests:  
None.*

*How to Cite This Article:*

*Chaithanya Singh B, Sheetal S.  
Prescription rates of laser peripheral  
iridotomy and its outcome in angle  
closure suspects in a tertiary hospital in  
Dakshina Kannada- a retrospective  
study. J. Evid. Based Med. Healthc. 2020;  
7(9), 446-450. DOI:  
10.18410/jebmh/2020/96*

*Submission 04-02-2020,  
Peer Review 06-02-2020,  
Acceptance 18-02-2020,  
Published 02-03-2020.*



**BACKGROUND**

Primary angle-closure glaucoma affects 20 million people worldwide. Angle-closure glaucoma is characterized by narrowing or closure of the anterior chamber angle.<sup>1</sup> This leads to increased IOP and damage to the optic nerve. Angle-closure glaucoma is divided into two main groups; Primary angle-closure where patients are anatomically predisposed to this type of glaucoma and there is no identifiable secondary cause. Secondary angle-closure where a secondary process is responsible for narrowing or closure of the anterior chamber angle. The Primary angle closure suspects (PACS) are defined as patients with narrow angles  $\geq 180$  degrees Irido-Trabecular Contact (ITC) with no evidence of glaucoma or damage to the angle (that is, no elevated IOP or peripheral anterior synechiae), Primary angle closure (PAC) are defined as  $\geq 180$  degrees ITC with peripheral anterior synechiae (PAS) or elevated IOP, but no optic neuropathy and Primary angle closure glaucoma (PACG) as  $\geq 180$  degrees ITC with PAS, elevated IOP, and optic neuropathy.<sup>1</sup> People with primary angle closure suspects have a higher but poorly measured risk of developing glaucoma.

The incidence of PACG in India is significantly high, it contributes to almost half of all adult primary glaucomas seen in a hospital setting.<sup>2,3</sup> In Indian population-based studies, the prevalence of PACG varies in different surveys according to the methodology and the age of the patients that were included.<sup>4,5,6</sup> If not properly treated PACG can result in blindness. Although angle closure disease contributes to only 25% of any glaucoma detected half of those blind from glaucoma are due to angle-closure disease.<sup>7</sup> Risk of blindness is almost three folds higher than in open-angle glaucoma (OAG). Early detection and appropriate management of angle closure disease poses a challenging task, especially in the developing world. However not all PACS need LPI, as the incidence of acute angle closure in angle closure suspects is not very high according to a few studies.<sup>8</sup>

Gonioscopy is an essential for the diagnosis of PACS. For the flashlight test the sensitivity was 45.5% and the specificity was 82.7%.<sup>9</sup> For the Van Herick's test, it was 61.9% and 89.3%.<sup>9</sup> In conditions where good gonioscopy is not possible, anterior chamber depth assessment and pupillary ruff evaluation may highlight angle closure. When needed dark room prone provocative test (DRPPT), can also be performed with any tonometer.<sup>10</sup> LPI may not widen the angle post procedure as 80% of the eyes with narrow angles have gonioscopic residual angle closure following iridotomy.<sup>11</sup> Hence post op evaluation in the form of gonioscopy to check the opening of angles and patency of iridotomy and measurement of IOP becomes important.

We wanted to study the completeness of the pre- and post-procedure evaluation of PACS in terms of gonioscopy and tonometry evaluate the prescription and treatment rate of Nd YAG LPI and its complications in a tertiary hospital.

**METHODS**

Retrospective analysis of medical case records of patients with angle closure suspects. Ethics committee clearance was obtained for the same (Letter No. YEC2/336) Data was retrieved from hospital EMR using ICD coding (H40.069) and also from the glaucoma speciality clinics registry.

**Inclusion Criteria**

Patients with the documented diagnosis of primary angle closure suspects were included.

**Exclusion Criteria**

Primary angle closure, primary angle closure glaucoma, Secondary angle closure glaucoma, open angle glaucoma, secondary glaucoma

Demographic data including age, gender was noted. Documentation of the performance of pre laser tonometry and gonioscopy as well as post laser tonometry and gonioscopy was noted. Prescription rate is the frequency of advising LPI as a modality for the management of angle closure suspects. The advice given for the management of angle closure suspects was noted as observation/close follow up or laser PI or surgical PI/ cataract surgery. The complications of LPI if documented were noted. The duration between the advice and performance of PI was noted. For the purpose of this study if 90% of participants had undergone a procedure (tonometry/gonioscopy) it was considered satisfactory. Descriptive statistics in the form of mean, percentages were used.

**RESULTS**

86 medical records were retrieved however only 61 records were included for analysis due to incomplete data entry or wrong diagnosis. Female predominance was apparent and most cases were bilateral (Table 1). For the purpose of analysis in bilateral cases the right eye was considered and in unilateral cases the affected eye was used for analysis.

Gender Distribution	No. % (n=61)
Males	23 (38%)
Females	38 (62%)
Unilateral	5 (08%)
Bilateral	56 (92%)

**Table 1. Gender and Laterality Distribution**

	Pre-Procedure	Post-Procedure
IOP	50(82%)	55 (90%)
Gonioscopy	53(87%)	47 (77%)

**Table 2. Shows the Pre- and Post- Procedure Evaluation Performed on The Patients**

LPI	Observation and Close Follow-up	Surgical PI	Cataract Surgery
53 (86%)	4 (6.5%)	0	4 (6.5%)

**Table 3. Showing the Treatment Pattern Advised for the Management of PACS (n=61)**

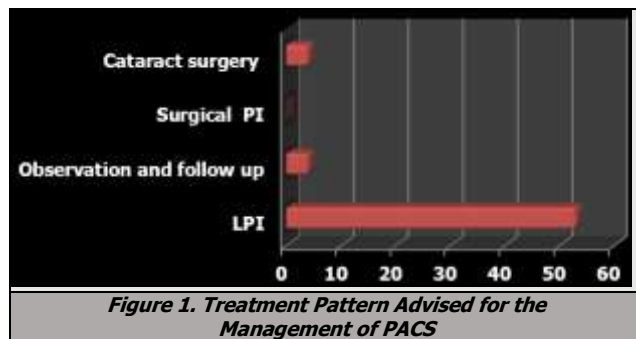


Figure 1. Treatment Pattern Advised for the Management of PACS

Same Day	Within 2 Weeks	Within 4 Weeks
25 (71.5%)	7 (20%)	3 (8.5%)

Table 4. Time Between Advice and Seeking Treatment



Figure 2. Time between Advise and Seeking Treatment

Out of 53 patients who were advised LPI only 35 underwent the procedure. Out of the 35 patients who underwent LPI, only 13(37.14) underwent post-procedure slit lamp, gonioscopy examination to check the opening up of the angles and patency of the iridotomy. 4 (30%) PI were not patent, 3 (23.07%) were partially patent and in 6 cases there was no mention on the status of iridotomy. The only documented complication post PI was hyphema in 5 patients.

## DISCUSSION

In our study the gender predominance was seen among females and majority cases were bilateral as mentioned in other studies.<sup>12</sup> Pre-procedure tonometry was not adequately documented/performed. However the post procedure tonometry rate was better probably to rule out post procedure increase in IOP which is commonly mentioned in literature.<sup>13,14</sup> The post procedure gonioscopy was not performed/documentated in a fairly large number of patients. The draw backs of not doing so, include the progression of the disease due to incomplete treatment (non-patent iridotomy), non- pupillary block mechanisms of angle closure such as plateau iris syndrome may be missed. The rate of prescription of LPI in this study was quite high (86.88%). Probably the demography and remote geographic location of the patients, difficulty in accessing timely treatment, affordable cost of treatment and as well as cautious nature of the treating doctors could be the reasons behind the high prescription rates. In Indian studies however the progress to PAC and PACG was not high. In an Indian population-based study of primary angle closure suspect (PACS) the 5-year incidence of PAC was 22% and

hence LPI could not be warranted for PACS per se unless there was some risk factor that could be identified. Repeated dilatation for diabetics or for logistical reasons as the surgeon’s individual decision were some such factors. The drawback of the study however was that it was only a 5 year follow-up which was insufficient to understand the course of the disease.<sup>8</sup> In another Indian hospital-based study by Ramani KK. et al on the course of PACS subjects after LPI, they found that 28% progressed to PAC. The study claimed decreasing anterior chamber angle (ACA) was the predictive factor for the progression of PACS to PAC.<sup>15</sup> In the randomized controlled Zhongshan Angle Closure Prevention (ZAP) trial, they evaluated the efficacy of prophylactic laser peripheral iridotomy (LPI) in bilateral angle-closure suspects. They found that the risk of converting from PACS to PAC was low during the 6-year Chinese trial and laser iridotomy decreases the risk of this conversion, although the incidence of PAC is remarkably low. This study suggests that perhaps laser iridotomy is not required in all angle-closure suspects at least in that ethnicity.<sup>16</sup> In a study by Wilensky et al on European patients with “occludable” angles, they found that eight patients (6.2%) developed acute angle closure glaucoma (AACG) and 17 (13.2%) developed either appositional closure or peripheral anterior synechiae.<sup>17</sup> In contrast the Greenland Eskimos had a high percentage of individuals 35%, (7 out of 35)with occludable angles developed ACG, in a study by Alsbirk.<sup>18</sup>

In India the prevalence of ACG is high and asymptomatic chronic angle closure glaucoma mimicking POAG is common. More than 80% of the patients with chronic angle closures will not have any significant symptoms.<sup>19</sup> Three landmark studies were conducted in India, the Vellore eye survey showed a prevalence of 4.32% for PACG and 10.3% for occludable angles in the population.<sup>4</sup> The Andhra Pradesh eye disease survey showed a prevalence of 0.71% for PACG and 1.41% for occludable angles in the study population.<sup>20</sup> The Aravind comprehensive eye survey showed a prevalence of 0.5% for PACG.<sup>5</sup> The course and progression from PACS to PAC or PACG may vary according to different populations affordable cost of treatment and as well as cautious nature of the treating doctors could be the reasons behind the high prescription rates.

Theoretically, laser peripheral iridotomy should prevent the onset of chronic ACG as well as acute ACG which are associated with higher rates of blindness. Studies have proved that after performing an LPI there was no increase in IOP, history or symptoms of acute attack of glaucoma among the study subjects.<sup>21</sup> Another hospital-based study reported that after LPI, no eye with PACS progressed to PAC or PACG.<sup>22</sup> On the basis of this, many advocate aggressive screening and early laser peripheral iridotomy in individuals with “high risk” of either acute ACG or chronic ACG. Although beneficial, laser iridotomies can give rise to ocular morbidities. The laser energy as well as the altered fluidics may give rise to endothelial cell loss more in case of argon laser peripheral iridotomy than after YAG laser peripheral iridotomy.<sup>23</sup> It can also give rise to uveitis and posterior

synechiae which could make future cataract surgery more challenging.<sup>24</sup> While complications may seem minor when compared with the risk of an acute attack, they become significant when considering glaucoma control programmes in developing countries with high prevalence of narrow angles. Even if visually significant complications affect as few as 5% of those treated, the consequences can be devastating to such programmes. For example the cataract due to LPI might cause more blindness than glaucoma itself where cataract services are not freely available. The Chennai eye disease incidence study found that the rate of cataract progression in six years was significantly higher than those who had undergone LPI.<sup>25</sup>

As rightly suggested by Thomas R. et.al the decision of LPI should be based on how far patients stay from the hospital and the connectivity of the place, laterality, motivation level of patients and their alertness, also keeping in mind the consequences of side effects of LPI.<sup>8</sup>

#### Limitations

The reasons or justification for high rate of LPI prescription could not be concluded as many details like the geographic location, the socioeconomic status and family support available in case follow-up was advised but were not available in many files. These drawbacks are as expected in a retrospective analysis.

### CONCLUSIONS

The pre-procedure tonometry and post-procedure gonioscopy rates confirming state of the angle anatomy and patency of iridotomy were not satisfactory. The rate of LPI prescription was high. Majority of patients underwent LPI immediately on prescription. Hyphema was the only complication documented.

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