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Visual and Surgical Outcomes of Phacoemulsification in Patients with Pseudoexfoliation Syndrome

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Abstract: Pseudoexfoliation syndrome is an age-related systemic disease. There is a deposition of whitish-gray, fibrillogranular amyloid like material on various ocular structures such as the anterior lens capsule, zonules, ciliary body, pupillary margin of the iris, corneal endothelium, anterior vitreous and trabecular meshwork. Pseudoexfoliation is associated with increased incidence of cataract, complications during cataract surgery and glaucoma. This study was done to document the visual and surgical outcome of phacoemulsification in patients with pseudoexfoliation syndrome. Forty three eyes of 43 patients with pseudoexfoliation,who underwent phacoemulsification at RIO, RIMS Ranchi were retrospectively studied. Intraoperative complications were zonular dialysis in 5 (11.62%) cases, posterior capsular rupture in 3 (6.9%) cases, iris hook required in 5 (11.6%) cases and 1 (2.3%) patient left aphakic**.** Post-operative complications were cystoid macular oedema in 2 (4.7%) cases, raised intraocular pressure in 4 (9.3%), posterior capsular opacity in 6 (13.9%) cases and IOL decentration 3 (6.9%). Final best-corrected visual acuity was between 6/6-6/9 in 28 (65.1%) cases. Phacoemulsification in eyes with pseudoexfoliation has a higher incidence of operative and postoperative complications like failure of pupil dilatation, posterior capsular rupture, zonular dialysis and poor visual outcome due to raised IOP. Posterior capsular opacity formation and IOLdecentration are also more common in patients with pseudoexfoliation syndrome.
Keywords: Pseudoexfoliation, Cataract, Phacoemulsification, Glaucoma.

INTRODUCTION

Pseudoexfoliation syndrome is an age-related systemic disease with both ocular and systemic manifestations and was first described by Lindberg in 1917 [1]. The ocular manifestations are characterized by deposition of whitish-gray, fibrillogranular amyloid like material on the anterior lens capsule, zonules, ciliary body, pupillary margin, corneal endothelium, anterior vitreous and trabecular meshwork [2].

Pseudoexfoliation is a risk factor for both open-angle glaucoma and angle-closure glaucoma. It can cause lens subluxation due to weak zonules, blood-aqueous barrier impairment, increased incidence of cataract and increased risks of intraoperative and postoperative complications of cataract surgery such as capsular rupture, zonular dialysis and vitreous loss [3]. So this study was done to document the visual and surgical outcome of phacoemulsification in patients with pseudoexfoliation syndrome.

MATERIALS AND METHODS

Consecutive patients of pseudoexfoliation syndrome who underwent phacoemulsification and IOL implantation at the Regional Institute of Ophthalmology, Rajendra Institute of Medical Sciences, and Ranchi from July 2016 to August 2018 were retrospectively analysed. Pseudoexfoliation syndrome was diagnosed on the slit lamp based on presence of fibrillary material on the 4333 apillary margin or the anterior lens capsule.

The parameters assessed were age, sex, pre-operative visual acuity, IOP, 4333apillary dilatation under maximal mydriasis by slit lamp biomicroscopy as well as the type and grade of cataract, presence of zonular dialysis and anterior chamber angles by gonioscopy.

Patients underwent phacoemulsification with posterior chamber foldable IOL. IOL power was calculated by SRK II formula. Pupils were dilated with tropicamide 0.8% and phenylephrine 5%.

The patients were reviewed routinely on post-operative Day 1, Day 7 and Week 4 and then kept on

follow up. Intraoperative and post-operative complications and the best-corrected visual acuity were documented.

Data processing and analysis

Data was analysed using the SPSS software for Windows, version 18.0 SPSS Inc, Chicago, IL, USA.

RESULTS

The study included 43 eyes of 43 patients with pseudoexfoliation syndrome of which 25 (58.14%) were females and 18 (41.86%) were males. The mean age of patients was 68.4 ± 6.8 years. The mean follow-up period was 7.8 ± 2.5 months.

Of the 43 patients, 24 (55.8%) patients had immature cataract, 10 (23.3%) had mature and 9 (21%) had posterior subcapsular cataract (Table 1).

Table-1: showing types of cataract

Types of Cataract	No. of patients
Immature	24
Mature	10
Posterior Subcapsular Cataract	9

Preoperatively, 22 (51.2%) patients had worse than 6/60 vision in the eye concerned. None of the patients had better than or equal to 6/9 vision. At 4 weeks post-operative period, 5 (11.7%) patients had worse than 6/60 vision and 28 (65.1%) patients had better than or equal to 6/9 vision. (Table 2)

Table-2: Showing Preoperative and postoperative visual acuity

Best Corrected Visual Acuity	Pre-operative N(%)	Post-operative 4th week N (%)
≤6/60	22 (51.2%)	5 (11.7%)
6/36-6/24	19 (44.2%)	1 (2.3%)
6/18-6/12	2 (4.7%)	9 (21%)
≥6/9-6/6	0 (0%)	28 (65.1%)

The most common complications faced during phacoemulsification were poor pupillary dilatation and zonular dialysis in11.6% of cases, each. In 2 (4.7%) patients' pupils did not dilate at all with Tropicamide 0.8% and Phenylephrine 5% drops. 25 (58.1%) had pupillary dilatation between 4mm-6mm and 16 (37.2%) had adequate pupillary dilatation (>6mm). Iris hooks had to be used intra-operatively in 5 (11.6%) cases.

Three eyes (6.9%) had posterior capsular rupture (PCR) during surgery. Two eyes (4.7%) of those patients with PCR had IOL implantation in the ciliary sulcus. One patient was left aphakic, in whom the entire capsular bag came out; he was planned for secondary scleral fixated IOL. In the rest of the 40 patients (93%), the IOL was placed in the capsular bag. There was zonular dialysis in 5 cases. We used capsular tension ring in 4 of the cases. The 5th was the aforementioned patient who was left aphakic (Table 3).

Table-3: showing intraoperative complications

Intraoperative complications	N(%)
Iris hook required	5 (11.6%)
Zonular dialysis	5 (11.6%)
Posterior capsular rupture	3 (6.9%)
Patient left aphakic	1 (2.3%)

In the immediate post-operative period, anterior chamber inflammation was seen in 4 (9.3%) eyes. In the intermediate post-operative period, decentered IOL and cystoid macular oedema were seen in 3 (6.9%) and 2 (4.7%) cases respectively. In the late post-operative period, posterior capsular opacity was seen in 6 (13.9%) eyes. (Table 4)

Table-4: Showing postoperative complications

Post-Operative Complications	N(%)
Post-operative inflammation	4 (9.3%)
Decentered IOL	3 (6.9%)
Cystoid Macular Oedema	2 (4.7%)
Posterior Capsular Opacity	6 (13.9%)

Pre-operative IOP measurement by Goldman Applanation Tonometry revealed that 36 (83.8%) patients had intraocular pressure within normal range and 7 (16.3%) patients had intraocular pressures more than 21 mm of Hg. Post-operatively, IOP was found to be raised in 4 (9.3%) eyes, in all of which there was glaucomatous optic atrophy. The rest of the 39 eyes (90.7%) had IOP within normal limits post-operatively.

DISCUSSION

Cataract surgery in PEX is generally associated with increased intraoperative and postoperative complications. In our study, 5 (11.6%) patients had zonular dialysis out of which, 4 (9.3%) patients needed capsular tension ring to be implanted intra-operatively. Drolsum and co-authors [4] found a frequency of 9.6% of capsular tear, zonular tear or vitreous loss in eyes with PEX.

A well dilated pupil is one of the main requirements for a safe and successful phacoemulsification surgery; even more so in eyes with PEX syndrome, in which phacoemulsification is complicated because of the risks associated with weak zonules and poor pupillary dilatation [5]. In our study, only 16 (37.2%) patients had adequate pupillary dilation (>6mm) and the rest 27 (62.8%) had <6mm dilation. A study by Aalia R Sufi et al [5] showed a highly significant difference in the preoperative pupillary dilatation in response to mydriatics between PEX and non-PEX groups.

We noted 7 patients with high IOP pre-operatively and 4 having glaucomatous damage post-operatively. Previous studies by Shingleton *et al*. [6] and K F Damji *et al*. [7] reported a mean baseline IOP higher in PEX versus the non-PEX group.

In our study, post-operative inflammation was seen in 4 (9.3%) patients. Aalia R Sufi *et al*. [5] noted that patients with PEX had a higher postoperative inflammatory response in the form of flare, cells, corneal edema and inflammatory membranes. They suggested that the significantly higher postoperative inflammatory response in such patients can be attributed to the transient breakdown of the blood-aqueous barrier that occurs during phacoemulsification in patients with PEX [8]. Permeability of protein is also increased in eyes with PEX due to pathological iris vessels, leading to significant inflammation [9].

Merkur A *et al*. speculated that phacoemulsification removes a source of PEX material i.e, the anterior lens capsule and results in the clearance of PEX and pigment debris from the anterior segment, in particular the trabecular meshwork [10]. Other studies by DJ Cimetta [11] and Shingleton [6] supported this. Our study showed a decrease in IOP after phacoemulsification, except in those who had glaucomatous optic atrophy prior to surgery.

CONCLUSIONS

Pseudoexfoliation with cataract has higher intraoperative complications due to weak zonules, poor pupillary dilatation and harder nuclei. Before surgery is undertaken, it is important to carefully assess zonular stability, lens position, anterior chamber angles and depth. Thereafter, appropriate precautions can be taken to avoid complications, like having iris hooks and capsular tension rings ready, and adopting methods such as gentle hydrodissection, gentle in-the-bag nuclear rotation, supracapsular nucleatomy using soft shell technique and pulsed phaco power to avoid in-bag stress.

It is also associated with a chance of poorer post-operative visual outcome due to underlying glaucoma, IOL decentration and increased incidence of posterior capsular opacity.

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