ORIGINAL RESEARCH

A clinical analysis of various complications encountered during manual small incision cataract surgery and post-operative visual outcome in patients with pseudoexfoliation syndrome

[1]Dr. Thejaswini P, [2]Dr. Anjali, [3]Dr. Guru Prasad NS

[1]Senior Resident, Department of Ophthalmology, AJ Institute of Medical Sciences, Mangalore, Karnataka, India
[2]Senior Resident, Department of Ophthalmology, Mysore Medical College and Research Institute, Mysuru, Karnataka, India
[3]Fellow In Phacorefractive, Prasad Netralaya, Mysuru, Karnataka, India

Corresponding Author
Dr. Guru Prasad NS
Fellow In Phacorefractive, Prasad Netralaya, Mysuru, Karnataka, India

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Abstract

Introduction: The prevalence of Pseudoexfoliation (PXF) syndrome increases dramatically with age and varies considerably among populations worldwide. Pseudoexfoliation causes serious complications during cataract surgery such as zonular dialysis, capsular rupture and vitreous loss etc.Hence we took up this study to analyse the intra operative complications and postoperative visual outcome of pseudoexfoliation on cataract surgery.

Materials and Methods: A cross sectional, hospital based, descriptive study done on 50patients attending the department of ophthalmology, wereevaluated for pseudoexfoliation syndrome.

Results and Observations: We had 6 cases (12.00%) of patients aged between41-50 years, between 51-60 years we had 10 cases (20.00%),between 61-70years we had 19 cases (38.00%) and above 70 years we had 15 cases (30.00%). There were 24.00% of femalesand 76.00% of males in the study. The disease was unilateralin 24.00% and Bilateral in 76.00%, Chi-squaretestshowed p= 0.002 which wassignificant. The distribution of pseudoexfoliationmaterialwas as follows - in the corneal endothelium it was seen in8.00%, pupillary margin it was seen18.00%,in the iris it was seen 16.00%, in the lens it was seen 20.00% andiris,pupillary margin and lens it was seen38.00%.The intraoperative complications wereiridiodialysis in 2.00%, rhexis extensionin 2.00%, posterior capsular rent in 4.00% and zonular dialysis in 2.00% Thepostoperative complications werepostoperative hyphema in 6.00%, corneal edema in 8.00%, anterior chamber reaction in 8.00%, retained lens matter in 2.00%,decentered IOL in 2.00%, irregular pupil in 8.00% and IOP elevation in 8.00%. The reasons for reduced visual acuity in the post-operative period were persistent corneal edema (in4.00%), posterior capsular opacification (in2.00%)and cystoid macular edemain(2.00%).

Conclusion: In the study we concluded that pseudoexfoliationsyndrome is an age-related disorder where there is anincreased risk ofintraoperative complications that can hamper the vision in the post-operative period. Thus it is imperative that detailed pre-operative evaluation be done in order for the surgeonto manage the complications efficiently

Keywords: Cataract surgery, Post-operative visual outcome, Pseudoexfoliation syndrome

Introduction

Pseudoexfoliation (PXF) syndromeis commonly diagnosed by the appearance of a grayishwhite fibrillar material, also called PXF material, on the pupillary margin, which may also appear on thelens surface, lens zonules, iris surface, corneal endothelium, trabecularmeshwork, and anterior hyaloid surface.

The prevalence of pseudoexfoliation increases dramatically with age and varies considerably among populations worldwide. Its higher among the age group of 60-70 years which constitutes 49% (n=29) and 30.5% (n=18) in age group of 50-60years.The

tremendous variation in prevalence of exfoliation syndrome is caused by true differences in the populations studied, but it may also vary because of other factors such as difference in age, environmental influences, definition of exfoliation syndrome, and examination techniques.PXF syndrome is more common in older age-groups, with most cases occurring in the late60s and early 70s. The condition may be unilateral or bilateral, and over half of unilateral cases become bilateral over a 20-year period.

Pseudoexfoliation causes serious complications during cataract surgery such as zonular dialysis, capsular rupture and vitreous loss etc. Glaucoma is the most important sequel of PXF syndrome. It is the most common identifiable cause of secondary open angle glaucoma caused due to PXF2,

PXF usually presents in the elderly age group and it is this very group of patients who are likely to undergo cataract surgery. PXF presents challenges that must be adequately addressed with proper pre-operative preparation, surgical care and postoperative follow-up.

However, cases may go undetected due to failure to dilate the pupil or to examine the lens with the slit lamp after dilatation. Adequate pre-operative assessment should aim 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 capsule support devices all of which can increase the margin of safety in these potentially complex cases.[3]

Methodology

Study design: A cross sectional, hospital based, descriptive study

Sample size: 50.

The patientsincluded by applying the following Inclusion and Exclusion criteria

Inclusion criteria: Patients belonging to either sex diagnosed to have pseudo exfoliation based on slit lamp examination attending outpatient, was included in the study.

Exclusion criteria

Following patients were excluded from the study

1. Patients with traumatic cataract.
2. Patients with occupational history of exposure to intense infrared lights i.e. glass blowing.
3. Patients with uncontrolled diabetes mellitus or other severe systemic and cardio vascular diseases and history of transient ischemic attacks or stroke.
4. Patients with developmental cataract.
5. Patients on steroids > 6months, corneal scars, lens induced glaucoma, other ocular pathology leading to secondary glaucoma.
6. Patients with previous ocular surgeries.

Patients fulfilling the inclusion criteriawere recruited into the study after written informed consent of the patients.

Ophthalmological workupwas done in all patients. It included, visual acuity testing for near and distant vision, slit lamp biomicroscopy for evidence of exfoliation material in anterior segment,before and after dilatation of pupil, special reference to the assessment of adequate pupillary dilatation with mydriatics was be made.

Initial ophthalmological workupwas followed by refraction and correction, tonometry using applanation tonometry, gonioscopy and fundoscopy.Patients requiring cataract surgerywas evaluated for routine parameters and routine blood investigations (HIV, HBsAg, Random blood sugars, ECG and COVID-19 RTPCR).

Cirrus HD-OCT of the eyes, done in view of measuring the RNFLthickness at presentation and in the follow up visits.

Elective manual small incision cataract surgerywas performed by different surgeons of the department, after informed consent.

Follow up

Postoperative cataract patientsfollow-up was done on day 1, 1stweek, after 3 weeks and at 6th week, making note towards complications and their management.

Results

Table 1: Type of surgery

Type of surgery	Cases	Percentage
SICS	50	100%

Small incision cataract surgery was done in all cases

Table2:Intraoperative complications

Intraoperative complications	No. of Eyes	Percentage (%)
Iridiodialysis	1	2.00%
Rhexis extension	1	2.00%
Posterior capsular rent	2	4.00%
Zonular dialysis	1	2.00%

The intraoperative complications wereiridiodialysis in 2.00%b, rhexis extensionin 2.00%, posterior capsular rent in 4.00% and zonular dialysis in 2.00%.

Table 3:Postoperative complications

Postoperative Complications	No. of Eyes	Percentage N (%)
Postoperative hyphema	3	6.00%
Corneal edema	4	8.00%
Anterior chamber reaction	4	8.00%
Retained lens matter	1	2.00%
Decentered iol	1	2.00%
Irregular pupil	4	8.00%
Iop elevation	4	8.00%

Thepostoperative complications werepostoperative hyphema in 6.00%, corneal edema in 8.00%, anterior chamber reaction in 8.00%, retained lens matter in 2.00%,decentered IOL in 2.00%, irregular pupil in 8.00% and IOP elevation in 8.00%.

Table 4:Causes for poor post-operative visual acuity

Causes	No of Eyes	Percentage n (%)
Persistent corneal edema	2	4.00%
Posterior capsular opacification	1	2.00%
Cystoid macular edema	1	2.00%

Table 5: Changes in pupil reaction

Pupil reaction	Frequency	Percent
ISL	15	30.00%
SRL	22	44.00%
NSRL	10	20.00%
RAPD	3	6.00%

30.00%had ISL 44.00% had SRL 20.00% had NSRL and 6.00% had RAPD

Table 6: Fundus

Fundus	Frequency	Percentage
Normal	21	42.00%
Hyperaemia	20	40.00%
Blurring of disc margins	1	2.00%
Temporal pallor	6	12.00%
Total pallor	2	4.00%

In the present study 42.00%had a normal fundus,40.00% hadhyperaemia of the disc, 2.00% hadblurring of disc margins, 12.00% hadtemporal pallor 4.00% hadtotal pallor.

Table 7: Changes at various stages of treatment and follow up in averageRNFLof the affected eye

Average RNFL	At presentation	Pod 1	1 week	3 weeks	6 weeks	At presentation	Pod 1	1 week	3weeks	6weeks
Less than 60 microns	0	1	3	15	29	0.00%	2.00%	6.00%	30.00%	58.00%
60 to 69 microns	0	1	12	5	13	0.00%	2.00%	24.00%	10.00%	26.00%
70 to 79 microns	7	10	11	13	4	14.00%	20.00%	22.00%	26.00%	8.00%
More than 80microns	43	38	24	17	4	86.00%	76.00%	48.00%	34.00%	8.00%
Total	50	50	50	50	50	100.00%	100.00 %	100.00%	100.00%	100.00%

Thetable and graph above show the changes in the average RNFL over the course of treatment and follow up. The difference was statistically significantANOVA P= 0.001

Table 8: Changes at various stages of treatment and follow up in BVCA of the affected eye

BVCA	At presentation	Pod 1	1 Week	3 Weeks	6 Weeks	At Presentation	Pod 1	1 Week	3 Weeks	6 Weeks
6 by6	0	6	5	7	12	0.00%	12.00%	10.00%	14.00%	24.00%
6 by9	1	6	7	7	6	2.00%	12.00%	14.00%	14.00%	12.00%
6 by12	1	1	4	3	4	2.00%	2.00%	8.00%	6.00%	8.00%
6 by18	2	3	1	1	12	4.00%	6.00%	2.00%	2.00%	24.00%
6 by24	5	5	6	17	5	10.00%	10.00%	12.00%	34.00%	10.00%
6 by36	2	5	5	11	8	4.00%	10.00%	10.00%	22.00%	16.00%
6 by 60	1	6	4	4	3	2.00%	12.00%	8.00%	8.00%	6.00%
finger counting at 4 meter	12	18	18	0	0	24.00%	36.00%	36.00%	0.00%	0.00%
hand movements close to face	13	0	0	0	0	26.00%	0.00%	0.00%	0.00%	0.00%
perception of light present	13	0	0	0	0	26.00%	0.00%	0.00%	0.00%	0.00%

There was a progressive improvement in the changes in the BVCA over the course of treatment and follow up as seen in the table and graph above. The difference was statistically significantANOVA P= 0.001.

Discussion

The intraoperative complications wereiridiodialysis in 2.00%, rhexis extensionin 2.00%, posterior capsular rent in 4.00% and zonular dialysis in 2.00%

Thepostoperative complications werepostoperative hyphema in 6.00%, corneal edema in 8.00%, anterior chamber reaction in 8.00%, retained lens matter in 2.00%,decentered IOL in 2.00%, irregular pupil in 8.00% and IOP elevation in 8.00%.

Shiraz Ali, stated that Pseudoexfoliation is associated with ≥30% visual impairment across all stages and 28% absolute blindness rate which is a huge hidden burden of glaucoma [7].

N.Soni*et al.*[8] noted that intra-operative complications noted in this study included intra-operative floppy iris (IFI) (31.34%), posterior capsule tear (PCT) with vitreous loss was noted in 5 eyes (7.46%), zonular dialysis (ZD) was noted in 4 eyes (5.97%), out of vitreous loss occurred in 2 eyes, thus overall 7 eyes had vitreous loss (10.45%). Major late post-operative complications included raised IOP (5/67 eyes-7.46%), IOL decentration (5/67 eyes-7.46%) and posterior capsule opacity (PCO) which was seen in 28 eyes within 1 year follow-up (41.79%).

As observed in this study, out 40 patients with fair mydriasis, intraoperative complications occurred in 2 patients and out of 3 patients with poor mydriasis all 3 had intra operative complications.

Shingleton B.J *et al.* (2009) in his study showed that cataract surgery is potentially complicated by the presence of small pupils and zonular laxity and significantly affects the IOP in pseudoexfoliation (PEX) patients.[7]

Moreno *et al.* (1993) suggested poor dilatation to be one of the risk factors related to posterior capsular rupture during cataract surgery in PEX patents[9].

Stanila (1996) reported increased incidence of insufficient pupil dilatation leading to complication like vitreous loss and posterior capsular rent in 10 patients with PEX syndrome undergoing cataract surgery.[10]

In our study we see that 58.00% of patients had an averagethickness of less than 60 microns at the end of 6 weeks. It is consisitent with a similar study conducted by Yasmeen *et al.*, a case control study done at Armed Forces Institute of Ophthalmology (AFIO), in order to compare mean retinal nerve fiber layer (RNFL) thickness in patients having pseudo exfoliation (PXF) with normal age matched controls using spectral domain optical coherence tomography (SD-OCT). Their study revealed significantly thinner mean average peripapillaryRNFLthickness (77.46 µm vs. 83.96 µm) and mean RNFLthickness in inferior quadrant (88.43 µm vs. 100.46 µm) in patients having PXF with normal IOP as compared with age matched healthy adults using SD OCT.

Ozge*et al.* in their study compared RNFLthickness in eyes with PXF glaucoma, PXF syndrome and healthy controls. They found out that RNFLthickness in all quadrants and average thickness was significantly low in PXF glaucoma eyes as compared to other groups, but RNFLthickness comparison between PXF syndrome and healthy control eyes did not show a significant difference except in infero temporal quadrant[11].

Postoperative vision of 6/6-6/12 was seen in 22 patients, visual acuity of 6/18-6/36 was seen in 25 patients and visual acuity of perception of light to 6/60 seen in 3 patients at the end of 6 weeks of post-operative period.

Bayramlar*et al.* (2007) conducted a retrospective study in 225 eyes of 187 patients of which 92 eyes had pseudoexfoliation syndrome. In this study he interpreted that in MSICS, pseudoexfoliation syndrome has an increased chances of intra operative posteror capsular complications, as the maturity of cataract increases. There by it is advisable to operate early on cataract in patient with pseudoexfoliation syndrome to increase the chances of good visual

acuity post operativelyand prevent the complications caused due tozonular and posterior capsule changes.[12]

Conclusion

Pseudoexfoliationsyndrome is mostly seen in the elderly age group.There is anincreased risk ofpseudoexfoliation glaucoma in those who have pseudoexfoliation thatand can lead to loss of vision. Bilateral disease is seen to be more common and males have agreater incidenceof pseudoexfoliationsyndrome

These patients are more prone to intra operative complications during manual small incision cataract surgery which can be attributed to poor pupillary dilatation, zonular weakness, increased hardness of the nucleus, shallower anterior chamber and sometimes even raised IOP.Intraoperative complications like posterior capsular rent, zonular dialysis, difficulty innucleus management and endothelial touch of the cornea.Hence leading to post-operative corneal edema, increased anterior chamber reaction and elevated IOP.

Since pseudoexfoliation syndrome poses significant challenge during cataract surgery, it's of utmost importance to evaluate patient's pre operatively in detail and have appropriate management protocols in mind in order for the surgeon tomanage the complications efficiently and provide the patient good vision post operatively.

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