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Clinical profile and surgical outcome of patients with pseudo-exfoliation syndrome undergoing cataract surgery - A retrospective study

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ABSTRACT

Pseudoexfoliation (PXF) syndrome is an age-related process of unknown etiology characterized by the deposition of distinctive fibrillar material in the anterior segment of the eye. The material is commonly deposited in the anterior chamber, angle of the eye, iris, trabecular meshwork, anterior capsule of the lens, and also the cornea. It is associated with open and narrow angle glaucoma, the formation of cataracts and the corneal endothelial decompensation.

PXF deposition in the lens zonules leads to disintegration of the lens zonules resulting in lens subluxation and dislocation. PXF deposition on the iris causes poor pupillary dilatation. Both zonular dehiscence and poor pupillary dilatation pose a great challenge to the cataract surgeon during surgery. Intra operatively, the chances of lens subluxation / dislocation, posterior capsular rupture, vitreous loss is high in the presence of pseudoexfoliation. In the immediate post-operative period, intra ocular pressure spikes, increased and prolonged iritis and corneal decompensation can affect the visual outcome of the surgery.

This study will retrospectively analyze the clinical profile of the patients with pseudoexfoliation and to evaluate the occurrence of intra and immediate post-op complications of cataract surgery. In this way, the surgeon can plan his/her surgical technique to help avoid complications during cataract surgery and be prepared to manage the potential intraoperative and postoperative complications that can occur in pseudoexfoliation eyes.

1. Introduction

Pseudoexfoliation syndrome is a systemic disease affecting the anterior structures of the eye mainly due to aging. In spite of its worldwide distribution, the reported incidence and prevalence of this syndrome vary greatly across ethnic groups and geographical regions. The exfoliative material consists primarily of abnormal cross-linked fibrils that accumulate progressively in some organs such as the heart, blood vessels, lungs or meninges, and particularly in the eye's anterior structures. The exact pathophysiological process still remains unclear but the association of genetic and environmental factors are thought to play a role in the development and progressive extracellular accumulation of exfoliative material. As a result, polymorphisms in the LOXL1 gene, which is involved in the metabolism of elastic fibers and extracellular matrix, and increased natural exposure to atmospheric ultraviolet or caffeine consumption are associated with pseudoexfoliation syndrome. It is common for ophthalmological manifestations to be bilateral, with asymmetric presentation, and can lead to severe vision impairment and blindness more often than in the general

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population, mostly due to glaucoma and cataracts. In comparison to cataract surgery without pseudoexfoliation, cataract surgery with pseudoexfoliation has a 5 to 10 fold increase in surgical complications due to poorer pupil dilation and increased zonular instability. [1]

2. Materials and Methods

2.1. Study design

Retrospective descriptive study.

2.2. Inclusion criteria

Case records of eyes of cataract patients with pseudoexfoliation who underwent cataract surgery in PIMS hospital from April 2019 to March 2020.

2.3. Exclusion criteria

Case records of eyes of patients with pseudoexfoliation who underwent other ocular surgeries during the same time period.

2.4. Period of study

2 months.

2.5. Sample size

68.

2.6. Data collection

Data such as the age, gender, area of residence, occupation, PXF distribution, intra ocular pressure, pupil dilatation, cataract assessment, surgical procedure, intra-op complications, post op complications and visual outcome after cataract surgery was also collected based on the inclusion criteria.

1. The data was analysed using SPSS software version.
2. Continuous variable was described by Mean and Standard Deviation and categorical variables was described by number and percentages.
3. Chi-Square test will be used to find association between variables.
4. P value <0.05 was considered as statistically significant.

3. Results

3.1. Age

According to this study of PXF syndrome in total of 68 cases, frequency of cases were more common among 61 to 70 years of age (44.1%) and second highest frequency of cases was along the age group of 71 to 80 years (29.4%). Therefore, it was comparatively less before the age of 60 years.(Figure 1)

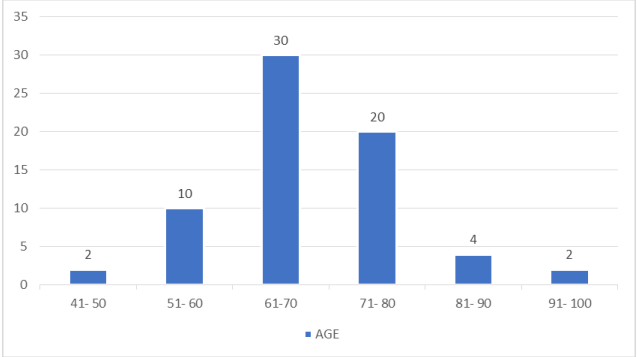

Fig. 1: Age-wise distribution of PXF

3.2. Gender

Out of 68 cases observed, PXF was more common in males which was total of 41 cases (60.3%) than females (39.7%).(Figure 2)

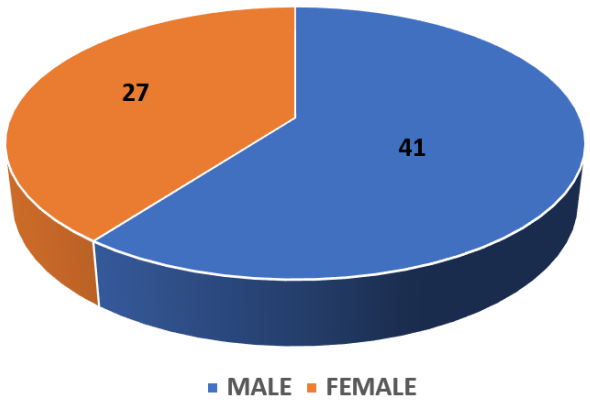

Fig. 2: Gender distribution of PXF

1. According to this study, pre op vision 6/18 to 6/36 has the highest incidence of PXF.
2. Except 2 cases all had normal IOP pre operatively.
3. Pupil dilatation was good in both right and left eye in most of the cases with percent of 67.6% and 66.2% respectively.
4. SICS was done in most of the cases owing to dense cataract (60 cases -88.2%).

3.3. Intra-op complications

1. No or very less PXF cases had complications such as iridodialysis (3 cases), PC rent (5 cases).
2. Sphincterotomy was done in 19 cases.

3. All these complications were statistically insignificant (p value >0.05).
4. Post op IOP was significantly increased 12 cases (17.6%) which was treated with timolol.
5. Only 32 of 68 cases had clear cornea post-operatively showing that nearly half the number developed striate keratopathy post-operatively while anterior chamber reaction was seen in 27 cases.
6. Post op vision was significantly good in most of the cases.

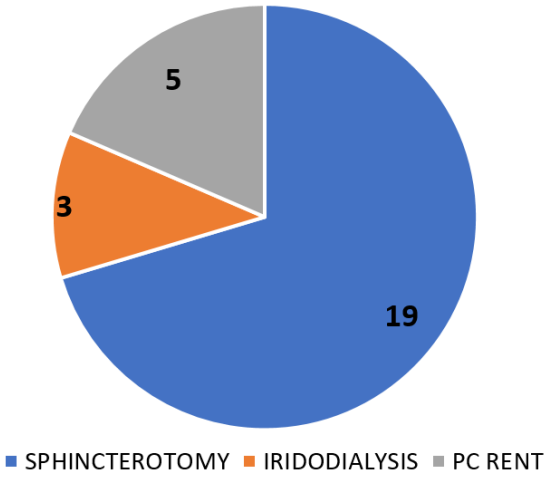

Fig. 3:

4. Discussion

Pseudoexfolation syndrome may present unilaterally or bilaterally and is associated with open and closed angle glaucoma as well as cataract formation. It is thought that changes in the vasculature of the iris and the blood-water barrier may affect the composition of the aqueous solution, which in turn may affect the metabolism of the lens, leading to early cataract formation. PXFs have a higher risk of developing complications during and even after cataract surgery.[2]

Complications associated with cataract surgery in PXF may arise from poor pupil dilation, zonular weakness leading to intraoperative or postoperative complications such as lens dislocation, vitreous loss and post-operative IOP spikes and corneal decompensation.[2]

The increasing accumulation of fibrous extracellular matrix in the trabecular meshwork reduces aqueous outflow and thereby increases IOP. When IOP rises suddenly, glaucoma optic neuropathy develops. Several studies have reported that IOP is markedly increased within 24 hours after cataract surgery in eyes with PXF syndrome.[3]

Levkovich-Verbin et al. showed that elevation of IOP occurred several hours after surgery. Alternatively, short-term elevation of IOP can be reduced by topical timolol maleate or bimatoprost.[3]

PXF material accumulates in corneal endothelial cells, leading to progressive endothelial transformation. Studies have shown decreased corneal endothelial cell density (ECD) and increased central corneal thickness (CCT) in eyes with PXF.

Since the corneal endothelium in eyes with PXF is vulnerable to cataract surgery, careful surgical procedures are necessary.[4]

Possible intraoperative complications in the eye with PXF include vitreous loss and vitreous displacement, while postoperative complications include glaucoma (IOP), persistent corneal edema, lens decentration and increased incidence of PCO.[5]

Kuchle et al. showed that shallower anterior chamber depth in PXF patients had a higher risk of complications with cataract surgery. Large incision extracapsular cataract surgery was associated with significant complications during cataract surgery in patients with PXF.

In these cases incidence of postoperative pupillary fibrin membranes were more common.[2]

When comparing complication rates between extracapsular cataract extraction and phacoemulsification in PXF eyes, several studies showed a lower complication rate in patients who underwent phacoemulsification. However, phacoemulsification was associated with increased rates of vitreous loss and capsule and granular tears in PXF eyes compared with non-PXF eyes. In general, PXF cataracts tend to be more difficult and require more emulsion time. Major risk factors for surgical complications during emulsification in PXF include weak zonular and poor pupil dilation. These risk factors can lead to intraoperative or postoperative vitreous displacement, vitreous loss, iridodonesis, and phacodonesis.

Other postoperative complications include intraocular pressure spikes causing irreversible glaucomatous damage, corneal decompensation, anterior capsular phimosis, posterior capsular opacification, and late lens subluxation.[2]

Intraoperative mydriasis may be limited in PXF by a number of mechanisms. The PXF material in the iris stroma can cause iris atrophy, deposition in the iris blood vessels, or leak into the iris stroma, resulting in a mechanical obstruction that prevents pupil dilation**.** In addition, adhesion of desquamating material to the pigmented epithelium of the iris and anterior capsule of the vitreous can lead to mechanical limitation of pupillary movement. Adding a preoperative topical non-steroidal anti-inflammatory drug to mydriatics topical may help minimize intraoperative miosis. Bimanual dilation with Y-hook, iris retractor hook, and pupillary dilation ring can also be used to maintain adequate pupillary dilation during

phacoemulsification. Viscomydriasis is another technique to increase pupil diameter during cataract surgery. However, whatever technique is used, care should be taken to not overstretch the pupil, as this may lead to an irregular atonic pupil postoperatively.[2]

Other postoperative complications include intraocular IOP spikes, corneal decompensation, anterior capsule phimosis, posterior capsule opacification and occasionally late lens subluxation.

5. Conclusion

Based on my study done on a total of 68 cases, majority of the cases had a good visual outcome post cataract surgery except for few cases where dilatation was inadequate, sphincterotomy was done which eventually showed better results.

PXF is thus posing a great challenge for the operating surgeons which can be diagnosed with proper pre operative evaluation.

In this way, the surgeon can plan his/her surgical technique to help avoid complications during cataract surgery and be prepared to manage the potential intraoperative and postoperative complications that can occur in pseudoexfoliation eyes.

6. Source of Funding

None.

7. Conflict of Interest

None.

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