CLINICAL PROFILE OF PSEUDOEXFOLIATION IN CATARACT SURGERY-A CROSS SECTIONAL STUDY

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ABSTRACT

Introduction

The pseudoexfoliation syndrome is an age related generalized abnormal production or turnover of extra-cellular matrix in ocular tissues, orbital tissues, skin and visceral organs. The exact etio-pathogenesis condition and chemical composition of the material still remains unknown. The renewed interest in this long known entity results from better awareness of the spectrum of intra-ocular risks in open angle glaucoma, conjunction with/ or intra-ocular surgery was described in the relevant findings.

Objectives

Study the clinical features of pseudo-exfoliation in eyes with cataract and to know the intraoperative, postoperative complications with visual prognosis of cataract surgery with pseudo-exfoliation

Methods

A Cross sectional study was conducted in the Department of Ophthalmology, PES Institute of Medical Sciences and Research Hospital, Kuppam, Andra Pradesh on patients with Pseudoexfoliation Syndrome and cataract during the period of one and half years. The Patients were attending ophthalmology OPD at PES hospital for cataract surgery during November 2013 to March 2015. A total 120 suspected cases were recruited for the study with written consent. Surgery was done at the standard procedure and protocol.

Results

In the present study, 71 (59.16%) cases were found to be either zonular dehiscence, posterior capsular rent, Vitreous loss, Corneal edema, Excessive lens mobility were seen during the capsulotomy. Majority of cases were presented intraoperative complications with insufficient mydriasis.

Conclusions

The surgical modifications like Sphincterotomy, Synchylolysis, Anterior vitrectomy, use of CTR can improves the outcome of the surgery and also gives the better visual quality

KEYWORDS: Pseudo-Exfoliation, Surgical Modifications, Postoperative, Intraoperative

INTRODUCTION

The pseudoexfoliation syndrome is an age related generalized abnormal production or turnover of extra-cellular matrix in ocular, orbital tissues, skin and visceral organs. The exact etio-pathogenesis condition and chemical composition of the material still remains unknown. The renewed interest in this long known entity results
from better awareness of the spectrum of intra-ocular risks in open angle glaucoma, conjunction with/ or intra-ocular surgery was described in the relevant findings. Especially cataract surgery of pseudoexfoliation syndrome has been characterized clinically with small white deposits of material in the anterior segments, most commonly in the papillary border and the anterior lens capsule were found. The most consistent diagnostic feature is three distinct zones of pseudoexfoliation material were appeared on the lens capsule after full dilatation. The middle clear zone corresponding to probable contact with the moving in iris. The Peripheral granular zone, which may have radial stations.(central zone is absent in 20% or more cases, but peripheral defect is a consistent finding in all cases. Therefore, papillary dilatation is a must before lens changes can be seen. Additional subtle clinical signs that help in early diagnosis are loss of pigment from peri-pupillary area producing transillumination defects, insufficient mydriasis, and pigment dispersion into anterior chamber after mydriasis, deposition of melanin over trabecular meshwork and Schwalbe’s line. The existence of posterior synechiae without any other cause and hemorrhage in the iris stroma after mydriasis are also suggestive of pseudoexfoliation syndrome. Deposition of material on the zonular fibres weakness can leading to phacodonesis, subluxation and dislocation of lens. The presence of secondary open angle glaucoma is known as glaucoma capsulare. The glaucoma has more serious clinical course and worse prognosis than primary open angle glaucoma, often not responding to medical therapy and requiring an early surgical intervention. Angle closure glaucoma may also be seen due to papillary block by forward displaced lens. The corneal epithelium shows decreased cell count and pleomorphism leading to early corneal decompensation at moderate rise in intraocular pressure and after cataract surgery. An increase incidence of nuclear cataract was seen. Making the diagnosis often requires a careful slit-lamp examination after papillary dilatation and pseudoexfoliation syndrome frequently goes undiagnosed leading to unexpected problems for management and during the course of surgery. Due to the involvement of virtually all the structures by pseudoexfoliation material, patients have significantly greater risks of varied complications during cataract surgery. Poor mydriasis, pigment dispersion, combined with phacodonesis and zonular dialysis predisposes to capsular rupture and vitreous loss. Breakdown of blood-aqueous barrier leads to transient elevations of intraocular pressure and fibrinoid uveitis after surgery. Late complications include posterior capsular opacification, secondary cataract, and decentration of intra-ocular lens and decompensation of corneal endothelium. The possible pre-operative and intra-operative measures to avoid or minimize these complications include an increased awareness of pseudoexfoliation syndrome, a careful slit lamp examination after full papillary dilatation, adequate control of intra-ocular pressure pre-operatively, avoidance of iris manipulation, adequate papillary dilatation, use of heparin coated intra-ocular lenses and judicious use of steroids post-operatively. Much remains to be learnt about the pseudo exfoliation material not only at the basic levels of production and by the chemical nature but also with regard to its genetics, epidemiology and treatment. There is an increasing prevalence of pseudo exfoliation syndrome as the mean age of general population increases. Yet the clinical implications of the systemic manifestations of this disorder remain unclear. In view of the multitude of clinical complications, we need to be aware of the risks and specially look for clinical signs of this entity.

**CLINICAL FEATURES**

**Ocular Manifestations - Lens and Zonules:** Deposits of white flaky material on the anterior lens surface are the most consistent and important diagnostic of Pseudoexfoliation Syndrome. The classic pattern consists of 3 distinct zones that become visible when the pupil is fully dialated – a relatively homogeneous central disc corresponding roughly to the diameter of the pupil, a granular often layered peripheral zone and a clear area separating the two. The central zone is homogeneous white sheet lying on the anterior pole of the lens capsule. Its diameter varies between 1.5-3 mm and it is
usually slightly smaller than the physiological pupil. The edges of the disk are often rolled equatorially. The central disk is absent in 20.60% of cases. It is often initially overlooked but with careful examination after dilatation, a subtle area of Pseudoexfoliation material may be noted especially when compared to the adjacent intermediate clear zone. It may be granular in the periphery and frosty white centrally and radial striations are often seen. It may be layered. The classical picture of Pseudoexfoliation Syndrome has often been described; the early stages have not been well defined. A precursor of Pseudoexfoliation material is thought to be initially deposited diffusely on the lens surface. A homogeneous “ground glass” or “matte” appearance of the lens surface in one eye compared to the other may represent a very early (pre-capsular) stage. In a perhaps slightly later (pre-granular) stage, there may be very faint radiant non-granular striae on middle third of the anterior capsule behind the iris. Ultra structurally, the pre-capsular layer at this stage consists of micro-fibrils, but not mature exfoliation fibrils. The intermediate clear zone is created by rubbing of the iris over the surface of the lens during papillary movement. As the pre-capsular layer becomes thicker the iris sphincter begins to rub against it during normal papillary movement. Faint clefts begin to form where Pseudoexfoliation material is rubbed away in what will eventually become the clear Zone. With time, these clefts increase in size and begin to become confluent. Eventually only small bridges may remain as an indication of the previous layer of Pseudoexfoliation material in the intermediate zone. In some patients the central disk may become thick enough to peel away in sheets from the lens, as may the peripheral zone, giving rise to appearance of True Exfoliation Syndrome. Chronic papillary dilatation also permits undisturbed accumulation of Pseudoexfoliation material. In this proximity of the research the main objectives are to study the clinical features of pseudo-exfoliation in eyes with cataract and to know the intraoperative, postoperative complications with visual prognosis of cataract surgery with pseudo-exfoliation.

METHODOLOGY

Cross sectional study was conducted in the Department of Ophthalmology, PES Institute of Medical Sciences and Research Hospital, Kuppam, Andra Pradesh on patients with Pseudoexfoliation Syndrome and cataract during the period of one and half years. Patients attending ophthalmology OPD at PES hospital for cataract surgery during November 2013 to March 2015 will be included in this study. A total 120 suspected caseses were recruited for the study with written consent obtained. Inclusion and exclusion criteria rules were adopted for the recruitment of the patients. Inclusion Criteria; all patients willing to give valid consent for clinical examination and evaluation and Senile cataract (cortical & nuclear) in eyes with clinical evidence of Pseudoexfoliation. Exclusion Criteria; client with traumatic cataracts, complicated cataracts, congenital cataract and metabolic cataracts are excluded from the study. Patient with lens induced glaucoma and subluxated lens. Senile cataracts without Pseudoexfoliation. Corneal opacities and any other intraocular pathologies like Uveitis or retinal pathology that may affect the postoperative visual outcome and If the patient develops any of the medical comorbidities while in the hospital during the study period will be excluded. The study was conducted at Department of Ophthalmology, PES Institute of Medical Sciences and Research, Kuppam for the period of one and half year. Institutional ethical clearance was obtained from the competent authority. After findings and suitability with defined inclusion and exclusion criteria, the patients were selected for the study. Demographic profile of the patients viz., age, sex, detailed history were obtained by interviewing the participants and clinical examination and necessary investigations were recorded on predesigned and pretested proforma. After taking informed consent of all the eligible patients they were subjected to detailed examination like history, general physical examination and systemic examination. Ocular examination consisted of History were Included, the presenting complaints and Preoperative evaluation were collected by using pretested questionnaires. The following examinations were done Torch light examination, Slit lamp examination direct
ophthalmoscopy Indirect ophthalmoscopy, Tonometry (indentation), Gonioscopy, -scan biometry for lens thickness and anterior chamber depth and Anterior segment visualization and photography by 3 NETHRa (fundus camera). All patients cataract surgery was done for all patients, the manual SICS and vision both preoperatively and postoperatively was recorded. Refraction was done and documented best corrected visual acuity and it was followed-up postoperatively for 2-4 weeks.

**SURGICAL TECHNIQUE**

All patients were given systemic antibiotics (Tablet ciprofloxacin 500 mg b. d.) on preoperative day and Tablet acetazolamide 250mg BD. On the day of surgery pupils was dilated adequately by using instillation of 0.8 mg tropicamide and 5% phenylephrine eye drops was given at every 10 minutes and one hour before surgery. For sustain the pupil dilatation the anti-prostaglandin eye drops such as flurbiprofen were instilled at three times in a day before surgery.

**SURGICAL STEPS OF MANUAL SMALL INCISION CATARACT SURGERY**

- The eye to be operated is painted, draped and prepared for surgery under aseptic precautions.
- Local anesthesia is given using 2% xylocaine with adrenaline mixed with 1500 units of hyaluronidase.
- Universal wire speculum applied.
- Superior rectus (bridle) suture is passed to fix the eye in downward gaze.
- A small fornix based conjunctival flap is made, and sclera is exposed.
- Haemostasis is achieved by applying gentle and just adequate electro cautery.
- A self sealing sclera-corneal tunnel incision is made.
- Anterior capsulotomy by continuous curvilinear capsulorrhexis or can-opener’s technique was left to surgeon’s choice.
- Hydrodissection is done to separate cortico-nuclear mass from the posterior capsule.
- Depending on the degree of mydriasis the pupil was stretched mechanically or sphincterotomies were done, depending on the operating surgeon’s discretion.
- Synechiolysis ws done if required.
- Nucleus was delivered.
- Cortical matter was removed by irrigation and aspiration.
- In case of a posterior capsule tear, the integrity of the capsular bag was assessed to place the intraocular lens.
- In case of vitreous loss, anterior vitrectomy was done.
- If there were no complications, posterior chamber intraocular lens was placed in the capsular bag.
- The viscoelastic ws cleared from the anterior chamber.
- Subconjuntival gentamycin and dexamathasone 0.5cc was given e at the end of the procedure.
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- Pad and bandage applied.
- Postoperatively all the patients received a course of topical antibiotic and steroid eye drops one hourly. Systemic antibiotic was given for 3 days. Collected data as analyzed by using SAS-16.50 version, Univariate analysis was used to draw the significant inference.

RESULTS

Figure 1: Age Distribution of the Patients

![Pie chart showing age distribution](chart1.png)

Figure 1 shows that 4 (3.3%) cases were belongs to the age group between 40-50 years, 14 (11.7%) patients age group between 51-60 years, 57 (47.50%) of age group 61.70 and 45 (37.50%) of age group 71-80. The average age of the patients was 66.13 years and about 102 (85%) of patients were found to be > 60 years older age. Study comprises 66 (55%) were males and 54 (45%) were females respectively. A 49 (40.8%) cases were appeared clinical bilateral involvement of Pseudoexfoliation syndrome and 71 (59.20%) had unilateral involvement. As per the results evident from the findings out of 120 patients, the range of IOP was 11.2 mm Hg to 26.1 mm Hg with an average IOP reading of 17.38 mm Hg.

<table>
<thead>
<tr>
<th>Papillary Diameter</th>
<th>Post-Dilatation</th>
<th>Post-Dilatation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6 mm</td>
<td>66(55.0%)</td>
<td>66(55.0%)</td>
</tr>
<tr>
<td>&gt;6 mm</td>
<td>54(45.0%)</td>
<td>54(45.0%)</td>
</tr>
</tbody>
</table>

66 (55%) of patients had insufficient mydrias, and 54 (45%) of the patients had sufficient mydriasis evident from the table 1

Table 2: PXF Material

<table>
<thead>
<tr>
<th>PXF</th>
<th>No. of Cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral zone</td>
<td>79</td>
<td>66.83</td>
</tr>
<tr>
<td>Peripheral + central zone</td>
<td>21</td>
<td>17.50</td>
</tr>
</tbody>
</table>

From the table 2, total 79 (65.83) of the cases were found to be PXF material deposited on the peripheral zone and 21 (17.50%) cases had PXF deposition on both peripheral zone and central zone and none of them had only central zone.
Table 3: Type of Cataract

<table>
<thead>
<tr>
<th>Types of Cataract</th>
<th>No. of cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypermature</td>
<td>3</td>
<td>2.50</td>
</tr>
<tr>
<td>Mature</td>
<td>27</td>
<td>22.50</td>
</tr>
<tr>
<td>Nuclear sclerosis</td>
<td>120</td>
<td>100.00</td>
</tr>
</tbody>
</table>

As shown in table 3, the present study 27 (22.50%) cases had mature cataract, only 3 (2.5%) cases were found to be hypermature cataract. None of the patients were not found to be isolated cortical cataract; difficulty during anterior capsulotomy was noted in 33 (27.5%) cases. However the difficulty in nucleus delivery was accounted in 45 (37.5%) cases. Corneal endothelial touch was noted in 64 (53.3%) cases. 3.33% (4 patients) had zonular dialysis (partial/complete 25 (20.4%) of the patients had Posterior Capsular Rent. In our study 25 (20.4%) of the patients had vitreous loss. 105 (95.8%) of the patients were implanted with intraocular lens after employment of various surgical modifications like Sphincterotomy, Synecholysis, Anterior Vitrectomy. 5 (4.2%) of the patients were left aphakic due to the above mentioned complications. The post operative vision of 6/18-6/6 was noted in 66 (55%) cases, visual acuity of 6/60-6/54 was noted in 39 (32.5%) cases and visual acuity of perception of light to 5/60 was noted in 15 (17.5%) cases.

DISCUSSIONS

This study includes 120 eyes of 120 patients with Pseudoexfoliation syndrome, who underwent preclinical evaluation and manual small incision cataract surgery and postoperative visual acuity is noted on follow-up at P.E.S hospital. As per the resulting findings 4 (3.3%) patients of age group 40-50 years, 14 (11.7%) patients of age group 51-60 years, 57 (47.5%) of age group 61-70 and 45 (37.5%) of age group 71-80. The average age of patients was 66.13 years and about 102 (85%) of patients were above 60 years of age. The prevalence of Pseudoexfoliation syndrome was increased and found to be statistically significant (p<0.01) with age of the patients. The pseudoexfoliation syndrome was usually occurs between 60 to 80 years, the average age of the incidence would be 70 years. Present study, 86.4% of the patients were belongs to the age group between 60-80 years. However the reason for this age related incidence would be not known. Many study documented the changes in gene expression that could be increases incidence in older age group population. In US population, the Framingham Eye Study 11 revealed the overall prevalence of Pseudoexfoliation syndrome to be 0.6% in 52-64 years old, rising to 5% in 75-85 years old which is similar to the present study. Although the pseudoexfoliation Syndrome might well be a condition that starts in midadulthood but become frankly manifest only in later years. Women have predominated in some series while other studies have found equal or greater prevalence in men where as in our study male patients had more prevalence of pseudoexfoliation when compared to females which can be explained by the fact that our study being conducted in a rural area where males are exposed to the sunlight (outdoor) more compared to females and exposure to sunlight is considered as a major risk factor for Pseudoexfoliation syndrome. However, studies regarding the sex distribution of Pseudoexfoliation syndrome are conflicting. 49 (40.8%) of patients had clinical bilateral involvement of Pseudoexfoliation syndrome and 71 (59.2%) had unilateral involvement. A review of literature comparing the frequency of monocular versus binocular involvement in various series is not conclusive. Many series have reported bilateral involvement to be more common with rations as high as 3:1 while other studies have reported unilateral involvement to predominate again with rations as high as 3:1. Our study is different from Menelik II Hospital 55 where PEX was bilateral in 62.2% of the cases. Our finding is also similar to the report of a hospital based study in Pakistan 56 in which PEX was bilateral in 76.9% of the cases and unilateral in 23.1% of the cases. This is expected as the disease process is invariably bilateral pathologically as shown by prince et al-57. This can be explained by the literature which shows the clinical
bilateral involvement is evidenced after 5-10 years of unilateral clinical presence. However only unilateral presence cannot be confirmed only with clinical finding since the histopathological are confirmative of the condition of whether it is unilateral or bilateral which is not done in our study and only clinical presence is take into consideration for classification of laterality. Hammer, Schlotzer-Schrehardt, Naumann in 2001 carried out an ultrastructural study of the contralateral eye in 5 pairs of donor eyes with unilateral Pseudoexfoliation syndrome. They showed “ultrastructural” alterations in anterior segment tissues of all the eyes. They concluded that basically Pseudoexfoliation syndrome is a bilateral disease with clinically marked asymmetric manifestations. The reasons for this market asymmetry remain unknown. Clinically unilateral involvement is often a precursor to bilateral involvement within 5-10 years after diagnosis. Hence further more studies along with histopathological studies are required for more insight into distribution of laterality curve. 110 (91.66%) of patients had Pseudoexfoliation material on the papillary margin, 25 (20.83%) on the iris surface 7 (5.83%) have Iris Atrophy, 3 (2.50%) have Iridodonesis and none had posterior synechiae in this study group. This is in concurrence with the study be Ritch Schlotzer. Scherhardt (2001) stated that deposits of Pseudoexfoliation material on the iris sphincter and papillary margin are seen in 84% patients. Thus next to the lens Pseudoexfoliation material, the most prominent and consistent clinical finding is the Pseudoexfoliation material at the papillary border of which pupil being the most common site of deposition of Pseudoexfoliative material followed by surface of iris which can be accounted for poor mydriasis in case of Pseudoexfoliation syndrome and involvement of angle with Pseudoexfoliative being late presentation. Although late its presents with significant morbidity which can be secondary to Pseudoexfoliative glaucoma due to deposition of Pseudoexfoliation material in the angle. Out of 120 patients in the present study group, the range of IOP was from 11.2 mm Hg with an average IOP of 120 eyes with Pseudoexfoliation syndrome was 17.38 mm Hg. In patients with Pseudoexfoliation syndrome, 20 (18.88%) had increased IOP at the time of diagnosis. Patients who had Pseudoexfoliation syndrome but not glaucoma should be considered vulnerable to glaucoma, because 15% of such patients develop increased IOP within 10 years. This underscores the need for careful follow up in patients who have Pseudoexfoliation syndrome. Pseudoexfoliation syndrome accounts for 15.20% of cases of open angle glaucoma. Patients having normal IOP were enrolled and patients with significant glaucomatous optic neuropathy were excluded as this would hinder on the visual outcome of the patient postoperatively. Wishart et al (1985) noted 32% of patients in their study to have narrow angles. Freyler H, Radax U (1990) noted papillary dilatation less than 4 mm in 19 to 32 patients with Pseudoexfoliation syndrome who underwent cataract surgery. Asano N, Schlotze-Scherhardt, Naumann (1996) attributed poor mydriasis in muscle tissues and apparent involvement of the muscle cells in Pseudoexfoliation material fiber formation. Repo L.P. et at (1996) found degenerative changes in both the stromal tissue and in the muscular layer of iris and regarded this as one of the causes for miosis. Alfaite et al (1996) noticed significant insufficient mydriasis (p value<0.001) in their study of 31 patients with Pseudoexfoliation syndrome. Reduction of stromal elasticity by accumulation of Pseudoexfoliation material may also play a role in poor mydriasis. Stanila A (1996) also noted an increased incidence of insufficient pupil dilatation in the 10 patients with Pseudoexfoliation syndrome undergoing cataract surgery in their study. Avramidis S, Trainanidis P, Sakkias G (1997) in their study of 84 patients with Pseudoexfoliation syndrome who underwent ECCE, noted that 61.90% of them had papillary dilatation less than 5 mm. Prince, A.M., Ritch R (1986) reported that anterior chamber melanin dispersion after mydriasis may be seen as a whorl like pattern of pigment particles on iris sphincter and peripheral iris. Ritch R, Schlotze-Scherhardt (2000) reported pigment dispersion in the anterior chamber after mydriasis to be common and profuse in Pseudoexfoliation syndrome. Pigment dispersion after mydriasis is one of the suspicious sign to meticulously look out for Pseudoexfoliation syndrome in preclinical stages. Takkanen (1962) found the central zone absent
in 18% of cases in his study while Ritch, Schlotezer-Scherhardt (2001) found it absent in 20-60% of their cases. 27 (22.50%) of the patients had Mature Cataract, 3 (2.50%) had hypermature cataract. All of them, i.e. 100% had Nuclear Cataracts. Cortical Cataract was present along with advanced nuclear cataract and none of the patients had isolated cortical cataract. Seland et al. 63 (1982) have reported a higher incidence of nuclear cataract in eyes with Pseudoexfoliation syndrome with fewer cortical cataracts. Hietanen J. et al have also reported nuclear cataract to be the predominant type of cataract in Pseudoexfoliation syndrome. Ritch R, Schlotezer-Scherhardt (2001) have also reported an increased incidence of nuclear cataract in Pseudoexfoliation syndrome. Futa R, Furnyoshi 64 (1989) reported an 8.4% incidence of phacodonesis, while Moreno J., Duch S., Harara J (1993) reported a 10.6% incidence of phacodonesis. This is because the iris in Pseudoexfoliation syndrome is more rigid due to vascular compromise and various other changes like deposition of Pseudoexfoliation material, Atrophy, Loss of iris stroma-Moth Eaten Appearance.

CONCLUSIONS

The following conclusions were drawn from the study. Patients with Pseudoexfoliation syndro9m and cataract posted for manual small incision cataract surgery, have to be carefully looked for zonular weakness, insufficient mydriasis, IOP, subluxation or dislocation of cataractous lens because these preoperative factors have bearing on the intraoperative complications. Inadequate mydriasis one of the major pre operative complications in eyes with Pseudoexfoliation syndrome which has a bearing on the intraoperative complications like posterior capsular rent and vitreous loss. Intraoperatively corneal endothelial touch and subsequent corneal edema was seen in majority of patients into his study. Adequate surgical modifications such as Sphincterotomy and/ or synechiolysis, pupil stretching in these eyes with inadequate mydriasis reduce the intra operative complications. Manual small incision cataract surgery is safe in eyes with Pseudoexfoliation syndrome.

REFERENCES

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