

Phacoemulsification Alone versus Phacoemulsification Combined with Trabeculectomy for Primary Angle-Closure Glaucoma

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Surgical outcomes of phacoemulsification only and phacoemulsification combined with trabeculectomy were compared in patients with primary angle-closure glaucoma (PACG). Clinical records of 41 consecutive patients were retrospectively reviewed, and there was no difference in best-corrected visual acuity and intraocular pressure preoperatively and at the final follow-up in both study groups. Regarding the number of anti-glaucoma medications, it was higher in the phacoemulsification combined with trabeculectomy group preoperatively than the phacoemulsification only group ($p = 0.045$), but both groups were taking similar quantities of medication at the final follow-up ($p = 0.6$). In addition, postoperative hypotony (two cases) occurred only after phacoemulsification combined with trabeculectomy, but not after phacoemulsification only. In one case after phacoemulsification only, a second operation was needed. There were no additional postoperative complications. In conclusion, both phacoemulsification only and phacoemulsification combined with trabeculectomy showed good surgical outcomes in PACG patients. Both procedures might be equally effective in treating patients with PACG.

Key Words: Phacoemulsification, phacoemulsification combined with trabeculectomy, primary angle-closure glaucoma

INTRODUCTION

The ocular lens of the eye plays a major role in the pathophysiology of primary angle-closure glaucoma (PACG). Eyes with PACG tend to have a shallow anterior chamber and a thick, anteriorly positioned lens when compared to normal eyes.¹⁻⁴ Lens extraction may eliminate the most important primary pathology, so it is not surprising that cataract removal significantly deepens the anterior chamber and widens the drainage angle in patients with PACG.⁵⁻⁸ Even though the conventional treatment modality for medically uncontrolled PACG is a trabeculectomy, this modality is associated with potentially serious complications such as the development of a shallow or flat anterior chamber, malignant glaucoma, suprachoroidal hemorrhage, and endophthalmitis, especially in PACG patients.⁹ Recent developments in small-incision phacoemulsification have prompted combined trabeculectomy and cataract surgery in patients with glaucoma and a coexisting cataract.¹⁰ However, there is accumulating evidence that cataract extraction alone may correct the anatomic pathology in PACG and improve intraocular pressure (IOP)

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control.^{7,11-23} Thus, we compared the surgical outcomes of phacoemulsification alone and phacoemulsification combined with trabeculectomy in patients with PACG.

After obtaining approval from the Institutional Review Board, the clinical records of 41 consecutive eyes (41 patients) with PACG who underwent phacoemulsification alone (20 eyes) or phacoemulsification combined with trabeculectomy enhanced by mitomycin C (21 eyes) were retrospectively reviewed. Primary angle closure was defined as a raised IOP of higher than 21 mmHg, or requiring IOP-lowering anti-glaucoma medications to maintain an IOP of below 21 mmHg, in the presence of a more than 180 degree angle-closure obstructing the pigmented part of the trabecular meshwork on gonioscopy without indentation. Eyes with primary angle-closure and evidence of glaucomatous optic neuropathy were diagnosed as PACG. A visually significant cataract was defined as either a cataract of sufficient maturity leading to a visual acuity of 0.18 logMAR or worse, or patient difficulty in activities of daily life due to reduced visual acuity.

All procedures were performed under peribulbar anesthesia. Phacoemulsification was performed to remove the cataract through a corneal temporal incision using phacoemulsification, followed by implantation of a foldable posterior chamber intraocular lens (IOL) in the bag. In cases of phacoemulsification combined with trabeculectomy, a limbal-based conjunctival flap and half-thickness scleral flap were created. Phacoemulsification was performed through a corneal incision at a site separate from where the trabeculectomy was performed. Following implantation of a posterior chamber IOL, a sponge soaked in 0.04% mitomycin C was applied under the scleral flap and subconjunctival space for 1-4 minutes. Then, a trabeculectomy and peripheral iridectomy were performed.

Preoperative and postoperative data were collected retrospectively. Patient follow-up occurred on the first postoperative day and according to clinical needs thereafter. During these visits, best-corrected visual acuity, IOP (measured using the Goldmann applanation tonometer), number of anti-glaucoma medications, postoperative adverse events (hypotony, endophthalmitis, hyphema, leakage, etc.), and additional procedures required to lower IOP were recorded. Statistical comparison between the two procedures was performed using the Mann-Whitney test, and *p* values less than 0.05 were considered statistically significant.

The mean postoperative follow-up period was 25.8 ± 16.8 months. The mean age was 69.4 ± 9.8 years in the phacoemulsification only group, and 72.1 ± 8.0 years in the phacoemulsification combined with trabeculectomy group (*p* = 0.3). There was no significant difference in best-corrected visual acuity preoperatively and at the final follow-up between the two study groups (preoperative; *p* =

0.5, at final follow-up; *p* = 0.6). The IOP preoperatively and at the final follow-up did not differ between the two groups. The mean preoperative IOP was 23.9 ± 10.2 mmHg for the phacoemulsification only group, and 19.6 ± 8.5 mmHg for the phacoemulsification combined with trabeculectomy group (*p* = 0.2). The mean final IOP was 13.7 ± 2.3 mmHg for the phacoemulsification only group, and 13.9 ± 5.7 mmHg for the phacoemulsification combined with trabeculectomy group (*p* = 0.3). The decrease in IOP after surgery was larger in the phacoemulsification combined with trabeculectomy group (5.7 ± 9.3 mmHg) than the phacoemulsification only group (10.1 ± 9.5 mmHg), but the difference was not statistically significant (*p* = 0.2). Although the number of anti-glaucoma medications was higher in the phacoemulsification combined with trabeculectomy group preoperatively, it was similar in both groups at the final follow-up. The number of preoperative medications was 1.7 ± 1.0 for the phacoemulsification only group and 2.3 ± 0.8 for the phacoemulsification combined with trabeculectomy group (*p* = 0.045). The number of medications at the final follow-up was 0.4 ± 0.6 for the phacoemulsification only group and 0.6 ± 0.7 for the phacoemulsification combined with trabeculectomy group (*p* = 0.6). Postoperative hypotony developed in two eyes belonging to two patients from the phacoemulsification combined with trabeculectomy group. A second operation was needed for only one eye, and this was for a patient in the phacoemulsification only group. Other postoperative complications were not detected in this study.

PACG is characterized by obstruction to the outflow of aqueous humor and a consistent rise in IOP.²⁴ While conventional trabeculectomy is often used in ACG, trabeculectomy alone in a phakic eye with PACG carries a significant risk of the development of a postoperative flat anterior chamber.²⁵ There has been extensive debate as to whether cataract surgery alone can control the IOP in established diseases with glaucomatous optic neuropathy, or whether it needs to be combined with trabeculectomy. Some studies suggest that cataract surgery may be as effective as filtering surgery in controlling IOP in PACG cases.^{12,14} In the present study, there was no significant difference in surgical outcomes between these two approaches, including postoperative best-corrected visual acuity, IOP, and number of anti-glaucoma medications required. Even though the number of preoperative anti-glaucoma medications was higher in the phacoemulsification combined with trabeculectomy group than the phacoemulsification only group, this may be because the surgeon chose phacoemulsification combined with trabeculectomy over phacoemulsification when the patient had a higher IOP. In addition, though the preoperative IOP seemed to be slightly higher (but the difference was not significant) in the phacoemul-

sification only group than the combined surgery group, it may be due to the difference in preoperative medications. While this report is a retrospective analysis consisting of a limited number of patients, it does compare the results of cataract extraction alone and phacoemulsification combined with trabeculectomy in PACG. Various previous studies have mostly compared the effect of cataract surgery alone with trabeculectomy alone.

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