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Postoperative Iop Fall After Cataract Surgery

KEYWORDS: pseudoexfoliation, intraocular pressure, glaucoma, cataract

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ABSTRACT *Pseudoexfoliation syndrome is a condition which leaves scalloped protein deposits on the internal lens of the eye that make the surface of the lens appear as if it is being peeled away.[1] It is a generalised disorder of the extracellular matrix characterised by the production of abnormal basement membrane-like material in several intraocular and extraocular tissues.[2] It is the most common identifiable cause of open angle glaucoma worldwide. Cataract surgery seems to lower intraocular pressure on a sustained basis.This study has been conducted in western Maharashtra. The ophthalmic evaluation included recording of relevant ocular and medical history, best corrected visual acuity with Snellen's chart, examination of the pupillary reaction, and slit lamp evaluation of the anterior segment. Intraocular pressure was recorded by Goldmann applanation and non-contact tonometry, preoperatively and postoperatively.In this study, we found the prevalence of pseudoexfoliation to be 4.13%, and mean fall in intraocular pressure following cataract surgery in these patients was 2.04 mmHg.*

METHOD –
This study was conducted in the region of western Maharashtra. Patients coming to Sassoon general hospital, Pune, in routine outpatient department and those coming as a part of camps from Shirur and other neighbouring districts were included in the study

ELIGIBILITY CRITERIA –
All patients aged 40 years or above, having pseudoexfoliation (pxf) with cataract in one or both eyes.

EXCLUSION CRITERIA –
Patients having pxf without cataract, known cases of glaucoma (other causes), traumatic cataracts, were excluded from the study.

EXAMINATION PROCEDURES –
1330 subjects were examined. Intraocular pressures were measured preoperatively in 55 patients with PEX, and 50 patients without PEX. Postoperative pressures were measured in those with PEX only. The ophthalmic evaluation included recording of relevant ocular and medical history, recording of best corrected visual acuity with Snellen's chart, examination of the pupillary reaction, and slit lamp evaluation of the anterior segment with careful search for PEX deposits. Intraocular pressure (IOP) was recorded by Goldmann applanation tonometry and non-contact tonometry.

Subjects had their pupils dilated with 5% phenylephrine and 1% tropicamide eye drops. The subject was classified as having PEX syndrome if PEX material was present in either or both eyes. Cataract grading by LOCS II system was done. All patients underwent manual small incision cataract surgery (SICS).

RESULTS –
Of 1330 subjects examined, 55 (4.13%) subjects were found to have PEX syndrome. Of these, unilateral disease was found in 25 (45.45%) and bilateral in 30 (54.54%) subjects. Of those with unilateral disease, 10 (40%) were in the right eye and 15 (60%) were in the left eye. The mean age of subjects with PEX was 66.4 (SD = 7.59). The prevalence of PEX increases with age. Table 1 shows the age specific prevalence of PEX. The mean age of the unilateral PEX and bilateral PEX subjects was 69.66 and 63.83 years respectively, the difference being insignificant.

Table 1
Age specific prevalence of PEX.

Age (years)	No. of subjects with PEX	Total patients examined	Prevalence (%)
40 – 49	1	41	2.43
50 – 59	2	74	2.70
60 – 69	20	595	3.36
70 - 79	28	575	4.86
>80	4	45	8.88

Women constituted 25 (45.5%) of subjects with PEX and men constituted 30 (54.5%) of them. There was no significant difference in sex distribution between both groups. Table 2 shows male - female distribution.

Table 2 : Male- Female distribution

Age group	Male	Female
40-50	0	1
50-60	1	1
60-70	9	11
70-80	16	12
>80	4	0

The mean IOP in eyes with PEX was 12.62 mmhg . The mean IOP in eyes without PEX was 10.64 mmhg. Difference is 1.98 mmHg (15.68%) Table 3. Mean fall in IOP after cataract surgery in eyes with PEX is 2.04 mmHg (16.64%). The fall in IOP following cataract surgery is very significant. (P-value < 0.0001). [paired t- test was used] Table 4.

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Table 3 – Distribution of preoperative and postoperative intraocular pressures

Intraocular pressure (mmHg)	No. of patients (Pre – operative)	No. of patients (Post – operative)
< 10	10	28
10 – 13	18	11
13 – 16	16	15
16 – 19	11	1
>19	1	0

Table 4 - Mean intraocular pressures in subjects with PEX and without PEX.

	Mean IOP (mm Hg)
Subjects with PEX	12.62
Subjects without PEX	10.64
Postoperatively (after cataract surgery) in eyes with PEX	10.58

(P-value < 0.0001) [using paired t – test]

DISCUSSION

The reported prevalence rate of PEX syndrome in different populations shows extensive variations—0% in Eskimos, 1.6% in a south eastern US population, 1.8% in the Framingham Eye Study, 5–25 % in the Scandinavian countries, and 38% in Navajo Indians. More recent population based estimates in Australia reveal prevalences of 0.98% in the Visual Impairment Project and 2.3% in the Blue Mountains Eye Study.2 These could reflect true variations arising from racial, genetic, and/or geographical differences, differences in techniques of assessment and whether PEX was actively looked for with a dilated pupil. However, they could also be accounted for by many other factors including differences in study design (prospective versus retrospective), sampling methods (population based, hospital based, or clinic based), population size, and age distributions in the sampled populations.[2]

The prevalence of PEX syndrome in India, by Sood and Ratnaraj in 1968, reported 1.87% prevalence in patients aged 45 years or above with a 34% prevalence of glaucoma in patients with PEX. The report by Lamba and Giridhar in 1984, who reported a 7.4% prevalence of PEX, 9% of whom had glaucoma. Both these were hospital based studies[2] The prevalence of pseudoexfoliation in our study was found to be 4.13%.

There was a significant increase in prevalence with age. It is well known that the prevalence of PEX increases with age. The bilateral cases were not significantly older than the unilateral cases. These findings are similar to those of other studies. The sex distribution in our study was similar to that of the normal population without any predilection towards either sex, which is also in accordance with other studies.

The Blue mountains study shows a difference of 1.2 -1.7 mm Hg in eyes with and without PXF. It also states that PXF is associated with a modest increase in IOP, and its relationship with glaucoma was relatively independent of IOP.[2,4] In our study, the mean IOP in subjects with PEX was 1.98 mm Hg higher than in those without PEX. This difference was significant. Almost all studies focusing on PEX in the past have shown an association with raised IOP and glaucoma. It is known that IOP spikes occur in PEX syndrome that may not manifest on a single IOP record. A rigid and sticky iris, a greater tendency to form posterior synechiae, and anterior lens subluxation due to zonular weakness have been thought to predispose to narrow angles, which are worsened by miotic therapy.[3] The prevalence of occludable angles varies depending on the study, but range from 9% to 18%.[5]

In pseudoexfoliative glaucoma the IOP can fluctuate considerably. There is greater diurnal IOP fluctuation in these patients. Therefore some choose to set a lower target pressure and follow up the patients more closely.[6]

Study by J. Gottanka has shown that the severity of glaucoma in PEX is related to the amount of PEX material present in the cribriform region. Elevation of IOP occurs before disorganization of the cribriform region and may be related to the location of the PEX material near the inner wall of Schlemm canal.[7]

PEX syndrome has been known to be associated with a greater prevalence of cataract though the exact aetiology of this association is not known. Cataract and glaucoma are the first and second leading causes of blindness worldwide. Many studies have demonstrated intraocular pressure reduction after cataract surgery.[3]

The mainstay of glaucoma treatment is to lower intraocular pressure. Traditional glaucoma surgeries such a trabeculectomy and tube shunts work well to lower intraocular pressure and decrease progression of glaucoma, but these procedures carry significant risk. Many patients with glaucoma have concurrent cataracts and some studies have suggested that glaucoma itself is a risk factor for cataract development. Glaucoma filtering procedures, peripheral iridotomy and some glaucoma medications increase the risk of cataract formation. Patients with moderate to advanced glaucoma with concurrent cataracts would have either a combined procedure or a two-stage surgery.

Patients with higher preoperative IOP enjoy the greatest reduction of IOP after cataract surgery.[3]

The method of cataract extraction may influence the reduction of IOP.

In patients of PXF, cataract surgery is frequently more challenging for many reasons. Because the pupil often does not dilate fully, the ocular surgeon may need to mechanically stretch the pupil to get access to the cataract which rests behind it. The greatest difficulty that can occur is that the zonules , that hold the natural cataract lens in place can be weak, or worse, absent. This can cause the entire lens, or part of the lens, to dislocate from its normal position into the vitreous. This vitreous material may come forward into the front section of the eye, necessitating a longer and more complex surgery. An artificial lens implant, may not be able to be initially or ever placed in an eye that has pseudoexfoliation.[8]

Phacoemulsification (particularly clear cornea phacoemulsification) seems to lower IOP more than manual extra capsular cataract extraction. Pseudo exfoliation patients may have an even greater long term decrease in IOP than POAG patients[3,9,10]

As the eye ages, the crystalline lens increases significantly in volume. This may initiate a series of anatomical changes

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that ultimately leads to the increase in IOP observed with aging. As the lens grows, the anterior lens capsule is displaced forward causing the zonules to place anteriorly directed traction on the ciliary body and uveal tract, which in turn compresses the canal of Schlemm and the trabecular meshwork. Since the anterior tendons of the ciliary muscles contribute to the architecture of the trabecular meshwork, as the ciliary body is displaced forward by the enlarging lens the tendons relax and the space between trabecular plates becomes narrowed.[3]

In a study by V.TaoTran, washout of pseudoexfoliative material combined with cataract surgery, using a new cannula capable of irrigating the iridocorneal angle and trabecular meshwork; significantly lowered the IOP. Washing and rinsing of the angle and the entire anterior chamber facilitate evacuation of most macro and microscopic deposits.[11]

Although the physiological reasons for decreased IOP after cataract surgery remain speculative, the facility of outflow is known to increase after cataract surgery. The angle width does not change in normal or OAG patients after cataract surgery suggesting improved function of the trabecular meshwork itself rather than improved aqueous access to the trabecular meshwork. Three or more different mechanisms may contribute to the observed reduction in IOP after cataract surgery.[3]

CONCLUSION –

In our retrospective observational study, we found a prevalence of PEX syndrome (4.13%) and a mean fall in IOP of 2.04 mmHg after cataract surgery in patients with PEX syndrome. Cataract surgery acts as a visual rehabilitating as well as intraocular pressure lowering surgery in these patients. Thus, we are able to control the 2 most important causes of preventable blindness (cataract and glaucoma) by timely intervention and meticulous management strategy.

6) FIGURES

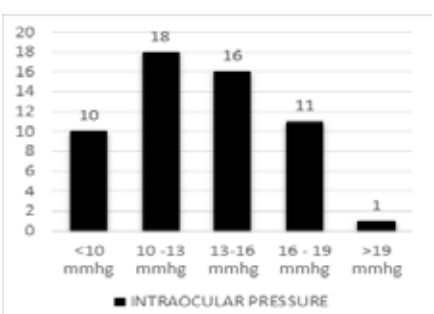

fig.1

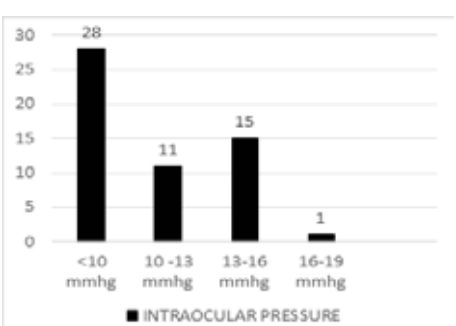

fig.2

fig.3

7) LEGENDS

Figure 1– preoperative intraocular pressures (in pseudoex foliation)

Figure 2– postoperative intraocular pressure (in pseudorxfo liation)

Figure 3– slit lamp photo showing pseudoexfoliation de posits on anterior

capsule of cataractous lens

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