



Study of different intraoperative and postoperative complications during cataract surgery in eyes with pseudoexfoliation

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ABSTRACT

Aims & objectives: 1) To study the different intraoperative & early postoperative complications during cataract surgery in eyes with pseudoexfoliation and to record the best corrected visual acuity at 8 wks postoperatively.

Materials & methods: It is a single centre, prospective, observational study, cases of 50 cataract patients (50 eyes) with pseudoexfoliation that underwent Small incision cataract surgery at tertiary care hospital between November 2012 to October 2014 were included in this study, patients with history of exposure to intense infrared light, trauma, subluxated/dislocated lens without pseudoexfoliation, uveitis with posterior synechiae were excluded from this study. All SICS performed by the same surgeon. Patients age, sex, anterior segment evaluation with Slit lamp, fundus findings in both eyes, IOP measurement & presence of pseudoexfoliation material preoperative & on postoperative day 1 evaluated.

Results: In this study PXF was noted in 38 % patients in the age group of 60-69 years. 64% of the patients were males & 36% were females. Poor pupillary dilatation was noted in 28% patients, moderate in 54% & good in 18% patients. In 14 patients with poor pupil dilatation, 85.71% patients had 1 or more intraoperative complications, & in 27 patients with moderate pupillary dilatation, 33.33% patients had intraoperative complications. Continuous curvilinear capsulorhexis was done in 29 cases. In 15 eyes there was difficulty in completion of rhexis, in 4 cases there was extension of the rhexis and resultant pc rent. Postoperative iritis occurred in 34% patients, corneal oedema occurred in 12 patients, of the total cases of corneal oedema, raised IOP was seen in 3 cases. Hyphaema occurred in 1 patient, 8 patients had retained cortical material. Pigment dispersion on IOL were noted in 4 cases. Postoperative best corrected visual acuity at 8 weeks was 6/6-6/12 in 38% cases, 6/18 -6/36 in 50% and 6/60-CFCF in 12 %.

Conclusions: surgeons should be aware of potential complications during cataract surgery in pxf eyes & adequate measures should be taken to prevent intraoperative complications, these include surgical modifications such as sphincterectomy & or bimanual pupil stretching, use of iris hooks in eyes with inadequate mydriasis.

Keywords: PXF, Cataract surgery, Poor pupillary dilatation, Intraoperative & postoperative complications, BCVA (best corrected visual acuity)

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INTRODUCTION

Pseudoexfoliation (PXE) was first described by Lindberg in 1917.^[1] He believed that this material was created by earlier inflammation. The main and full description was made by a Swiss Ophthalmologist Alfred Vogt^[2] in 1918. PXF is now recognized as an accumulation of grey white fibrogranular extracellular pseudoexfoliative material produced by abnormal basement membranes of ageing epithelial cells in trabeculum, equatorial lens capsule, pupillary margin of iris and ciliary body of the eye.^[3] Moreover, exfoliative fibrilopathy has been reported in the skin and visceral organs^[4] as well, thereby suggesting that it may be an ocular manifestation of a systemic disorder. Pseudoexfoliation is a senile condition⁵ more common in males as compared to females⁶. Multiple factors contribute to the development of pseudoexfoliation, the most common association is age⁷. Prevalence rates increase markedly from age 50 to late 80's. It is most common between 60 and 70 years. Pseudoexfoliation syndrome has been recognized as the most common identifiable cause of secondary open angle glaucoma^[8]

The clinical changes are most readily apparent on the lens capsule on which a grey amorphous material is layered in the pupillary region and along the pre-equatorial region of the lens. Pre-operative diagnosis can be made by examining the pupillary margin for deposits of grey dandruff like flakes along with a moth eaten appearance of iris sphincter on transillumination. The cornea may show diffuse pigment deposition or sometimes a Krukenberg spindle. Mild aqueous flare may be seen. On dilating the pupil, the characteristic double ring appearance can be seen with a central disc and peripheral band of PXF and clear area in between. Histologically, the material is produced by ageing epithelial cells of basement membranes of the ciliary body, iris and lens epithelium.

The objectives of this study are to determine the types and frequencies of the different intraoperative and postoperative complications encountered during and after cataract surgery in patients having pseudoexfoliation syndrome and cataract & to evaluate BCVA at 8 weeks postoperatively. Once we have diagnosed pseudoexfoliation, we can modify our usual technique and can avoid both short and long term complications. Awareness & ability to manage these complications is key to success.

MATERIALS AND METHODS

It is a single centre, prospective, observational study. Total 50 eyes of 50 cataract patients attending outpatient department of ophthalmology

of a tertiary care hospital from November 2012 to October 2014 diagnosed with pseudoexfoliation syndrome included in this study. Patients with history of exposure to intense infrared light, patient with traumatic cataract, patient with lens dislocation/subluxation without pseudoexfoliation, patients with uveitis with posterior synechiae. Institutional ethics committee approval was obtained. Patients were admitted 1 day prior to surgery, written informed consent was taken from all the participants included in the study after fully explaining the procedure, purpose of the study and complications of surgery and anaesthesia to them. Detailed history is taken, visual acuity recorded by using Snellen's chart, IOP measurement is done with applanation tonometry, gonioscopy is done and angle grading is done by Shaffer's angle grading system & detail slit lamp examination is carried out after dilatation of the pupil to check for PXF deposits on cornea, iris, pupillary margin, anterior lens capsule. Cataract grading is done by using "lens opacity classification system". A scan and intraocular lens power calculation is done by SRK-2 formula. Patients started on local antibiotic eye drop qid, preoperative mydriasis was achieved with instillation of tropicamide (1%) & phenylephrine (10%) combination. Flurbiprofen eye drops were used to sustain the mydriasis achieved. All patients were operated by single surgeon using SICS surgery. Peribulbar block 5ml is given with 3 ml of 2% xylocaine and 2 ml of 0.5% bupivacaine with 150 units/ml of hyaluronidase. Povidone-iodine 5% eye drop was instilled into the conjunctival sac for 3 min before the start of surgery. Conjunctival flap was taken, scleral incision was made superiorly, 1.5 mm away from the limbus with Bard Parker knife with 15 no. blade and sclerocorneal tunnel was constructed with crescent. Side port entry was made at 9 o'clock, to stain the anterior lens capsule trypan blue dye (0.1%) was injected intracamerally. With the help of needle cystitome & continuous curvilinear capsulorhexis was done. Gentle hydrodissection was performed to separate cortex from nucleus. Nucleus delivered by visco expression method. Irrigation and aspiration was done with two way irrigation and aspiration cannula. Rigid, single piece, biconvex, polymethyl methacrylate posterior chamber intraocular lens (IOLs) was implanted in the bag using Kelman McPherson forceps.

Post-operatively, patients were started on topical antibiotics and steroids eye drop which tapered over 6 weeks. Post-operative follow up was done on day 1, 1 week, 4 weeks, and 8 weeks on each follow up visual acuity testing, slit lamp examination was done, Best corrected visual acuity was measured at 8 weeks.

RESULTS

The youngest patient was 54 years & the oldest patient was 85 years old with mean age of 67.02 years & standard deviation of 8.32. of the total 50 cases that were studied. 64% were males & 36% were females, showing more frequent occurrence of pseudoexfoliation in males. In our study, pseudoexfoliation syndrome was found to be bilateral in 66% cases while unilaterality was observed in 34% cases. In all patients with pupillary dilatation there was difficulty in prolapse of nucleus while it was encountered in around 37.03% cases with moderate dilatation requiring additional manoeuvres like sphincterotomy. A chi Square value is 24.77 and $p=0.001$. This shows that inadequate pupillary dilatation in pseudoexfoliation syndrome is responsible for difficulty in nucleus delivery. IOP (mm of Hg) was measured using Applanation tonometer. In this study, out of 50 patients, 32(64%) patients had IOP in the range 12-18mmhg. 13(26%) patients in the range of 18-24 mmhg and 5(10%) patients had IOP more than 24 mm hg. 4(8%) patients had open angle glaucoma. Sphincterotomy was done in 91.66% of patients with difficult nucleus delivery, bimanual stretching was done 8.34%. During nucleus delivery complications like sphincter damage (10%) and pigment dispersion (12%) were common.

Zonular dialysis occurred in 4 eyes, in 2 eyes there was <4 clock hours of zonular dialysis without vitreous loss. In 2 eyes there was >4 clock hours of zonular dialysis with vitreous loss, of which one eye had a posterior dislocation of the nucleus in to the vitreous cavity. Maximum intraoperative complication rate was noticed between 60-69 years of age followed by 70-79 years. chi square value is 2.199. P value is 0.532 i.e >0.05

From the results obtained above, no statistically significant association was observed between intraoperative complications and age.

Posterior capsular rent occurred in 6 cases. In 4 cases, there was extension of the rrhexis and a large rent with vitreous loss. In the other 2 cases, there was a small rent without vitreous loss. Vitreous loss occurred in 5 eyes (10%).

In the present study, iritis was the most common post operative complication seen in 17 (34%) cases, corneal edema in 12 (24%). post operative raised of IOP 3(6%). iris pigment dispersion in 4(8%), residual cortical matter in 8(16%) and hyphaema 1(2%) cases was observed. Postoperative Best Corrected Visual Acuity at 8 weeks was 6/6 – 6/12 in 38% cases, 6/18 -6/36 in 50% and 6/60 –CFCF in 12%.

Table 1: Distribution of cases according to age, sex & laterality

Age	No of cases	Sex	No.of cases	Unilateral	Bilateral
50-59	13 (26%)	Males	32(64%)	17(34%)	33(66%)
60-69	19 (38%)	Females	18(36%)		
70-79	14 (28%)				
>80	4 (8%)				

Table 2: Distribution of cases according to grading of mydriasis & difficulty in nucleus delivery

Pupillary dilatation	No of cases	Difficulty in nucleus delivery
Poor	14 (28%)	14 (28%)
Moderate	27 (54%)	10 (20%)
Good	09 (18%)	-

Table 3: Intraocular pressure measurement

12-18 mmhg	18-24 mmhg	>24 mmhg
32(64%)	13(26%)	5(10%)

Table 4: Maneuvers done during difficult nucleus delivery

Pupillary dilatation	No. of cases	Sphincterotomy	Bimanual stretching
Poor	14	13	01
Moderate	10	09	01

Table 5: Complications during nucleus delivery

Complication	No of cases	Percentage
Sphincter damage	5	10
Iridodialysis	1	2
Intraocular bleeding	1	2
Pigment dispersion	6	12

Table 6: Zonular dialysis encounter during surgery

<4 clock hours	2
>4 clock hours	2

Table 7: Distribution of intraoperative complications according to age

Age in years	Intraoperative complications		
	Yes	No	Total
51-59	5	8	13
60-69	9	10	19
70-79	5	9	14
>80	3	1	4

Table 8: Other intraoperative complications

	No	Percentage
PC rent	6	12
Vitreous loss	6	12

Table 9: Early postoperative complications on Day 1

Type of complication	No	Percentage
Iritis	17	34
Corneal edema	12	24
Raised IOP	03	06
Pigment on lens	04	08
Residual cortical matter	08	16
Hyphaema	01	02

Table 10: Postoperative Best corrected visual acuity at 8 weeks

Visual acuity	No of cases	Percentage
6/6-6/12	19	38
6/18-6/36	25	50
6/60-CF	06	12

DISCUSSION

Association with age, Sex distribution & laterality: Pseudoexfoliation of lens rarely occurs below 50 years of age. Study of literature shows highest prevalence to occur between 60-80 years. In a study by M.Javed⁹, 37% were in the age group of 60-69 years. Tarkkanen et al (1962)¹⁰, Sood et al (1968)¹¹ reported the maximum prevalence between 60-70 years. In present study, highest prevalence of 38% was recorded in the 60-69 years age group.

In this study 64% of the patients were males & 36% were females, showing more frequent occurrence of pseudoexfoliation in males.

Author	Male	Female
Sood et al(1968) ¹¹	78.8%	21.2%
M.Javed ⁹	84%	16%
Present study	64%	36%

Pseudoexfoliation can be unilateral or bilateral, In study by Mizuno and Muroi (1979)¹² bilateral pseudoexfoliation was observed in 54.84% cases. In present study 66% cases were with bilateral pseudoexfoliation.

Association with pupillary dilatation & difficulty in nucleus delivery: Pseudoexfoliation is associated with constricted pupil, In this study poor pupillary dilatation was seen in 28% patients, moderate in 54% and good in 18% patients, In a study by Naseem A¹³, 68.75% of pseudoexfoliation patients had poor to moderate pupillary dilatation. In a study by M.Jawad⁹, 48% had poor pupillary dilatation, moderate in 42% and good in 10%. These results indicate that good/adequate pupil dilatation for cataract extraction is more difficult to be obtained in patients with pseudoexfoliation. Difficulty in nucleus delivery was seen in all cases with poor pupillary dilatation, to obtain adequate pupil dilatation, additional surgical manoeuvres were needed. Bimanual stretching is one of the least time consuming methods and was used in this study but it was used in 2(8.34%) cases. This method is more convenient and cheaper but may lead to iris sphincter damage. The other technique used for pupil dilatation is sphincterectomy. It was done in 22 (91.66%) eyes. Sphincterectomy provides more controlled enlargement of pupil and at the same time better site can be selected. Pupil stretching maneuvers, while effective, are not indicated for all pseudoexfoliation cases. The blood aqueous barrier is compromised in these eyes &

excessive inflammatory responses are well documented.¹⁴ the same is true for sphincterectomies. Iridodialysis occurs intraoperatively as a result of manipulation of intraocular tissues, It is one of the established, although rare complication of cataract surgery. The patients with pseudoexfoliation syndrome are more prone to have this complication as compared to patients without pseudoexfoliation. In this study, only 1(2%) patient had this complication, the patient had only mild iridodialysis, which was optically as well as cosmetically insignificant, that is why no significant surgical intervention was done. In the study by M.Jawad⁹, this complication was seen in 1% patients. Intraocular bleeding can occur from the incision or iris. Only 1(2%) patient had this complication in this study. It usually occurs, as a result of manipulation of the iris. In this study intraocular bleeding was mild and not associated with vitreous loss, No intervention was done and it resolved spontaneously.

Pseudoexfoliation and intraoperative complications: Zonular integrity

In this study, preoperative features show that 8% patients had zonular fragility, In the study by M.Jawad⁹, 22% patients had zonular fragility. In this study, zonular dialysis was seen in 4 patients (8%). In 2 patients with zonular dialysis of <4 clock hours, a scleral fixated PCIOL was put after cataract extraction. In 1 patient with zonular dialysis >4 clock hours, there was posterior lens dislocation & patient was referred for vitreoretinal surgery. In the other patient with zonular dialysis >4 clock hours, a scleral fixated PCIOL was put. In the study by L.Drolsum¹⁶, capsule/zonule tears (without vitreous loss) occurred in 4.3% of pseudoexfoliation eyes. Compared to 1.3% in eyes with pseudoexfoliation ($p < 0.05$). Early on, one may sense diffuse zonular weakness or laxity, even during capsulorrhexis creation. Once this weakness apparent, the risk of creating zonular dialysis looms. In such a case, flexible iris retractor can engage the rrhexis margin and stabilize the loosened capsular bag. If a small or moderate zonular dialysis occurs, a standard CTR can re-expand the capsular bag and redistribute the mechanical stresses evenly across the remaining zonules. For a larger zonular dialysis, a suture fixated M-CTR(modified Cionni ring) with one or two fixation eyelets will re-expand the capsular bag and secure the capsular bag/IOL complex to the scleral wall.

Risk of intraoperative complications with age

In a study by SJ Robbie, no significant association was found between age & the risk of an intraoperative complication¹⁸. In this study no significant association was found between age and the risk of an intraoperative complication, chi

square test was applied using mini Tab version 13 software. Chi square value was 2.199 and p value is 0.532($p > 0.05$).

Capsular complications

In this study capsulorrhexis was done in 29 cases. In 15 cases there was difficulty in completion of rrhexis. In 4 cases there was extension of the rrhexis and resultant PC rent. There was a large tear and severe vitreous loss and the patient was kept aphakic after doing limited anterior vitrectomy. In study by Bayramlar et al¹⁵. Intraoperative capsular complication was seen in 18% with pseudoexfoliation and in 5.5% cases without pseudoexfoliation.

Rate of vitreous loss: Vitreous loss was seen in 12% cases in this study. In study by Bayramlar et al¹⁵. 12% patients with pseudoexfoliation had vitreous loss & 2.3% cases without pseudoexfoliation ($p < 0.004$). In a study by G.Landa¹⁷, the occurrence of vitreous loss did not differ significantly between the groups.

Early postoperative complications

In this study, postoperative iritis occurred in 34% patients, they were managed with antibiotic steroid eye drops half hourly and cycloplegic eye drop twice a day, if required subconjunctival gentamycin and dexamethasone injection was given. In the study by S.Schumacher¹⁹. Tyndallometrically, eyes with senile cataract and pseudoexfoliation did have clearly increased flare values on the 3rd & 5th postoperative days compared with the group of normal eyes with senile cataract ($p < 0.02, p < 0.003$) respectively.

Intraocular pressure: In this study corneal edema occurred in 12(24%) patients, of the total cases of corneal edema, raised intraocular pressure was seen in 3(6%) cases. They were managed with Timolet 0.5% eye drops twice a day & responded to treatment. Their IOP on follow-up visits was within normal limits. In a study by A.Akinci²⁰, rise in IOP in the early postoperative period was significantly higher in the pseudoexfoliation group ($p < 0.02$).

Retained lens material: Present study describes 8(16%) patients who had retained lens material. All of them had retained little cortical material, which is better tolerated and was having no optical effects due to inferior position in anterior chamber that is why, repeat surgery was not done. Treatment with cycloplegic and topical steroids allow for the gradual dissolution of the retained lens material.

Hyphaema: In this study, hyphaema occurred in 1(2%) patient, In a study by G.Landa¹⁷, hyphaema was the most common postoperative complication in the pseudoexfoliation group(14.5%).

Pigment dispersion on IOL: In this study pigment on lens was seen in 4(8%) cases. It was managed with topical antibiotic-steroids & cycloplegics.

Best Corrected Visual Acuity at 8 weeks: In this study, postoperative Best Corrected Visual Acuity at 8 weeks was 6/6-6/12 in 38% cases. 6/18-6/36 in 50% and 6/60-CFCF in 12%, In the study by M.Jawad⁹. BCVA was 6/6-6/12 in 27%, 6/18-6/36 in 69% and 6/60-FC in 4% in pseudoexfoliation patients. In a comparative study by A.Akinci²⁰, there was no significant difference in the incidence of visual acuity gain between the patients with and without pseudoexfoliation after cataract surgery at the end of 8 weeks.

CONCLUSION

Patients with cataract & pseudoexfoliation syndrome posted for cataract surgery should be evaluated thoroughly. Inadequate mydriasis is one of the major preoperative finding in eyes with

pseudoexfoliation syndrome which has a bearing on the intraoperative & postoperative complications. Adequate surgical modifications such as sphincterectomy and/or bimanual pupil stretching, use of iris hooks in eyes with inadequate mydriasis reduce the intraoperative complications. These pupil enlargement procedures are advocated during cataract surgery.

If the surgeon is aware of these condition pre-operatively & plays meticulous attention to the surgical technique during manual small incision cataract surgery. The intraoperative and postoperative complications can be managed and a good outcome can be expected Manual small incision cataract surgery is safe in eyes with pseudoexfoliation syndrome. However we recommend evaluation of the surgical techniques by further studies to improve the surgical outcomes.

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