

## Effectivity of Nd yag pi in treatment of acute primary angle closure glaucoma

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### ABSTRACT

A Prospective hospital based study to note the efficacy of Nd Yag Peripheral Iridotomy (PI) in the treatment of acute primary angle closure glaucoma was carried out in Nepal Eye Hospital from Jan 2007 to Jan 2008. All the Patients(n=50) with acute primary angle closure glaucoma admitted to our hospital were selected for the study. Patients with secondary angle closure glaucoma were excluded. It is more common in age of 56-65 years (20%), in females (70%), and in tibetoburman ethnic group (56%). Mean duration of presentation to hospital was 5 days (22%) (Range 4-7days). Grade 1 Angle closure was present in 74%. All 50 patients (100%) with AACG had undergone Yag PI. Out of 50 patients, 11 patients (22%) were surgically operated i.e. trabeculectomy. Among 11, 1 patient (9%) who had undergone trabeculectomy had presented with acute on chronic angle closure glaucoma. Majority of cases (66%) presented with visual acuity (VA) 1/60-PL at the time of presentation and the Intraocular pressure (IOP) in affected eye was 31-40mmHg (42%). After performing Yag PI the mean visual acuity in the affected eye at the time of discharge was 6/60 (20%) and the IOP was 12 mmHg (40%). Prolonged duration of attack, elderly age, acute on chronic angle closure glaucoma, very high IOP at presentation, patients needing repeat Yag PI were found to have failure Yag PI. In this study 78% eyes had controlled IOP following Yag PI.

**Keywords:** Acute primary angle closure glaucoma, Nd Yag PI, IOP control.

### INTRODUCTION

Glaucoma is one of the leading causes of irreversible blindness in the world. It affects approximately 65 million people around the world and an expected 7.5 million are blind due to this disease. It is the second most common cause of blindness worldwide.<sup>1</sup> It is estimated that half the blindness from glaucoma in the world is caused by angle closure and it is one of the causes of bilateral blindness.<sup>2</sup> Although it affects less than 10 percent of patients with glaucoma, acute narrow angle glaucoma is the most serious form of the disease. In the United States, fewer than 10% of glaucoma cases are due to angle-closure glaucoma. In Asia, angle-closure glaucoma is more common than open-angle glaucoma. In Acute angle closure glaucoma (AACG) the iris quickly covers the entire or almost the entire trabecular meshwork leading to sudden symptomatic elevation of intraocular pressure. AACG predominately affects females because of their shallower anterior chamber. As people age, the lens of the eye enlarges and pushes the iris forward, thus increasing the risk for angle-closure glaucoma. Acute angle-closure glaucoma is an emergency because optic nerve damage and vision loss can occur within hours of the onset of the problem. There is irreversible damage to optic nerve head and visual field loss in cases of glaucoma leading to irreversible blindness. So more emphasis has to

be given for early diagnosis. Acute angle closure glaucoma is ocular emergency and receives distinction due to its acute presentation, need for immediate treatment. Rapid diagnosis, immediate intervention have profound effects on patient outcome and morbidity. In Nepalese population the effectivity of Yag PI has not been studied till yet. Therefore this study would provide baseline suggestion in the management of AACG. This study was to assess the demography, presenting signs and symptoms, IOP control, Improvement of visual acuity, effectivity of Yag PI and various causes of ineffectiveness of Yag PI.

### MATERIALS AND METHODS

Fifty patients presenting to the glaucoma department of Nepal Eye hospital with unioocular AACG during a 24 month period were included in the study. With the verbal informed as well as written consent from the patients with AACG were included in the study. Patients with secondary angle closure glaucoma like phacomorphic glaucoma, malignant glaucoma were excluded. Initial examination included assessment of Snellen corrected visual acuity, intraocular pressure by Applanation tonometry, gonioscopy by Goldmann single mirror gonioscopes, Anterior segment was examined by Haag Striet 900 slit lamp and fundus examination by 90D lens.

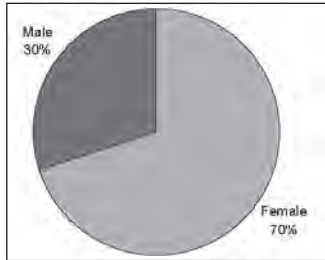
Following a diagnosis of unioocular AACG the following treatment was administered: Mannitol 1gm/kg body weight intravenously over 45 minutes followed by oral acetazolamide 250 mg 6 hourly by mouth, pilocarpine drops 2% 6hourly to the affected and fellow eye, timolol eyedrops 0.5% 12 hourly to both eyes. Corticosteroid mixed antibiotic eye drop was installed in the affected eye 6 hourly. The intraocular pressures were measured every 2 hours until they fell below 21 mm Hg. Following initial medical control of IOP, Nd Yag PI was performed by single surgeon. The person sits in a special chair with his chin resting on a frame or support to prevent head from moving. After the anaesthetic has taken effect, laser beam (3-5mJ) was exposed into affected eye through the Ahamed iridotomy contact lens which is placed on the cornea. A treatment site was chosen in the superior iris, in a crypt where present and repeated until patency was achieved. Patency was assessed by direct visualisation of the posterior chamber. And the same procedure was repeated in the fellow eye. All patients had an intraocular pressure measurement performed 24 hours after treatment and slit lamp examination to assess patency of yag PI. After the procedure corticosteroids mixed antibiotics were given in both eyes 6 hrly for 7days, pilocarpine eye drops was stopped and oral acetazolamide 6hrly was given to control post laser IOP rise for 2 days. After stoppage of antiglaucoma drugs IOP and best corrected visual acuity were recorded at the time of discharge (5-7days of admission). PI was considered effective if IOP was controlled ( $\leq 21$  mm Hg) by iridotomy alone. In contrast, when trabeculectomy was needed to control IOP ( $\leq 21$  mm Hg) PI was considered to have failed.

### STATISTICAL ANALYSIS

All the data were collected and entered in Microsoft Excel. Statistical Analysis was performed using SPSS version 11.5 software. Significance was set as  $P < 0.05$ .

**Table-1:** Age distribution of patients with acute primary angle closure glaucoma

Age of Patients	n. (%)
35-45 years	7 (14)
46 -55 years	15 (30)
56-65 years	20 (40)
66-75 years	6 (12)
76-85 years	2 (4)
<b>Total</b>	<b>50 (100)</b>



**Fig. 2.** Sex Distribution of Patients with Acute primary angle closure glaucoma

### RESULTS

Fig 2. shows the sex distribution of patients (n=50). Among them female were 35(70%) and male were 15(30%). The age of patients ranged from 46 years to 85 years. Table-1 shows age wise distribution of patients admitted in hospital. The maximum number of patients was within 56-65 years age group (40%). Out of 50 patients, 28 were Tibetoburman (56%) and 22 (44%) were Indoaryan. Table-3 shows the symptoms of the patients. All presented with Diminish vision, 49(98%) presented with headache, 39 patients (78%) with vomiting and 18 patients (36%) presented with coloured haloes. Twenty nine patients (58%) were presented on 4-7 days of attack of angle closure, followed by 10 patients (20%) on 1-3 days and 1 patient (2%) presented on 20-23 days. Only 5 patients (10%) had previous attack of glaucoma whereas 45 patients (90%) had no previous attack of glaucoma. Majority 49 patients (98%) had no positive family history. Only 1 patient (2%) had positive family history. Out of 50 patients, 13 patients (26%) had hypermetropia. And no patient had myopia. Out of 50 patients, 33 patients (66%) had cup disc ratio of 0.3:1 followed by 14 patients (28%) had cup disc ratio of 0.4:1. One patient (2%) had cup disc ratio of 0.5:1, another had 0.6:1 and other had 0.8:1. On gonioscopic examination 37 patients (74%) had Grade I angle closure.

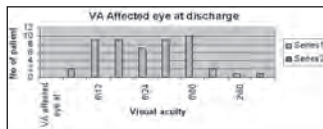
**Table-3:** Presenting symptoms of acute angle closure glaucoma

Presenting Symptoms	n. (%)
Headache	49 (98)
Vomiting	39 (78)
Diminish Vision	50 (100)
Coloured haloes	18 (36)

Eight patients (16%) had Grade 0 angle closure and 5 patients (10%) had Grade II angle closure. Eleven cases (22%) had Peripheral Anterior Synchia (PAS)<180 degree. Table-4 shows the visual acuity of affected eye at the time of admission. Nine cases (18%) had the VA of >6/60 on the affected eye at the time of presentation. Eight cases (16%) had VA in the range of 5/60-2/60. Majority 33 cases(66%) had VA in the range of 1/60-PL. Out of them 14 cases(42%) had a VA of HM, followed by 11 cases (33%) having counting finger close to face, 4 cases(12%) had 1/60 and 4 cases (12%) having perception of light at the time of presentation. Fig. 5 shows the visual acuity of affected eye at the time of discharge. Forty six patients (92%) had VA > 6/60 in affected eye at the time of discharge followed by 4 patients (8%) had VA <6/60. Table-6 shows the IOP of affected eye at the time of presentation. Majority of patients 21(42%) presented with IOP in the range of 31-40 mmHg at the time of presentation. Fourteen cases(28%) with IOP 41-50mmHg, 12(24%) with IOP of 51-60mmhg, 2(4%) in the range of 21-30 mmhg and 1(2%) presented with IOP of 61-70mmhg. At the time of discharge all 50 patients(100%) had IOP in the range of 10-20mmhg on the affected eye. Table-7 shows the treatment received by the patients with APACG. Out of 50 cases, 10(20%) needed repeat PI, 11 (22%) had undergone trabeculectomy. PI was effective in 39 patients(78%) and was failed in 11 patients (22%).

**Table-4:** Visual acuity of affected eye at admission with acute primary angle closure glaucoma

VA at admission affected Eye	n. (%)
6/12	1 (2)
6/24	2 (4)
6/36	3 (6)
6/60	3 (6)
5/60	1 (2)
4/60	1 (2)
3/60	1 (2)
2/60	5 (10)
1/60	4 (8)
Finger counting at 1 m	11 (22)
Hand Movement	14 (28)
Perception of light	4 (8)
<b>Total</b>	<b>50 (100)</b>



**Fig. 5.** Visual acuity of affected eye at the time of discharge

## DISCUSSION

Out of 50 patients enrolled, the age was grouped from 35-85 years. It was seen that the youngest patient was 37 years and oldest was 84 years. Most of the patients reported were in 56-65 years (n=20) (40%) which is similar to the study done by Lim<sup>6c</sup> average age affected by ACG was 61.5 +/-10.6 years.<sup>3</sup> Similar result was shown by Mazhar Ammar where ACG was more common in 5th decade of life.<sup>4</sup> In a study conducted by S Senthil the incidence of ACG was more in above 40 years.<sup>5</sup> Hence in view of these studies it is concluded that ACG is more common in older age. In this study 20 patients were within 56-65 years, out of which 16 patients had effective PI and 4 patients had failed PI. 7 Patients with age of 35-45 years out of which, 4 patients had effective PI and 3 had failed PI. 46-55 years of 15 patients, 13 had effective PI, 2 had failed PI. Of 66-76 years out of 6, 5 had patent PI and 1 had failed. At age range of 76-85 1 patient had effective PI and 1 had failed PI. In S a Buckley study one of the factor for failure of Yag PI was elderly age group<sup>6</sup>. But in this study there was no statistically significant correlation between age of presentation and the effectivity of Yag PI (p=0.47).

In this study out of 50 patients, Female were 35 (70%) and male were 15 (30%). Female were 2.1 times more affected than the male.

Similar result was found in Bojic L study where 122 were women and 54 were men. The relative risk of developing ACG was 2.1 times higher for women as compared to men.<sup>7</sup> Various other study also showed female preponderance. Ivanisevic study showed that ACG affects female twice more than male.<sup>8</sup> Lai study found that ACG is 3.8 times more common in female than in male.<sup>9</sup> Hence Female is regarded as a risk factor for Acute Angle Closure Glaucoma.

**Table-6:** Intra ocular pressure of affected eye at admission with acute primary angle closure glaucoma.

IOP affected eye at admission	n. (%)
21-30	2 (4)
31-40	21 (42)
41-50	14 (28)
51-60	12 (24)
61-70	1 (2)
<b>Total</b>	<b>50 (100)</b>

**Table-7:** Treatment Received by patients with acute primary angle closure glaucoma

Treatment	n. (%)
Nd Yag PI	50 (100)
Repeat PI	10 (20)
Trabeculectomy	11 (22)

Regarding the ethnic distribution out of 50 patients, 28 (56%) were TibetoBurman and 22 (44%) were Indoaryan. Incidence and ethnic distribution of glaucoma in patients attending Kedia eye hospital, Birgunj was studied by Amar Deuja. However his study showed no clear ethnic preponderance of any type of glaucoma<sup>10</sup>. Similar study was done by Ramesh Set al about Ethnic aspect of ACG at Bolton hospital which showed that Chinese ethnicity were at risk for ACG.<sup>11</sup> In Tin Aung study out of 90 patients all were Asian and 78 patients were Chinese (86.7%).<sup>12</sup> Hence this study concluded that ACG is more common in patients with small eye.

Regarding the association of Angle closure glaucoma patients with respect to family history showed that out of the total 50 patients 49 patients (98%) did not have family history of glaucoma. Only 1 patient (2%)

had positive family history. Ronald F studied about Positive Family history in Angle closure glaucoma. Over 300 patients of ACG were questioned carefully about the disease in their families. Positive Family histories are very uncommon which was similar to this study.<sup>13</sup>

Most of the patients were presented within 4-7 days of the onset of attack, n=29 (58%). The median time of presentation to hospital in this study was 5 days. In DC Saunder study the mean duration of symptoms was 4-7 days<sup>14</sup>. In Bojic L et al study the median time from the onset of symptoms to presentation at the hospital was 2 days (range 1-15 days)<sup>7</sup>. SA Buckley study showed that prolonged duration of attack was factor for failure of Yag PI.<sup>6</sup> But In this study association between duration of presentation and effectivity of PI was statistically insignificant (p=0081).

In this study out of 50 patients there were 45 patients (90%) who did not have previous attack of Angle closure glaucoma and 5 patients (10%) had one episode of previous attack of angle closure. Patients with Previous attack of ACG, out of 5 patients 2 patients had effective Yag PI and 3 had failed PI. There was no statistically significant (p=0.064) association between previous attack of ACG and effectivity of PI.

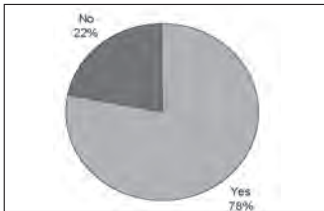


Fig. 8. Effectivity of Yag PI

Out of 50 patients, 41 patients (82%) presented with VA <6/60 at the time of presentation and 9 Patients (18%) with VA >6/60. And at the time of discharge 46 patients (92%) had VA >6/60 and 4 patients (8%) had VA <6/60. In this study visual acuity at the time of presentation and at the time of discharge after performing Yag PI in the affected eye was (p=0.0004) which was statistically significant. In this study the lowest IOP in the affected eye was 30 mm hg and the highest recorded was 64mmhg at the time of presentation. 2 patients (4%) presented with IOP of 21-30mmhg, 21 patients (42%) with 31-40mmhg, 14(28%) patients with 41-50mmhg, 12 (24%) patients with 51-60mmhg and 1(2%) patient with 61-70mmhg. All 50 patients (100%) had IOP of 10-20mmhg in the affected eye at the time of discharge which was statistically significant (p=0.0004).

Out of the total 50 patients Cup disc ratio was examined where 32(64%) had cup disc ratio of 0.3:1 In Mazhar Ammar study out of total 84 eyes 27 eyes were classified as Yag PI failure. Out of 27 failures eye 17 eyes had CDR >0.8 which was the cause for failure Yag PI<sup>4</sup>. In this study also one patient (2%) with 0.8:1 CDR who presented with acute on chronic angle closure glaucoma had failed Yag PI and undergone Trabeculectomy.

On Gonioscopic examination 11 patients (22%) were found to have Peripheral Anterior Synchia <180

degree. Out of the 11 patients (22%) with PAS < 180 degree, 4 patients (8 %) needed Trabeculectomy.

Nolan Winifred study showed that once the glaucomatous optic neuropathy is associated with synechial

angle closure, iridotomy alone is less effective at controlling IOP<sup>15</sup>. In this study there was no statistically significant (p=0.53) correlation between PAS < 180 and effectivity of Yag PI.

In this study 39 patients (78%) had effective Yag PI. Total 11 patients (22%) had undergone trabeculectomy. In P L Blaxter et al study 39 cases of acute congestive glaucoma was treated with peripheral iridotomy where it has control the disease in all but not in 3 cases.<sup>16</sup> In Gray et al study efficacy of Yag PI was studied in 150 patients. Forty of these patients (27%) were treated for acute angle closure glaucoma and three of them (7%) suffered recurrent AACG at a maximum post-YAG interval of six weeks, and all had previously undergone more than one YAG iridotomy. Following a peripheral iridectomy the IOP became normal without any medications.<sup>17</sup> In this study 78% eyes had controlled IOP following laser PI without medication and only 11% required trabeculectomy. Similarly B.W Fleck found that 70.4% of operative iridectomy patients and 71.8%

of laser iridotomy patients had an intraocular pressure less than 21 mm Hg without medication 3 years after treatment.<sup>18</sup> Playfair and Watson reported 72% of patients had an intraocular pressure less than 21 mm Hg without medication after 6–12 months of follow up.<sup>19</sup> Buckley et al reported that 75% of operative iridotomy patients and 65% of laser iridotomy patients had an intraocular pressure less than 21 mm Hg without medication after a minimum follow up period of 1 year.<sup>6</sup> A Chinese study found 82.4% of patients had a 'successful' outcome 3 years following Nd: YAG laser iridotomy for acute angle closure glaucoma.<sup>20</sup> However, in this study as the number of eyes studied was small and long term follow up was not taken, further studies with greater number of eyes and long term follow up are required to confirm these findings.

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