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Contents

Original Articles

A Study of Levels of Plasma Vitamin B12, Folate, and Homocysteine In Cataract Patients **5**
Anand Reddi, Meena Lakshman

A Clinical Study of Visual Outcome and IOP in Lens Induced Glaucoma Attending a Tertiary Eye Centre **9**
Y.M. Gagan, C.H. Haasitha, Taklikar Anupama R.

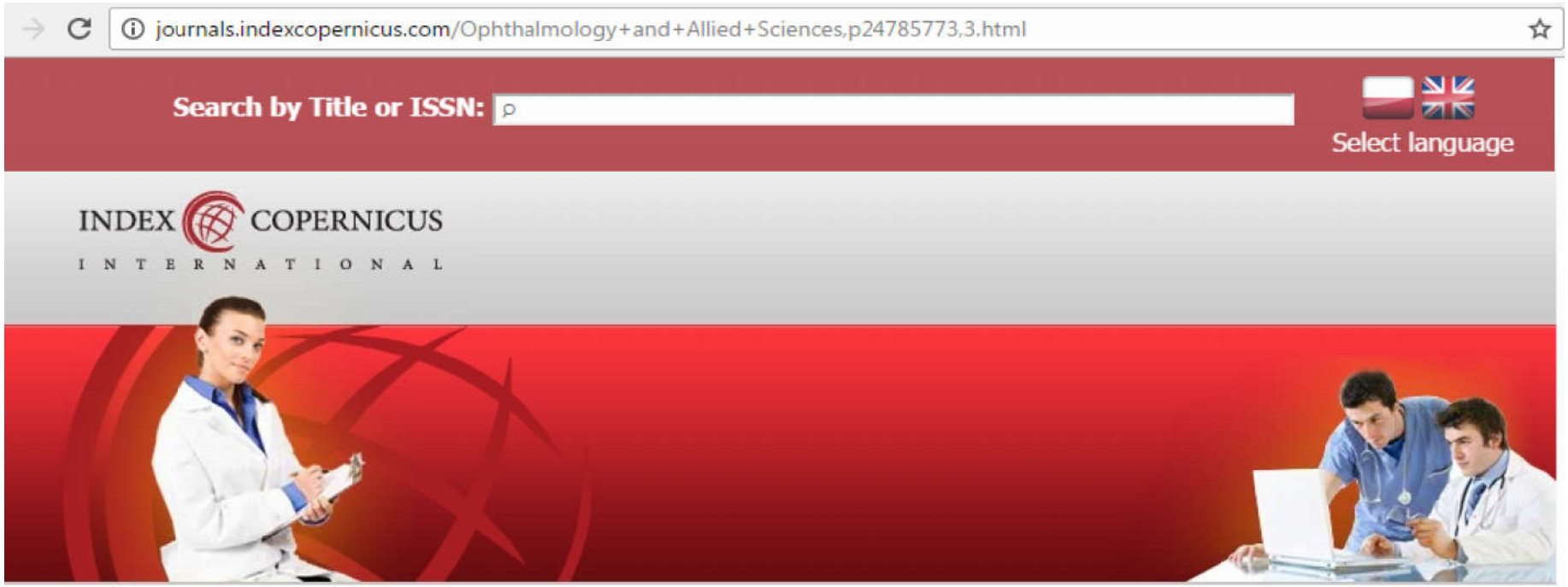
Evaluation of Pseudo Exfoliation Syndrome and its Associated Intra Operative and Post Operative Complications in Cataract Surgery **15**
Meena Lakshman, Anand Reddi

Ocular Findings in Encephalitis Patients: A Clinical Study **21**
Ramyash Singh Yadav, Aprajita Chaudhary,Deepti Yadav, Komal Prasad Kushwaha, Sunil Gupta

Visual Outcome in Posterior Polar Cataract after Small Incision Cataract Surgery at Navodaya Medical College, Raichur **31**
Shruti Hunakunti, Anupama Taklikar, Pradeep Reddy, Shreya Hunakunti

Prevalence of Glaucoma Capsulare and Cataract in Patients with Ocular Pseudo Exfoliative Syndrome **37**
Sujani Narendar Bairy, Pravenya Praveen Kemidi

Guidelines for Authors **45**



Home ⇒ Journal passport ⇒

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A Study of Levels of Plasma Vitamin B12, Folate, and Homocysteine In Cataract Patients

Anand Reddi*, Meena Lakshman**

*Assistant Professor, Department of Ophthalmology, Kerala Medical College and Hospital, Mangode, Palakkad Dt, Kerala -679503. **Assistant Professor, Department of Ophthalmology, KMCT Medical College and Hospital, Kozhikode, Kerala -673602.

Abstract

Background: Elevated plasma Homocysteine level is an independent risk factor for age related (senile) cataract. Certain nutritional deficiencies, in particular Folate, Vitamin B12 , Vitamin B6 relate inversely with Homocysteine level. *Aim:* This study was undertaken to evaluate the plasma level of Vitamin B12 , Folate, and Homocysteine of cataract patients and to study the interplay between them. *Methods*: This study included 50 cataract patients and 30 age matched control subjects. Samples were collected from cataract patients admitted in Ophthalmology ward prior to cataract surgery. Assays were carried out by using well-established methods for Homocysteine, Folate, Vitamin B12 by Chemiluminescence. *Results*: Serum Homocysteine level is significantly increased in cataract patients when compared with control ($p< 0.001$). There was a significant decrease in the level of Folate as compared with control ($p<0.001$). There was a negative correlation between Homocysteine vs. Vitamin B12 ($p<0.01$) and Folate ($p<0.01$) in the Cataract patients. *Conlcusion*: An increased plasma Homocysteine level is associated with decreased plasma levels of Folate and Vitamin B12 in Cataract patients, which might have a possible role in the root cause of cataract pathogenesis.

Keywords: Homocysteine; Senile Cataract; Vitamin B12; Folate.

Introduction

Cataract may be defined as any light scatter opacity in the lens, not necessarily with any demonstrable effect on vision. Cataract that is significant enough to impair vision is the leading cause of blindness worldwide [1]. Senile cataract, which is most common in south India, describes any cataract that occurs after the age of 45 and has no evident cause. Age related cataract is a multifactorial disease in which genetic, environmental, socio-economic and biochemical factors may act synergistically. A number of indicators of poor nutrition have been found to be associated with increased risk of cataract inIndia [2,3]. Elevated Homocysteine levels are seen in various eye diseases such as exfoliation syndrome, glaucoma, and cataract [4,5]. It has been proposed that Homocysteine being a putative oxidant is involved in the pathogenesis of endothelial cell injury and atherosclerotic vascular disease [6,7,8]. Vitamin B12 (Vit B12) and Folate are involved in the metabolism of Homocysteine in methylating it to Methionine. Vit B12 and Folate has strong protective effect against formation of Cataractogenesis [9, 10]. So, present study was under taken to assess the Homocysteine levels in age related cataract in relation to the levels of Vit B12 and Folate.

Methods

This study included 50 cataract patients and 30 age matched control subjects. Samples were collected

Reprint Request: Anand Reddi, Assistant Professor, Department of Ophthalmology, Kerala Medical College and Hospital, Mangode, Palakkad Dt, Kerala -679503.

E-mail: thesisusm@gmail.com

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from cataract patients admitted in Ophthalmology ward at , Kerala Medical College and Hospital, prior to cataract surgery. Cataract patients were selected based on the vision less than 6/18 and visible opacity in the lens. All these patients were above 50 years of age. They were normotensive and non-diabetic as their blood pressure was normal and random blood glucose was below 140mg%. Similarly controls were non-diabetic and normotensive . Both patients and control subjects were not on vitamin, mineral, any drug or such supplementation. Random blood samples were collected and non-hemolysed plasma was used for all biochemical parameters. . Assays were carried out by using well-established and sensitive methods for Homocysteine, Folate, Vitamin B12 by Chemiluminescence (Immulite analyzer) using reagent kits obtained from DPC [11]. Protein estimation was done by Biuret method [12], Albuminby BCG method [13] and Random blood glucose by GOD/POD method [14] in the Dadebehring Autoanalyser. The reagent kits for total protein and albumin were obtained from Biosystems S.A.(Costa Brava 30, Barcelona, Spain) and that for blood glucose estimation was obtained from Reckon Diagnostics P.Ltd (Gorwa,Baroda-390 016, India).

Statistical analysis was done by using student's 't' test for comparison between the groups and correlation was done by Pearson correlation in Microsoft excel and P values < 0.05 were considered as statistically significant.

Results

Our present study aimed at finding the levels of Homocysteine, Folate, and Vitamin B12 in senile cataract patients. We selected 40 cataract patients and 20 controls. Table 1 shows comparisons of Homocysteine, Vit B12 and Folate levels in cataract patients with control subjects. Statistically significant increase in the level of Homocysteine ($p<0.001$) was found in cataract patients as compared to control subjects. Also there was a significantly decrease in the level of Folate ($p<0.001$) and random blood glucose ($p<0.05$) in cataract subjects as compared with controls. Table 2 showed the pair wise correlation analysis in cataract patients showed following results. Hcy was negatively correlated with Vit B12 (r = - 0.68) and Folate (r = - 0.47).

Table 1: Plasma levels of Homocysteine, Vitamin B12, Folate, Total Protein, Albumin and Random Blood Glucose in control subjects and Cataract patients

Parameters	Control (n = 30)	Case (n = 50)
Age	57.9 ± 6.82	59.85± 10.52
Homocysteine (µmol/L)	5.44 ± 3.20	28.06 ± 8.92**
Vitamin B12 (pg/ml)	279.85 ± 91.00	201.8 ± 178.60
Folate (ng/ml)	7.06 ± 2.33	2.42 ± 1.73**
Total Protein (gm/dl)	7.65 ± 0.47	7.69± 0.58
Albumin (gm/dl)	4.21 ± 0.39	4.24± 0.34
Random blood glucose (mg/dl)	97.3 ± 5.77	93.00± 15.8*

Values are expressed as mean ± SD; **P value < 0.001; *P value < 0.05

Table 2: Pairwise correlation analysis in cataract patients

Pairwise correlation of parameters	R value
Homocysteine and Vit B12	-0.66**
Homocysteine and Folate	-0.45*

**P value < 0.001; *P value < 0.001

Discussion

Homocysteine is derived from the dietary methionine. In normal person Homocysteine is metabolized to Methionine with the help of Folate and Vit B12. It may also be converted to cystathionine by cystathionine -b-synthase. Normal level of Homocysteine is 5-12 µmol/L. Under certain circumstances Homocysteine level is increased in blood. Those are 1) Vit B12, Folate deficiency and heterozygous or homozygous trait for Methyl-tetrahydrofolate reductase 2) Heterozygous or homozygous trait for cystathionine -β-synthase activity 3) Renovascular stenosis and volume retention. In our study we found an increased level of Homocysteine, which correlate with age [15], Folate and Vit B12 deficiency [16]. It is well known that hyper homocysteinemia produces oxidative stress by generating reactive oxygen species spontaneously [17]. Sulfhydryl group of Homocysteine is believed to act catalytically with ferric and cupric ions in a

mixed function oxidation system to generate hydrogen peroxide, oxygen radicals [18,19]. Superoxide anion, hydrogen peroxide, and hydroxyl radical are produced during auto-oxidation of Homocysteine [20,21]. These could promote lipid peroxidation and damage vascular endothelium. Hyperhomocysteinemia is an independent graded risk factor for atherosclerotic disease in coronary, cerebral and peripheral blood vessels [8].

Contemporary hypothesis considers the oxidative stress as a crucial event in age related processes as well as in the age related cataract. Sulfhydryl group of lens protein (Crystallins) is the target of enhanced oxidative stress seen in senile Cataract [22]. Recently, it has been shown that post translational modification of lens proteins play crucial role in the formation of age related cataract and also found that oxidized amino acids accumulate in cataractous lenses which are probably due to altered redox balance, thus contribute to lens opaciation [23].

In our study, we found there was a significant decrease in Folate level in cataract patients as compared with controls.Vit B12 was also decreased but not statistically significant. This is in accordance with previous study, which reveals low Folate as the strong determinant of Hyperhomocysteinemia in older age [16]. In the present study, Homocysteine level correlates negatively with Vit B12 and Folate levels which is in agreement with previous studies proving low Folate, Vit B12, Vit B6 and older age were all independently associated with elevated Homocysteine [16]. Vit B12, Folate supplements has strong protective influence on reducing the prevalence of Cataractogenesis [9].

Accumulating evidences suggest that, prolonged hyperglycemia seen in type 2 diabetes mellitus enhances the glycation of proteins and may be the root cause of cataract formation [24,25]. But in our study, random blood glucose levels of patients were within the reference range and even it showed statistically significant decrease than control group. This suggests that elevated Homocysteine level even in the absence of hyper glycemia or any other virtual metabolic and nutritional disorder as evident by total protein and albumin levels, may play a possible role in the cataract formation. Hyperhomocy steinemia with low Vit B12 and Folate levels in older age group can be independent risk factor for Senile Cataract, which might be mediated through oxidative stress. Further studies are needed to unravel the role of oxidative stress arising from elevated Homocysteine level in older age groups in senile cataract formation.

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Original Article

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A Clinical Study of Visual Outcome and IOP in Lens Induced Glaucoma Attending a Tertiary Eye Centre

Y.M. Gagan*, C.H. Haasitha, Taklikar Anupama R.*****

*Assistant Professor, **Postgraduate, ***Professor and HOD, Department of Ophthalmology, Navodaya medical college, Raichur, Karnataka, India.

Abstract

Objectives: To know the post-operative visual outcome and intraocular pressure (IOP) in lens induced glaucoma (LIG) cases. *Methods and Material:* 50 cases of lens induced glaucoma are studied in 1year. All patients diagnosed as LIG were included. At presentation visual acuity, IOP were recorded, which were repeated postoperatively at 2 and 7weeks interval. *Results:* The most frequent type of LIG was Phacomorphic glaucoma (86%). The best corrected visual acuity (BCVA) of 6/18 or more was found in 54% cases. Visual acuity of less than 6/60 was seen in 26% of cases. Good visual acuity of 6/12 or better was achieved in 72% ($p<0.01$) of cases with symptoms less than 2 weeks and in 59.10% of cases with IOP less than 35 mmHg at presentation. The mean IOP in cases with duration of symptoms of 2 to 4 weeks was 40.33 ± 9.36 mmHg. *Conclusions:* Good visual outcome was seen in patients with early diagnosis, early presentation within 2 weeks and with IOP less than 35mmHg at presentation.

Keywords: Lens-Induced Glaucoma; Cataract; IOP; Cataract Surgery.

Introduction

Lens induced glaucomas are a common occurrence in India.

Glaucoma's in which the lens plays a role, either by size or by position or by causing inflammation have been classified as lens induced glaucomas. In the past, significant confusion existed about the terminology and mechanisms causing the glaucoma. Terms such as phacotoxic reaction, phacogenetic glaucoma, phacotopic glaucoma, lens-induced uveitis and endophthalmitis phacoanaphylactica were used [1].

With a cataract backlog of around 12 million and annually increasing at an estimated rate of 3.8 million [2], it is not surprising that the occurrence of lens induced glaucomas is not an infrequent event in India [3].

It has long been recognized clinically that several forms of glaucoma may occur in association with the formation of cataracts, which are an important cause of secondary glaucoma in the developing world [4].

In the developing world, like India, financial, cultural and psychosocial barriers for accessing excellent surgical services still exist. There is an ever-increasing backlog of cataract due to the population explosion, increased life expectancy and low productivity in terms of utilization of the available surgical services. The uptake of eye care services by the rural community has also been sub optimal in countries like India, where lens induced glaucoma's is a common cause of ocular morbidity [4].

Reprint Request: Gagan Y.M., Assistant Professor, Department of Ophthalmology, Navodaya Medical College, Raichur, 584103, Karnataka.
E-mail: ymgagan@gmail.com

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These lens-induced glaucoma's are a common occurrence in India, hardly surprising in a situation where the incident of cataract cases far exceeds the total number of surgeries performed currently [5].

Though not all inclusive, these lens induced glaucomas are either secondary angle closure glaucomas (phacomorphic glaucomas) or secondary open angle glaucomas (phacolytic glaucomas). Irrespective of these models of presentation, the treatment has been oriented towards a single focus, namely, removal of the cataractous lens [6].

Whatever be the mode of surgical intervention, the prognosis for good postoperative visual recovery in these conditions remains guarded.

The present study has endeavored to determine the postoperative visual outcome and IOP in lens induced glaucoma's.

Materials and Methods

Methodology

This study included 50 cases of different types of LIG, admitted in the ophthalmic wards of the tertiary hospital during the period of one year.

Inclusion Criteria

- All patients diagnosed for lens induced glaucoma.
- Patients who signed written and informed consent.

Exclusion Criteria

- Primary glaucoma.
- Secondary glaucoma other than lens induced glaucoma.
- Patients unfit for surgery due to very poor general condition.

All patients diagnosed as LIG on the basis of clinical symptoms and signs were included. Clinical features included pain, loss of vision, redness of the eye, headache, presence of an intumescent, mature or hyper mature cataract associated with raised IOP of more than 21 mmHg.

A detailed clinical examination of both eyes included the status of the lens, depth of the anterior chamber by slit lamp biomicroscopy and IOP recording by Perkins applanation tonometry. Written and informed consent was taken from patients. At presentation visual acuity, IOP were recorded, which were again repeated after medical treatment and post operatively. None of the cases had fundal glow at presentation.

Phacomorphic glaucoma was diagnosed, when patients presented with red eye, acute pain and reduction of vision of certain duration. On clinical examination the eye showed circumcorneal congestion, corneal oedema, shallow anterior chamber, dilated and fixed or sluggish pupil, intumescent cataract and IOP more than 21 mmHg.

Phacolytic glaucoma was diagnosed, when patients presented with acute pain in the eye with long standing poor vision. On examination the eye showed marked diminution of vision, corneal oedema, normal or deep anterior chamber containing floating lens particles and or pseudohypopyon in severe cases and hypermature morgagnian cataractous lens in some cases. Dense flare was seen with extensive keratic precipitates.

The management of these 50 cases consisted, with the aim of preserving useful vision, relief from pain and reduction of the elevated ocular tension to almost normal levels, achieved by both medical and surgical methods. Relief from pain was by bringing down the IOP and by systemic administration of analgesics. Anti-emetics were given in cases of severe vomiting.

In all cases, preoperative medication to reduce IOP included either topical timolol 0.5% twice a day, oral acetazolamide 500mg thrice a day or intravenous mannitol 20% alone or in combination, and also intravenous mannitol 20% was used before the surgery in refractory cases. Topical mydriatics, phenylephrine 10% and cycloplegics were used just before surgery, for good capsulotomy.

In all patients cataract extraction with IOL implantation was offered under guarded prognosis. After controlling IOP, patients were taken for surgery. In all the patients, after peribulbar block, digital pressure was applied except in lens displacement cases, for nearly 8-10 minutes to achieve good hypotony. Planned manual small incision cataract surgery with intra ocular lens implantation was done in all but except in one case. In one case, after lens extraction IOL was not implanted, since the patient had posterior capsule tear. Peripheral iridectomy was added in one case with long standing refractory glaucoma. Thorough anterior chamber wash with balanced salt solution was given. At the end of procedure, subconjunctival injection of steroid and antibiotic was given.

Post operatively, all the patients received topical antibiotic-steroid combination, 1 drop hourly a day

tapering was given upto 40 days and mydriatic-cycloplegic, twice a day if required. If the tension appeared to be on higher side, topical timolol 0.5% twice daily for 7 days were instilled and in severe cases, oral acetazolamide was given. All the patients were followed up regularly at 2nd and 6th week interval. At every visit, patients were evaluated for visual acuity with Snellen's chart, IOP by Perkins applanation tonometer, slit lamp examination of anterior segment and posterior segment examination with direct ophthalmoscope and 90D lens. The results were tabulated on Microsoft excel spreadsheet and data was statistically analyzed using Paired 't' test, Chi square test and pooled chi square test wherever applicable and a P value less than 0.05 was considered significant.

Results

Phacomorphic glaucoma was the most common LIG with 43 cases (86%), followed by phacolytic glaucoma with 07 cases (14%).

In this study, it was observed that none of the cases presented with visual acuity of better than hand movement

Table 1: Distribution of cases according to LIG subgroups

Diagnosis	No. of cases	Percentage
Phacomorphic glaucoma	43	86
Phacolytic glaucoma	07	14
Total	50	100

Table 2a: Distribution of cases according to Visual acuity at presentation

Visual Acuity	At Presentation	
	No.	%
HM	32	64
PL	16	32
?PL	02	04
TOTAL	50	100

Table 2b: Distribution of cases according to Visual acuity at last follow-up

Visual Acuity	At last follow up	
	No.	%
6/6-6/12	22	44
6/18-6/60	15	30
<6/60	13	26
Total	50	100

Table 3: Distribution of cases according to IOP at presentation, after medication, and at last Follow-up

IOP MmHg	At NO.	Presentation %	After NO.	Medication %	At Last NO.	Follow UP %
00-20	00	00	43	86	50	100
21-30	15	30	07	14	00	00
31-40	17	34	00	00	00	00
>41	18	36	00	00	00	00
Total	50	100	50	100	50	100

At the last follow up, 22 (44%) cases gained good visual acuity, 15 (30%) cases gained moderate visual acuity and 13 (26%) cases gained poor visual acuity.

In this study, total mean IOP at presentation was 38.88 ± 11.31 mmHg (range 22–64), after medication it was 18.76 ± 3.47 mmHg and at last follow up it was 15.60 ± 2.10 mmHg. Paired 't' test was used to compare the reductions of IOP from the baseline at presentation to IOP after medication, IOP from baseline at presentation to IOP at last follow up and IOP after medication to IOP at last follow up, the mean respective were 20.12 ± 1.41 ($t=14.31$, $p<0.0001$), 23.32 ± 15.94 ($t=14.62$, $p<0.0001$) and 2.78± 0.49 ($t=5.65$, $p<0.0001$).

BCVA of 6/12 or better, at last follow up was achieved in 18 (41.86%) of Phacomorphic glaucoma and 4 (57.14%) in phacolytic glaucoma. ($p=0.603$). Poor visual acuity of less than 6/60 in both the subgroups were almost same with 11 (25.58%) in Phacomorphic glaucoma and 02 (28.57%) in phacolytic glaucoma.

Table 4: Distribution of cases according to BCVA at last follow up among LIG subgroups

BCVA	Phacomorphic NO.	Glaucoma %	Phacolytic No.	glaucoma %	Total No.	%
6/6-6/12	18	41.86	04	57.14	22	44
6/18-6/60	14	32.56	01	14.29	15	30
<6/60	11	25.58	02	28.57	13	26
Total	43	100.00	07	100	50	100

Table 5: Distribution of cases according to BCVA at last follow up and duration of symptoms

BCVA	Duration of Symptoms (In Days)									
	0-2	%	3-7	%	8-14	%	15-30	%	>30	%
6/6-6/12	00	00	10	76-92	08	66.67	04	28.57	00	00
6/18-6/60	00	00	03	23.08	04	33.33	06	42.86	02	18.2
<6/60	00	00	00	00.00	00	00	04	28.57	09	81.8
Total	00	00	13	100.00	12	100.0	14	100.0	11	100

The BCVA at last follow up of 6/12 or better was achieved in 18 (72%) of 25 cases with symptoms less than 2 weeks and in only 4 (16%) cases of 25 cases with symptoms more than 2 weeks. The poor visual acuity of less than 6/60 was found in 13 (52%) in 25 cases with more than 2 weeks and in 0 (0%) in 25 cases with symptoms less than 2 weeks duration. Duration symptoms had linear relation with visual outcome. More the duration of symptoms poorer the visual outcome ($ð^2$ =31.5, p=0.0001)

BCVA at last follow up of 6/12 or better was achieved in 13 (59.10%) cases with IOP at presentation of less than 35 mmHg and in 09 (32.14%) cases with IOP at presentation of more than 35 mmHg. Poor vision of less than 6/60 was 12 (42.86%) cases and 01 (4.54%) cases with IOP at presentation of more than 35 mmHg and less than 35 mmHg respectively. ($ð^2$ -9.52, p=0.009)

Table 6: Distribution of cases according to BCVA at last follow up and IOP at presentation

BCVA	IOP at Presentation			
	<35mmHg		>35mmHg	
	No.	%	No.	%
6/6-6/12	13	59.10	09	32.14
6/18-6/60	08	36.36	07	25.00
<6/60	01	04.54	12	42.86
Total	22	100.00	28	100.00

Discussion

This longitudinal study was undertaken to study the visual outcome after planned manual small incision cataract surgery.

In this study series, it was observed that the most frequent type of LIG was PMG (86%) followed by PLG (14%), similar occurrence was noted by Madurai study [5] (52.68%) and Lahan study [7] (72%).

Occurrences of various lens-induced glaucomas in the above studies shows variations. Nevertheless, Phacomorphic glaucoma has been the most frequent and commonest among all the studies including the present one, which is peculiar to the developing countries. In this study, none of PMG occurred below 50 years of age, showing that Phacomorphic glaucoma is a disease of old age with preponderance in 60-69years age group.

This is perhaps because of insidious onset, lack of medical awareness and limited resources in developing countries. On the other hand, phacolytic glaucoma represents, lens induced acute secondary open angle glaucoma associated with rapid onset of pain, redness and watering in the eye and acute rise in intra ocular pressure causes the patient to seek medical advice earlier than Phacomorphic glaucoma.

Visual Outcome

In this study, none of the cases had vision better than hand movement at presentation. The best-corrected visual acuity at the end of last follow up is compared with other studies.

In this study, BCVA of 6/18 or better, is slightly higher (54%) than Lahan study series [7] (31.40%). There were a significant proportion of cases that had blindness, with visual acuity less than 3/60 (20%) slightly less than Lahan study [7](21.0%). Thus, in this study higher percentage of cases has achieved good visual recovery and lower percentage of cases have poor visual outcome when compared to Lahan

study series.

BCVA in this study, of 6/12 or better was low (44%) and poor vision of less than 6/60 higher (26%) compared to Madurai study [5], with 59.13% and 11.82% respectively.

Final Visual Outcome by Subgroups

BCVA of 6/12 or better was taken as good visual acuity and less than 6/60 as poor visual outcome.

In this study, good visual acuity achieved by cases with phacolytic glaucoma (57.14%) was more than Phacomorphic glaucoma (41.86%) this difference was clinically significant but statistically not significant ($p > 0.05$). Poor outcome of less than 6/60 showed no significant difference between PLG (28.57%) and PMG (25.58%).

1994, Madurai study series found no statistical difference between the two groups on the final post-operative visual recovery ($p=0.68$)[5]. In a study done by Lane S S et al., BCVA of 20/50 or better was seen in 80% in PLG [8]. Study by A Braganza et al., showed BCVA of 20/80 or better in 85.4% in PLG. In another study by Gurudeep Singh et al., on PLG, BCVA of 6/12 or better was seen in 80% [9].

Duration of Symptoms

Good visual acuity achieved, in cases presented within 2 weeks (72%) was 65 more than the cases presented beyond 2 weeks (16%), whereas poor visual acuity of less than 6/60 was more in cases presented beyond 2 weeks (52%). In this study, duration of symptoms had a linear relation with best-corrected visual acuity at final follow up. More the delay in presentation, poorer was the visual outcome, which was both clinically and statistically significant ($p<0.01$).

The Lahan study [7] of 1998, found that duration of pain and high level of intra ocular pressure at presentation in PMG was associated with poor visual outcome at discharge, while in phacolytic group no such association were made out. In our study, the mean duration of symptoms in PLG was 9± 14.52 days. In a study by A Braganza et al., on PLG mean duration of symptoms was 11.5 + 21.7 days [10].

Clinically, significant proportion of cases with IOP at presentation less than 35 mmHg (59.10%) achieved good visual acuity, than cases with IOP more than 35 mmHg (32.14%), whereas poor visual outcome was more in cases presented with IOP more than 35 mmHg (42.86%) than cases with IOP less than 35 mmHg (4.54%). The correlation between height of IOP and visual outcome was, clinically and statistically significant ($p<0.05$). Madurai study had found no statistically significant association between the level of preoperative IOP and final visual acuity[5].

It is found that the IOP tends to be higher with the delay in presentation beyond 30 days (44.67 ± 14.84 mmHg) than the duration of presentation of less than 2 weeks (38.76± 12.59 mmHg). Though mean IOP at last follow-up was normal (16.44 ± 6.54 mmHg), cases with delay in presentation between 2 to 4 weeks and more than 30 days tend to be on higher end of normal (18.44 ± 6.98 mmHg and 18.67 ± 12.48 mmHg). Thus delay of more than 2 weeks in presentation would result in higher IOP, especially if the delay is beyond 30 days, which is clinically significant.

Conclusion

The results have shown that, good visual acuity can be achieved in lens induced glaucoma presenting within two weeks, with intraocular pressure of less than 35 mmHg.

Planned manual small incision cataract extraction with IOL implantation, minimal tissue handling, a good follow up with efficient management of attendant complications and inflammation, are the key factors in the management.

In other words, a delay in presentation of more than two weeks, and intraocular pressure of more than 35 mmHg would ultimately jeopardize vision, in these potentially blinding lens-induced glaucomas.

It is to be stressed upon, imparting health education and creating awareness regarding cataract and its implications among the rural community, ophthalmic assistants and peripheral health workers.

This study has highlighted the importance of early diagnosis, and efficient medical management to control IOP, with meticulous surgery and IOL implantation, and also proficient postoperative management and follow up would probably achieve excellent visual prognosis.

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Original Article

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Evaluation of Pseudo Exfoliation Syndrome and Its Associated Intra Operative and Post Operative Complications in Cataract Surgery

Meena Lakshman*, Anand Reddi**

*Assistant Professor, Department of Ophthalmology, KMCT Medical College Hospital, Kozhikode, Kerala -673602. **Assistant Professor, Department of Ophthalmology, Kerala Medical College Hospital, Mangode, Palakkad Dt, Kerala -679503.

Abstract

Background: The association of pseudoexfoliation with blindness and aging has public health implication for India; this is especially so considering the burden of cataract with aging and the association of pseudoexfoliation with cataract as well as complications of cataract surgery. *Aim:* To clinically evaluate the cases of pseudoexfoliation syndrome and its associated intra operative and post operative complications during cataract surgery. *Methods:* A descriptive study based on probability sampling of patients having pseudoexfoliation syndrome admitted for cataract surgery in a tertiary care hospital was carried out spread over 3 years. A total of 220 eyes of 125 cataract patients aged 50 years or more were included in the study The data were analyzed through SPSS version 15.0. *Results:* A total of 125 patients having Psuedoexfoliation were included in the study. Vitreal prolapse in 21 (10.5%)andposterior capsular rupture in 18 (9%) patients were the most common complications seen in Pseudoexfoliation. Damage to sphincter pupillae in 16 (8%), iridodialysis in 2 (1%), decentration of IOLin8(4%) andhyphaemain 2(1%) patients wasseen. Zonulardialysisin8(4%), retainedlens matter in 12 (6%) and lens dislocation was seen in 6 (3%) patients. *Conclusion:* Patientswithpseudoexfoliation are at increased risk for development of complications. Ophthalmologists should stress to in crease awareness among general public for the proper diagnosis and convince patients for proper and regular follow up visits to thehospital.

Keywords: Pseudoexfoliation; Cataract; Complications; Intraocularpressure.

Introduction

Pseudoexfoliation (PXF) is a senile condition, more common in females, familial and seems to be genetically inherited disease. A high risk of developing pseudoexfoliation syndrome and pseudoexfoliation glaucoma is confirmed by mutations in LOXL1 gene at locus 15q22, coding for elastic fibre components of the extracellular matrix. A grey-white fibrillary extracellular material composed of a protein core surrounded by glycosaminoglycans is produced by abnormal basement membranes of aging epithelial cells in the trabaculum, equatorial lens capsule, iris and ciliary body. The material is then deposited on the anterior lens capsule, zonules, ciliary body, iris trabaculum, anterior vitreous face and conjunctiva [1].

Ultra structural studies performed on eyes during autopsy suggest that pseudoexfoliation syndrome is a systemic disorder. Pseudoexfpliation material has been found in a number of organs, which includes skin, lungs, gall bladder, liver, myocardium, kidney, bladder and meninges [2].

Pseudoexfoliation is rarely seen before the age of 40, and its prevalence increases markedly with age. Although it occurs virtually in every area of the world, a considerable racial variation exists. Framingham study showed that the prevalence of

Reprint Request: Meena Lakshman, Assistant Professor, Department of Ophthalmology, KMCT Medical College and Hospital, Kozhikode, Kerala -673602.
E-mail: thesisusm@gmail.com

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pseudoexfoliation was 1.8 %. In another study of subjects over 60 yrs in various ethnicities, prevalence rates ranging from 0 % in Greenland Eskimos to 21% in Icelanders were noted [3].

Pseudoexfoliation is a known risk factor for developing cataracts. Cataract surgery in eyes with pseudoexfoliation has higher incidence of operative complications like posterior capsular rupture, zonular dialysis, vitrous loss and intra ocular bleeding. Post-operatively, these patients are at greater risk of developing immediate elevation of IOP and inflammation.Posterior capsular opacification and intraocular lens decantration are more common in patients with pseudoexfoliation in post- operative period [4].

The association of pseudoexfoliation with blindness and aging has public health implication for India; this is especially so considering the burden of cataract with aging and the association of pseudoexfoliation with cataract as well as complications of cataract surgery [5].

Our hospital being a tertiary care hospital , we get fair number of cases of pseudoexfoliation syndrome, hence in the present study every effort is made to clinically evaluate pseudoexfoliation syndrome and its associated intra operative and post operative complication of cataract surgery. In this background it was decided to take up this study.

Method

This study was carried out from January 2013 to December 2015 at Departments of Ophthalmology, KMCT Medical College and Hospital, Calicut. Convenience (non probability sampling) was used for this prospective and descriptive study.

Patients with developmental cataract, traumatic cataract, complicated cataract, high myopia, any other ocular disease and previous surgery were excluded. Patients were admitted to the Ophthalmology wards of the hospitals.

Written consent of all the patients included in the study was taken after fully explaining the procedure and purpose of the study to the patients. A detailed proforma was devised containing all essential details for each individual. A complete ophthalmic history was taken. The patients were asked about their name, age, sex, occupation and address. The questions and inquiries about the complaints were made which included dimness of vision, headache, pain in the eyes, watering of the eyes, discharge from the eyes, sticking of the lids, photophobia, history of injury and past history.

A thorough examination including visual acuity, anterior segment, posterior segment and measurement of intraocular pressure (IOL) was performed before the cataract surgery. Intraocular pressure was recorded with applanation tonometer.

The diameter of pupil of each patient was measured. Intra-operative maximum pupillary dilatation was obtained and its size measured. This pupil size was graded as poor, fair and satisfactory/ good. Poor pupillary dilatation meant 2–4 mm, fair papillary dilatation meant 5–6 mm, satisfactory/ good papillary dilatation meant 7–9 mm.

Standard extracapsular cataract extraction with PMMA intraocular lens implantation was done. Topical antibiotic ointment was applied. Eye was padded and patients were put on oral analgesics. The patients were examined with slit lamp on 1st post operative day. The follow up of the patients was carried out on 8th day, 4 weeks, 8 weeks and finally 12 weeks. All the patients received oral analgesics and topical Polymyxin, Neomycin, Dexamethasone and Ofloxacin/Ciprofloxacin. The data were entered and analysed using SPSS version 15.0. Analysis was done for quantitative and qualitative measures.

Results

Two hundred (220) cataract patients with pseudoexfoliation syndrome were included in this study. Patients lost during follow up were excluded from the study. The ages of these 220 patients ranged from 50 years to 87 years with 12% patients in age group of 80–89, 35% patients in the age group of 70–79, 37% patients in age group of 60–69 years and 16% patients in age group of 50–59 years. The distribution by gender shows that 84% of patients were males, while the remaining 16% of the patients were females; the male and female ratio was 5.25:1. Distribution of frequency and percentage of right and left eyes shows that 12% were right, 10% were left and 78% were bilateral.

Preoperative features show that 22% patients had zonular fragility, 6% had iridodonesis and 14% had phacodonesis. In 6% patients, pigment dispersion was seen, out of these 4% was present on lens and 2% was present on cornea. Subluxation of lens was seen in 4% patients. Mean IOP was 19.6 ±2.30 mmHg. Intraoperative pupillary diameter measurements showed that poor pupillary dilatation was seen in 48% patients, fair pupillary dilatation was seen in 42% patients while satisfactory/good papillary

dilatation was seen in 10% patients.

Different procedures were conducted during cataract surgery. Peripheral iridectomy was done in all the cases. Sphincterotomy was done in 46% patients with poor pupillary dilatation. Fifty-four (54%) patients received posterior chamber IOL and 92 (46%) had planned cataract extraction. Table 1 shows distribution of surgical complications during cataract surgery. A total of 93 (46.5%) complications were recorded. Routine follow up visits were done for 12 weeks in all the patients. On each follow up, visual acuity and slit lamp examination was done. Final visual acuity was recorded after 12 weeks.

Table 1: Surgical complications during Cataract surgery(n=93)

Surgicalcomplications	Pseudoexfoliationpatients(n=220)
Damage to sphincterpupillae	16(8%)
Irididialysis	2(1%)
Lensdislocation	6(3%)
Posterior capsulerupture	18(9%)
Vitreousprolapse	21(10.5%)
Retained lensmaterial	12(6%)
Decentration ofIOL	8 (4%)
Zonulardialysis	8(4%)
Hyphaema	2(1%)
Total:	93(46.5%)

Discussion

This study explored the peroperative outcomes and complications of cataract patients with pseudoexfoliation in tertiary care setting. Pseudoexfoliation was more commonly seen in males as compared to females in the present study, i.e., 84% in males and 16% in females. This ratio is approximately 5:1. More frequent occurrence of pseudoexfoliation in males can be explained by two factors. The first factor is that most of the patients undergoing cataract surgery are males. Secondly, males are more commonly involved in outdoor activities while most of the females are restricted to homes as traditional housewives. This particular aspect of restriction to houses partly explains environmental factors, as there are fewer risks for development of pseudoexfoliation. This is consistent with the finding of other studies [6,7]. Pseudoexfoliation can be unilateral or bilateral. Our study describes unilateral cases to be 22%.

Pseudoexfoliation is associated with constricted pupil. Adequate pupillary dilatation is necessary for standard extracapsular extraction. Pupillary dilatation is obtained by topical tropicamide. In the present study, pupil size was recorded after installation of tropicamide at 10 minutes interval for half an hour. Poor papillary dilatation was seen in 48% of the patients, adequate in 42% of the patients and good in 10% of the patients with pseudoexfoliation. In another study, 68.75% of pseudoexfoliation patients had poor to moderate pupillary dilatation [7]. These results indicate that good/adequate pupil dilatation for standard extracapsular cataract extraction is more difficult to be obtained in patients with pseudoexfoliation.

Constricted pupil exposes the patient to more complications [8]. To obtain adequate dilatation, different methods are in use. Bimanual stretching is one of the least time consuming methods [9] and was used in our study. This method is more convenient and cheaper but may lead to iris sphincter damage. Sphincter damage was seen in 8% of the patients. This damage leads to anisocoria postoperatively but is of help to obtain pupil dilatation thus making anterior capsulotomy more convenient and of appropriate size. Proper anterior capsulotomy and adequate dilatation of pupil help in uneventful surgery. The better option is sphincterectomy in patients who are susceptible to sphincter damage.

Sphincterectomy thus provides more controlled enlargement of pupil and at the same time better site can be selected.

Iridodialysis occurs intraoperatively as a result of the manipulation of intraocular tissues. It is one of the established, although rare, complications of cataract surgery. The patients with pseudoexfoliation syndrome are more prone to have complications as compared to patients without pseudoexfoliation [10]. In this study, only two patients had this complication. The main reason is inappropriate handling of intraocular tissues rather than pseudoexfoliation. These patients had only mild iridodialysis, which was optical as well as cosmetically insignificant. That is why no significant surgical intervention was done.

Pseudoexfoliation is a source of severe complications in cataract surgery [11]. The increased

frequency of intraoperative complications stem from zonular weakness rather than capsular tears. Zonular weakness poses different problems that are zonular dialysis, posterior dislocation of crystalline lens material [12] and delayed spontaneous dislocation of the intraocular lens and capsule [13]. In the present study, 8 patients (4%) had zonular dialysis. Experienced surgeons do have complications but their frequency and extent of damage is far less as compared to juniors or residents.

Posterior capsular rupture impacts the patients in terms of additional surgical procedures, additional topical and oral medications, and number and duration of follow up reviews [14]. In the present study, 18 patients (9%) had posterior capsular rupture. The risk factors for the development of this complication are quite extensively discussed, keeping in mind its effects on visual outcome. Even racial differences although not significant have been considered [15].

Our study describes vitreous loss rate as 10.5%. Measures were taken to clear the vitreous from the anterior chamber and wound edge and no postoperative complications occurred. Intraocular lens was not implanted in any patient who had posterior capsular rupture, vitreous loss or zonular dialysis. Posterior capsular tears, zonular dialysis and vitreous loss are reported to be more frequent in pseudoexfoliation syndrome than in otherwise normal subjects and this study confirms the findings [16,17]. Retained lens material does not necessarily require surgical intervention but may incite a significant postoperative inflammation that may be difficult to distinguish from microbial endophthalmitis. Present study describes 12 patients who had retained lens material. All of them had retained little cortical material, which is better tolerated and was having no optical effects due to inferior position in anterior chamber; that is why, repeat surgery was not done. Treatment with cycloplegics and topical steroids allows for the gradual dissolution of the retained lens material. Patients with pseudoexfoliation may be at risk for delayed spontaneous dislocation of intraocular lens within the capsular bag after uncomplicated surgery. There may be tilting of the intraocular lens in less severe cases. Keeping in mind this complication, it is better to re-evaluate surgical consideration for cataract removal. Better option is to implant the intraocular lens in the ciliary sulcus. Hyphema in the immediate postoperative period usually originates from the incision or iris. Only 2 patients with pseudoexfoliation had this complication. It was mild and not associated with vitreous loss. No intervention was done and it did resolve spontaneously.

Conclusion

Cataract surgery, like any surgical procedure, has associated complications. Patients with pseudoexfoliation are at increased risk for development of complications. Early diagnosis, detailed examination, knowledge of the complications, ability to manage these complications, use of viscoelastic material and surgery by experienced surgeon are keys of success.

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Ocular Findings in Encephalitis Patients: A Clinical Study

Ramyash Singh Yadav*, Aprajita Chaudhary,Deepti Yadav***, Komal Prasad Kushwaha****, Sunil Gupta*****

*Associate Professor, ***Resident, Department of Ophthalmology, ****Professor, Department of Paediatrics, B.R.D. Medical College, Gorakhpur. **Associate Professor, Department of Ophthalmology, M.L.N. Medical College, Allahabad. *****Consultant, Shau Rameshwaran Kothiwal Hospital, Kath Road, Moradabad.

Abstract

Objective: To observe incidence, recovery rate and extent of recovery in ocular manifestation of viral encephalitis. *Method:* All the patient with symptoms of encephalitis in the age group of 6 months to 14 years; Attending the Paediatric OPD with admission and eye OPD of B.R.D. Medical College will be included in this study. The details in infant include weight, age of presentation, gender significant neonatal problem and ocular findings up to a period of 6 months. All the children underwent a detailed paediatric examination by a paediatrician. *Result:* The findings of the study are based on 118 patients of Acute Encephalitis Syndrome. Maximum number of children were 6-10 year of age group , 47 children which covers 38.97 % cases. 58.47 %(69 children) of total cases being male and 41.53 %(49 children) of cases being female .In our study number of children showing any ocular finding were 44 i.e. 37.29% of total cases and the remaining 74 children i.e. 62.71 % cases does not show any ocular finding. Ocular findings include conjunctivitis, seen in 18 children, Subconjunctival hemorrhage in 6 children , corneal ulcer in 4 children, exposure keratitis in 16 children, iritis / Iridocyclitis seen in 3 children , Papilloedma in 12 children and CN Palsy in 2 children .Patients of conjunctivitis , Subconjunctival hemorrhage , exposure keratitis and iritis / Iridocyclitis recover completely without leaving any ocular deformity. Corneal ulcer is seen in 4 patients. These are all unconscious patient having GCS < 9 and malnutrition grade III &IV. These patients treated conservatively and in a follow up period of 1 month all patient recovered leaving nebular/*macular grade corneal opacity* in 2 patients. At time of admission 12 children had Papilloedma. In a follow up period of 6 months it resolved in 10 children without leaving any ocular deformity but in 2 children Papilloedma resolved with leaving post oedema optic atrophy. 2 children had 6th Cranial Nerve palsy without recovery in a follow up period of 6 month. Ocular manifestation of Vitamin A deficiency is seen in 13 children (6 male, 7 female). So total of 8.7 % male population of AES show vitamin A deficiency while 14.29 % of female population show the deficiency. Children showing untreatable blindness in our study were 18 (10 male, 8 female). Causes of untreatable blindness are post oedema optic atrophy in 2 children (1 male, 1 female) and retro bulbar neuritis / higher cortical lesion in 16 children (9 male , 7 female). 4pts of treated population suffer visual disability. *Conclusion*: Various observations in our study have clearly indicated that AES is more common in young males in rural area. Children showing ocular finding were 44 i.e. 37.29% of total population and the remaining 74 children i.e. 62.71% population does not show any ocular finding. Ocular manifestation of Vitamin A deficiency is seen in 13 children (6 male , 7 female). Children showing untreatable blindness in our study were 18 (10 male, 8 female). Causes of untreatable blindness are post oedema optic atrophy in 2 children (1 male, 1 female) and retro bulbar neuritis / higher cortical lesion in 16 children (9 male, 7 female). So 15.25 % treated population suffer visual disability. 2 children show 6th Cranial Nerve palsy without recovery in a follow up period of 6 month. 2 children show nebular /macular grade corneal opacity. So ocular damage and blindness is quiet common in AES. All children should undergo a thorough ophthalmological examination and follow up.

Keywords: Acute Encephalitis Syndrome (AES); Blindness; Optic Atrophy; Eastern UP.

Reprint Request: Ramyash Singh Yadav, Type-4/32, B.R.D. Medical College, Gorakhpur, Uttar Pradesh 273013.

E mail-ramyashyadav93@yahoo.in

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Introduction

Encephalitis is a serious devastating illness prevalent in eastern region of Uttar Pradesh, for so many years, causing both morbidity and mortality.

The cases of encephalitis are now prevalent throughout the year but there is sudden increase in number of Japanese Encephalitis and Non-Japanese Encephalitis (JE) in the month of August to November [1]. About 20% children are immunologically incompetent and have behavioural problems [7]. Virus Encephalitis is caused by different viruses, or by different serotypes of some virus [2,3]. It occurs as a sporadic disorder or in form of sudden outbreaks. In India JE virus causes major epidemics and endemic in many regions including Gorakhpur region of Eastern U.P [4,5]. As part of the effort to control Japanese encephalitis (JE), the World Health Organization (WHO) is producing a set of standards for JE surveillance [4]. The surveillance consists of identifying patients with acute encephalitis syndrome (AES), and then classifying the patients according to the results of laboratory diagnostic tests. AES is defined as the acute onset of fever and a change in mental status (including symptoms such as confusion, disorientation, coma, or inability to talk) and/or new onset of seizures (excluding simple febrile seizures) in a person of any age at any time of year [4,5].

In AES there is increase in intracranial pressure which can be consequent to an increased production of fluid or to a decrease in out flow facility [6].

A large no patient of AES are unconscious at the time of admission, many of these patient have a swollen lid due to a generalized inflammatory body reaction. Such patient suffers from exposure keratitis, conjunctivitis, iritis, Iridocyclitis, choroiditis, vitritis and corneal infection. Such patient of long duration also suffer corneal ulceration, these ulcer when heal leave a corneal opacity. Most patient of raised ICT seeks treatment of headache. The patient may complain of decrease visual acuity , transient obscuration of vision , enlarged blind spot or diplopia (due to 6^{th} nerve palsy) [8]. 6^{th} CN Palsy is a nonspecific sign of Papilloedema. The principal pathophysiology of optic disc oedema in AES may be the axoplasmic stasis, oedema or vascular congestion due to generalized body viremia [9]. AES caused by some viruses especially by CMV and AIDS virus can lead to chorioretinitis and acute retinal necrosis [10]. But this is a very rare finding. In patient of AES chronic Papilloedma may lead to injury of optic nerve and secondary optic atrophy with permanent loss of vision.

Enteroviruses are also associated with major central nervous system infection with diverse clinical syndrome such as a minor febrile illness, to severe potential fatal illness viz [11]. aseptic meningitis, meningoencephalitis, acute flaccid paralysis, myocarditis and neonatal entero viral multi organ failure [12-15]. AES child which get recovery from disease suffer from major and minor neurological deficit . Such deficits usually occur in association with behavioural problem [16]. Neurological deficit in children include impaired memory, extra pyramidal sign, speech deficit, convulsion, involuntary movement, mental retardation, hemi paresis, CN Palsy and cerebellar sign [17,18].

So far more than 80 serotypes have different temporal pattern of circulation and are associated with different clinical manifestations [19]. Outbreaks of enterovirus, mediated encephalitis have been mainly described with EV-71 in Taiwan and other countries in Southeast Asia region [20,21]. Other human enterovirus have been associated with meningitis and acute flaccid paralysis (AFP) including recently described novel serotype of EV-76, 89, 90, 91 and Coxsackie virus [5,8,22,23].

In encephalitis the ocular symptoms ranges from mild irritation to vision threatening blindness depending upon the part affected and extent of damage [24,25].

Materials and Methods

All the patient with symptoms of encephalitis in the age group of 6 months to 14 years; attending the Paediatric OPD with admission and eye OPD of B.R.D. Medical College from June 2007 to September 2008 were included in this study. The detail in children include weight, age of presentation, gender significant neonatal problem and ocular findings up to a period of 6 months. All the children underwent a detailed paediatric examination by a paediatrician. Symptoms of viral encephalitis, distinctive features associated with a typical Japanese Encephalitis (JE) case like high grade fever associated with headache and vomiting, hypertonia, exaggerated Deep Tendon Reflex(DTR), extensor plantar have been seen.

Cases with encephalitis not showing typical JE features are grouped into "Non-JE". Cases with features of viral encephalitis & showing distinctive features like moderate grade fever, hypotonia, diminished DTR, inelicitable planters and any one of features like puffiness of the face, oedema feet, tachypnea, signs of congestive cardiac failure,

spleenomegaly and hepatomegaly etc. are grouped into Non-JE.

Grading of Severity

Classification of nutritional status using WHO/ CDC growth chart, Classification of ocular manifestation of vitamin-A deficiency using WHO xerophthalmia classification, Level of consciousness using modified GCS score.

Diagnostic Criteria

Febrile children with change in level of consciousness, with or without seizure or convulsion, CSF finding ***(Nelson Paediatrics, 18th ed.)***-Normal blood sugar, Pleocytosis, Slightly raised protein, Sterile CSF for bacteria culture.

Exclusion Criteria

Children conscious less than 1 hour,<6 months of age, Children with turbid CSF, Purpuric rashes, Ventriculomegaly found on CT scan, CSF finding suggestive of bacterial or tubercular meningitis.

Ophthalmic Examination

The initial examination of eye should assess symmetry, conformation and gross lesions, the eye should be viewed from 2-3 fit away in good light, and with minimal restraint of head. The anterior ocular segment and pupillary light reflex are examined in detail with a strong light and decrease magnification in a darkened room. Baseline tests like the Schirmer tear test, fluorescein staining and tonometry may be followed by averting the eyelids for examination, and flushing the nasolacrimal duct and see external part of the eye, including the anterior segment. Disease of vitreous and fundus are evaluated by direct and indirect ophthalmoscopy (usually performed after mydriasis) and vision testing (if possible). Schirmer test is performed before topical anaesthesia is instilled. Fluroscein staining and eversion of the eyelids need not require topical anaesthesia.

Material

Snellens Chart, Slit lamp, Direct, indirect ophthalmoscopy, Fluorscein strip and Schirmer strip, Dilator (Atropine, Tropicamide), Schizot Tonometer.

Follow up

I) 48 hours of hospitalization, II) 7 days of hospitalization, III) 1 week post discharge, IV) 1month post discharge, V) 3months post discharge, VI) 6 months post discharge.

Results

Study started with 161 patients (82 male ,79 female). Among 161 patients only 118 patients fulfilled the criteria of continuous follow up period of 6 months. 43 patients dropped out during the study and hence excluded.

Table 1: Age wise distribution

Age group (in year)	No. of patients	Percentage (%)
½-2	8	6.78
3-4	11	9.32
4-5	11	9.32
5-6	12	10.17
6-7	13	11.02
7-8	11	9.32
9-10	9	7.63
10-11	13	11.02
11-12	10	8.47
12-13	9	7.63
13-14	11	9.32

Table 2: Residental distribution

Residential Area	No. of Patients	Percentage (%)
Rural	71	60.17 %
Urban	47	39.83 %
Total	118	

Table 3: Classification of nutritional status using WHO Growth Standard

z- scores	Male	Female	Total
1 - +1	31	21	52
1 - 2	36	24	60
< 2	16	12	28
> +2	5	5	10
+ 1- +2	16	14	30
Total	69	49	118

Table 4: Level of consciousness in children at the time of admission by Modified Glasgow Comma Scale

GCS Score	Male	Female	Total	Percentage (%)
15(normal)	21	13	34	28.81
14-12	18	16	34	28.81
12-9	11	7	18	15.25
9-7	13	8	21	17.80
<7	6	3	9	7.63

Table 5: Classification of ocular manifestation of Vitamin A deficiency using Xero-ophthalmia classification

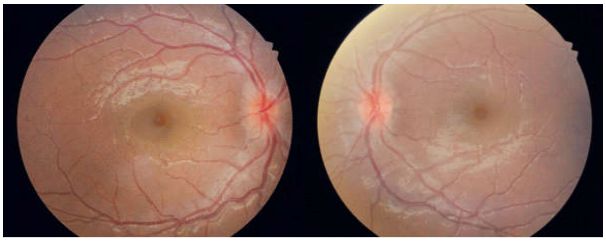
Grade	Male	Female	Total
XN	3	3	6
X1A	1	1	2
X1B	1	2	3
X2	0	1	1
X3A	1	0	1
X3B	0	0	0
XS	0	0	0
XF	0	0	0
Total	6	7	13

Table 6: Distribution of Ocular Findings at time of admission

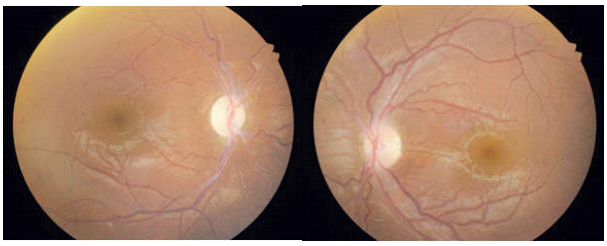
Ocular Manifestation	Male	Female	Total	Percentage (%)
Conjunctivitis	12	6	18	15.25
Subconjunctival hemorrhage	4	2	6	5.68
Corneal ulcer	3	1	4	3.39
Exposure keratitis	11	5	16	13.56
Iritis/Iridocyclitis	2	1	3	2.54
Papilloedma	8	4	12	10.17
Cranial nerve palsy	1	1	2	1.69
Total	41	20	61	51.69

Picture 1: Exposure keratitis

Picture 2: Conjunctivitis



Picture 3: Early papilloedema



Picture 4: Optic atrophy

Table 7: Follow up of conjunctivitis in Hospitalized/ Discharge patient

Follow up in days	Male	Female	Total
2	12	6	18
7	4	2	6
14	0	0	0

All the patient of conjunctivitis recovered without leaving any ocular deformity.

Table 8: Follow up of Subconjunctival Hemorrhage in Hospitalized/ Discharge patient

Follow up	Male	Female	Total
2nd day	4	2	6
1 week	4	2	6
1 month	2	1	3
3 month	0	0	0

Table 9: Follow up of corneal ulcer in Hospitalized/ Discharge patient

Follow up	Male	Female	Total
2nd Day	3	1	4
1 week	2	1	3
1 month	1	0	1
3 month	0	0	0

All patient of corneal ulcer are treated conservatively. All the patient heal completely with leaving ***nebular / macular grade corneal opacity*** in 2 patients.

Table 10: Follow up of exposure keratitis in Hospitalized/ Discharge patients

Follow up	Male	Female	Total
2nd day	11	5	16
1 week	4	2	6
2 week	0	0	0

All patient of exposure keratitis are treated with proper cleaning, antibiotics, cycloplegic and lubricating eye drops. Unconscious patients are treated with pad and bandage .All the patients recover completely without leaving any ocular deformity.

Table 11: Follow up of iritis/iridocyclitis in Hospitalized/Discharge patient

Follow up	Male	Female	Total
2nd Day	2	1	3
1 week	1	1	2
2 week	0	0	0

All patients of iritis / Iridocyclitis treated conservatively without leaving any ocular deformity.

Table 12: Follow up of Ocular palsies (6th CN Palsy) in Hospitalized/ Discharge patient

Follow up	Male	Female	Total
2nd day	1	1	2
1 week	1	1	2
1 month	1	1	2
3 month	1	1	2
6 month	1	1	2

2 children show 6th cranial nerve palsy at admission which does not recover during a follow up period of 6th month.

Table 13: Papilloedma in Hospitalized patient at follow up

Follow up in Days	Male	Female	Total
2	8	4	12
7	8	3	11

Table 14: Follow up of discharge patient for Papilloedma

Follow Up	Male	Female	Total
1 week	8	3	11
1 Month	6	2	8
3 Month	1	1	2
6 Month	1	1	2

Table 15: Identification of untreatable cause of blindness in AES patients

	Retro bulbar Neuritis/ Higher cortical lesion	Post oedema optic atrophy
Male	9	1
Female	7	1
Total	16	2

Table 16: Blindness according to age and sex

Sex	½-5 year	6-10 year	11-14year	Total
Male	3	4	3	10
Female	2	4	2	8
	5	8	5	18

Table 17: Neurological Manifestation in AES

	No. of Patients	Percentage
Complete Recovery	76	64.41%
Behavioural Problem with no neurological deficit	3	2.54%
Minor Neurological Deficit	10	8.47%
Minor Neurological Deficit with behavioural problem	6	5.08%
Major Neurological Deficit	13	11.02%
Major neurological Deficit with behavioural problem	10	8.47%

Discussion

This is the *first study of this kind*, ocular findings in AES has not been reported *elsewhere.* The maximum no of children i.e. 47 were from 6-10 year age group forming 38.97% of population. 58.47% of total population being male and 41.53 % of population being female. 71 patient (60.17%) of total population belong to rural population while 47 patient (39.83%) were of urban population. Children are classified for nutritional status using WHO Growth Standard (W/A) classification. Among all children 70 children have normal range z-score i.e. 59.32%. 28 children were under nutrition (< 6 2 z-score) i.e. 23.73% and the 10 children were overweight (> + 2 z-score). At the time of admission 34children i.e. 28.8% population were of normal conscious level i.e. Glasgow Comma Score 15. So among all children 84 (71.19%) children found subnormal GCS Score. 34children (18 male, 16 female) were GCS Score 14-12, 18 children (11male, 7 female) were GCS Score 12-9 , 21 children (13 male, 8 female) were GCS Score 9-7 and the remaining 9 children (6male, 3 female) were of GCS Score <7 . In our study number of children showing any ocular finding were 44 i.e. 37.29% of total population and the remaining 74 children i.e. 62.71% population does not show any ocular finding. Ocular findings include conjunctivitis, seen in 18 children (12 male, 6 female) i.e. 15.25%, Sub conjunctival haemorrhages in 6 children (4 male, 2 female) about 5.68 % , corneal ulcer in 4 children (3 male 1 female) i.e. 3.39%, exposure keratitis in 16 children (11 male, 5 female) i.e. 13.56% , iritis/ Iridocyclitis seen in 3 children (2 male 1 female) i.e. 2.54%, Papilloedma in 12 children (8 male, 4 female)

i.e. 10.16% , and CN Palsy in 2 children (1 male 1 female) (Table 7*)*.

All patient of conjunctivitis show watery discharge, boggy swelling of conjunctiva with minimal congestion. All 18 patients treated conservatively with antibiotic drops and proper cleaning of eye. 12 patient recover in a week period and the rest 6 patient recover in another week. Subconjunctival hemorrhage is seen in 6 patient, it is seen in all those patient having Papilloedma. The cause of Subconjunctival hemorrhage may be raised ICT due to which the pressure in subconjunctival vessels also rises and they rupture due to increase tension. In three month follow up period hemorrhage resolve in all patient without leaving any ocular deformity (Table 9). Corneal ulcer is seen in 4 patients. The cause of corneal ulcer is super infection on exposure keratitis and vitamin A deficiency. These are all unconscious patient having GCS < 9 and malnutrition grade III & IV. All these patient treated conservatively in a follow up period of 1 month all patient recover with leaving *nebular / macular grade corneal opacity* in 2 patients.16 patients show exposure keratitis. These are all unconscious patient having GCS <12. The reason behind exposure keratitis is incomplete closure of eyes because of unconsciousness and lid oedema. 6 of these patient also show lid swelling at time of admission .Lid swelling in these patients are the result of generalised body inflammation. All these patient treated conservatively and in a period of 2 week they recover completely without leaving any ocular deformity. Iritis / Iridocyclitis is seen in total 3 patient at time of admission , all these patient treated conservatively without leaving any ocular deformity in a follow up period of 2 week. At time of admission 2 patient show 6^{th} CN Palsy, these two patient also have Papilloedma. 6th cranial nerve palsy is a pseudo localizing sign in Papilloedma which resolve as the ICT lower down or Papilloedma resolves. But in these patient Papilloedma resolve in a month period but 6th nerve does not come to its normal level. Thus producing a major neurological deficit in these children. Raised ICT can result in downward displacement of brainstem, causing stretching of the 6^{th} cranial nerve which leads to 6^{th} CN palsy. At time of admission 12 children show Papilloedma. On 2^{nd} day of admission number of children showing Papilloedma remain same and in 1 week follow up of admission 11 children show Papilloedma. Papilloedma is seen more in unconscious children. Only 1 children of normal GCS show Papilloedma and the rest 11 children show Papilloedma were of GCS <15. Out of them 1 children were GCS 14-12, 3 children were of GCS 12-9, 5 children were of GCS 9-7 and 2 children were of GCS <7. Showing that Papilloedma is more common in children having lower level of consciousness i.e. the children severely ill. In post discharge patient at 1 week 11 children show Papilloedma, at 1 month follow up 8 children show Papilloedma, at 3 month period 2 children show Papilloedma and at 6 months period 2 children show Papilloedma with post oedema optic atrophy. Papilloedema in AES may be because of the axoplasmic stasis, oedema or vascular congestion due to generalized body viremia. Ocular manifestation of Vitamin A deficiency is seen in 13 children (6 male, 7 female) 6 children come in XN grade (3 male, 3 female), 2 children come in X1A grade (1 male 1 female), 3 children in X1B grade (1 male, 2 female), 1 children in X2 grade (1 female) and I children in X3A grade (1 male). So total of 8.7 % male population of AES show vitamin A deficiency while 14.29% of female population show the deficiency. This show that vitamin deficiency is more common in female children as compared to male population and most of patients belong to rural background.

For neurological manifestation and behavioural problem all children underwent a detailed examination by a paediatrician. Children which show a complete recovery from AEs in follow up patient were 74 i.e. 62.71% population .Behavioural problem with no neurological deficit is seen in 3 children (2.54%), minor neurological deficit is seen in 10 children (8.47%) , minor neurological deficit with behavioural problem in 6 children (5.08 %), major neurological deficit in 13 children (11.02 %) and major neurological deficit with behavioural problem in 10 children (8.47%). So total children showing behavioural problem (with or without minor or major neurological deficit) seen in 19 children (16.02%). Total major neurological (including major neurological deficit with behavioural problem) seen in 23 children i.e. 19.40 %. Major neurological deficit include impaired memory in 4 children (17.39%). Out of 118 patients 96 children recover without leaving any ocular deformity i.e. 81.35% children in a follow up period of 6 months. Total number of children showing untreatable blindness in our study were 18 (10 male, 8 female) .Causes of untreatable blindness are post oedema optic atrophy in 2 children (1 male , 1 female) and retro bulbar neuritis / higher cortical lesion in 16 children (9 male, 7 female). 2 children show nebular / macular grade corneal opacity with visual acuity near normal. 2 children show 6^{th} Cranial Nerve palsy without recovery in a follow up period of 6 month.

Conclusions

Various observations in our study have clearly indicated that AES is more common in young males in rural area. Children showing ocular finding were 44 i.e. 37.29% of total population and the remaining 74 children i.e. 62.71% population does not show any ocular finding. Ocular manifestation of Vitamin A deficiency is seen in 13 children (6 male, 7 femal). Children showing untreatable blindness in our study were 18 (10 male, 8 female). Causes of untreatable blindness are post oedema optic atrophy in 2 children (1 male, 1 female) and retro bulbar neuritis / higher cortical lesion in 16 children (9 male, 7 female). So 15.25 % treated population suffer visual disability. 2 children show 6th Cranial Nerve palsy without recovery in a follow up period of 6 month. 2 children show nebular/macular grade corneal opacity. Major neurological (Major neurological deficit and major neurological deficit with behavioural problem) seen in 23 children i.e. 19.40 %. So total children showing behavioural problem (with or without minor or major neurological deficit) seen in 19 children (16.02%). Out of 118 patient 96 children recover without leaving any ocular deformity i.e. 81.35% children in a follow up period of 6 month. Children which show a complete recovery from AES (without leaving any neurological deficit and behavioural problem) in follow up patient were 76 i.e. 64.41% population . So ocular damage and blindness is quiet common in AES. All children should underwent a thorough ophthalmological examination and follow up.

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Visual Outcome in Posterior Polar Cataract after Small Incision Cataract Surgery at Navodaya Medical College, Raichur

Shruti Hunakunti*, Anupama Taklikar, Pradeep Reddy***, Shreya Hunakunti******

*PG Student, **Professor and Head, Dept. of Ophthalmology, Navodaya Medical College, Raichur, Karnataka.***Meenakshi Netralaya, Yadgir, Karnataka. ****Dept of orthodontics, Navodaya Dental College Raichur, Karnataka.

Abstarct

Posterior polar cataract is a rare form of congenital cataract. It is usually inherited as an autosomal dominant disease, yet sporadic. It is highly associated with complications during surgery, such as posterior capsule rupture and nucleus drop. The reason for this high complication rate is the strong adherence of the opacity to the weak posterior capsule. *Objective:* To evaluate the visual outcome in posterior polar cataract after small incision cataract surgery. *Methods:* A Prospective study of 50 eyes of 50 pts with posterior polar cataract were reviewed. All pts underwent small incision cataract surgery. The surgical techniques used, intraoperative complications, preoperative and postoperative visual acuity and the causes of impaired visual acuity after surgery were examined. *Results:* 50 eyes of 50 pts presenting, high incidence was noticed in females (58%) mean age of presentation was 53.125Yrs. 27(54%) eyes had pre op visual acuity between PL+ and CF2Mts. During surgery 3eyes (6%) had PCR and were aphakic.PCR in 1(33.33%) eye occurred during nucleus prolapsed and in 2(66.66%) eyes during cortical wash. Snellens Visual acuity on day 1 was >6/18 in 13 cases (26%),on day 7 in 34 cases (78%) and BCVA after 6weeks was >6/18 in (98%) cases. AC reaction was seen in 4 cases (8%). *Conclusion:* Visual outcome in pts with posterior polar cataract is good when surgery done after proper pre-op assessment, with thorough planning. Experienced surgeons with proper knowledge of the technique during the surgery and about vitrectomy.

Keywords: PPC, SICS, Hydrodelineation, Intraoperative complications, Visual Outcome

Introduction

Cataract can have a wide variety of presentations ranging from a white dot in the anterior lens capsule to dense total opacity involving all the lens structures. It can be morphologically classified as zonular, nuclear, subcapsular, polar, sutural, total and membranous [1]. One of the important morphologies of lens opacity is the posterior polar cataract. The posterior polar form is a clinically distinctive cataract that consists of a white, well demarcated disk-shaped opacity located on the central posterior capsule [2]. The indication for surgery consists of visually significant cataract impairing the patient's quality of life and activities of daily living.

Posterior polar cataract present a unique challenge to cataract surgeons as it is associated with the high risk of posterior capsule rupture [3-4]. Incidence of PPC ranges from 3 to 5 in 1000 [5]. It is found to be bilateral in 65% - 80% of the cases [4,6]. There is no sex predilection in general. An important clinical feature of posterior polar cataract is the significant incidence of extreme capsular weakness in the area of polar opacity [7]. In approximately 20% of cases, an association with a congenital defect in the posterior capsule is seen [3].

Reprint Request: Shruti G. Hunakunti
Sajjalashree opposite to New Bus Stand Station,
Area Yadgir – 585202 Karnataka
E-mail: shunakunti@gmail.com

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Generally two types of posterior polar cataract are described in the literature stationary and progressive [7]. In stationary-type central opacity is localised on the central posterior capsule, and in progressive type changes take place in the posterior cortex in the form of radiating rider opacities. Both stationary and progressive posterior polar cataracts may become symptomatic.

The lens may have evidence of a small opacity at birth, but there are cataractous changes later in life, usually at 30–50 years of age. Glare while driving at night and difficulty in reading fine print are typical symptoms. The indication for surgery consists of visually significant cataract impairing the patient's quality of life and the activities of daily living.

Aims and Objectives

1. To study the visual outcome of posterior polar cataract after Small incision Cataract Surgery with Posterior Chamber Intra Ocular implantation done at Navodaya medical college and hospital Raichur.
2. To study the complications occuring intra operatively and post operative

Materials and Methods

The present study was conducted in ophthalmology department at Navodaya Medical College Hospital and Research centre, Raichur. Institutional ethical committee clearance was taken for the study and informed consent was taken from all the patients.

Patients attending ophthalmic OPD who had Posterior Polar Cataract were included in the study.

Source of Data

Study will be conducted on patients with posterior polar cataract attending the out patients department of ophthalmology, in Navodaya Medical College, Raichur.

Methods of Collection of Data

- A cross sectional prospective clinical study conducted on 50 patients with posterior polar cataract attending the out patients department of ophthalmology in Navodaya Medical College and Teaching Hospital, Raichur and willing to participate in this study.
- Sampling Method: Complete enumeration of the 50 patients with posterior polar cataract attending the out patients department of Ophthalmology, NMC are selected on the basis of simple random selection technique and included in the study.

Results

Table 1: Age distribution in patients with PPC

Age in yrs	Frequency	Percentage
<30	2	4
31-40	4	8
41-50	15	30
51-60	22	44
>61	7	14
Total	**50**	**100**

Of 50 patients, 2 patients were of <30years, 4 patients were between 31-40 years., 15 patients were between 41-50 years., 22 patients were between 51-60 years., 7patients were >60years.

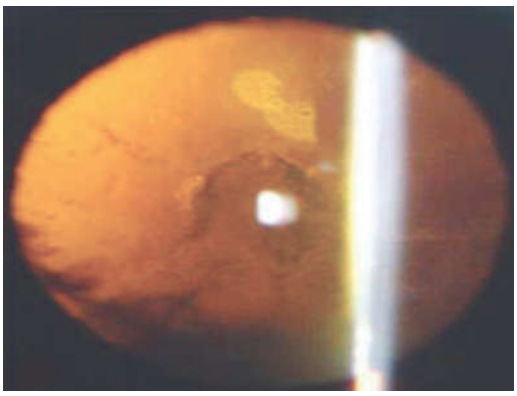

Fig. 1: Appearance of posterior polar cataract under operating microscope.

Table 2: Pre-operative vision

Visual acuity	Frequency	Percentage (%)
>6/18	47	94
<6/18-6\60	-	-
<6\60	03	06
Total	**50**	**100**

Of 50 patients:
27 patients had snellens vision between PL+—CF2mts.
20 patients had snellens vision between CF3mts—6/60.
3 patients had snellens vision <6/60.

Table 3: Post operative vision after 6 weeks

	Frequency	Percentage
With PCR	03	06
Without PCR	47	94
Total	**50**	**100**

Of 50 patients:
47 patients had snellens vision >6/18.
3 patients had snellens vision <6/60.

Table 4: PCR

	Frequency	Percentage
Aphakia	03	06
Pseudophakia	47	94
Total	**50**	**100**

Of 50 patients:
3 patients had PCR.

Table 5: Aphakia

Anterior vitrectomy	Frequency	Percentage
Done	03	06
Not done	47	94
Total	**50**	**100**

Of 50 patients:
3 patients were left aphakic.
47 patients were pseudophakic.

Table 6: Anterior vitrectomy

	Frequency	Percentage (%)
Nuclear prolapse	1	33.33
Cortical wash	2	66.66
Total	**3**	**99.99**

Of 50 patients:
Anterior vitrectomy was done in 3 patients.
Anterior vitrectomy was not done in 47 patient

Table 7: Stage at which rent occurred

Pre op Vision	Frequency	Percentage
PL+---CF2mts	27	54
CF3mts—6/60	20	40
<6/60	3	06
Total	**50**	**100**

Of 3 patients with PCR:
In 1 patient PCR was during nuclear prolapse.
In 2 patients PCR was during cortical wash.

Discussion

Present study was conducted in ophthalmology department at Navodaya medical college hospital and research centre Raichur on 50 patients with posterior polar cataract who underwent small incision cataract extraction during June 2014-July 2015.

Posterior polar cataract is a white, well-demarcated disc-shaped opacity located on the central posterior capsule. It has been reported that posterior polar cataract is usually inherited in an autosomal-dominant manner, although other sporadic cases exist. Molecular genetic analyses have demonstrated that an autosomal-dominant posterior polar cataract is a genetically heterogenetic disease. Cataract surgery in posterior polar cataract is very challenging because of thin posterior capsule and its predisposition to posterior capsular tear.

Following precautions are to taken while operating.

1. Equally experienced surgeons performed the surgeries.
2. All surgeries were carried out under peribulbar anaesthesia.
3. Big Continuous curvilinear capsulorhexis was performed under an ophthalmic viscosurgical device (OVD) using a 26-gauge bent needle.
4. All patients underwent hydrodelineation in different quadrants using minimal fluid.
5. Hydrodissection was avoided in order to prevent posterior capsule rupture.

Age Distribution in Patients with PPC

In our study, the age of the patients varied from 20-70yrs, but high prevalence was between 50-70yrs (44%) followed by 41-50yrs (30%). With mean age of 53.125yrs.

In study done by Ken Hayashi, MD, et al the mean age of the 12 men and 8 women with posterior polar cataract was 49.6 years ± 16.4 (SD) (range 23 to 74 years). Similar to that of our study.

H Siatiri in their study reported Mean age at presentation as 33.5 years (from 19 to 65 years), which is converse to our study.

RB Vajpayee in their study reported the mean age of the patients was 43.75 yrs.

Sex Distribution in Patients in PPC.

Female preponderance in our study was seen with 58% of total cases. Where as in study done by Das et al there were 48 men (79%) and 11 women (21%), which is in contrast to our present study.

Ken Hayashi,in their study reported that 12 men and 8 women with posterior polar cataract were involved.

H Siatiri in their study had 12 males and 11 female patients.

Modalities of surgical techniques are conventional ECCE,manual SICS and phacoemulsification.

In our study SICS was performed in all the case.Adequate hydrodelineation was done Prolapsing the nucleus into the anterior chamber was done with utmost care in order to avoid PCR.

The viscoelastic substance was filled above and below the nucleus and then nucleus was delivered out by sandwitch method with the help of wire vectis and sinskey hook.

Thorough wash was given and all the cortical matter was aspirated.

Allen and Fine suggest viscodissection of the epinucleus performed by injecting a viscoelastic (Healon 5 or GV and Viscoat, respectively) under the capsular edge to mobilize the rim of the epinucleus. It is removed with a two way irrigation-aspiration (I/A) simcoe cannula.

If PCR was present with vitreous loss, anterior vitrectomy was done and the IOL was placed in the sulcus. In absence of PCR, IOL was placed in the bag.

Preoperative Vision

In our study more number of patients presented with pre-op vision between PL+and CF2mts i.e around 54%, (27 of 50 cases) followed by CF3mts—6/60around 40%, (20 of 50 cases) least incidence below 6/60 around 6%(3 of 50 cases).

Selcuk Sýzmaz in their study reported mean preoperative visual acuity was 20/80. converse to that of our study.

S Das in their study Preoperatively only (22%) had visual acuity of 20/30.

BCVA

In our study 49 of 50 pts (98%) had BCVA at post operative 6 weeks of <6/18 by snellens visual acuity. 1 pt (2%) had between 6/18-6/60.

Selçuk Sýzmaz reported The postoperative visual acuity was worse than 20/20 S Das et al in their

study reported the postoperative visual acuity in 76 eyes (94%) was 20/30 or better similar to that of our study.

Complications

Intra Operative Complications;

Posterior Capsular Rupture:

Complications noticed in our study are PCR and aphakic state of patient. Of 3 cases with PCR seen in our study,1 case occurred during nucleus delivery and in 2 cases it occurred during cortical wash.

S Das et al reported the rate of posterior capsule ruptures in their series to be (31%) where as in our study it was just 6% and he also reported that rupture occurred during emulsification of the nucleus in the phacoemulsification group in nine of 15 and during nucleus expression in the extracapsular extraction group in five of nine cases.

In study done by Selçuk Sýzmaz, et al Posterior capsule rupture occurred in 4 (15.3%) eyes. PCR occurred during removal of the posterior plaque.

Osher et al. reported the incidence of posterior capsule rupture to be 26%–36%.In contrast to our study, which showed a low incidence of posterior capsule rupture (6%).

Hayashi et al, Lee and Lee cases, Liu et al reported PCR occurance in 7.1% 11.1% , 16.7% respectively.

H Siatiri reported that posterior capsule rupture occurred in none of their cases. Where as 6% of our cases had PCR.

Nucleus Drop

S das et al reported two eyes had nucleus dropped into the vitreous during phacoemulsification.

No case of nucleus drop were seen in our study.

Ken Hayashi reports the lens nucleus dropped into the vitreous cavity in 1 patient.

S das et al Sixty intraocular lenses (74%) were implanted in the bag and 21 (26%) in the sulcus.

In 94% of cases in our study IOL was placed in the bag.

Post operative Complications:

In 8% of cases in our study AC reaction was noticed on post operative day 1.

Other complications like PCO, Retinal detachment, Macular edema were not seen in our case.

Hatem Kalantan, MD, FRCS stated other complications of the surgery are retinal Detachment, macular edema.

Summary and Conclusion

The present study of posterior polar cataract was conducted in Navodaya Medical College Hospital and Research Centre, during the period of June 2014-July 2015.The main objective of this study were to study the visual outcome in posterior polar cataract after small incision cataract extraction.

The study sample included 50 cases of posterior polar cataract.

1. The range of age of presentation was 51-60yrs with mean age of 53.125years.
2. Sex predominant: Females(56%) and Males (42%).
3. Almost equal presentations in RE (58%) and LE (42%)
4. Complications like PCR in 3 cases (6%).
5. Snellens Visual acuity on day 1 was >6/18 in 13 eyes of 26% cases.
6. Snellens visual acuity on day 7 was >6/18 in 34 eyes of 78% cases.
7. BCVA after 6weeks was >6/18 in 49 eyes of 98% cases.

The reasons for minimal complication rate in our study were:

1. Proper pre-operative assessment.
2. Thorough planning.
3. Experienced and skilled surgeons.
4. Proper knowledge of the proper technique during the surgery and about vitrectomy.

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Prevalence of Glaucoma Capsulare and Cataract in Patients withOcular Pseudo Exfoliative Syndrome

Sujani Narendar Bairy*, Pravenya Praveen Kemidi**

*Assistant Professor, Department of Ophthalmology, Kamineni Academy of Medical Sciences and Research Centre, LB Nagar, Hyderabad. **Consultant, Department of Ophthalmology, ESI Hospital, Hyderabad.

Abstract

Introduction: Pseudoexfoliation is a complex ocular disorder having increased production and accumulation of fibrillar material in the anterior segment of eye. It is more commonly seen with increasing age. Lindberg was the first author to observe pseudo-exfoliation material in 50% of his glaucoma patients. Vogt observed these findings with open angle glaucoma and proposed the name 'glaucoma capsulare'. *Aims and Objectives*: To find the prevalence of glaucoma capsulare and cataract in patients with pseudo-exfoliation syndrome in the population visiting Mamata Medical College and General Hospital, Khammam. *Materials and Methods:* This was a prospective, one year study conducted in the department of Ophthalmology, Mamata Medical College, Khammam. The study population consisted of 90 patients of ocular psudoexfoliative syndrome. Complete ocular examination was done in all subjects to detect glaucoma capsulare and cataract. *Observations and Results*: The incidence of glaucoma capsulare and cataract in PES was 18.05% and 81.94% respectively. Glaucoma capsulare increased with increasing age, was more common in males and more often unilateral. Mean Intra-ocular pressure in glaucomatous eyes was 33.82 (SD±10.79) mm of Hg. Visual acuity was poor in these patients because of cataract, glaucoma or both. More the number of pseudo-exfoliation syndrome signs and less the angle width, the higher the chances of raised intra-ocular pressure was noted. ($p<0.001$). *Conclusions*: Glucomacapsulare and cataract are common in patients having pseudoexfoliation syndrome. Glaucoma capsulare becomes more common with increasing age, affects males more than females, is more often unilateral, leading to poor visual acuity and its risk increases with the severity of pseudoexfoliation. Appropriate ophthalmologic evaluation of patients with peudoexfoliation syndrome is recommended at an early stage so as to prevent complications.

Keywords: Pseudo Exfoliation Syndrome; Glaucoma Capsulare; Cataract; Visual Acuity.

Introduction

Pseudoexfoliation is a complex ocular disorder having increased production and accumulation of fibrillar material in the anterior segment of eye. It is more commonly seen with increasing age. The association of glaucoma with pseudo-exfoliation syndrome is a well-known fact. Lindberg [1] was the first author to observe pseudo-exfoliation material in 50% of his glaucoma patients. Vogt [2] observed these findings with open angle glaucoma and proposed the name 'glaucoma capsulare'. The association of glaucoma and cataract with pseudo-exfoliation syndrome (PES) is well-known.

Aims and Objectives

To find the prevalence of complications, especially

Reprint Request: Sujani Narendar Bairy,
Assistant Professor, Department of Ophthalmology, Kamineni Academy of Medical Sciences and Research Centre, LB Nagar, Hyderabad - 500068 Telangana.
E-mail: drsujathapasula@gmail.com

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glaucoma capsulareand cataract in patients with pseudo-exfoliation syndrome in the population visiting Mamata Medical College and General Hospital, Khammam.

Materials and Methods

This was a prospective study carried out over a period of one year in the department of Ophthalmology, Mamata Medical College and associated General Hospital, Khammam. In this study 90 individuals, above the age of 40 years, were selected randomly. The inclusion criteria were that all the patients had pseudo exfoliation syndrome in one or both the eyes. The patients having traumatic, infective and inflammatory eye conditions were excluded.

Firstly, Visual acuity of both eyes was recorded. Both eyes were examined with flash torch light and Haagstreit slit lamp bimicroscopefor signs of pseudo-exfoliation syndrome. Then gonioscopic examination was done with Goldman three mirror gonioscope. Xylocaine (4%) eye drops were instilled in the conjuctival sac to anesthetize the cornea. Gonioscope filled with 2% methylcellulose, was applied over the cornea and angle of anterior chamber was examined. The following findings were noted:

Pseudo-exfoliation material deposits over angle and ciliary body, Sampaolesi's line and width of angle of anterior chamber as described by Shaffer [3].

Grade 0	0^0	Iridocorneal contact Closed angle
Grade 1	10^0	Schwalbe's line and Very narrow
		Part of trabecular angle Meshwork visible
Grade 2	10^0-20^0	Trabecular-meshwork Moderately Visible narrow
Grade 3	20^0-35^0	Scleral spur visible Moderately wide angle
Grade 4	35^0-40^0	Ciliary body visible wide angle

Then the pupils were dilated by one to two drops of 10% phenylepherineor 1% tropicamide or both. The patients werere-examined again for presence of Pseudoexfoliation. Intra-ocular pressure of both eyes was recorded with the help of applanation tonometer after anaesthetizing the cornea with 4% Xylocaine drops in conjunctival sac. Fundus oculi, the optic cup and disc, retinal vessels were examined in all cases. In advanced senile cataract cases, the fundii were examined after cataract surgery.Visual field examination was done in all glaucomatous patients on Goldmann perimeter. Lens was with Haagstreit slit lamp bimicroscope.

Observations and Results

The present study had 90 individuals. There were total 144 eyes with Pseudoexfoliation as some patients had both eye involvement by Pseudoexfoliation.

Incidence of Glaucoma Capsularein Pseudoexfoliation Syndrome

In the present study, 26 (18.05%) out of 144 eyes had pseudo-exfoliation glaucoma with IOP>22 mm Hg and field of vision and fundus oculii changes. Three eyes (2.08%) had IOP >22 mm of Hg with no field and fundus oculii changes and were labelled as ocular hypertension. 115 (79.86%) eyes had normal IOP (<22 mm of Hg). The mean age for occurrence of pseudo-exfoliation glaucoma was 66.10(SD+/-8.99) years and mean IOP was 33.82 (SD+/-10.79) mm of Hg.

Age and Sex Variation in Pseudo-Exfoliation Glaucoma

Six of the 27 females (22.22%) who had pseudo-exfoliation syndrome had glaucoma. Similarly, 20 of 63 (31.74%) male patients of pseudo – exfoliation showed glaucoma. Thus, pseudo – exfoliation glaucoma was more common in males than females (1.43:1).

The mean age for onset of glaucoma in males was 65.59 (SD±8.05) years and in females 61.98 (SD± 11.62) years.

Laterality

Unilateral pseudo-exfoliation glaucoma was more common than bilateral. Out of 26 patients, unilateral

glaucoma was seen in 16 (67.53%) and bilateral in 10 (38.96%) patients. The ratio between unilateral to bilateral pseudo-exfoliation glaucoma was 1.73:1.

Unilateral glaucoma in males was detected at the mean age of 64.93(SD±6.66) and in females, at 61.02 (SD±9.64) years. Bilateral glaucoma in males occurred at the mean age of 66.31(SD±5.92) and in females, at 61.82 (SD+/-11.2) years.

Visual Acuity

Out of 21 glaucoma patients (42 eyes), 26 eyes were having glaucoma capsulare. Out of them, 6 eyes (23.07%) had no perception of light, 14 (53.84%) had vision 3/60 to PL +, 5 (19.23%) eyes had 6/36 and 1 (3.84%) eye had 6/36 to 6/6 vision.

Table 1: Incidence of glaucoma in relation to age, gender and laterality

Age	Male Unilateral	Bilateral	Female Unilateral	Bilateral	Total
40-49	0	0	0	2	2
50-59	1	0	0	0	1
60-69	7	4	0	2	13
70-79	5	2	2	0	9
80 And Above	1	0	0	0	1
Total	**14**	**6**	**2**	**4**	**26**
Percentage	53.84 %	23.07%	7.69%	15.38%	100%

Table 2: Visual status in glaucoma capsulare patients

Visual Acuity	PL-Neg.to PL+ PR accurate	HMCF to 3/60	4/60 to 6/36	6/24 to 6/6	Total	%
Glaucoma	1	4	1	1	7	16.66
Cataract	1	4	6	5	16	38.11
Both glaucoma and cataract	5	10	4	0	19	45.23
Glaucoma%	23.07	53.84	19.23	3.84	42	100

Both eyes glaucoma 5 cases = 18.18%
Total glaucoma % = 19+7 = 26 (61.9%)
Total cataract % = 19+6 = 35 (83.33%)

Fundus Oculii

Out of 26 glaucomatous eyes, fundus could be visualized on dilatation of pupil in 19 eyes only. Variable glaucomatous cupping; ranging from cup to disc ratio (C:D ratio) of 0.4 to 0.9 were seen. All cups had larger diameter, other characteristic of the cups seen in these eyes was nasal shifting of vessels. In rest of the 7 eyes fundus details were obscured.

Visual Fields

Out of 26 eyes having pseudo-exfoliation glaucoma; visual fields examination could be carried out only in 3 eyes since rest of the eyes had poor vision due to cataract or glaucoma itself. All above three eyes examined showed glaucomatous field defects- 2 had Bjerrum's scotoma and 1 eye had only temporal island of vision.

Relation of Raised IOP to Angle Status

Out of 144 eyes (of 90 patients) having pseudo-exfoliation syndrome, 91 eyes had grade 4, open angle, 39 eyes had grade 3, 8 eyes had grade 2 and 6 eyes had grade 1 open angle. 3 cases of ocular hypertension were recorded out of which one eye showed angle grade 3 and 2 eyes had open angle grade 4. Among 26 glaucomatous eyes, 17 had grade 4, 5 eyes had grade 3, 2 eyes had grade 2 and another 2 eyes had grade 1 anterior chamber angle width.

Frequency of Pseudo-Exfoliation Signs in 144 Eyes

Out of 144 eyes, 22 eyes had 1-2 number of pseudo-exfoliation signs; 29 eyes had 3-4 signs, 38 had 5-6; 48 had 7-8 and 7 eyes had 9-10 signs of pseudo-exfoliation syndrome. The signs of PES were 1. Pseudo-exfoliation on pupillary margin 2. Pseudo-exfoliation on anterior surface of lens 3. In pupillary

area 4. In retro-iridialportion 5. Degranulation of pupillary ruff 6. Pigment deposition on trabeculum7. Pseudo-exfoliation at angle 8. Pigment on corneal endothelium 9. Sampaolesi's line 10.Pigment on anterior surface of lens

Out of 144 eyes, 115 had IOP <22 mm of Hg with no signs of pseudo-exfoliation glaucoma. Twenty nine eyes showed IOP > 22 mg and signs of glaucoma in the optic fundus. Three eyes had IOP >22 but <30 mm of Hg and no signs of pseudo-exfoliation glaucoma and were labeled as cases of ocular hypertension.

Table 3: Relation of raised Intraocular Pressure to Angle Status and Frequency of Signs in Pseudo-exfoliation Syndrome

No. of signs of PES	Angle status grade and number of eyes affected								Subtotal		
	Grade 4		Grade 3		Grade 2		Grade 1				
	N	H	N	H	N	H	N	H	N	H	
1,2	12	0	9	0	1	0	0	0	22	0	22
3,4	17	2	7	0	1	0	2	0	27	2	29
5,6	19	5	10	1	2	0	0	1	31	7	38
7, 8	22	9	6	5	2	2	2	0	32	16	48
9, 10	2	3	1	0	0	0	0	1	3	4	7
Total	72	19	33	6	6	2	4	2	115	29	144

N: normal IOP, H: high IOP

Table 4: Incidence of IOP in Relation to Age, Sex and Laterality

Age	Males		Females		Total No. of eyes
	Unilateral	Bilateral	Unilateral	Bilateral	
40-49	-	-	-	2	2
50-59	1	-	-	-	1
60-69	7	4	-	2	13
70-79	8	2	2	-	12
80 and above	1	-	-	-	1
Total	17	6	2	4	29

IOP Status in Eyes with Pseudo-Exfoliation Syndrome

Among 90 patients, 144 eyes showed varied number of signs of pseudo-exfoliation. Out of them, 22 eyes presented with 1 – 2 signs and among them no eye (0%) had high IOP, 29 eyes who presented with 3 – 4 signs had high IOP in 2 eyes (6.90%), 38 eyes with 5 – 6 signs showed high IOP in 7 eyes (18.42%), 48 eyes with 7 – 8 signs had high IOP in 16 eyes (33.33%) and 7 eyes who showed 9 – 10 signs presented with high IOP in 4 eyes (57.14%).

Table 5: Relation of Number of Signs of PES to IOP Status

No. of signs of PES	Total No. of eyes	No. of eyes with high IOP	%	Mean age, SD
1,2	22	0	0%	51.23+/-6.18
3,4	29	2	6.90%	60.02+/-9.31
5,6	38	7	18.42%	60.52+/-8.24
7,8	48	16	33.33%	65.73+/-8.83
9,10	7	4	57.14%	67.83+/-8.66
Total	144	29	20.14%	66.10+/-8.99

IOP: intraocular pressure. SD: standard deviation

Incidence of Cataract and Glaucoma in Pseudoexfoliation Syndrome

The incidence of cataract in pseudo- exfoliation syndrome 118 (81.94%) eyes out of 144 having pseudo-exfoliation syndrome had changes from early lenticular opacities to mature cataract.

Discussion

Relation between Pseudo-Exfoliation and Glaucoma

The most important complication of pseudo-exfoliation syndrome is glaucoma capsulare. The development of glaucoma was first postulated and

later demonstrated by Vogt [2] He found that pseudoexfoliation material created obstruction at the angle of anterior chamber, leading to glaucoma. According to Sampolesi et al [4] Glaucoma capsulare is secondary type of glaucoma in which pseudo-exfoliation material and pigment granules obstruct the trabecular meshwork.

Schlotzer-Schrehardtet al [5] have postulated an underlying defect of the outflow channels. This theory was verified by Leyden et al [6] by finding a unilateral pseudo-exfoliation and bilateral glaucoma.

The incidence of glaucoma capsulare in pseudo-exfoliation syndrome has been reported by various authors and has wide variations. Vogt [2] found'glaucoma capsulare in 75% cases of pseudo-exfoliation syndrome in Switzerland. Incidences reported from other places are 72% in England by Roche [7] 20-25% in UK by Hansen et al,[8] 32.5% in India by Sood et al, [9] 8.1% in Australian aborigines by Taylor et al, [10] 75% in USA by Kozart et al [11] 9% in India by Lamba et al,[12] 63% in Japan by Shimizu et al [13] and 18.8% in Shimla Hills of India by Sharma et al [14].

Incidence of glaucoma capsulare was more in females than in males as observed by Roche [7] Smith [15] and Yanoff [16]. But others studies by Aasved [17] and Kozartet al [11] found no variation of incidence among either sex. Higher incidence among men was reported by Lowe [18]. The mean age of onset of glaucoma capsulare in pseudoexfoliation syndrome as reported by Lowe[18] is 73 years and by Smith [15] is 69 years.

Onset of glaucoma occurred within five years in 7-20% and within 10 years in 9-24% as reported by Hansen et al [8] and within 10 years in 15% of cases as reported by Leyden et al [6].

Glaucoma occurs more commonly in eyes with PES than in those without it. Elevated IOP with or without glaucoma occurs in about 25% of persons having PES. The clinical course and prognosis are much worse in exfoliative glaucoma than in primary open-angle glaucoma. Also the problems of optic nerve damage,visual field damage, poor response to medications and surgical interventions are more common. Persons with elevated IOP and PES are much more likely to develop glaucomatous damage on long-term follow-up than those without PES [14, 19].

Several authors have observed higherintraocular pressure in pseudo-exfoliation glaucoma than in primary open angle glaucoma [6, 11, 17] . Optic nerve damage was more pronounced and earlier in PES glaucoma than primary open angle glaucoma [6, 16, 17].

Sampolesi [20] reported heavy pigment desposition over trabecular meshwork in pseudoexfoliation syndrome as a pigmented line and he called that pigmented line as 'Sampolesi's line'. He found it in 83% of PES glaucoma cases. Later this observation was confirmed by Horven [21] who found its presence in 77% of glaucoma capsulare cases. Moreno – Montanes et al [22] suggested a highly significant correlation between elevated IOP and the degree of pigmentation of the meshwork.

The apparent production ofpseudoexfoliation material by trabecular cells not only causes mechanical obstruction but also may be responsible for development of a special type of secondary open-angle glaucoma in PES syndrome [5].

Patients with pseudo-exfoliation syndrome respond poorly to medical therapy as compared to laser trabeculoplasty and trabeculectomy [6, 21, 23]. The disappointing results in pseudo-exfoliation glaucoma were explained due to delayed diagnosis, the tendency to ever higher intraocular pressure, early optic nerve damage in these eyes and failure to recognize the conditions earlier by its quiescent nature. Many investigators have advised to make a thorough search for this condition, close follow up and early management of the disease [15, 21] .

PES is the only common glaucoma which usually affects only one eye or affects one eye long in advance of the other. Anyone over age 50 with unilateral glaucoma should be suspected of having PES.When only one eye is clinically involved, the fellow eye often has abnormal aqueous humor dynamics or glaucomatous damage [19] .

Incidence of Glaucoma Capsulare

The incidence of glaucoma capsulare is quite variable. Aasved et al [17] reviewed the incidence in world literature and found it ranging from 0-93%. These figures included the pseudo-exfoliation syndrome incidence in population as well as in glaucoma clinics. However, we reviewed the pseudo-exfoliation glaucoma incidence in hospital visiting population studies, which is as follows:-

In the present study of 144 eyes, glaucoma capsulare was seen in 26 (18.05%) eyes and ocular hypertension in 3 (2.08%) eyes. Lamba et al [12] observed 9% incidence of glaucoma capsulare and 1.7% of ocular hypertension. On the other hand, Kozart et al [11] observed 7% incidence of glaucoma capsulare and 15% of ocular hypertension in pseudo-exfoliation syndrome. Similarly, Klemetti [23]

Table 6: Incidence of Glaucoma Capsulare in Hospital Visiting Population

Study	Country	Incidence of Glaucoma (%)
Sood et al [9]	India	32.5%
Kozart et al [11]	USA	7.0%
Lamba et al [12]	India	9.0%
Sharma et al [14]	North India	18.0%
Klemetti et al [23]	Finland	4.0%
Thomas et al [24]	South India	5.5%
Present study	**South India**	**18.0%**

reported incidence of 4% glaucoma capsulare and 44% ocular hypertension. Sharma et al [14] did a study in Shimla, North India, and observed glaucomacapsulare in 18.82% and ocular hypertension in 1.76% of PES cases, which compares well with the present study from South India.

Incidence of glaucoma capsulare is nearly two times in the present study as compared to the incidence reported by Lamba et al [12]. However, the incidence of ocular hypertension is again much lower in both the studies, whereas, incidence of ocular hypertension is much higher in the studies by Kozart [11, 23]. The possible explanation is that in the Indian milieu, the patients report very late at an Ophthalmological centre, by which time a considerable number of patients who had been having ocular hypertension, had turned into overt glaucoma cases and add up to the latter figure.

Age Variation in PES Glaucoma

The onset of glaucoma capsulare usually occurs in 6th decade of life [13]. Lowe [18] reportedthe mean age of onset of glaucoma at 73 years, Sharma et al [14] at 63.04 (SD+/-7.4). In the present study, mean age for onset of glaucoma was 63.24 (SD±7.96) years which compares well with the figure of Shimizu et al from Japan [13]. Thus, our findings show that onset of glaucoma capsulare is comparatively at an earlier age than other countries of the west.

Gender Variation in PES Glaucoma

The incidence of glaucoma capsulare has been reported higher in males by Hansen et al [8] Roche, [7] Smith,[15] Lamba et al, [12]Shimizuet al [13] and Sharma et al [14]. Present study showed 31.74% incidence of glaucoma capsulare in males and 22.22% in females (ratio 1.43:1). This is quite in agreement with above enumerated studies.

However, Aasved et al [17] and Leyden et al [6] found no significant difference between the two sexes. The possible explanation of this variation is again, perhaps the difference of parameters of the samples studies.

Laterality in Glaucoma Capsulare

In the present study unilateral glaucoma was seen in 61.54% and bilateral in 38.46% out of the 26 patients with pseudo-exfoliation syndrome. Kozart et al [11] reported incidence of 76% unilateral and 24% bilateral glaucoma capsulare in their patients of pseudo-exfoliation syndrome. Sharma et al [14] reported 66.6% unilateral and 33.4% bilateral glaucoma capsulare. Thus, higher incidence of unilateral glaucoma capsulare in the present series compares well with above authors. Lamba et al [12] have also reported unilateral glaucoma capsulare more common than bilateral, but these authors have not given the exact incidence. However, some authors [7] have reported bilateral glaucoma capsulare more common than unilateral but such reports are very few.

In females, bilateral glaucoma capsulare is more common than males. In the present study, 66.66% glaucoma patients had bilateral glaucoma capsulare in females and 30% in males. So there is significantly higher incidence of bilateral glaucoma capsulare in females than males ($p< 0.05$). Similar findings were reported by Kozart et al [11] who observed 67% bilateral glaucoma capsulare in females and 33% in males. Sharma et al [14] also reported bilateral involvement in 55.6% females and 25% males. Thus, we are quite in agreement with the observations of above authors. But it is difficult to postulate why PES: bilateral glaucoma incidence is so high in females than males.

In this study, mean age of onset of unilateral glaucoma was 63.8 (SD±8.1) years and of bilateral glaucoma 65.16 (SD±9.2) years. Kozart et al[11] reported mean age of 71 years for onset of unilateral glaucoma capsulare and 72.5 years for bilateral glaucoma. Sharma et al [14] reported 63.8 years for onset of unilateral and 65.16 years for onset of bilateral PES. No such figures are available in other studies from this country for comparison.

Intraocular Pressure in PES Glaucoma

Mean intra-ocular pressure in the present study

was 33.82 (SD±10.79) mm of Hg in glaucoma capsulare patients, which was quite high. Many authors have also noted higher intra-ocular pressure levels in glaucoma capsulare as compared to primary open angle glaucoma [6, 8, 14, 17, 23]. A definite cause had not been found for higher intra-ocular pressure levels in glaucoma capsulare but blockade of trabecular meshwork with pigment granules is the most likely cause [11, 23].

Visual Acuity in PES Glaucoma

Visual acuity was found to be quite poor in our glaucoma capsulare patients. 23.07% eyes had complete glaucomatous optic atrophy and no perception of light; 53.84% were economically blind (vision 3/60), 19.23% were having vision 3/60 to 6/60 and in 3.84% eyes vision was 6/24 to 6/6. The cause for poor vision was senile cataract or glaucoma capsulare or both. Roche[7] reported that 37% eyes had poor to worse vision in glaucoma capsulare. Sharma et al [14] reported that 53.1% were economically blind among patients of glaucoma capsulare. Thomas et al [24] reported poor vision (no perception to light) in 20.5% of pseudoexfoliation cases and significantly impaired vision (<6/60) in 24.65%. Thus, our observations compare well with the above authors and we conclude that glaucoma capsulare is much more devastating to the eye for visual prognosis.

Visual Fields in PES Glaucoma

In most of cases visual fields couldn't be charted because of poor vision due to either glaucoma or accompanying cataract. Out of 26 eyes having glaucoma capsulare, visual field could be examined only in 3 eyes. All these showed glaucomatous field defects - two eyes had Bjerrum's scotoma and other had only a temporal island of vision left. Early damage of optic nerve head in glaucoma capsulare leading to early visual field defects is a well-known fact [6, 7, 14, 23]. Similar finding in the present study further substantiates this observation.

Relation of Glaucoma to Frequency of Signs and Angle Status

We tried to correlate the number of signs of pseudoexfoliation syndrome and angle width, on one hand, to the raised intra-ocular pressure and on the other, to frequency of signs of PES in the 144 affected eyes. The study revealed that highest incidence of raised intra-ocular pressure occurred in the eyes having maximum number of signs and minimal width of angle (Grade 1 open). The converse is also true i.e. minimum incidence of raised intra-ocular pressure occurred in the eyes having minimum number of signs of pseudo-exfoliation syndrome and maximum angle width. If the angle status of the eye is ignored, then incidence of eyes having raised intra-ocular pressure (more than 22 mm of Hg) increased as the number of signs of pseudo-exfoliation syndrome increased. Raised intra-ocular pressure was noticed in 57.14% eyes having 9-10 signs of pseudo-exfoliation syndrome, in 33.33% eyes having 7-8 signs; in 18.42% eyes having 5-6; in 6.90% eyes having 3-4 and 0% in eyes having 1-2 signs. This suggests that more the number of signs of pseudoexfoliationsyndrome, more are the chances of raised intra-ocular pressure.

As expected, the raised intro-ocular pressure was found more often in the eyes having minimal angle width. Raised intra-ocular pressure was found in 33.3% eyes with grade 1 angle of anterior chamber, 25% in grade2, 15.38% in grade 3 and 20.87% in grade 4 wide angles. The above correlation proves that an eye which has a narrow angle width and more number of signs of pseudo- exfoliation syndrome is at a much greater risk to develop glaucoma.In other words more angle width provides inbuilt protection from development of glaucoma against the severity of the pseudo-exfoliation syndrome, if number of signs is any indication of the severity of the disease.

Relation of Cataract to Pseudoexfoliation Syndrome

In the present study, 118 out of 144 eyes examined (81.94%) with pseudo-exfoliation syndrome had cataract. Cataract is known as a most common and frequent associated condition with pseudo-exfoliation syndrome. Usually it is nuclear type, but cortical type can also be present. Lindberg [1] reported 20% incidence of cataract in pseudo-exfoliation syndrome, while Sood et al, [9] 34.6% nuclear cataract and 23.1% cortical type. Thomas et al [24] in south India reported 46.7% incidence of cataract in pseudo-exfoliation syndrome.

Since senile cataract and pseudo-exfoliation syndrome are essentially age related degenerative diseases, it is possible that the latter process enhances the former, whenever the two conditions co-exist.

Conclusions

Glucomacapsulare and cataract are common in patients having pseudoexfoliation syndrome. Glaucoma capsulare becomes more common with increasing age, affects males more thanfemales, it is

more often unilateral, leading to poor visual acuityand its risk increases with the severity of pseudoexfoliation.Appropriate ophthalmologic evaluation of patients with peudoexfoliation syndrome is recommended to detect these lesions at an early stage so as to prevent complications.

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