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Outcomes of Surgery for Posterior Polar Cataract Using Torsional Ultrasound

Arka Polar Kataraktta Torsiyonel Ultrason ile Cerrahi Sonuçları

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Summary

Purpose: The aim of this study is to report outcomes of surgery for posterior polar cataract using torsional ultrasound.

Material and Method: Medical records of 26 eyes of 21 consecutive patients with posterior polar cataract who had cataract surgery using the torsional phacoemulsification were evaluated retrospectively. The surgical procedure used, phacoemulsification parameters, intraoperative complications, and postoperative visual outcome were recorded.

Results: Of the 26 eyes, 24 (92.3%) had small to medium posterior polar opacity. Two eyes had large opacity. All surgeries were performed using the torsional handpiece. Posterior capsule rupture occurred in 4 (15.3%) eyes. The mean visual acuity improved significantly after surgery ($p<0.001$). The postoperative visual acuity was worse than 20/20 in 5 eyes. The cause of the low acuity was amblyopia.

Discussion: Successful surgical results and good visual outcome can be achieved with phacoemulsification using the torsional handpiece.

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Key Words: Posterior polar cataract, torsional phacoemulsification, posterior capsule rupture, vitreous loss

Özet

Amaç: Bu çalışmanın amacı, arka polar katarakt cerrahisinde torsiyonel ultrason kullanımının sonuçlarını değerlendirmektir.

Gereç ve Yöntem: Arka polar kataraktı olup, torsiyonel fakoemülsifikasyon ile ameliyat edilmiş ardışık 21 hastanın 26 gözüne ait kayıtlar retrospektif olarak incelendi. Kullanılan cerrahi yöntem, fakoemülsifikasyon parametreleri, intraoperatif komplikasyonlar ve ameliyat sonrası görsel sonuçlar değerlendirildi.

Sonuçlar: Yirmidört gözde (%92,3) hafif - orta arka kapsül opasitesi vardı. İki gözde opasite genişti. Tüm olgularda torsiyonel ultrason elciği kullanıldı. Dört gözde (%15,3) arka kapsülde rüptür meydana geldi. Ameliyat sonrasında görme keskinliğinde artış meydana geldi ($p<0,001$). Beş olguda, ambliyopiye bağlı olarak, görme keskinliği 20/20'nin altında kaldı.

Tartışma: Arka polar katarakt cerrahisinde toriyonel ultrason ile başarılı cerrahi sonuçlar elde edilir ve görme keskinliğinde artış sağlanır.

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Anahtar Kelimeler: Arka polar katarakt, torsiyonel fakoemülsifikasyon, arka kapsül rupture, vitreus kaybı

Introduction

With the high risk of capsular rupture, reported to be 26% to 36%, posterior polar cataracts are one of the challenging cases for anterior segment surgeons.[1,2] Although posterior polar cataract is a subtype of congenital cataracts, these cases generally become symptomatic and necessitate surgery at early adulthood. Visual disturbances, particularly glare at night-time driving, impair the life quality. Phacoemulsification has become the gold standard procedure; however, higher complication rates have encouraged surgeons to seek new techniques that could lower these rates.

Several modifications in phacoemulsification for posterior polar cataracts have been reported. These reports, in common, suggest avoiding hydro-dissection and making an effective hydro-delineation. Further, they introduce phacoemulsification modifications, all aiming to diminish the stress on the capsular bag and the weakened zonules.[3-6]

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Energy, which is introduced into the eye with phacoemulsification by means of ultrasound (US) and fluid dynamics, causes adverse effects on ocular structures.[7-9] A recently developed mode, torsional phacoemulsification, has been reported to be superior to classic longitudinal mode, providing lower US time and energy and more effective phacoemulsification.[10-12]

Thus, in the current study we aimed to report the efficiency of torsional phacoemulsification in posterior polar cataracts.

Materials and Methods

Medical records of all patients with posterior polar cataract who underwent pacoemulsification between 2006 and 2010 were reviewed retrospectively. The diagnosis of posterior polar cataract was made by slit-lamp examination.

All surgeries were carried out under peribulbar anesthesia, by the same experienced surgeon (AP), using the Infinity Vision System (Alcon, Inc.) with the OZil torsional handpiece set for continuous mode without axial US. The microtip used was 0.9 mm, aspiration bypass system, 45 degrees, Kelman tip with a micro-smooth high-infusion sleeve.

A 2.75-mm self-sealing clear corneal incision on the temporal side and two side-port incisions, each 3 clock hours apart from the main incision, were created. A dispersive ophthalmic viscosurgical device (sodium hyaluronate 3.0% and chondroitin sulphate 4.0%, Viscoat, Alcon Inc.) was injected into the anterior chamber, while care was taken to avoid overfilling. An anterior continuous curvilinear capsulorhexis with a maximum diameter of 5.0 mm was created with an Utrata forceps. Hydro-dissection was avoided in order to prevent capsular rupture; controlled hydro-delineation was performed, and the golden ring sign occurred in most cases. Rotation of the nucleus was also avoided. For soft nuclei, chip and flip technique was used with 100 mmHg vacuum and 20% US power. Harder nuclei (grade II-III) were emulsified by stop and chop technique with 50-60 mm Hg vacuum and 80-90% US power. Emulsification was done at the 70%to 80%power at an increased vacuum pressure of 100 mmHg. Throughout the procedure, the aspiration flow rate was 16-18 ml/min and the bottle height was 50-60 cm. Cortical material was cleaned up by automated irrigation-aspiration with low flow and low vacuum; the peripheral cortex was removed first, and the central part, consisting of the cortex and the posterior plaque, was firmly dissected from the posterior capsule. Then a single-piece foldable intraocular lens (IOL) (Acrysof SA60AT, Alcon Inc) was injected into the capsule. In case of posterior capsular rupture, two-port vitrectomy through the side-port incisions was performed, and a 3-piece foldable IOL (Acrysof MA60AC, Alcon Inc) was placed in front of the anterior capsulorhexis and optic capture was done.

Best-corrected visual acuity was checked with the standard Snellen chart at baseline and during follow-up. The result was converted to logarithm of the minimum angle of resolution (logMAR). The paired t-test was used to compare the mean preoperative and postoperative visual acuities. A P-value below 0.05 was considered to be statistically significant.

Results

Twenty-six eyes of 21 patients were included in the study. Five patients underwent surgery in both eyes. The mean age of the 13 men and 8 women was 38 (range 5-70) years. The mean follow-up time was 12 (range 3-40) months.

Of the 26 eyes, 24 (92.3%) had small to medium posterior polar opacity. Two eyes had large opacity. Posterior capsule rupture occurred in 4 (15.3%) eyes during removal of the posterior plaque. No case of nuclear drop occurred.

The mean preoperative visual acuity was 20/80. The mean postoperative visual acuity was 20/25. The mean visual acuity improved significantly after surgery ($p<0.001$). The postoperative visual acuity was worse than 20/20 in 5 eyes. The cause of low vision was amblyopia. During follow-up, none of our patients developed retinal detachment.

Discussion

Numerous modifications have been reported for posterior polar cataract surgery, which is still one of the challenging cases for anterior segment surgeons. Avoiding over-inflation of the anterior chamber, avoiding hydro-dissection, low-energy surgery which includes low bottle height, reduced vacuum and US power all carry the common philosophy to maintain the integrity of the posterior capsule and the plug; since broken integrity of the posterior capsule, which is reported to be 0%to 36%in posterior polar cataract surgery, might lead to devastating complications like loss of nuclear fragments into the vitreous.[5,13,14] Even minimal trauma, could result in posterior capsule tear.[13]

Low-energy phacoemulsification is hypothesized to cause less trauma to ocular structures.[7,9,15] A study with a large cohort, reported a decrease in US time and energy with torsional phacoemulsification decreases.[10] Thus, Bozkurt and co-workers[16] concluded that torsional phacoemulsification reduced the risk of posterior capsule rupture as it is associated with less repulsion of the nuclear fragments and anterior chamber instability.

In the current study, of the devastating complications of posterior polar cataract surgery, posterior capsule rupture rate was comparable with the literature (15.4%). The posterior capsule rupture occurred during plaque removal; this was also consistent with previous studies which report this rate to vary between 0% and 36%.[14] We used very low levels of vacuum (100 mmHg average), bottle height (50-60 cm), and aspiration flow rate (16-18 mL/min). These parameters were similar to the ones given by Vasavada and co-workers (150-250 mmHg, 50-60 cm, and 16 mL/min, respectively).[17] Torsional phacoemulsification is reported to be associated with greater vacuum limit accuracy, less occlusive break surge, less vibration, and improved followability.[18,19] Thus, we believe with these enhanced dynamics torsional phacoemulsification can be safely and efficiently used in posterior polar cataracts. However,

intelligent phacoemulsification which offers reduced occlusion time, aspiration time, and balanced salt solution use was recently introduced.[20,21] Perhaps, this software would reveal enhanced surgical outcome in posterior polar cataract surgery; further studies are required.

To the best of our knowledge, this is the first report in the literature that emphasizes the benefit of torsional phacoemulsification in posterior polar cataract. With low complication rates, torsional phacoemulsification is a safe and preferable technique in posterior polar cataract management.

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