



LONG TERM STUDY OF CATARACT SURGERY AND POSSIBLE COMPLICATIONS IN PATIENTS WITH PSEUDOEXFOLIATION SYNDROME IN GARHWAL HIMALAYAN REGION

Ophthalmology

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ABSTRACT

Purpose: To study the frequency and intraoperative difficulties associated with pseudoexfoliation (PXF) syndrome at a tertiary eye care center in Garhwal Himalayan region. **Methods:** This study included patients scheduled for cataract surgery who were diagnosed with PXF syndrome. All patients underwent a complete ophthalmologic evaluation, including slit-lamp examination, tonometry, gonioscopy, and ophthalmoscopy before the surgery. Cataract surgeries were performed by a single surgeon who reported the intraoperative difficulties. **Results:** In total, 424 phakic eyes of 934 patients were evaluated, 126 of whom (22.1%) were diagnosed with PXF syndrome. Most eyes ($n=81$, 35.8%) with PXF syndrome were ≥ 81 years old. Eighty-six eyes (38.1%) had bilateral involvement, whereas 70 (30.9%) had right or left eye involvement. Further, PXF material was distributed on the iris, pupil, and lens in 70 eyes (30.9%) and on the pupillary margin in 36 eyes (15.9%). The mean pupillary dilation was $5.1 (\pm 1.4)$ mm in patients with PXF syndrome compared with $7.2 (\pm 1.6)$ mm in those without it ($P=0.03$). Grade VI cataract was observed in 93 eyes (41.2%) and hypermature cataract was the most commonly observed cataract stage. Twenty-one eyes (9.3%) had increased intraocular pressure. Intraoperative difficulties were encountered in 62 eyes (27.4%) with poor pupillary dilation being the most common problem (32 eyes, 14.2%), followed by zonular dehiscence (18 eyes, 8%). **Conclusion:** This hospital-based study showed that PXF syndrome is common in rural population of Garhwal region and that the intraoperative complication rate in these patients is high. Surgeons should be aware of the potential complications of cataract procedures in patients with PEX. Caution should be taken at every stage of the surgery to prevent these complications, and surgeons should be knowledgeable and skilful in complication management should they arise.

KEYWORDS

Phacoemulsification in pseudoexfoliation, pseudoexfoliation, pseudoexfoliation in Indian population

Introduction

Pseudoexfoliation syndrome (PEX) is a condition characterized by the secretion of a grey-white, fibrogranular substance in the anterior segment. The source of this substance is multifocal and is believed to appear secondary to abnormal basal membrane constituents produced by aging epithelial cells [1]. *PEX is diagnosed clinically by anterior segment examination, and is defined as the presence of grey-white fibrogranular pseudoexfoliation material on the anterior capsule of the lens and edges of the pupil* [2, 3]. *The prevalence of PEX varies by population; however, PEX frequency increases with age and it is believed that an extremely significant relationship exists between age-related cataractous lens changes and PEX* [4].

In eyes with PEX, it has been reported that degenerative changes in the iris stroma and muscle layer may interfere with sufficient pupil dilation [5]. *In eyes with pseudoexfoliation, the lens zonules can become detached from the ciliary body and lens by mechanical forces or enzymatic zonulolysis. Clinically, this can lead to iridophacodonesis and spontaneous lens subluxation or dislocation* [6]. *These structural changes make cataract surgery more difficult and increase the incidence of intraoperative complications* [7, 8].

The aim of this retrospective study was to evaluate the demographic characteristics and intraoperative complications of cataract surgery in PEX patients in garhwal Himalayan region.

Materials and Methods

This prospective, cross-sectional, and observational study was conducted over a period of 2 years at a tertiary eye care center in Garhwal Himalayan region. All patients provided written informed consent, and the study was conducted in accordance with the tenets of the Declaration of Helsinki. Ethical approval was obtained from the Institutional Review Board of the hospital. Patients scheduled for cataract surgery and diagnosed with PXF syndrome during the study period were consecutively included. Patients with both pseudophakia and PXF syndrome, those <50 years old, and those with cataract due to uveitis, trauma, or systemic diseases were excluded. Demographic characteristics evaluated were age, sex, and place of residence (rural or urban).

Any pupillary dilatation <5 mm was considered to be poor pupillary dilation. Patients suspected of having glaucoma (due to the presence of optic nerve head abnormalities, history of glaucoma, and IOP >21 mm Hg) were screened for glaucoma. A single surgeon performed the cataract surgeries in all study patients by phacoemulsification

technique through clear corneal incision. Patients with zonular dehiscence $<90^\circ$ were implanted with capsular tension ring (PMMA, 12–12.5 mm size).

Pearson's Chi-square test and t -test were used to test the significance of data at 95% confidence interval.

Results

There were 51 (34.7%) males and 29 (38.6%) females among the PEX cataract patients. The incidence of pseudoexfoliation was similar in women (38.2%) and men (34.7%) ($p=0.660$). There was no statistically significant effect of gender on pseudoexfoliation frequency. The mean age was 74.64 ± 6.8 in the PEX group. Mean age was significantly higher in the PEX groups ($p<0.001$).

Poor pupil dilation was observed intraoperatively in 60 (75%) of the patients with pseudoexfoliation. Frequency of poor intraoperative pupillary dilation was significantly higher in the PEX group ($p<0.001$). Intraoperative posterior capsule rupture occurred in 10 (12.5%). The incidence of intraoperative posterior capsule rupture was statistically significantly higher in the PEX group ($p=0.012$). Intraoperative vitreous loss occurred in 7 (8.8%) PEX patients. Despite the fact that more PEX patients developing vitreous loss than controls, the difference was statistically insignificant ($p=0.090$). The difference between "posterior capsular rupture" and "vitreous loss" should be identified.

A single surgeon performed the cataract surgeries in all patients and reported the intraoperative difficulties, which are presented in **Table I**. Intraoperative difficulties were reported in 62 (27.4%) eyes, 32 of whom (14.2%) presented poor pupillary dilation, 12 of them (5.3%) needed iris retractors at the beginning of the surgery, and 5 eyes (2.2%) needed iris retractors during the nucleus removal and cortical aspiration stage. Iris capture with the phaco tip occurred in one of these patients (0.4%) during nucleus removal. Further, zonular dehiscence was the second most common complication that occurred in 18 eyes (8%), necessitating capsular tension ring placement to stabilize the zonular apparatus. Posterior capsular rupture occurred in three eyes (1.3%), for which anterior vitrectomy was performed, and the intraocular lens was placed over the anterior capsular rim. Five eyes (2.2%) were converted to small-incision cataract surgery from phacoemulsification because of extended capsulorhexis in two eyes and stony hard nucleus in three eyes. None of the patient had complete capsular bag removal instance.

Table 1

Surgical difficulties	Number of eyes %
Poor pupillary dilatation	14.2
Zonular dehiscence	8
Posterior capsular tear	1.3

Discussion

The incidence of PEX varies by population, ethnic group and age. However, studies consistently show that the frequency of PEX increases with age [9-13]. In a study conducted in the Çukurova Region of Turkey, Yalaz et al. reported a PEX frequency of 11.2% in individuals over 60 years old [12]. In their epidemiological study, Elibol et al. (13) found a PEX incidence of 13.7%. Consistent with these findings, an increase in the frequency of PEX with age was observed in the current study.

There are reports in the literature of a significant relationship between PEX and cataract development; furthermore, certain challenges of cataract surgery in the presence of PEX and increased risk of complications have been reported [8, 14]. Complications during cataract surgery occur at a higher rate in eyes with pseudoexfoliation than in standard cataract cases due to increased frequency of glaucoma and poor pupillary dilation. There is also a higher risk of zonular dialysis, capsule rupture, vitreous loss and postoperative IOL decentralization [14]. It is considerably more difficult to achieve sufficient pupillary dilation for cataract surgery in eyes with PEX than normal eyes [8, 15, 16]. Iris haemorrhage, corneal endothelial damage, lens dislocation, vitreous loss, posterior capsule rupture and sphincter rupture occur more frequently in eyes with insufficient intraoperative pupillary dilation during cataract extraction [15–18].

Drolsum et al. [19] also reported a higher rate of posterior capsule rupture without vitreous loss in PEX eyes compared to controls, although there was no difference in the incidence of vitreous loss. There are many studies in the literature about intraoperative complications of cataract surgery in PEX patients. In a study of phacoemulsification in PEX eyes conducted by Drolsum et al. [20], intraoperative complications occurred in 9.6% of the eyes with pseudoexfoliation, compared to 3.7% of the eyes without pseudoexfoliation. Lumme et al. [7] found significantly higher rates of intraoperative complications including zonular rupture, posterior capsule rupture, and vitreous loss (14.8%, 10.2%, and 7.4%, respectively) during cataract surgery on eyes with PEX, and suggested that zonular and posterior capsule rupture are important risk factors for vitreous loss. Scrolli et al. [16] also found higher intraoperative incidences of zonular dialysis, posterior capsule rupture and vitreous loss in PEX patients undergoing phacoemulsification than in patients without pseudoexfoliation. Avramides et al. (21) found that 61.9% of the patients with PEX had a pupil diameter of less than 5 mm, and the incidence of intraoperative complications in these patients was as follows: zonulolysis, 13.09%; posterior capsule tear, 10.71%; and vitreous loss, 7.14% [21]. In the current study, poor pupillary dilation occurred in 75% of the patients in PEX group, compared to 11.7% in the non-PEX group. Intraoperative posterior capsule rupture occurred in 12.5% of PEX patients and 3.4% of the patients without pseudoexfoliation. Vitreous loss was observed in 8.8% of the patients in PEX group and 3.4% of non-PEX group; despite the fact that more patients in the PEX group had vitreous loss, the intergroup difference was not statistically significant. However, the rates of poor pupillary dilation and posterior capsule rupture were significantly higher in the PEX group when compared to the non-PEX controls. Our results support the observation that pseudoexfoliation increases the incidence of poor pupillary dilation and is a factor that increases the risk of complications such as posterior capsule rupture during cataract surgery.

Cataract patients considering surgery should be evaluated preoperatively for pseudoexfoliation. Surgeons should be aware of the possibility of poor pupillary dilation and the complications that can arise in patients with PEX during cataract surgery. Caution should be taken during every stage of surgery to avoid these complications, and surgeons should be knowledgeable and skilled in complication management should they occur.

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