A CLINICAL STUDY OF PSEUDOEXFOILIATIVE GLAUCOMA IN EASTERN ODISHA

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ABSTRACT

BACKGROUND

Pseudoexfoliative material, the presence of which in the eye is termed as pseudoexfoliative syndrome (PXS), is a common cause of secondary open angle glaucoma world-wide.1 Pseudoexfoliation (PXF) should be differentiated from true capsular exfoliation, which occurs due to chronic Infrared exposure in glassblowers. We wanted to study the presentation, clinical features, management, and visual prognosis of pseudoexfoliation glaucoma cases in our department.

METHODS

This hospital based prospective study included 1253 patients with pseudoexfoliative material in one or more of the anterior segment structures with intraocular pressure (IOP)>21 mmHg and /or glaucomatous optic disc changes selected from the ophthalmology OPD of SCB Medical college from April 2016 to March 2018.

RESULTS

Incidence of pseudoexfoliation was found to be 1.3% among OPD patients who were >40 years of age and 8.9% of patients of pseudoexfoliation had glaucoma.

CONCLUSIONS

After medical and surgical management, most of the patients showed visual improvement with >6/60 in 70% of cases except those who had poor visual acuity at presentation because of advanced glaucomatous damage.

KEYWORDS

Optic Atrophy. Pseudoexfoliation, Pseudoexfoliative Glaucoma


BACKGROUND

Pseudoexfoliative material, the presence of which in the eye is termed as pseudoexfoliative syndrome (PXS), is a common cause of secondary open angle glaucoma world-wide. Pseudoexfoliation (PXF) should be differentiated from true capsular exfoliation, which occurs due to chronic Infrared exposure in glassblowers. Pseudoexfoliation is a grayish white fibrillary amyloid like material; it may derive from abnormal extracellular matrix metabolism in ocular and other tissue. The material deposited on various ocular structures like lens capsule, zonular fibers, iris, trabecular meshwork, and conjunctiva. Also, Pseudoexfoliative material has been found in the skin and visceral organs, leading to the concept of PXS as the ocular manifestation of systemic disorder. Open angle glaucoma associated with PXF (sometimes called capsular glaucoma) is conventionally due to elevated IOP, likely mechanism includes trabecular obstruction by PXF and liberated iris pigments with secondary degenerative out flow dysfunction. A less common mechanism of glaucoma in PXF includes acute or chronic angle closure glaucoma like zonular weakness causing anterior movement of lens, increased adhesiveness of iris to lens due to exfoliative material, sphincter muscle degeneration and uveitis. Pseudoexfoliative glaucoma prognosis is often worse than Primary Open Angle Glaucoma (POAG); the IOP is often higher and may exhibit marked fluctuation. Severe damage may present at diagnosis or can develop rapidly.2

Medical treatment is similar to POAG, but failure is more common. Laser trabeculoplasty is more effective in Pseudoexfoliative glaucoma (PXG) than that of POAG. Phacoemulsification alone may significantly lower the IOP, though it may give better result with combined trabeculectomy. Filtration surgery in PXG has similar success rate to POAG. Early recognition and appropriate management are essential for good outcomes.3 As Pseudoexfoliation glaucoma is especially challenging to control; patients may require aggressive treatment and frequent, close follow up. Keeping in mind, we studied Pseudoexfoliation glaucoma cases in our department and discussed their presentation, clinical feature, management, and visual prognosis.
METHODS
All the patients for the study of Pseudoexfoliative glaucoma were selected among those, presenting to the Department of Ophthalmology, SCB Medical College, in the time period of April 2016 - March 2018.

All patients of age >40 years presenting to the OPD and with Pseudoexfoliative glaucoma were included in the study. Patients with Pseudoexfoliative material in one or more of anterior segment structures along with IOP>21 mmHg and/or glaucomatous optic disc changes (vertical cup: disc ≥0.7: 1 or cup asymmetry ≥0.2: 1 between both eyes) were taken as Pseudoexfoliative glaucoma cases.

Exclusion Criteria
Patients who did not give consent for the study, who were lost to follow up within six months, with history of trauma, with previous history of ocular surgery, diabetes mellitus, history of corticosteroid use, uveitis or other causes of secondary glaucoma.

Patients selected for the study were evaluated clinically after taking written informed consent and a detailed relevant clinical history was taken under the following schedule.

Case Sheet
1. Case number.
2. Personal history of patient, name, age, sex, address, socioeconomic status, habitat, occupation,
3. Detailed history of present, past illness and associated disorder.
4. Family history.
5. Treatment history.
7. Local examination of eyes.
8. Slit lamp examination for further evaluation of ocular structure.
9. Retinoscopy.
10. Fundoscopy by direct, indirect ophthalmoscopy, 90 Diopter lens (90D) examination in slit lamp.
11. Visual acuity for distance vision (DV), near vision (NV), best corrected visual acuity (BCVA).

Special Investigations
1. Evaluation for dry eye.
2. CCT central corneal thickness.
3. Gonioscopy by Zeiss four mirror gonioscope.
4. OCT or optical coherence tomography.
5. Visual field testing using Humphrey perimeter.

Medical Management
Patients with IOP less than 30 mmHg at presentation were given monotherapy preferably with prostaglandin analogue ± beta blocker/carboxic anhydrase inhibitor /alpha agonist. Patients with IOP >30 mmHg at presentation or who did not show response to monotherapy after 3 weeks, were treated with additional drops or fixed drug combination. Those patients with IOP >40 mmHg at presentation were managed with oral acetazolamide tablets/oral glycerol/ I.V. mannitol along with topical drops. Patients who showed good response with IOP <21 mmHg continued with same, those with still elevated IOP at 6 weeks of follow up were planned for surgery.

Surgical Management
1. Trabeculectomy/cataract extraction with IOL implantation.
2. Laser peripheral iridotomy.

Follow up was done in all cases at 3 weeks, 6 weeks, 3 months, 6 months, with BCVA and IOP measurement and fundoscopy.

RESULTS
Total OPD attendance was 168945 out of which 96054 were above 40 yrs. of age. 1253 number of patients had Pseudoexfoliation syndrome. 203 patients had Pseudoexfoliative glaucoma. After taking exclusion criteria, 112 cases were considered for this study.

<table>
<thead>
<tr>
<th>Total OPD Cases of Age &gt;40 yrs.</th>
<th>No. of Patients with PXS (%)</th>
<th>No of Patients with PXG (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>96054</td>
<td>1253</td>
<td>1.3</td>
</tr>
<tr>
<td></td>
<td>112</td>
<td>8.9</td>
</tr>
</tbody>
</table>

**Table 1. Incidence of PXG**

<table>
<thead>
<tr>
<th>Age Group (in Years)</th>
<th>No. of Cases n=112</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>41–50</td>
<td>15</td>
<td>13.3</td>
</tr>
<tr>
<td>51–60</td>
<td>26</td>
<td>23.3</td>
</tr>
<tr>
<td>61–70</td>
<td>35</td>
<td>31.3</td>
</tr>
<tr>
<td>&gt;70</td>
<td>36</td>
<td>32.1</td>
</tr>
</tbody>
</table>

**Table 2. Age Distribution of PXG**

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>No. of Patients (n=112)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diminution of vision</td>
<td>112</td>
<td>100</td>
</tr>
<tr>
<td>Pain in eye</td>
<td>16</td>
<td>14.3</td>
</tr>
<tr>
<td>Redness</td>
<td>12</td>
<td>10.7</td>
</tr>
<tr>
<td>Headache</td>
<td>10</td>
<td>8.9</td>
</tr>
<tr>
<td>Lid swelling</td>
<td>4</td>
<td>3.6</td>
</tr>
<tr>
<td>Nausea, vomiting</td>
<td>2</td>
<td>1.8</td>
</tr>
</tbody>
</table>

**Table 3. Presenting Symptoms of PXG**

<table>
<thead>
<tr>
<th>BCVA</th>
<th>At Presentation No. of Eyes (n=140)</th>
<th>Post Treatment After 3 Months (n=140)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥6/60</td>
<td>64(45.7%)</td>
<td>98(90%)</td>
</tr>
<tr>
<td>&lt;6/60-2/60</td>
<td>46(32.9%)</td>
<td>22(15.7%)</td>
</tr>
<tr>
<td>Counting finger at 1 meter</td>
<td>15(10.7%)</td>
<td>7(5%)</td>
</tr>
<tr>
<td>Hand movement</td>
<td>7(5%)</td>
<td>5(3.6%)</td>
</tr>
<tr>
<td>PL/PR+</td>
<td>6(4.3%)</td>
<td>6(4.3%)</td>
</tr>
<tr>
<td>PL/PR-</td>
<td>2(1.4%)</td>
<td>2(1.4%)</td>
</tr>
</tbody>
</table>

**Table 4. Best Corrected Visual Acuity in PXG at Presentation and after 3 Months**

<table>
<thead>
<tr>
<th>Grades of Visual Field Defect</th>
<th>No. of Eyes (n=64)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>23</td>
<td>35.93</td>
</tr>
<tr>
<td>Mild</td>
<td>26</td>
<td>40.62</td>
</tr>
<tr>
<td>Moderate</td>
<td>15</td>
<td>23.43</td>
</tr>
<tr>
<td>Severe</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 6. Visual Field Changes at Presentation**
The incidence gradually increased with age. In all patients, the main symptom was defective vision either for near or distance. Visual acuity was ≥6/60 in 64 (45.7%) eyes, 5/60 to 2/60 in 46 (32.9%) eyes. Visual acuity was CF at meter in 15 (10.7%), HM in 7 (5%), PL in 6 (4.3%) eyes. IOP was between 22-25 mmHg in 46 (32.9%) eyes, 26-30 mmHg in 53 (37.9%), 31-35 mmHg in 24 (17.1%), 36-40 mmHg in 8 (5.7%), 41-45 mmHg in 6 (4.3%) and 46-50 in 3 (2.1%) eyes. Mean IOP was 28.73 ± 27.04 mmHg. Visual field examination could be done in 64 eyes with presenting visual acuity 6/60 or better. Visual field was normal in 23 eyes (35.93%). Rest of the patients had visual field defects. 40.62% had mild and 23.43% had moderate. Severe field defect was absent because all of them had visual acuity less than 6/60. In 78 eyes, mean RNFL thickness could be measured and in rest 62 eyes it was not possible due to hazy media.

**DISCUSSION**

The present study included presentation, clinical features, management and prognosis of Pseudoexfoliation glaucoma. The comparative study shows a wide range of variation in prevalence might be due to racial, genetic, and/or geographical differences worldwide. Prevalence of PXS was found to be 1.3%. Incidence was 8.9%. Most of the patients were above the age of 70 years. According to Irfan Shafiq et al., highest prevalence was in age group >70 years. Mean age of patients in present study was 62.5±18.84 years. The greater number of male cases might be due to our male dominated society and negligence towards female health care. In present study 84 (75%) patients had unilateral and 28 (25%) bilateral involvement. In 124 eyes (88.6%) angle was open and 16 (11.4%) eyes were occludable angle. If the pigmented trabecular meshwork was not visible in at least 180-270 degree of the angle circumference without indentation or manipulation, then the angle was called occludable. Also, patients with shallow anterior chamber (PACD<1/4 corneal thickness by Van Herick method) were taken into this category. The main symptoms in all patients were defective vision either for near or for distance. Rest of the symptoms like pain in eye associated with acute elevation of IOP. In present study most of the cases presented with diminution of vision only (100%) which suggests the silent nature of the disease which might be a cause for late presentation of PXG patients. Normal AC was present in 124 (88.6%) eyes and shallow AC in 11.4% eyes. Peripapillary iris atrophy was found in 40% eyes. Good Mydriasis found in 37.9% eyes, poor in 62.1%, might be due to atrophy and degeneration of the iris muscle cells. PXF material was deposited around pupil in 72.9 eyes on corneal endothelium 16.4% cases, over anterior capsule in 11.4% eyes. In 25.7% eyes PXF material deposits observed in angle of anterior chamber by gonioscopy. Ravi Thomas (2002) found exfoliative material present mainly on anterior lens capsule. In contrary to this Alan P Rotchford et al (2003) found PXF deposits mainly at papillary margin. In present study PXF deposits found mainly over lens capsule. So, it is ideal to dilate the pupil to avoid missing of cases with PXS. Mean central corneal thickness (CCT) in present study was 520.36 ± 27.04 µm. In Tomamaszewski BT et al 2014 study mean CCT in eyes with PXG was thinner (508.2 ± 32.6 µm) than eyes with PXS syndrome without glaucoma (529.7 µm ± 30.3 µm). Fundus view was not possible in 27 eyes having very hazy media duo to lenticular opacity and/or corneal oedema. C: D ratio was between 0.7:1 to 0.8:1 in 78 (69%) of eyes. Gonioscopy was not possible in 15 eyes due to corneal oedema. PAS was present in 1.45 eyes. Angle closure in PXG might result from the development of iridocapsular adhesion and subsequent pupillary block. Other possible mechanism includes anterior lens movement resulting from weak zonules. Visual field examination could be done in 64 eyes with VA 6/60 or better. Visual field was normal in 23 eyes (35.93%). Rest of the patients had visual...
field 40.62% mild, 23.43% moderate visual field defects. Severe field defect was absent because all of them had visual acuity <6/60. B. E. Stephan (1999), et al study shows 11.3% cases had normal visual field. Mean RNFL thickness was within normal limits in 47.4% eyes, borderline in 35.9% and outside normal limit in 16.7% cases. All PXG cases initially managed medically. Laser PI was done in 2 eyes (1.9%) with pupillary block and then managed with topical steroids for 2 weeks and then continued topical anti-glaucoma medication. Patients who showed good response with IOP ≤21 mmHg by topical drops continued the same and those with still elevated IOP at 6 weeks of follow up were planned for surgical management. Medical management showed good response in 103 eyes (73.6%) but poor response in 37 eyes (26.4%) at 6 weeks. Those cases are planned for trabeculectomy alone or combined trabeculectomy with cataract extraction and IOL implantation. Historically PXG cases are difficult to manage either medically or surgically, as most of the patients were with cataract, combined trabeculectomy and cataract surgery is the preferred procedure. According to W.E gillies (1973) and Goder J (1988) lens extraction plays an important role in reduction of IOP. Combined procedure is also the procedure of choice in patients with uncontrolled IOP. A prospective study by Konstas et al 1997.12 shows a higher success rate after trabeculectomy among exfoliative glaucoma eyes (mean untreated postoperative IOP of 11.8±4.4 mm Hg) compared with the response in those with primary open angle glaucoma (mean untreated postoperative IOP of 15.0±4.6 mm Hg) at 6 months follow up. Major surgical complication encountered, out of 106 eyes in this study was damage to sphincter pupillae in 23 eyes (21.7%) due to poor Mydriasis Posterior capsular rupture and zonular dialysis found in 12 cases (11.35%) and 11 eyes (10.4%) respectively Vitreous prolapse was there in 7 eyes (6.6%) and iridodialysis in 2 eyes (1.9%). The major complications during postoperative follow up included corneal haze in 38 (35.9%) eyes, subluxation of IOL 8 eyes (7.5%), uveitis in 5 (4.7%), shallow AC in 6 eyes (5.7%), hyphema in 4 (3.7%), Hypotony in 3 (2.8%), CME in 4 (3.7%) eyes. Similar complications were reported by Scorrill et al 1998 stated that postoperative complication in PXG cases were five times that without PKS.13 During follow up at 6 months most of the cases showed lowering of IOP below 21 mmHg with appropriate medical and surgical management, except 5 cases. Those patients with still elevated IOP at 6 months were planned for glaucoma valve surgery. Right medical and surgical management, most of the patients showed visual improvement with more than 6/60 in 70% cases (at presentation it was 45.7%). Most of the patients showed improvement except those who had poor visual acuity at presentation, because advances glaucomatous damage had already occurred in them.

CONCLUSIONS
Blindness is a major problem in India for which glaucoma is an important contributing factor. Damage caused by glaucoma is irreversible, but it can be prevented. So, early diagnosis and proper timely intervention are the key factors to halt the disease progression. As PXG has mostly incipient course, by meticulous examination by slit lamp before and after pupillary dilation, large number of cases can be diagnosed early. PXG shows rapid progression and poor response to treatment. Appropriate medical and surgical treatment can control disease progression.

Abbreviations
AC- Anterior Chamber
CCT- Central Corneal Thickness
CME- Cystoid Macular Oedema
HM- Hand Movement
OCT- Ocular Coherence Tomography
PGA- Prostaglandin Analogue
PI- Peripheral Iridotomy

REFERENCES