The Role of Prophylactic Laser Iridotomy on the Fellow Eye in Primary Angle Closure Glaucoma

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Abstract

Purpose: To evaluate the long-term efficacy of laser peripheral iridotomy (LPI) of fellow eye of patients with acute primary angle-closure glaucoma (APACG).

Design: Retrospective non comparative case series.

Material and Methods: Forty six patients (46 eyes) with APACG at presentation to Assiut University Hospital from January, 2005 to December 2008 were included. All fellow eyes were initially treated with prophylactic pilocarpine 2% eye drops four times daily before LPI which was done within 2 weeks. All patients were followed to detect development of acute angle-closure and rise of IOP.

Results: No cases developed APAC after LPI during the follow-up of 37.3 ± 27.1 months. Thirty eight eyes (82.8%) did not develop rise of IOP during the follow-up period, while the remaining eight eyes (17.2%) developed chronic rise of IOP and required additional treatment.

Conclusion: LPI is effective in preventing angle-closure in fellow eyes. Long-term follow-up is recommended to detect any rise of IOP that may occur and required additional treatment.

Key Words: Prophylactic laser iridotomy – Fellow eye – Primary angle closure glaucoma.

Introduction

GLAUCOMA recently has emerged as the second most common cause of blindness worldwide and the leading cause of irreversible blindness [1,2]. The prevalence of primary angle closure glaucoma (PACG) is highly race-dependent, with lowest rates found in European whites and highest in Inuit [3,4]. The actual incidence is lacking in Egypt. Females are affected 3 to 4 times as often as men [5,6], increasing age is also a major risk factor for developing PACG, with the relative risk of acute angle-closure glaucoma in patients above the age of 60 being 9 times higher compared to younger patients [4]. It is now believed that PACG is more rapidly progressive and visually destructive than primary open angle glaucoma. Therefore, early diagnosis and appropriate management are essential in preventing significant visual loss [6].

Few reports have looked at fellow eyes of persons with APACG. Such eyes were found to have a high incidence of angle-closure and peripheral anterior synechiae [7,8] and if left untreated they are at high risk of developing angle closure glaucoma [9]. Lowe [7] reported that without treatment, 58 of 113 patients developed an acute attack in the fellow eye, a third of these occurring in the first year. Snow [10] documented that 43 of 72 second eyes not treated with iridectomy experienced some form of angle-closure glaucoma.

Peripheral iridectomy to relieve papillary black is safe and effective in treating or preventing angle-closure glaucoma. Laser peripheral iridotomy (LPI) has largely replaced surgical peripheral iridectomy (SPI) as a definitive treatment of choice in both the management of acute primary angle closure (APAC) and as a prophylactic procedure in fellow eyes [11,12]. Its major advantage over SPI is that, It is non invasive and can be performed as an outpatient procedure, without the risks of invasive surgery such as haemorrhage, wound leak and infection.

This study was conducted to assess the long-term outcome of fellow eyes of patients with APAC at presentation who were treated with LPI. The principle parameters studied were the incidence of APAC and the IOP outcome after prophylactic LPI.

Patients and Methods

A retrospective review was carried out on consecutive patients who had APAC at presentation to Assiut University Hospital, from January, 2005 to December 2008. There were a total of 46 eyes...
of 46 patients. The dermographic and ophthalmic data were recoded for each patient. These include age, gender, date of presentation, date of onset of symptoms, visual acuity, IOP measured by Goldman applanation tonometer, gonioscopic findings using Goldman 3 mirrors lens and the treatment instituted.

Eyes with secondary acute angle closure such as phacomorphic glaucoma, neovascular glaucoma, or uveitis, were excluded. Patients who had previous attack of APACG or chronic narrow angle in the fellow eyes were also excluded.

All eyes had an acute attack underwent similar initial medical management to break the acute attack. This consisted of the following: Intravenous mannitol 20% in a dose of 3-7ml/kg, timolol 0.5% every 12 hours, acetozolamide 250mg every 6 hours and steroid eye drops every 6 hours. Corneal indentation was tried if IOP still high. Pilocarpine 3% was given every 6 hours when IOP decreased to 30mmHg or less. The fellow eye was treated with 2% pilocarpine every 6 hours as prophylaxis in preventing an acute attack until prophylactic LPI was done. Sequential argon laser and Nd:YAG laser PI was performed in all fellow eyes. The use of sequential argon laser and Nd:YAG laser results in a reduction of the total laser energy required, thereby reducing damage to the iris [13,14]. An Abraham contact lens was used and the iridotomy site selected was in the superonasal or superotemporal quadrant of the mid peripheral iris. The settings used were as follow: Argon blue green at 1.0 to 1.3w, 50mm spot size, 0.05 to 0.10 second exposure, followed by Nd:YAG laser at 1.5 to 5.0mJ. Patients were given topical steroid drops 4 times daily for 1 week after LPI. All LPI was done within 2 weeks of presentation.

Patients were examined at 1 week, 2 weeks, 1 month and there after every 3 months. To evaluate the effect of LPI, a rise in IOP during the follow-up was defined as IOP >21 mmHg or additional medicine or surgery required.

**Results**

A total of 46 patients with PACG (46 eyes) treated with LPI met the inclusion criteria. Table (1) shows that there were 12 men and 34 women. The mean age of patients was 68.8 ±7.3 years. The mean follow-up period was 37.3 ±7.1 months. The mean IOP at presentation was 16.7 ±2.5 (range 14-22mmHg) Gonioscopy showed 27 eyes had very narrow angle (schwalbe’s line with the top of the trabeculum can be seen), 19 eyes had occludable angle (the trabeculum was not visible for at least 180 degree without indentation on gonioscopy [15]. The mean cup-to-disc ratio was 2.3 ± 1.7 (range 1.2-3.1) at first presentation.

**Table (1): Clinical data of patients.**

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>No. of patients</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>No. of eyes</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td>Age (yrs): Mean</td>
<td>68.8±7.3</td>
<td>Range 51-73</td>
</tr>
<tr>
<td>Sex: M/F</td>
<td>12/34</td>
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<tr>
<td>IOP: Mean</td>
<td>16.7±2.5</td>
<td>Range 14-22</td>
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<tr>
<td>C/D: Mean</td>
<td>2.3±1.7</td>
<td>Range 1.2-3.1</td>
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<tr>
<td>Follow-up (months):</td>
<td>37.3±7.1</td>
<td>Range 27.3-46.5</td>
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**Outcome of prophylactic LPI in the fellow eyes of patient with PAAC:**

- No fellow eye developed acute angle closure after LPI throughout the follow-up period.
- Thirty eight of the 46 eyes (82.6%) that underwent LPI did not developed rise of IOP during the follow-up.
- The remaining eight eyes (17.4%) experienced rise of IOP despite the presence of patent LPI at a mean period of 29.6 ±9.6 months (range 26.5-38.8 months). Gonioscopy of these eyes revealed that they had occludable angle. In five of these eyes, IOP were controlled medically. The remaining three were uncontrolled on medical treatment and underwent trabeculectomy (Table 2).

**Table (2): Post LPI outcome.**

<table>
<thead>
<tr>
<th>No. of patients</th>
<th>Developed PAAC</th>
<th>Zero</th>
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<tbody>
<tr>
<td>No. of patient</td>
<td>Developed ↑ IOP</td>
<td>8</td>
</tr>
<tr>
<td>Duration between LPI and ↑IOP</td>
<td>Mean 29.6 months</td>
<td>Range 26.5-38.8 months</td>
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**Complications:**

- Mild iris bleeding at the time of ND: YAG laser application occurred in 12 eyes (26%) and was stopped with gentle pressure with Abraham lens without sequale.
- Transient rise of IOP was seen in 17 eyes (36.9%) and they were controlled with timolol 0.5 and topical steroid.
Discussion

The general recommendation is that fellow eye (i.e. the contra lateral eyes that did not develop angle-closure glaucoma) should also receive laser iridotomy. A number of studies indicate that 40-80% of fellow eyes develop angle-closure glaucoma over a 5 to 10 years period [8-11]. The incidence of angle closure-glaucoma in the fellow eyes is reduced somewhat by the prophylactic long-term administration of miotic agents. However, this approach is not advised because miotic agents do not provide total protection against acute attacks, and their chronic use may favor the development of peripheral anterior synechiae and chronic angle closure glaucoma [8].

Studies in Caucasians have shown that prophylactic laser PI or surgical PI in fellow eyes were equally effective in preventing acute angle closure [8,11,14].

This study showed that LPI in the fellow eyes of patients with PAAC was effective as prophylaxis against the development of acute angle closure during the follow period. Many patients in Upper Egypt may wait several days before seeking medical care for acute attack of angle-closure glaucoma, therefore LPI is highly recommended to prevent visual morbidity in these patients.

Prophylactic LPI was also effective in preventing a subsequent rise in IOP in 82.6% (38/46) of fellow eyes during the follow-up period of 37.3 months. Ang et al. [16] also reported that prophylactic LPI prevented rise of IOP in 88.8% the fellow eyes of patients with APACG, during a follow-up period of approximately 4 years.

However, a chronic rise in IOP was still seen in 17.4% (8/46) in fellow eyes and required additional treatment. This was similar to that reported by Ang et al. [16] who reported rise of IOP after LPI in 8.8% of their patient during follow-up period of 50 months. Ang et al., attributed this rise of IOP after LPI to the fact that these eyes had mixed mechanisms of glaucoma and to progressive thickening of the lens.

Conclusion:

Prophylactic LPI to the fellow eyes should be done early and the patients should be monitored for life to protect them against this potentially blinding disease.

References