

Complications of Cataract Surgery in Patients with Pseudoexfoliation Syndrome in a Tertiary Care Hospital of West Bengal

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Abstract

Introduction: The pseudoexfoliation (PEX) syndrome is a production and deposition of fibrillar extracellular material in ocular structure. The prevalence of PEX based on hospital reports from India varies between 1.87% and 13.5%.

Aim: To study the prevalence of PEX, and complications during cataract surgery due to the pupillary rigidity and zonular weakness and instability as well as post-operative complications. The purpose of this study was to assess the frequency and types of complications of small incision cataract surgery (SICS) in patients with cataract and PEX.

Materials and Methods: A cross-sectional descriptive study was conducted on 3334 eyes of 512 patients with cataract and PEX who underwent SICS in a tertiary care hospital from 1st July 2013 to 31st December 2016. The PEX was diagnosed by the presence of gray flakes on the anterior lens capsule or at the pupillary margin or both.

Results: Prevalence of PEX was 15.53% (512 cases). 358 (69.92%) patients were male, and 154 (30.07%) cases were female. There was tendency of increasing prevalence of PEX with advancement of age, 4 (1.24%) in 41-50 years, 51 (9.96%) in 51-60 years, 162 (31.45%) in 71-80 years, 213 (41.11%) in 71-80 years, and 88 (16.98%) were >80 years of age group. Poor pupillary dilatation in spite of the use of standard mydriatic drops and nonsteroidal anti-inflammatory drugs was the most common finding in 334 (65.32%) cases. In 62 (12.10%) cases, a supplementary procedure of pupillotomy was done. Other problems encountered were accidental iridodialysis in 6 (1.17%), zonular dialysis in 7 (1.36%) posterior capsule rupture with vitreous loss in 14 (2.73%), retained cortical matter in 44 (8.59%), and decentered intraocular lens 23 (4.49%) cases.

Conclusion: Presence of associated PEX in cataract patients significantly increases the risk of vision-threatening complications. Use of flexible iris hooks for small pupils and capsular stability are advocated, capsular tension rings and high viscosity viscoelastics are useful modifications of surgical technique for good visual outcome.

Key words: Iridopathy, Phacopathy, Pseudoexfoliation, Zonular weakness

INTRODUCTION

The pseudoexfoliation (PEX) syndrome is a production and deposition of fibrillar extracellular material in ocular structure.¹ The term PEX was coined by Lindberg² and was assumed that this material is created during earlier

inflammation. The full description of PXE was made by Alfred Vogt who described it as a film on the anterior lens capsule, as a remnant of the pupillary membrane.³ Recently, it has been identified as an accumulation of whitish gray fibrinogranular extracellular pseudoexfoliative material produced by abnormal basement membranes of ageing epithelial cells in trabecular meshwork, equatorial lens capsule, pupillary margin of iris and ciliary body, hyaloid and endothelial surface of the cornea.⁴

The global prevalence of PEX shows extensive variations, in Ethiopia (39.3%),⁵ Finland (30.8%),⁶ Greece (28%),⁷ South Africa (26%),⁸ Portugal (25.3%),⁹ and Turkey (16.7%).⁴ In our country, the prevalence of PEX in South

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www.ijss-sn.com

Month of Submission : 04-2017
Month of Peer Review : 05-2017
Month of Acceptance : 06-2017
Month of Publishing : 06-2017

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India was found to be 3.8% and Andhra Pradesh, India, eye disease study reported it as 3.01%.^{10,11} While study in Kashmir showed overall prevalence rate 26.32%.¹² This wide variations of PEX globally and in a different region of India draws our attention to study the prevalence of PEX and complications of cataract surgery with PEX syndrome in a tertiary eye care hospital of West Bengal.

The deposition of PEX on iris (iridopathy) and lens (phacopathy) with zonular instability make routine cataract surgery a challenging task. Scorolli¹³ observed that there is increased the risk of intraoperative complications in cataract surgery on such patients. In majority of such cases, the early detection passes unnoticed due to poor dilatation. Our study was performed with the aim of to find prevalence of PEX in patients attending eye outpatient department for cataract surgery by observing presences of gray flakes of PEX material on the anterior lens capsule or at the pupillary margin or both, and studying the intraoperative and post-operative complications during cataract surgery in patients with PEX and to suggest measures to minimize the possibility of such complications.

MATERIALS AND METHODS

A prospective cross-sectional study was conducted in the eye department of a tertiary care eye hospital from 1st July 2013 to 31st December 2016. A total 3334 patient from the age of 46 to 84 years attending R. G. Kar Medical College, Kolkata, West Bengal, India, diagnosed with senile cataract planned for surgery were enrolled in our study. Prior approval from Institutional Ethics Committee was obtained for the study.

After a written informed consent, complete clinical evaluation was done regarding age, sex, occupation, visual acuity, projection of rays, anterior segment evaluation by slit lamp biomicroscopy, undilated and under full mydriasis with tropicamide 1% was performed to assess the type of cataract and grading was done according to Lens Opacities Classification System II. Cataract was classified morphologically as nuclear sclerosis (NS), cortical and posterior subcapsular, pseudoexfoliative deposit was looked for on the cornea, iris and pupillary margin, on the anterior capsule of the lens. Associated anatomical features looked for included pupillary ruff atrophy and pigment dispersion. Intraocular pressure was measured by Goldmann applanation tonometer, and angle evaluation was done by Goldmann 4 mirror gonioscope and graded by Shaffer's classification.

All patients were operated by one surgeon by small incision cataract surgery (SICS). All patients were given 0.5%

moxifloxacin eye drop, 4 times daily for 3 days before scheduled surgery. Pre-operative pupillary dilatation was done by mydriatic-cycloplegic drops and nonsteroidal anti-inflammatory drugs. Pupillary diameter after dilatation was measured and graded as good (7-9 mm), moderate (5-6 mm), and poor (2-4 mm).

All patients underwent extracapsular cataract extraction with posterior chamber intraocular lens (IOL) in the capsular bag by manual SICS technique under peribulbar block with 5 ml of 2% xylocaine and 5 ml of bupivacaine with 150 units/ml of hyaluronidase. 5% povidone-iodine drop was instilled into a conjunctival cul-de-sac. A fornix-based conjunctival flap was made, perilimbal blood vessels were cauterized, scleral incision was made with 15 no. blade superiorly, and sclerocorneal tunnel was constructed with crescent knife. Side port entry was made by lance tip, intracameral injection of trypan blue 0.6% was given to stain the anterior capsule. A continuous curvilinear capsulorrhexis about 6-7 mm was made using needle cystotome. Gentle hydrodis section was performed to separate cortex from nucleus. Nucleus was delivered by irrigating vectis. Irrigation and aspiration were done with Simcoe's two-way irrigation and aspiration cannula. Rigid, single piece biconvex poly methyl acrylate posterior chamber IOL with optic diameter 6 mm was implanted in the bag using Kelman-McPherson forceps. Subconjunctival injection of dexamethasone and gentamycin (80 mg/2 ml) was given. Postoperatively all patients were advised topical antibiotic-steroid (moxifloxacin with prednisolone acetate) eye drops for 6 weeks in tapering dose along with homatropine 2% eye drops for 2 weeks. The follow-up postoperatively schedule was on day 1, 1st week and 2nd week and at weekly intervals for 12 weeks to evaluate the intraocular inflammation, decentration/tilt of IOL and corneal decompensation.

RESULTS

Out of 3334 patients diagnosed and planned for cataract surgery over a period of 3½ years, the prevalence of PEX was found 15.53% (512 cases) (Table 1 and Figure 1). Prevalence of PEX was highest 358 (69.92%) in males and 154 (30.07%) in females (Table 1 and Figure 2). The age wise distribution was 4 (1.24%) in 41-50 years, 51 (9.96%) in 51-60 years, 162 (31.45%) in 61-70 years, 213 (41.11%) in 71-80 years, and 88 (16.98%) over the age of 80 years (Table 2 and Figure 1). A tendency of high prevalence with increasing age was observed. Mean age of patients with PEX was 73.67 years. Among 512 cases diagnosed with PEX, 263 (51.36%) eyes had NS, and 137 (26.75%) had a cortical cataract, whereas both NS and cortical cataract were present in 112 (21.87%) eyes (Table 3 and Figure 3).

Table 1: Sex distribution of PEX (n=512)

Sex	Number of cases (%)
Male	358 case (69.11)
Female	160 cases (30.88)

PEX: Pseudoexfoliation

Table 2: Age-specific prevalence of PEX syndrome (n=512, prevalence of PEX 15.53%)

Age in years	Patient with PEX	Percentage
41-50	4	1.24
51-60	51	9.96
61-70	162	31.45
71-80	213	41.11
>80	88	16.98

PEX: Pseudoexfoliation

Table 3: Distribution of patients according to type of cataract in PEX (n=3334)

Type of cataract	Patient with PEX	Patient without PEX	Total
Nuclear cataract	263	1317	1580
Cortical cataract	137	816	953
PSC (cortical+nuclear cataract)	112	689	801
Total	512	2822	3334

Distribution of patients with PEX in different variant of cataract (n=512)

Nuclear cataract	263 (51.36%)
Cortical cataract	137 (26.75%)
PSC (cortical+nuclear cataract)	112 (21.87%)

PEX: Pseudoexfoliation, PSC: Posterior subcapsular

Table 4: Surgical complication during cataract surgery (n=512)

Surgical complications	Number of eyes (%)
Poorly dilating pupil	334 (65.32)
Iridodialysis	6 (1.17)
Lens dislocation	1 (0.19)
Posterior capsule rupture	14 (2.73)
Vitreous loss	14 (2.73)
Retained lens matter	44 (8.59)
Decentered IOL	23 (4.49)
Zonular dialysis	7 (1.36)
Post-operative hyphema	6 (1.17)

IOL: Intraocular lens

A total of 512 patients diagnosed with PEX underwent cataract surgery by SICS technique and were evaluated for intraoperative and post-operative complication.

All patients were operated by one senior consultant with experience more than 5 years. The technique opted was manual SICS.

The notable intraoperative complication observed was rigid pupil. All eyes showed some evidence of pigment

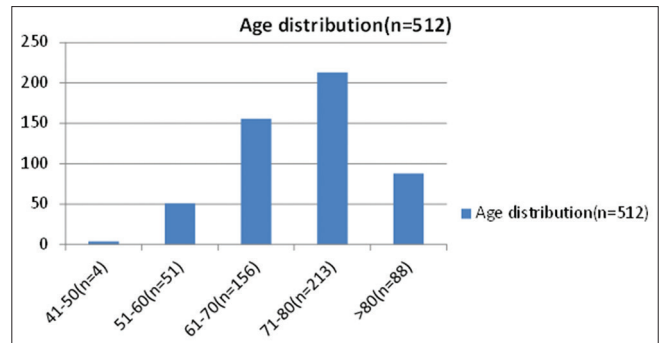


Figure 1: Number of patients with pseudoexfoliation in different age groups

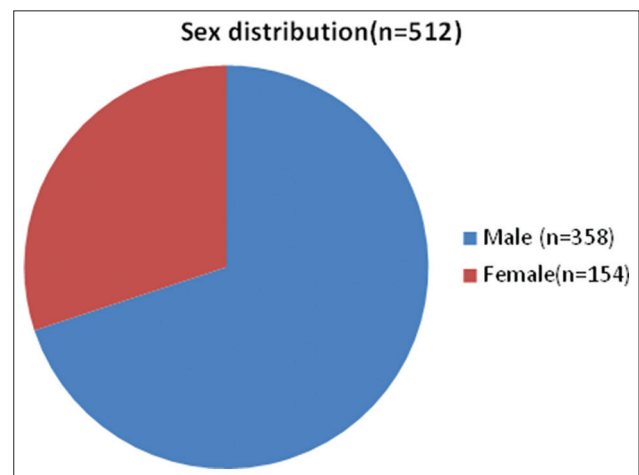


Figure 2: Sex distribution in pseudoexfoliation syndrome

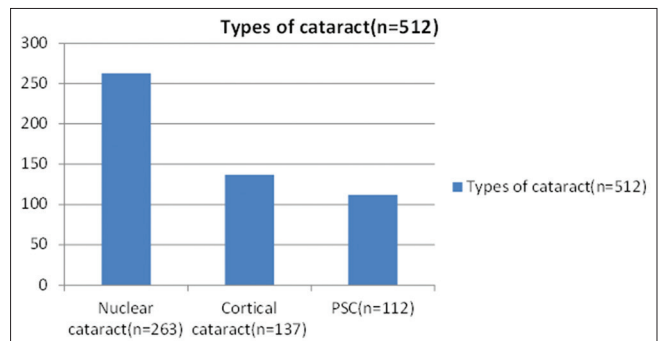


Figure 3: Different types of senile cataract in diagnosed cases of pseudoexfoliation syndrome

dispersion mainly on the anterior surface of the lens and cornea. 46 (8.98%) eyes had poor dilatation of the pupil. 254 (49.60%) eyes were found to be a moderately dilated pupil. However, none of the eyes got dilated more than 7 mm. There was no pre-operative subluxation in any case. All patients underwent cataract surgery using SICS technique. Surgical complications are shown in Table 4 and Figure 4. In 62 (12.10%) cases, supplementary procedure of iris sphincterotomy was carried out to facilitate capsulorhexis and nucleus delivery. 14 (2.73%)

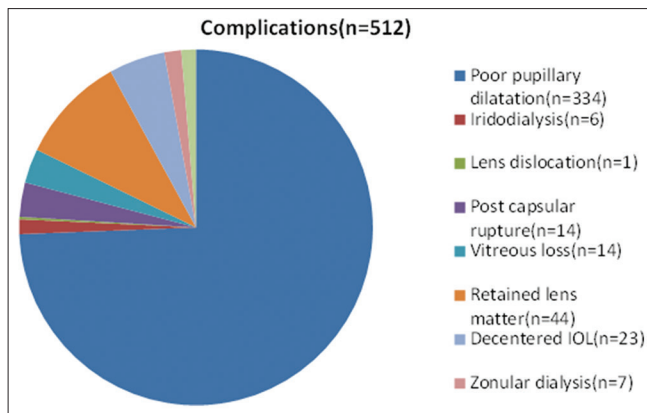


Figure 4: Intra- and post-operative complications in cataract surgery in patient with pseudoexfoliation

had posterior capsular rent with vitreous loss due to difficulty in surgical maneuver, all of them underwent anterior vitrectomy with peripheral button hole iridectomy and anterior chamber IOL was implanted. Patients were followed on the post-operative day 1, day 7, day 14 and at monthly intervals for 3 months to evaluate intraocular pressure spikes, increased in intraocular inflammation, decentration/tilt of IOL and corneal decompensation.

Post-operative corneal haze was seen in 58 (11.32%) cases. 61 (11.91%) had significant intraocular inflammation. The IOP was measured both preoperatively and postoperatively. We did not find any pressure spikes in any patient. Final visual acuity was recorded after 12 weeks of surgery. At the end of 12 weeks, 23 (4.49%) patients showed persistent corneal edema probably due to corneal decompensation. However, pre- or postoperative specular microscopy and pachymetry were not included in this study.

DISCUSSION

The prevalence of PEX based on hospital reports from India varies between 1.87% and 13.5%.¹⁴ In our study, the prevalence was found to be 15.53%. No such study on prevalence is reported earlier from this area. This prevalence is similar to the study conducted in other parts of the world but, it was high as compared to prevalence studies conducted in southern parts of the country. This difference can be attributed to a number of factors ranging from differences in the climatic and geographical conditions, ethnic origin and genetic factors. Variations also occur due to age and sex distribution of patients or population group examined; the clinical criteria used to diagnose PEX, the thoroughness of the examination and the ability of the examiner to detect early stages. Cataracts are known to be more common in PEX, with NS being the predominant type of cataract. Similar result was obtained in our study.

PEX is a common finding in elderly patients diagnosed with cataract, and it may be missed if the eyes are not examined under slit lamp. It is best assessed before the pupillary dilatation while lens related changes are best seen after dilatation.¹⁵ It has been reported earlier that an axial anterior chamber depth of <2.5 mm increases the risk of surgical complications five-fold.¹⁶ The ages group of patients diagnosed with PEX in this study was 40-80 years age group. Epidemiological studies of PEX have shown that it is more common in patients older than 60 years and prevalence further increases with age.⁹

Of the 512 patients studied, 263 (51.36%) had NS, 137 (26.75%) had cortical cataract, and both changes were seen in 112 (21.97%) cases. Most studies have found a strong association between PEX and nuclear cataract.¹⁷ It has been hypothesized that high levels of epithelial metabolic activity may be beneficial for ion pumps and electrolyte environment of cortical fibers.¹⁸ In this study, most frequent problem encountered was a rigid pupil and none of the pupils dilated more than 8 mm in spite of the use of standard mydriatic drops. We resorted to sphincterectomy, but other alternatives include bimanual stretching and use of iris hooks or flexible iris retractors. Sphincterectomy and stretching have the disadvantage of causing post-operative distorted pupil, which may even lead to the pupillary capture.

A well centered and adequately sized capsulorhexis is important in the presence of zonular weakness. Ideal size of a capsulorhexis should be 6.0-7.0 mm in diameter. A small capsulorhexis may lead to excessive pull on the zonules, difficulty in extracting nuclear material from capsular bag, increased risk of anterior capsular tear and a higher incidence of post-operative capsular phimosis. Excessive intraoperative manipulations cause post-operative corneal edema and iritis. In the presence of weak zonules, it may lead to severe complications of lens subluxation and vitreous loss.

Other complications encountered were also reported in the previous studies include iridodialysis, intraocular bleeding, and vitreous loss. These are because of difficult maneuvers due to small rigid pupils and zonular instability. Zonular fragility increases the risk of lens dislocation, zonular dialysis, and vitreous loss up to 10 times.⁴ Rate of vitreous loss varied from 0% to 11% across different studies.¹⁵

There was significant intraocular inflammation in 61 (11.91%) cases and corneal decompensation in 23 (4.49%) cases. There was a high frequency of post-operative inflammation in cases of retained subincisional cortex which may have caused the decentration of IOL. This complication may directly affect the visual recovery. Hence,

surgical skill becomes an important factor for good visual outcome in such patients.

To minimize the stress on the zonules, the strategies that may be adopted are well maintained anterior chamber, avoidance of intraocular fluctuations, liberal use of viscoelastics, gentle hydro procedures and free rotation of nucleus. In cases with frank zonular weakness, use of a capsule tension ring that distributes forces circumferentially also reduces post-operative IOLs decentration.

In our study, 44 (18.59%) of cases had posterior capsular opacification. Other studies have reported an increase in posterior capsular opacification following cataract surgery in eyes with PEX.¹⁶ This may be due to incomplete removal of cortical matter due to poor visibility secondary to a small pupil. In this study 23 (4.49%) cases showed IOL decentration which may be explained due to decentration of IOL bag.¹⁹

This study showed increased incidence of intraoperative and post-operative complications. The proper evaluation of cases with PEX syndrome keeping the multifactorial risk factors in mind may minimize the complications.

Conclusively, it can be said that there should be a routine procedure to dilate the pupil or to examine the lens with the slit lamp after dilatation, to detect the PEX syndrome. Pre-operative assessment should be directed to identify potential problems like the possibility of fragile zonules and difficult visualization due to small pupils. This can help with surgical planning, particularly predicting the possible need for ophthalmic viscosurgical devices, pupil expansion devices and use of capsular tension ring which can increase the margin of safety in these cases. Routine post-operative follow-up is required to monitor and address intraocular pressure, capsular contracture, and IOLs decentration issues. The limitation of this study was the duration of the study and also, pre- and postoperative specular microscopy and corneal pachymetry were not included.

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How to cite this article: Islam MN, Goswami S (Gayen), Khanam BSM, Mukherji S. Complications of Cataract Surgery in Patients with Pseudoexfoliation Syndrome in a Tertiary Care Hospital of West Bengal. *Int J Sci Stud* 2017;5(3):11-15.

Source of Support: Nil, **Conflict of Interest:** None declared.