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Original Research Article

Complications and visual outcome of cataract surgery in pseudoexfoliation patients

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ABSTRACT

Pseudoexfoliation syndrome is a multifactorial diffuse disease and is diagnosed clinically on slit lamp examination of the eye by the deposition of white, dandruff like material on different structures in anterior segment i.e corneal endothelium, iris, pupillary margin, anterior lens capsule, zonules and trabecular meshwork. The aim of study was to study demographic features, intraoperative and postoperative complications and the visual outcome of cataract surgery in pseudoexfoliation patients. 93 eyes of 93 patients with pseudoexfoliation posted for cataract surgery were included in the study. 79.56% patients were of more than 60 years of age group. 43 patients were male and 50 patients were female. 44 patients had pseudoexfoliation syndrome in both eyes and 49 patients had either right eye or left eye involvement. Intraoperative problems encountered were poor pupillary dilatation, capsular bag prolapse, zonular dehiscence, posterior capsular rent, residual cortical matter and positive vitreous pressure. Postoperative complications reported were corneal edema, raised intraocular pressure, significant anterior chamber cell reaction, left cortical matter and exudative membrane. Best corrected visual acuity was more than 6/18 in 67 eyes, between 6/60-6/24 in 16 eyes, and less than 6/60 in 10 eyes. At 1 month, best corrected visual acuity was more than 6/18 in 92 eyes. Cataract surgery in pseudoexfoliation patients is associated with high risk of complications. Use of iris hooks and capsule tension rings where required during the surgery can decrease the intraoperative complications and thus will give better visual outcome.

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1. Introduction

Pseudoexfoliation syndrome is a multifactorial diffuse disease having both systemic and ocular manifestations. It is characterized by deposition of elastotic material in different tissues¹ and is diagnosed clinically on slit lamp examination of the eye by the deposition of white, dandruff like material on different structures in anterior segment i.e corneal endothelium, iris, pupillary margin, anterior lens capsule, zonules and trabecular meshwork.² Systemically, the pseudoexfoliation material deposition is seen in different parts of human body e.g

lungs, heart, liver, kidney, blood vessels and meninges.³ Thus, the patients with pseudoexfoliation may give history of hypertension, cardiovascular diseases, stroke and abdominal aorta aneurysms.⁴ Ocular deposition of exfoliative material on the pupillary margin, iris, near the ciliary processes, and anterior lens capsule causes iridopathy (poor pupil dilatation) and zonulopathy (zonular weakness) leading to high risk of intraoperative and postoperative complications.^{5,6} Scorolli et al. has found that cataract surgery in pseudoexfoliation eyes had 5 times greater risk of intraoperative complications compared to the normal eyes.⁷ Thus, in our study we aim to evaluate the intraoperative complications, postoperative complications and the visual outcome in pseudoexfoliation patients

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undergoing the cataract surgery.

2. Materials and Methods

This prospective observational study was conducted from November 2021 to June 2022 in Sankara eye hospital Ludhiana Punjab. The study was approved by ethics committee of the hospital and the written informed consent was taken from all the patients. The study included the patients with cataract and pseudoexfoliation syndrome scheduled for cataract surgery. Patients with age less than 40 years, bilateral pseudophakia and PXF syndrome, those with cataract due to trauma and uveitis were excluded from the study. Demographic factors like age, sex were noted. The visual acuity was assessed using snellen's chart and complete ocular examination was done by an ophthalmologist before and after dilating the pupil with ophthalmic solution drops containing 0.8% tropicamide and 5% phenylephrine hydrochloride. The grading of cataract was assessed and the location of exfoliative material and its laterality was noted. The amount of pupil dilatation was measured with a caliper during the surgery under the microscope. The pupil size of <5mm after dilatation was considered to be poor pupillary dilatation. This grading was used by Joshi et al. in their study.⁸ All the patients underwent manual small incision cataract surgery with intraocular lens implantation. The surgical difficulties and complications encountered during the surgery and postoperatively were reported. Postoperatively visual acuity was assessed with snellen chart at day 1 and at 1 month after the surgery. All the data was collected, compiled and analysed using statistical package for the social sciences, version 21.0 for windows.

3. Results

In our study, a total of 93 eyes with pseudoexfoliation who underwent small incision cataract surgery were evaluated. Among 93 patients, one patient (1.07%) was of 41-50 age group, 18(19.35%) were of 51-60, 42(45.16%) were of 61-70, 32 (34.40%) were of more than 70 years of age. The mean age of the patient in this study was 68.12(\pm 7.13) years. The age wise distribution is shown in Table 1.

Table 1: Age distribution

Age in years	Male	Female	Total	Percentage
41-50	0	1	1	1.07
51-60	7	11	18	19.35
61-70	17	25	42	45.16
>70	19	13	32	34.40

Out of 93 patients, 43(46.23%) patients were male and 50(53.76%) patients were female. 44 patients (47.31%) had pseudoexfoliation syndrome in both the eyes while 49 patients (52.69%) had either right or left eye involvement.

The pseudoexfoliation material deposition was seen only on lens in 70 eyes(75.27%), on iris, pupillary margin and lens in 16 eyes (17.20%), only on pupillary margin in 6(6.45%) eyes and only on iris in 1(1.07%) eye. (Table 2)

Table 2: Distribution of PXF in ocular structures

Distribution of PXF	Number of eyes	Percentage
Pupillary margin	6	6.45
Iris	1	1.07
Lens	70	75.27
Iris, Pupillary margin, Lens	16	17.20

The mean pupillary dilatation in pseudoexfoliation patients was 5.76(\pm 1.2)mm. Out of 93 eyes, 40 eyes had less than 5mm pupillary dilatation with 15 eyes were having less than 4mm pupillary dilatation.

All the patients with pseudoexfoliation underwent small incision cataract surgery with intraocular lens implantation. The surgeries were performed by a trained cataract surgeon. Iris hooks were used in 15 eyes and capsular tension ring was used in 2 eyes. Intraoperative difficulties were reported in 51 eyes, 40 eyes (43.01%) had poor pupillary dilatation with 15 eyes(16.12%) were having less than 4mm pupillary dilatation. The capsular bag prolapse was the most common intraoperative complication seen in 7 eyes(7.52%) and retropupillary iris claw lens was implanted in these patients. 2 eyes (2.1%) had zonular dehiscence, 1 patient (1.07%) had posterior capsular rent, 1 patient had residual cortical matter and 1 patient(1.07%) was having high positive vitreous pressure. (Table 3)

Table 3: Intraoperative surgical complications/problem encountered

Intraoperative Surgical complications/problem encountered	No. of cases	Percentage
Poor dilating pupil	40	43.01%
Iridodialysis	0	0
Zonular dehiscence	2	2.1%
Capsular bag prolapse	7	7.52%
Posterior capsular rent	1	1.07
Retained lens matter	1	1.07%
Lens dislocation	0	0
High positive vitreous pressure	1	1.07%

All the patients were followed postoperatively on Day 1 and at one month. On Day 1, 15 (16.12%) patients had corneal edema with striate keratopathy, 5 (5.37%) patients had raised intraocular pressure, 2 (2.1%) patients had significant anterior chamber cell reaction, 1 (1.07%) patient had left cortical matter, and 2(2.1%) patients had exudative membrane.(Table 4)

On Day 1, best corrected visual acuity was \geq 6/18 in 67 (72.04%) eyes, between 6/60-6/24 in 16 (17.20%) eyes and <6/60 in 10 (10.07%) eyes.

Table 4: Post-operative complications

Postoperative complication	No. of eyes	Percentage
Corneal edema with SK	15	16.12%
Raised IOP	5	5.37
AC cell reaction	2	2.1%
Retained lens matter	1	1.07%
Exudative membrane	2	2.1%

At one month postoperatively, 92(98.92%) eyes have BCVA \geq 6/18, while 1 (1.07%) eye had vision less than 6/60 due to glaucomatous optic cupping. In our study, patients were followed for one month only so late complications like posterior capsular opacification, decentred IOL were not recorded.

4. Discussion

Pseudoexfoliation syndrome i.e a disease of elderly patients. In our study (79.56%) of the patients were of more than 60 years of age. Different studies had also shown the preponderance of the disease in elderly age group of more than 60 years.^{9,10} Out of 93 patients, 43 patients were male and 50 patients were female. Female preponderance was also shown in study by Avramides.¹¹ However, few studies have shown male preponderance^{12,13} while others have shown no sex predilection.^{8,14}

Out of 93 eyes, 70 eyes (75.27%) had pseudoexfoliative material deposition on lens surface while 16 eyes(17.20%) had material deposition on lens, pupillary margin, and iris. Similar results were seen in study by Idakwo et al. in which all the patients had material deposition on lens surface and 8 had on pupillary margin.¹⁵

In our study, the most common difficulty found was poor dilating pupil. The mean pupillary dilatation in pseudoexfoliation patients was 5.76(+1.2)mm. 40 eyes(43.01%) had less than 5mm pupillary dilatation with 15 eyes (16.12%) were having less than 4mm pupillary dilatation. Similar results were seen in many studies. A study by Carpel had shown 94.1% prevalence of poor pupil dilatation in PXF patients¹⁶ while Alfaiate et al. had found 48.4% eyes with poor dilating pupil.⁷ Similarly, 96.7% eyes with PXF syndrome had pupillary dilatation of \leq 6 mm in a study by Philip et al.¹⁷

The complications encountered in our study were capsular bag prolapse in 7 eyes (7.52%), zonular dehiscence 2 eyes(2.15%), posterior capsular rupture 1 eye(1.07%) and high positive vitreous pressure in one eye(1.07%).

Results similar to our study with high incidence of zonular dialysis and dropped nucleus were also seen in 10 year retrospective cohort study done in England.¹⁸

A study by Avramides et al. had shown zonulolysis in 13.09%; posterior capsule tear in 10.71% and vitreous loss in 7.14%.¹⁰

Another study by Joshi et al. had shown intraoperative difficulties in 62 eyes (27.4%) with poor pupillary dilation being the most common problem (32 eyes, 14.2%), but zonular dehiscence (18 eyes, 8%) being the most common complication.⁸

While few studies had shown different results. In a cross-sectional descriptive study done over 4 years by Jawad et al., vitreous prolapse was seen in 21 (10.5%) patients and posterior capsular rupture in 18 (9%) patients, zonular dialysis in 8 (4%), retained lens matter in 12 (6%), Damage to sphincter pupillae in 16 (8%), iridodialysis in 2 (1%), decentration of IOL in 8 (4%) and hyphema in 2 (1%) patients with Pseudoexfoliation.¹¹

A study by Pranathi et al on 52 patients had encountered poor dilating pupil in 32 eyes(61.5%), retained lens matter in 6 eyes(11.1%), vitreous loss in 4 eyes(7.7%), posterior capsular tear in 4 eyes, (7.7%), zonular dehiscence in 2 eyes (3.8%), iridodialysis in 1 eye(1.9%).¹⁹

A well centered ideal size capsulorhexis of at least 5-5.5 mm is required for cataract surgery. A small capsulorhexis can lead to difficulty in prolapsing the nucleus in anterior chamber, and excessive stress on zonules thus leading to zonular dialysis, capsular bag prolapse and vitreous loss. Poor pupillary dilatation leads to poor peripheral visualization and thus inadequate capsulorhexis compared to the size of cataract which leads to increased risk of intraoperative complications. In our study, 40 eyes (43.01%) had less than 5mm pupillary dilatation with 15 eyes (16.12%) having less than 4mm pupillary dilatation. Viscomydriasis was mainly used during surgery for dilating rigid pupil. Iris hooks were used in 15 eyes and capsular tension ring was used in 2 eyes. Excessive intraoperative manipulations and vitreous prolapse can lead to postoperative complications like corneal edema with striate keratopathy, iritis and thus poor visual outcome.

The use of iris retractors and iris hooks in poor dilating pupils can lead to improved peripheral visualization and can help in achieving adequate size of capsulorhexis, good hydrodissection. This will decrease the stress on zonules and thus decreasing the risk of bag prolapse, zonular dialysis and posterior capsular rupture. In a patient with preexisting zonular weakness, use of capsular tension rings can help in preventing bag prolapse and IOL decentration.

In our study postoperatively on Day 1, 15 (16.12%) patients had corneal edema with striate keratopathy, 5 (5.37%) patients had raised intraocular pressure, 2 (2.1%)patients had significant anterior chamber cell reaction, 1 (1.07%) patient had left cortical matter, and 2 (2.1%) had exudative membrane.

On Day 1, 67 (72.04%) eyes had vision \geq 6/18, 16 (17.20%) eyes have vision between 6/60-6/24,while 10 (10.75%) eyes have vision $<$ 6/60.

One month, postoperatively, 92 (98.92%) eyes have BCVA \geq 6/18, while 1 (1.07%) eye had vision less than

6/60 and the reason for less vision in that patient was glaucomatous optic cupping.

Similar results were seen in a study by B. Ramalakshmi et al. where, 16.12% patients had postoperative corneal edema, 12.90% cases showed AC reaction, 9.67% patients had raised IOP and 3.22% cases had decentered IOL. At 3 months followup, BCVA was $\geq 6/18$ in 43 cases (69.35%), 6/18 to 3/60 in 14 cases (22.58%), $< 3/60$ in 5 cases (8.06%).²⁰

In another study by Pranathi et al., corneal edema was seen in 12 (23%) cases while 6 cases (11.5%) had significant intraocular inflammation. At 12 weeks, 48 (92.30%) patients had best corrected vision of more than 6/60 only 4 (7.69%) patients had BCVA $< 6/60$ due to corneal edema probably due to corneal decompensation.¹⁹

In our study, postoperative follow up was done for 30 days only. Thus, we can't predict the incidence of posterior capsular opacification, capsular contracture, late IOL decentration.

Cataract surgery in pseudoexfoliation patient is a challenge to the operating surgeon. A good, detailed preoperative assessment before and after dilating the pupil can help in diagnosing the patients with pseudoexfoliation syndrome. This can help the surgeon to adequately plan the surgery and by using pupil expansion devices or capsular tension rings when required can improve the postoperative surgical and visual outcome.

5. Conclusion

Patients with pseudoexfoliation syndrome undergoing cataract surgery have high incidence of intraoperative and postoperative complications. A good and detailed preoperative workup can help to anticipate the difficulties during the cataract surgery and can thus help the surgeon to plan better to avoid the complications and thus giving a good surgical and visual outcome.

6. Source of Funding

None.

7. Conflict of Interest

None.

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