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COMBINED MANUAL SICS – TRABECULECTOMY IN PSEUDOEXFOLIATION SYNDROME : IOP CONTROL AND PROGNOSIS

Ophthalmology

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ABSTRACT

Introduction : Pseudoexfoliation syndrome is an age related systemic microfibrillopathy characterized by the deposition of amyloid/hyaloid like material on various body parts like heart , lung , liver , kidneys , cerebral meninges and ocular tissues . In eye , this pseudoexfoliation material is one of the major predisposing factors for the development of secondary open angle glaucoma .

Material and Methods : 100 patients , all above 50 years of age and with cataract and pseudoexfoliation glaucoma underwent combined cataract and glaucoma surgery using Manual SICS-Trabeculectomy procedure by a single surgeon . Post-operatively , the results were studied on the basis of visual rehabilitation and Intraocular pressure control .

Results : 70.83% male and 78.57% female patients achieved a post-operative best corrected visual acuity of 6/6-6/9 and significantly well controlled Intraocular pressure at 6 months follow up .

Conclusion : Combined SICS-Trabeculectomy in pseudoexfoliation patients is a cost effective procedure and also lessens the burden of two separate cataract and glaucoma surgeries .

KEYWORDS

Pseudoexfoliation syndrome (PES) , Pseudoexfoliation glaucoma (PEG) , Small Incision cataract surgery (SICS) , Intraocular Pressure (IOP) .

INTRODUCTION :

The term Exfoliation syndrome was first coined by Lindererg in year 1917, who observed the presence of bluish-grey material on the pupillary margin in 50% of Chronic glaucoma patients. Vogt in 1926 named the condition as capsular glaucoma, believing that the white flaky material originates from peeling of the anterior capsule of the lens. Finally, In 1954 an ocular pathologist Georgiane Dvirok-Theobold used the name Pseudoexfoliation syndrome for this disease, due to observation of deposits of pseudoexfoliation material on the ciliary body, Zonules and lens capsule .

Pseudoexfoliation is diagnosed by the deposition of white, "dandruff-like", fluffy material, virtually in all the structures of the human eye, but more importantly in the anterior segment: corneal endothelium, iris, papillary margin, anterior capsule, lens zonules and trabecular meshwork. The material is composed of amyloid, laminin, elastic fibers, collagen, and basement membrane (1 ,2) . The same material as seen in the ocular tissues , has been found in other parts of the body such as heart, lung, liver, kidney, cerebral meninges, and blood vessels (3), indicating that PXF is a multiorgan disease.

The pathogenesis of PXF is multifactorial, where geographical and environmental factors, together with genetic predisposition, explain the different incidence of this syndrome across the world. A documented association with mutations in the lysyl oxidase-like 1 gene (LOXL1) at the locus 15q22 (4), which codes for elastic fiber components of extracellular matrix, suggests a genetic factor for the inheritance of this disease. For this reason, it has been suggested that PXF is a form of elastosis resulting from the overproduction of elastic microfibrillar components such as fibrillin-1 (5). The systemic origin of the disease explains why patients with unilateral involvement manifest PXF signs in the normal fellow eye at a later time, indicating that PXF is a generalized, bilateral disorder with a markedly asymmetric clinical presentation at onset. Patients with unilateral signs of the disease are usually younger than those with bilateral involvement.

The exact etiological relationship between cataract and pseudo exfoliation is not clear. Ocular ischemia has been suggested as the most common underlying factor for One may therefore The exact etiological relationship between cataract and pseudoexfoliation is not clear . Ocular ischemia has been suggested as the most common underlying factor for the occurrence of cataract and pseudoexfoliation in the same eye (6). One more finding that can explain the relationship between pseudoexfoliation and cataract is that ascorbic acid (vitamin c) is significantly reduced in the aqueous of cataract patients in pseudoexfoliation (7). One may therefore consider the possible association between the two .

Raised intraocular pressure is frequently expected in patients with PXS and the prevalence of glaucoma has been reported as high as 26% to 49% at the time of cataract surgery (8,9). PXF is the most frequent cause of secondary glaucoma as the results of an increased outflow resistance due to the chronic deposition of pigmented material freed from iris , in addition to exfoliative material throughout the trabecular meshwork, Schlemm canal and collector channels (10). The estimated incidence of glaucoma in PXF patients is three to four times greater than patients without PXF (11,12). Owing to the high level of the intraocular pressure exhibited in these patients, the risk of glaucoma development and progression is elevated (13). Kim et al (14) found that PXF patients present a thinner and possibly weaker lamina cribrosa, suggesting a particular susceptibility of these patients to the development of optic nerve cupping .

MATERIAL AND METHODS :

The present study was conducted in the Department of Ophthalmology, Sher-i- Kashmir institute of Medical Sciences Medical College , Srinagar . 100 patients with pseudoexfoliation , having cataract and on Glaucoma medication were included in the study. All the patients were explained the need for combined cataract and Glaucoma surgery (Manual SICS –Trabeculectomy) including cost effectiveness and the burden of otherwise two separate cataract and Glaucoma surgeries. The patients were also explained the increased risk of intraoperative and postoperative complications in pseudoexfoliation syndrome .

After taking relevant medical and ocular history , all the patients were examined using slit lamp biomicroscopy for pseudoexfoliation material on cornea , iris and lens surface . The type of cataract and the stability of lens zonules was also noted after dilating the pupil .The Intraocular pressure (IOP) was measured using Goldmann Applanation tonometer and patients with IOP greater than 30 mm Hg were administered intravenous Mannitol 1ml/Kg body weight one hour before surgery .

Table : 1 . Age Distribution

Age (Years)	Male	Female
51 – 60	8 (11.11%)	2 (7.14%)
61 – 70	24 (33.33%)	9 (32.14%)
71 -80	29 (40.27%)	12 (42.85%)
Above 80	11 (15.27%)	5 (17.85%)

Table : 2 . Pre-operative visual acuity

Visual Acuity	Male	Female
5/60 – HM	51 (70.83%)	15 (53.57%)
6/36 – 6/60	14 (19.44%)	9 (32.14%)
6/18 – 6/24	7 (9.72%)	4 (14.28%)
< 6/18	-	-

Table : 3 . Pre-operative IOP

IOP (mm Hg)	Male	Female
17-20	18 (25%)	6 (21.42%)
21- 25	36 (50%)	15 (53.57%)
26-30	10 (13.88%)	5 (17.85%)
>30	8 (11.11%)	2 (7.14%)

Table : 4 . Type of Cataract

Cataract	Male	Female
Nuclear Cataract	49 (68.05%)	17 (67.85%)
Posterior subcapsular cataract	3 (4.16%)	1 (3.57%)
Mixed Cataract	7 (9.72%)	2 (7.14%)
Total Cataract	13 (18.05%)	6 (21.42%)

Table : 5 . Type/Pattern of Pseudoexfoliation

Pseudoexfoliation	Male	Female
Pupillary margin only	2	9
Lens surface only	3	2
Both Pup margin & Lens surface	42	15
Above three & Corneal endothelium	7	2

Surgical Procedure :

After taking a written consent , all the patients underwent Manual small incision cataract surgery (SICS) using a triangular sclera incision 5mm x 5mm .

15 patients with zonular dialysis less than 180 degree were implanted a capsular tension ring after capsullorexis procedure to stabilize the lens capsule .

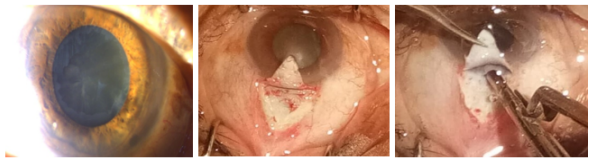
8 patients with zonular dialysis greater than 180 degree were considered as having an instable capsular bag . These patients were not implanted an intraocular lens (IOL) and were advised for a secondary IOL implantation at a later stage .

2 patients developed a posterior capsular rupture during the cortical wash . These 2 patients were also not implanted an IOL and were advised a secondary IOL implantation at a later stage.

After cataract surgery with/without IOL implantation , trabeculectomy was done using a Kelly's Trab punch . Scleral incision was closed using a single 10-0 nylon suture at the apex of triangular sclera flap . Conjunctiva was sutured with a single 10-0 nylon suture .

Post-operatively all the patients were administered Steroid-antibiotic eye drops for 6 to 8 weeks and cycloplegic-mydriatic eye drops for 3 weeks .

All the surgeries were performed by a single surgeon to avoid any surgical bias .



(Fig : 1) G III Cataract with PXF material
(Fig : 2). 5.0 mm Triangular Scleral flap
(Fig : 3) Inner sclera flap being on Lens surface being cut with Kell's Trab punch

RESULTS :

Table : 6 . Intra-operative findings (Lens Zonular integrity)

Lens zonules	Male	Female
Intact zonules	56 (77.77%)	21 (75.0%)
Zonular dialysis < 180 deg	11 (15.27%)	4 (14.28%)
Zonular dialysis > 180 deg	5 (6.94%)	3 (10.71%)

Table : 7 . Surgical Procedure Performed

Surgery	Male	Female
SICS+Trabeculectomy+PcIOL	54 (75.0%)	21 (75.0%)
SICS+Trabeculectomy+CTR+PcIOL	11 (15.27%)	4 (14.28%)
SICS+Trabeculectomy	7 (9.72%)	3 (10.71%)

All the patients were followed up at regular interval postoperatively on day 1, day 7, day 21, 6 weeks, 8 weeks, 3 months and 6 months .

Post-operatively 37 patients (25 male and 12 female) developed moderate to severe anterior chamber uveitic reaction in the immediate postoperative period . Among them 16 patients (10 male and 6 female) responded to vigorous topical steroid therapy and 18 patients (12 male and 6 female) needed systemic steroid therapy. 3 patients, all male, developed a thick fibrinous membrane in the pupillary area with dense posterior synechiae. These patients did not respond to topical or systemic steroids , hence needed a YAG Laser membranectomy after 3 weeks .

Table : 8 . Post-Operative Best corrected visual acuity (BCVA)

Visual Acuity	Male	Female
6/6 – 6/12	51 (70.83%)	22 (78.57%)
6/18 – 6/24	10 (13.88%)	3 (10.71%)
6/36 – 6/60	4 (5.55%)	1 (3.57%)
5/60 – 3/60	4 (5.55%)	2 (7.14%)
< 3/60	3 (4.16%)	-

Table : 9 . Post-operative IOP (At 8 weeks)

IOP (mm Hg)	Male	Female
10 – 14	42 (58.33%)	18 (64.28%)
15 – 18	25 (34.72%)	7 (25.0%)
19 – 21	3 (4.16%)	3 (10.71%)
22 – 25	2 (2.77%)	-
Above 25	-	-

Table : 10 . Post-operative IOP (At 6 months)

IOP (mmHg)	Male	Female
10 – 14	41 (56.94%)	18 (64.28%)
15 – 18	23 (31.94%)	7 (25.0%)
19 – 21	4 (5.55%)	1 (1.38%)
22 – 25	2 (2.77%)	2 (2.77%)
Above 25	2 (2.77%)	-

DISCUSSION :

It is well known that an abnormal blood–aqueous barrier is part of PES (15). Previously, the frequency of postoperative inflammatory response in terms of fibrinoid reaction, cellular deposits on the IOL and posterior synechiae was significantly increased in eyes with PES (16) . However due to improvements made in surgical techniques and the equipment in recent years has considerably reduced the post-operative inflammatory reaction in these patients .

Glaucoma frequently occurs in eyes with pseudoexfoliation syndrome. Compared with primary open-angle glaucoma, optic disc damage is more pronounced in these eyes at the time of diagnosis (17) . Eyes with PEG respond poorly to medical therapy . Topical drugs, such as latanoprost, travoprost, and dorzolamide-timolol combination, yield a good response in the first period of medical treatment, but PES is usually recalcitrant to glaucomatous medical therapy and this is the reason why patients affected by PES/PEG usually need laser or surgical therapy (17). In our study, 60.61% of patients achieved IOP between 10 – 14 mm Hg at 6 months follow up. Shingleton BJ et al (18) assessed the short and long term effects of combined cataract and glaucoma surgery in pseudoexfoliation syndrome and concluded a significant long term reduction in IOP in such patients. Usha BR (19) studied the outcome of combined cataract and trabeculectomy surgery and found a mean post-operative IOP of 13.7+- 3.31 mm Hg after 6 months follow up . However this study combined different methods of cataract surgery and also most of the patients were not having PES .

It has been observed that patients with PES present a higher percentage of nuclear cataract. Recent studies have also demonstrated a higher rate of subcapsular cataract in PES with respect to non-PES eyes (20). Prachee H et al (21) in a study of pseudoexfoliation eyes with cataract found 62.17% having nuclear cataract and 32.05% having mixed cataract. In our study, 68.05% of males and 67.85% females patients with pseudoexfoliation were having a nuclear cataract .Despite the widely reported higher incidence of cataract, its pathogenesis is still not clear. Cataract development seems to be related to the age of patients, although, in patients with unilateral PES, cataract appears to be more advanced on the affected rather than the unaffected eye (19) .

CONCLUSION :

PES increases the risk of development of both cataract and glaucoma . However the Pseudoexfoliation glaucoma is usually resistant to medical therapy. Thus a combined approach towards cataract and glaucoma management by combined SICS-Trabeculectomy is a viable option for early rehabilitation and at the same time a cost effective

surgery particularly in developing countries including India where the load of patients with both cataract and glaucoma is very high and at the same time facilities for medical insurance being almost negligible .

The Present study is unique in that a large series of 100 patients with pseudoexfoliation syndrome were operated upon by Manual SICS-Trabeculectomy method. In comparison majority of the studies in pseudoexfoliation syndrome patients conducted so far were done using Phacoemusification – Trabeculectomy procedure .

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