Intraocular Pressure Control Following Phacoemulsification in Patients with Chronic Angle Closure Glaucoma

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Objectives: To evaluate intraocular pressure (IOP) and glaucoma control following phacoemulsification with posterior chamber intraocular lens implantation in patients who had chronic angle closure glaucoma (CACG) whose peripheral anterior synechiae (PAS) were less than 270 degrees.

Design: Non-randomized consecutive cases series.

Participants: CACG cases at the glaucoma service, Ramathibodi Hospital who underwent Neodymium YAG laser peripheral iridotomy (PI) and subsequently received or did not receive anti-glaucoma medication.

Material and Method: Retrospective analysis of CACG patients who had PAS 270 degrees or less and underwent YAG-PI with or without anti-glaucoma medication to control IOP at 21 mmHg or less. The IOP and number of anti-glaucoma medication used at 1, 3 and 6 months were measured. Patients were classified into 2 Groups according to degree of PAS: Group 1 were patients who had PAS 180° or less and Group 2 were those whose PAS was between 181° and 270°.

Main Outcome Measures: The IOP and number of anti-glaucoma medication at baseline and postoperatively at 1, 3 and 6 months were compared by nonparametric statistics.

Results: There were 28 patients (48 eyes) in the present study. Twenty-two were females and 6 were males. Patients’ age ranged from 45 to 76 years old with a mean of 55 ± 6.5 years. Of the 48 eyes, 34 were in Group 1 and 14 were in Group 2. In Group 1, the mean baseline IOP was 20 ± 2.5 mmHg and the average number of preoperative anti-glaucoma medication used was 0.08. At 1, 3 and 6 months postoperatively, the IOPs were 16.2 ± 2.2, 17.1 ± 2.0, 18.1 ± 1.4 mmHg, respectively with an average number of anti-glaucoma medications of 0.3 and 0.3, respectively, whereas in Group 2, the mean baseline IOP was 22 ± 3.8 mmHg and mean preoperative number of anti-glaucoma was 1.8 whereas postoperatively, the IOPs at 1, 3 and 6 months were 17.1 ± 2.2, 17.3 ± 1.8, and 17.1 ± 1.7 mmHg, with an average number of 1.1, 1.4 and 1.4 anti-glaucoma medications used, respectively. When compared between the 2 Groups, Group 1 had a significant difference in IOP control at 1 and 3 months and less use of antiglaucoma medications than Group 2 up to at least 6 months.

Conclusion: Phacoemulsification in CACG helped control of glaucoma. There was a statistically significant difference in IOP reduction and number of anti-glaucoma medication used before and after phacoemulsification in the CACG patients whose PAS did not exceed 270 degrees at least up to 6 months.

Keywords: Chronic angle closure glaucoma, Phacoemulsification


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angle closure include relative papillary block, plateau iris configuration and forward movement of the lens. The mean AC depth in eyes that have ACG is approximately 1.8 mm shorter than in normal eyes due to an increasing lens thickness and anterior position of the lens. A long-term cure of ACG could be expected if the angle obstruction was removed earlier before permanent closure of the filtration angle occurs. Goniosynechialysis (GSL), as well as phacoemulsification (PE) with GSL have been shown to successfully lower the IOP in patients with uncontrolled ACG. However, the authors wanted to know whether or not PE and posterior chamber intraocular lens (IOL) implantation in eyes that underwent YAG-PI would possibly help control IOP of these patients. The objective of the present study was to assess the IOP control in CACG patients with PAS < 270° who had underwent YAG-PI with or without antiglaucoma medication prior to phacoemulsification.

Material and Method

The present study was a retrospective consecutive cases series of a single surgeon who performed PE with IOL in the eyes of patients who had cataract and CACG. These eyes previously underwent YAG-PI and subsequently received anti-glaucoma medication. Patients were classified into 2 Groups according to degree of PAS. Group 1 consisted of patients who had PAS of 180° or less and Group 2 were those whose PAS were between 181° and 270°. Patients with PAS more than 270° were excluded from the study. All eyes underwent clear corneal PE with foldable intraocular lens implantation and received antiglaucoma medication to control IOP postoperatively targeted at 21 mmHg or lower. The authors evaluated the outcome by means of comparing IOP and number of anti-glaucoma medication required between the 2 Groups at baseline and at 1, 3 and 6 months postoperatively by Wilcoxon Sign Romb test for peakline vs 1, 3, 6 months and Mann Whitney U-test to compare between Group 1 and Group 2 at 1, 3, 6 months respectively with statistical significance at p < 0.05.

Results

From Tables 1 and 2 it was found that at one month postoperatively, patients in Group 1 had a mean IOP of 16.2 ± 2.2 mmHg and none required any glaucoma medication, while in Group2, the mean IOPs was 17.1 ± 2.2 mmHg with an average of 1.1 medication. At 3 months postoperatively, the mean IOPs in Group 1 were 17.1 ± 2.0 mmHg with an average of 0.03 medication, whereas in Group2 mean IOP was 17.3 ± 1.8 mmHg with an average of 1.4 medication. At the last follow-up at 6 months, the mean IOP in Group1 was 18.1 ± 1.4

| Table 1. Mean IOP ± SD in Group 1 and Group 2 at baseline and postoperatively |
|--------------------------|--------------------------|--------------------------|
| N = 48 eyes               | Mean baseline IOP ± SD   | Mean Postop IOP ± SD     |
|                          |                          | 1m          | 3m          | 6m          |
| Group 1                  | 34                       | 20 ± 2.5    | 16.2 ± 2.2  | 17.1 ± 2.0  | 18.1 ± 1.4  |
| Group 2                  | 14                       | 22 ± 3.8    | 17.1 ± 2.2  | 17.3 ± 1.8  | 17.1 ± 1.7  |
| p value                  |                          | 0.0078      | 0.033       | 0.11        |

SD = Standard deviation

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<th>Table 2. Average number of antiglaucoma medications used in Group1 and Group2 at baseline and postoperatively</th>
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mmHg with an average of 0.03 medication while in Group 2 mean IOP was 17.1 ± 1.7 mmHg with an average of 1.4 medication. When comparing IOP control of patients before and after phacoemulsification in Group 1 and Group 2, it was found that patients in Group 1 had IOP control significantly better than those in Group 2 at 1 and 3 months postoperatively (p = 0.008 and p = 0.03, respectively), but not at 6 months (p = 0.11). As to the number of anti-glaucoma used, it was found that patients in Group 1 used less anti-glaucoma medication than those in Group 2 significantly at all 3 visits postoperatively (p = 0.05, p = 0.01 and p = 0.01 at 1, 3 and 6 months respectively) which reflected a more severe degree of PAS with less functioning trabecular meshwork in the latter Group.

Discussion

The prevalence of primary angle-closure glaucoma (PACG) is higher among the Asian race compared to Caucasians[4,11,12]. The study analysis population data from Mongolia and Singapore suggested that AC depth is a risk factor for angle closure and that the angle width appears to be correlated with the proportion of PAS. In that study the rate of PAS among Mongolians increased dramatically in eyes with AC depth < 2.4 mm while in Singaporeans the increase in PAS was more gradual[13]. Comparisons of data between populations is relatively consistent with this finding[14]. However, a recent study has shown that angle width depends on many factors and can rapidly vary as shown in ultrasound biomicroscopy[15].

ACG and other clinical subtypes of plateau iris syndrome, plateau iris configuration and floppy zonule or mobile lens, all are surgical cases. Among these cases despite post-iridectomy, a large number of patients required additional medical therapies in which glaucoma surgical interventions usually were unavoidable in the long-term follow-up. The mechanisms of uncontrollable IOP were due to trabecular damage, creeping angle-closure and mechanical forward movement of the lens.

Lens removal, whether it was cataractous or not, in an appropriate time prior to irreversible permanent synechial closure of the angle will add favorable outcome to glaucoma control. Removal of cataract in narrow eyes or eyes with ACG has an impact on AC width and depth. Hayashi et al found that the width and depth of the anterior chamber angle in eyes with angle-closure glaucoma increased significantly after cataract extraction and intraocular lens (IOL) implantation and became similar to that in eyes with open-angle glaucoma (OAG) and that in normal eyes[16]. Greve has reported the effect of ECCE and posterior chamber IOL implantation on IOP in patients with PACG. In many

Fig. 1 Mean IOP of Patiens in Group 1 (PAS < 180) and Group 2 (PAS 181-270) at Baseline and Postoperatively at 1, 3 and 6 months
cases ECCE was performed instead of a filtering surgery with good IOP reduction and only a few eyes needed anti-glaucoma medication after surgery and preferred cataract surgery only rather than a cataract and future trabeculectomy\(^{(17,18)}\). Yang and Hung reported the anterior chamber angle widened significantly in all quadrants after lens removal and all eyes in the ACG group maintained an IOP under 21 mm Hg during the 6-month follow-up with eighty-four percent maintained or decreased their anti-glaucoma medication and 16% required more medication\(^{(19)}\). The results of the present study show that phacoemulsification with IOL implantation in eyes with CACG previously treated with YAG-PI can achieve a satisfactorily IOP control in CACG patients whose PAS was 180° or less better than those whose PAS was more extensive (181-270 degrees), up to 6 months. At target pressure of 21 mm Hg or less, patients with lesser degree of PAS used less anti-glaucoma medication than those with more advanced PAS significantly. Phacoemulsification can reopen the relative closed angle that was not permanently closed. The increasing lens thickness in this anatomically small eyes when replaced with artificial lens which is thinner than a natural lens, can significantly restore the angle structure function because trabecular meshwork itself is not permanently damaged. The authors advocate the choice of the first cataract procedure with subsequent trabeculectomy as we believe that a significant number of CACG patients may benefit from cataract surgery with additional few anti glaucoma medications than a trabeculectomy followed by a cataract procedure or a combined procedure of cataract/glaucoma surgery in the first setting which in the long-term may pose a problem of risk development of bleb-related endophthalmitis. Other more complicated procedures such as drainage surgery in patients with ACG is associated with multiple surgical interventions and deterioration in visual function. The present study had limitation in long term follow up of IOP control and comparison with combined phaco-trabeculectomy in each study group. Future studies on evaluation of this procedure using a new evaluation of an angle width with other intervention would be justified.

References

การควบคุมความถี่การกลัวในผู้ป่วยติดเชื้อมุมปิดคนเริ่งหลังผ่าตัดสายตาต้อกระจกด้วยคลื่นเสียงความถี่สูง

อัจฉรา อยู่วัสจิต, ผู้ชุม วรรคกิต

วัตถุประสงค์: เพื่อประเมินความถี่การกลัวและจานวนยาตัวหินที่ใช้ในการควบคุมต้อหิน ในผู้ป่วยที่เป็นต้อหินชนิด มุมปิดเริ่ง และต้อกระจก ภายหลังผ่าตัดสายตาโดยวิธีสายตาต้อกระจกด้วยคลื่นเสียงความถี่สูง และมีผลสำเร็จตามคาด

วัสดุและวิธีการ: ศึกษาอย่างหลังตัวผู้ป่วยที่เป็นต้อกระจกชนิดมุมปิด และได้รับการรักษาขั้นต้นด้วยการยิงแสง YAG เจาะรูผ่านทางตาข้างและฉีดยาตัวหินในเนื้อเยื่อตาต้อหินคุณภาพดีสุดมาก เพื่อให้ควบคุมความถี่การกลัวในระยะใกล้กัน 21 วัน จำนวนผู้ป่วยรวม 2 ประเภท ตามความมากมายของดวงตาที่ปิด คือกลุ่มที่ 1 และกลุ่มที่ 2 แล้วหาความต่างที่มีมุมตาที่ปิด ภายใน 180 องศา และกลุ่มที่ 3 ได้ มุมด้านใน 181-270 องศา วัดผลโดยประเมินทإبداعคำสั้นความคิดในผ่าตัด และจานวนยาตัวหินที่ใช้ควบคุมความถี่การกลัว ระหว่างกลุ่มผ่าตัด และที่ 1, 3 และ 6 เดือนหลังผ่าตัด โดยถือว่ามีความแตกต่างอย่างมีนัยสำคัญที่ความเชื่อมั่นในระดับ p<0.05

ผลการศึกษา: มีผู้ป่วยทั้งสิ้น 28 ราย (48 ตา) เป็นผู้หญิง 27 คน และผู้ชาย 1 คน อายุระหว่าง 45 ถึง 76 ปี โดยอายุเฉลี่ย 55 ± 6.5 ปี ในจำนวน 48 ตา อยู่ในกลุ่ม 1 จำนวน 34 ตา และกลุ่มที่ 2 จำนวน 14 ตา คำสั่งความคิดต่างๆในกลุ่มที่ 1 ได้แก่ 20 ± 2.5 มม. 1 และมุมที่ใช้ทำกับ 0.08 ดี หลังผ่าตัดพบความต่างของค่าความคิดต่างๆในกลุ่มที่ 1, 3 และ 6 เดือน ลดลงตามลำดับอย่างมีนัยสำคัญ และคำสั่งของคำสั่นที่ใช้ ศิลปะ 0, 0.03 และ 0.03 ส่วนในกลุ่มที่ 2 คำสั่งความคิดต่างๆไม่ได้เปลี่ยน 22 ± 3.8 มม. 1 และค่าที่ลดลงที่ใช้ หลังผ่าตัดพบความต่างต่างอย่างมีนัยสำคัญ และคำสั่งของคำสั่นที่ใช้ทำกับ 1.1 ดี, 1.4 ดี และ 1.4 ดี ตามลำดับ เมื่อเปรียบเทียบกันด้วยกัน เฉพาะผู้ป่วยในกลุ่มที่ 1 และ 2 พบว่า ความต่างต่างพาตีและจำนวนยาที่ใช้หลังผ่าตัดลดลงในกลุ่มที่ 1 ต่ำกว่าในกลุ่มที่ 2 อย่างมีนัยสำคัญทางสถิติ

สรุป: การทดลองตื้นกระทบโดยใช้คลื่นเสียงความถี่สูง มีส่วนช่วยให้การควบคุมต้อหินได้ ด้วยคำสั่นของความตัน ตกตาลดลง และจำนวนยาที่ใช้ช่วยควบคุมความตันตกตาลดลงอย่างน้อยเป็นระยะเวลากว่า 6 เดือน