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# Al-Shifa Journal of Ophthalmology

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**QUARTERLY PUBLISHED**

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- **Case Report - Peters anomaly and hydrocephalus**

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# Al-Shifa Journal of Ophthalmology

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**Aims and Scope:** ASJO, The official journal of Al-Shifa Trust Eye Hospital, Rawalpindi, publishes original reports of research in Ophthalmology mostly in the form of clinical studies. Topics may include new diagnostic and surgical techniques, treatment methods, atypical case reports, major and mini-reviews, preventive ophthalmology including health economics and applied research findings.

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There were two objectives, first, to analyze the refractive change in children with congenital ptosis who have undergone levator resection/ sling surgery during the period of study and second, to find out the relationship between preoperative severity of ptosis and postoperative magnitude of change in refractive error. Twenty patients with isolated congenital ptosis were taken through convenient sampling who fit the inclusion criteria. Two techniques were used for the surgery- sling and levator resection. Preoperative and postoperative visual acuity was measured by age-appropriate methods, VA was then converted to LOGMAR.

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**A Newborn child with Peters Anomaly and Hydrocephalus (Case Report)** **53**

Muhammad Kashif Habib, Saad Alam Khan, Muhammad Saqib Habib

A one month old female child presented with complaints of watering and discharge from her right eye. On examination her right eye had corneal abscess with descemetocoele and perforation, while left eye had microcornea and corneal opacity with central irido-corneal and lenticulo-corneal adhesions (Peters anomaly). On systemic examination she was having hydrocephalus.

## Ocular Trauma in Children – Prevention is better than cure

Mahmood Ali

The saying by Benjamin Franklin “An ounce of prevention is worth a pound of cure” is particularly true in the context of pediatric ocular trauma, where appropriate preventive measures can save many eyes, effort, money and time.

Each year an estimated 3.3 to 5.7 million pediatric eye injuries occur worldwide, out of which, nearly 90% are preventable<sup>1</sup>. Being a leading cause of non-congenital unilateral blindness, the incidence of severe visual impairment or blindness resulting from ocular trauma in children is reported to be up to 14%<sup>2</sup>. Such enormity of the resulted morbidity makes ocular trauma an important public health problem.

Statistics show that male gender is a risk factor for ocular injuries of all types and in all environments, while the causes of injury vary with the living environment of the children. A study with 15 years retrospective review of paediatric eye trauma reports that injuries occurred at home predominate in children younger than 6 years, whereas injuries at play are the most frequent in school children<sup>2</sup>. Major sources of ocular injuries in children include pencils, syringes, vegetative material like branches, sticks, bow and arrow made with straws etc<sup>3</sup>. From a local perspective, the study conducted at Al-Shifa Trust Eye Hospital on childhood ocular trauma revealed that open globe injuries were 76% versus 23% of closed globe injuries (See the article on childhood ocular trauma by Aziz et al.). Factors indicating poor visual prognosis in such cases include poor presenting visual

acuity, posterior segment involvement, long wound length, globe rupture, lens involvement, vitreous hemorrhage, retinal detachment, and endophthalmitis. Long term complications like uveitis, traumatic cataract and secondary glaucoma require timely clinical decisions for appropriate management strategies. Unfortunately, the number of tertiary care eye hospitals in the country with adequate facilities to deal with such complicated cases is too less.

As mentioned previously, up to 90% of eye injuries can be prevented with better education, supervision, and proper eye protection. In general, strategies aimed at reducing ocular trauma fall into 3 broader categories: legislation, education, and protection. Legislations including restrictions on the sale and supply of certain consumer products like fire crackers and mandatory vehicle seatbelts have assisted in reducing paediatric eye injuries in many developed countries<sup>4</sup>. Educational tools aimed at children, their parents and caregivers have been effective in changing attitudes to eye health and safety. Effective pediatric eye injury prevention systems require a multifactorial approach combining legislation, policies, standards, education, and personal eye protection to limit exposure to ocular hazards<sup>5</sup>.

In addition to these measures, analyzing mechanism of trauma can also facilitate the efforts to prevent eye injuries at home, school & workplace. Moreover, parental awareness and supervision is extremely important in order to reduce the incidence of ocular trauma. Parents and caregivers

must ensure to keep sharp objects like needles, pens, pins away from small children. Cases have been reported in which mere fights among school children resulted in serious ocular injuries and permanent loss of sight. It is the duty of parents as well as school teachers to teach children regarding the hazards of fighting with others.

Importance of collaborative work between health professionals and development of a standardized protocol for a trauma registry is of also paramount importance<sup>4</sup>. Educational campaigns in print and electronic media are required, to highlight the importance of prevention of potentially damaging factors and promotion of health education strategies covering both the home environment and the streets. At government level, measures like control of the toy industry and legislation on sale of fireworks etc. can help to significantly reduce the cases of ocular injuries in children<sup>6</sup>.

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# Comparison of efficacy of intravitreal avastin alone with combination of intravitreal avastin and peribulbar triamcinolone in diabetic macular edema

Yaseen Lodhi<sup>1</sup>, Adnan Aslam Saleem<sup>2</sup>, Danish Gani<sup>3</sup>, Nadeem Qureshi<sup>2</sup>

## ABSTRACT

**Background:** Bevacizumab and triamcinolone acetonide (TA) are both common choices for treatment of diabetic macular edema (DME), but the comparative efficacy of combined or separate applications is still debatable.

**Purpose:** To compare the efficacy of intravitreal injection avastin alone with combined intravitreal injection of avastin and peribulbar triamcinolone/ posterior sub tenonkenacort (PSTK) in patients of diabetic macular edema.

**Methods:** The study was carried out in the vitreoretina department of Al-Shifa Trust Eye Hospital, Rawalpindi. Main outcome measure was improvement in number of Snellen visual acuity lines one month after treatment in this randomized clinical trial.

**Results:** Thirty five patients were studied in both groups. All but 2 patients completed the follow-up. At baseline mean BCVA  $\pm$ SD was  $0.8712 \pm 0.28685$  log MAR of Snellen letters in the avastin alone group. In avastin + PSTK group, baseline mean BCVA  $\pm$ SD was  $0.8371 \pm 0.33267$  log MAR of Snellen letters. The follow up BCVA  $\pm$ SD was  $0.5541 \pm 0.31255$  in the avastin only group compared to  $0.5406 \pm 0.31255$  in the avastin + PSTK group. This shows significant improvement in visual acuity ( $p$ -value  $< 0.001$ ) in their respective groups. When comparing both groups using the independent t-test, the  $p$ -value came out to be 0.790, showing there is no significant difference in VA improvement when subtenon triamcinolone is added to intravitreal avastin.

**Conclusion:** Intravitreal bevacizumab injection alone in a concentration of 1.25mg / 0.05ml in patients with DME resulted in significant improvement in BCVA. Intravitreal avastin when given with posterior subtenon triamcinolone in a dosage of 4mg/.1 ml (40mg/ml) also showed significant improvement in BCVA but this improvement was not statistically significant. *Al-Shifa Journal of Ophthalmology 2016; 12(1): 9-15.* © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

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## Introduction

Diabetic retinopathy (DR) is one of the leading causes of blindness in working population with about 200 million affected across the world.<sup>1</sup> Diabetic macular edema (DME) is a manifestation of DR. It can occur at any stage of retinopathy and is the most common cause of visual loss in patients with DR. Its prevalence in patients has been reported to be 2.7–11.0%.<sup>2</sup>

DME is caused by increased vascular permeability and increase in concentration

of growth factors such as vascular endothelial growth factor (VEGF).<sup>3</sup> To find the best treatment strategy that not only cures the condition, but has the least side effects is still a big challenge. Various treatment modalities have been postulated with different degrees of success.

Anti VEGF such as Intravitreal bevacizumab (avastin), a full-length humanized monoclonal anti-VEGF antibody is currently being used in DME.<sup>4</sup> It has anti-angiogenic and anti-exudative effects. Although still an off-label drug but its use has risen tremendously in the last few years probably due to its efficacy and economic considerations. Posterior sub-tenon triamcinolone/kenacort (PSTK) or methyl prednisolone injections have been used to treat DME either as monotherapy or as adjunctive therapy. Their efficacy in improving visual acuity has been demonstrated in some studies.<sup>5</sup> This study is structured to see if PSTK is given along with intravitreal avastin, is there any additional benefit or not.

### **Subjects and Methods:**

The study was conducted after approval by the hospital ethical committee. An informed consent was taken from all the patients. In this randomized clinical trial all patients with DME were included. DME was diagnosed by clinical exam and confirmed on OCT (Optical Coherence Tomography). Both type 1 and 2 diabetics of any age and gender were included. Complete ophthalmic examination including best corrected visual acuity measurement (BCVA) using a standard Snellen chart (converted to log MAR), and slit lamp and dilated fundus examination was performed.

Exclusion criteria were history of intraocular surgery during last 8 months, history of retinal laser photocoagulation, high refractive errors (>6 diopters of sphere or >3 diopters of cylinder), media opacity affecting VA and OCT

measurements, history of glaucoma or intraocular pressure more than 22 mmHg, ischemic or inflammatory optic neuropathy, uveitis, retinal vascular occlusion, vitreo-macular interface disorders and the need for pan-retinal photocoagulation. Both eyes of each participant were enrolled if both eyes met the inclusion criteria.

The patients were selected for the study by systematic random sampling taking into consideration the inclusion and exclusion criteria. Patients were randomly allocated to either group based on computer generated table of random numbers. First group was given monotherapy i.e. only injection avastin and the other group received both intravitreal avastin and PSTK by a blinded senior retina consultant.

Intravitreal injections of 1.25 mg/0.05 ml bevacizumab and 40mg/1ml posterior subtenon triamcinolone were administered in retina clinic under sterile conditions. After instillation of a drop of proparacaine, one drop of 5% povidone-iodine was instilled in the fornix. The lids were kept open by the surgeon and no speculum was used. The patients were asked to look at the contralateral shoulder. Triamcinolone injections were given into the sub-tenon space in the superotemporal fornix (as far posteriorly as could be easily visualized, nearly more than 8 mm from limbus) with a 27-gauge needle under direct visualization. Avastin injection was given with a TB syringe (30 G) in the inferotemporal quadrant, 3-3.5mm for pseudophakes and 3.5-4.0 mm for phakic patients.

Patients started using ciprofloxacin eye drops four times per day one day before the injection/ injections and continued to do so for four days after the injection. Follow up after completion of therapy was done in the retina clinic of the hospital at 1 month. Statistical analyses were performed

with SPSS software (version 17, SPSS Inc. Chicago, IL), paired *t* test and Independent sample *t* test were used for analysis.  $P < 0.05$  was considered significant.

## Results

A total of 70 patients of DME were included in the study in 2 groups of 35 each from which one patient in each group was lost to follow up. In this study group minimum age was 41 years and maximum 80 years with a mean age of  $62.37 \pm 7.734$ . There were 37 (54.4%) males and 31 (45.6%) female patients in the study. 36 (52.9%) right and 32 (47.1%) left eyes were part of the study. 34 patients each were in both groups i.e. avastin only and avastin + PSTK.

In avastin only group, there were 34 patients in all. 18 were male and 16 were female. 19 right and 15 left eyes were part of this group. The baseline BCVA was  $0.8712 \pm 0.28685$ . The follow up BCVA was  $0.5541 \pm 0.31255$ . The mean improvement in VA (number of Snellen lines) was  $1.7353 \pm 1.05339$ . 1 eye got worse by 1 line. In 4 eyes there was no improvement while the other 29 eyes showed improvement. Maximum improvement seen was of 3 lines. A p-value of  $<0.001$ , indicates a definite improvement (change in VA) after the

administration of avastin as a monotherapy (single therapy) at 1 month post injection. (Table 1).

In avastin + PSTK group, there were a total of 34 patients including 19 male and 15 female patients. Baseline BCVA was  $0.8371 \pm 0.33267$ . The follow up BCVA was  $0.5406 \pm 0.34608$ . The mean improvement in VA (number of Snellen lines) was  $1.6471 \pm 1.61212$ . The visual acuity of 3 patients decreased while VA of 7 patients experienced no change. Rest of the 24 eyes showed improvement in their visual acuities. Maximum deterioration recorded was by 2 lines (1 patient) and maximum improvement seen remarkably was by 6 lines. Comparing pre and post treatment visual acuities, the p-value came out to be  $<0.001$ , this indicates improvement after therapy i.e. intravitreal avastin along with posterior subtenon triamcinolone at 1 month post treatment. (Table 2).

For the comparison between the 2 groups i.e. intravitreal avastin only (monotherapy) and intravitreal avastin + PSTK, independent t-test was used. P-value of 0.790 revealed that statistically there is no difference between these two groups in terms of improvement in the number of lines improved on Snellen's chart. (Table 3).

**Table 1:** Avastin only group

	n	Minimum	Maximum	Mean	Std. Deviation
Age	34	41.00	80.00	62.8529	7.15682
BLVA=baseline VA(logMAR)	34	.48	1.30	.8953	.28744
FUVA=follow up VA(logMAR)	34	.00	1.30	.5871	.33043
Change=Improvement in no. of Snellen lines (efficacy)	34	-1.00	3.00	1.6765	1.09325

**Table 2:** Avastin + PSTK group

	n	Minimum	Maximum	Mean	Std. Deviation
Age	34	41.00	80.00	61.9118	8.35343
BLVA=baseline VA (log MAR of Snellen lines)	34	.30	1.30	.8371	.33267
FUVA=follow-up VA (log MAR of Snellen lines)	34	.00	1.30	.5406	.34608
Change=Improvement in no. of Snellen lines (efficacy)	34	-2.00	6.00	1.6471	1.61212

**Table 3:** Comparison of mean change (VA) between two groups  
(Change = Follow up VA - Baseline VA)

Groups	n	Mean change of VA		p-value
		Mean	Standard Deviation	
Avastin only group	34	1.6765	1.09325	0.790
Avastin + PSTK group	34	1.6471	1.61212	

**Discussion**

DME is a manifestation of DR that produces loss of central vision. There are several treatment modalities under use. Initially, laser photocoagulation, intensive glycemic control and blood pressure control were the main stays of treatment. Given that most eyes with DME that are treated with laser photocoagulation do not have an improvement in VA, there was search for other treatment modalities such as therapy with oral protein kinase C inhibitors and the use of intravitreal corticosteroids, peribulbar (sub tenon) steroids and intravitreal administration of anti-VEGF compounds such as bevacizumab.

Results of this study suggest that intravitreal bevacizumab injection given alone or when combined with posterior subtenon triamcinolone appears to be

effective in the primary treatment of DME. But, there is no significant benefit of giving sub-tenon triamcinolone with injection of intravitreal avastin as the outcome in both groups is quite similar. Also by adding another drug, the risk of side effects may increase (which itself necessitates further studies in this subject). Limited data is available in this context. There are studies in which intravitreal avastin is studied or compared with triamcinolone but, in most studies the route of administration of triamcinolone is intravitreal and not subtenon. The need for studying the effect of subtenon triamcinolone was felt firstly due to the increased safety profile of sub-tenon route compared to intravitreal route of administration and secondly due to the fact that before the advent of anti-VEGF and laser therapies, sub-tenon triamcinolone was considered among the treatment

options for DME. PSTK is still a treatment of choice in some forms of macular edema (but not in DME) especially macular edema secondary to intermediate or posterior uveitis.<sup>6</sup>

This study was carried out on 70 eyes and demonstrated significant improvement in visual acuity taken as log MAR of Snellen letters following either a single injection of Intravitreal bevacizumab or injections of intravitreal bevacizumab with PSTK in the same sitting in patients of DME. The results of our study confirm previous reports showing the beneficial effect of intravitreal bevacizumab in the treatment of DME.<sup>7,8</sup>

Extensive research has been done and further is ongoing regarding the role of intravitreal Avastin in diabetic macular edema. The Pan-American Collaborative Study Group in their study on eyes with clinically significant macular edema (CSME) performed repeated intravitreal bevacizumab injections, after a mean of 13.8 weeks for the second injection and after 11.5 weeks for the third injection.<sup>9</sup> IVB was used as a primary treatment for diabetic macular edema at doses of 1.25 mg or 2.5 mg and results showed that within 1 month after the initial bevacizumab injection mean BCVA improved from 0.87 to 0.6, a difference that was statistically significant ( $P < 0.0001$ ).

In our study mean BCVA improved significantly from  $.8712 \pm .28685$  baseline value to  $.5541 \pm .31255$  ( $p < 0.05$ ) in the avastin only group while in avastin + PSTK group, the improvement is from baseline values of  $8371 \pm .33267$  to  $.5406 \pm .34608$  ( $p < 0.05$ ). Our results closely coincide as regards the BCVA after the first IVB (intravitreal bevacizumab/avastin) at 1 month follow up is concerned, however due to their lack of standardization regarding the number of injections, anti-VEGF drug dosage and not

using PSTK, further comparisons cannot be made.

Seo and Park in their study in Korea treated 33 eyes with 0.05 mL intravitreal injection containing 1.25 mg.<sup>10</sup> The mean BCVA in log MAR, significantly improved ( $p = 0.003$ ) at 1 month as compared to mean BCVA at 2 or 6 weeks from baseline. Their findings concur with our study showing that the beneficial effect on BCVA was seen at 1 month after injection of bevacizumab. However PSTK was not considered in their study.

Shimura Mand others in Japan found that in bevacizumab-injected eyes VA from baseline improved at one week ( $P < 0.002$ ), and kept the level up to four weeks ( $P < 0.008$ ). However, at 12 weeks, VA returned to the initial level ( $P > 0.161$ ). Their results at 1 month are consistent with our; however their 12 week findings cannot be compared with our study.<sup>11</sup>

Lam DSC and others compared efficacy of 1.25 and 2.5 mg doses of intravitreal bevacizumab for CSME. For both groups, there were significant reductions in mean central macular thickness (CMT) at all visits compared with baseline ( $P < 0.013$ ). No significant difference in BCVA was observed between the two groups at any time point ( $P > 0.56$ ).<sup>12</sup> Subgroup analysis showed that intravitreal bevacizumab seemed to be more effective in eyes without any previous diabetic macular edema treatment, hence confirming the reason for the better results of our study and those of others when IVB was used as a primary treatment.

The Korean Institute of Vision Research in their study of repeated Intravitreal injections of bevacizumab for CSME showed that improvement in VA with a single injection of IVB lasted for 4 to 6 weeks with deterioration of VA and recurrence of macular edema at 8 to 12 weeks, necessitating another injection.<sup>13</sup> Though our study only dealt with a single

injection of IVB, it still showed significant improvement in visual acuity at 4 weeks.

Study by Young showed the mean visual acuity at 1 month in the posterior subtenon injection group to be  $(0.650 \pm 0.281; p=0.011)$  from baseline and at 3 months  $(0.623 \pm 0.264; p=0.007)$ .<sup>14</sup> This study showed no significant difference between the 2 groups i.e. PSTK and IVTA (both as monotherapy) while individually both groups showed significant improvement in visual acuity. We didn't use PSTK as a monotherapy, but the study showed that when steroid is given by either route i.e. intravitreal or peribulbar it causes a reduction in ME thereby improving VA.

Cardillo compared intravitreal injection with PSTK in DME. They concluded that the intravitreal injection was more favorable than the posterior subtenon injection for the anatomic and functional aspects of improvement.<sup>15</sup> Bonini-Filho also suggested that intravitreal injection may be more effective than posterior subtenon injection for the management of refractive diffuse diabetic macular edema.<sup>16</sup>

The results of our study were statistically similar to most of the above-mentioned studies because of following standard research methodology. Furthermore the results of this study are comparable with various studies in which a single injection of IVB was used as primary treatment. The results of studies in which multiple Intravitreal injections were used were naturally better. Although the exact duration of action of intravitreal bevacizumab is unknown, recent retinal penetration studies have reported that full thickness retinal penetration is present at 24 hours. This may explain the earlier clinical effects of intravitreal bevacizumab observed in our current study and those of others.

The limitations of this study included a relatively short duration of follow-up. Any regression in terms of worsening in late follow up period could not be taken into

account. However the initial visual responses were apparent during the follow-up time. Results of repeated injections, different dosage of bevacizumab and triamcinolone need to be evaluated in further trials. The strengths of this study include the prospective design and the careful follow-up. Plus the study is a randomized trial and the combination of avastin with peribulbar triamcinolone is quite unique.

In this research, the aim was to explore new horizons in the treatment of DME. As IVTA is more notorious in its IOP increasing effect than PSTK, therefore PSTK was used instead of IVTA. The therapeutic effects in both groups definitely persisted and sustained up to 1 month. However to evaluate the long-term efficacy of avastin, the side effect profile when PSTK is concomitantly given and exploration of further horizons in treatment of DME further prospective randomized controlled clinical trials will be needed, with scheduled re-injections of avastin, newer treatment modalities, different anti-VEGFs and longer follow-up.

In conclusion, primary single Intravitreal bevacizumab injection at dose of 1.25mg in patients with DME appears to result in a significant improvement in BCVA and is as good as when PSTK is given concomitantly. To evaluate the long-term safety and efficacy of anti VEGFs, further prospective randomized controlled clinical trials are needed.

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# Detection of early glaucomatous damage in pseudoexfoliation syndrome by assessment of retinal nerve fiber layer

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## ABSTRACT

**Objective:** To compare mean RNFL thickness measured using spectral OCT in the PXS eye without glaucoma with the normal eye RNFL thickness.

**Material and methods:** We conducted a case control study at Al-Shifa Trust Eye Hospital, Rawalpindi, from June 2013 to March 2014. We included 80 patients; 40 in non-glaucomatous pseudoexfoliation syndrome group and 40 in age matched control group. The RNFL thickness (global average) was assessed using OCT and compared with age matched normal control subjects.

**Results:** The mean age was 66.75±6.36 years. 36 (45%) were males and 44 (55%) were females. The difference in gender distribution between two groups was statistically insignificant; p=0.653. The BCVA of all participants was at least 0.9, with normal intraocular pressure <20 mmHg, normal CDR of ≤0.3 and no abnormal visual field tests in either group. The global average RNFL thickness of the eyes in PXS group was 105.13±11.53 μm. The global average RNFL thickness of the eyes in Control group was 118.6±15.94 μm; p= 0.05

**Conclusion:** PXS without glaucoma is associated with a thinner RNFL compared with those of age-matched normal subjects. *Al-Shifa Journal of Ophthalmology 2016; 12(1): 16-21.* © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

## Introduction

Pseudoexfoliation syndrome (PXS) is an age-related, generalized disorder of the extracellular matrix characterized by production and progressive accumulation of an abnormal extracellular pseudo-exfoliative (PXF) material in intra & extraocular tissues. The presence of this material causes changes to the cornea, angle, lens and zonules. PXS, one of the most common causes of glaucoma; represents a complex, multifactorial, late-

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onset disease of worldwide significance. It has an estimated prevalence ranging from 10% to 20% of the general population over 60 years of age.<sup>1</sup>

Compared to primary open-angle glaucoma (POAG), PXS glaucoma (PXG) has a more grave clinical course and poorer prognosis. It is typically associated with higher mean levels of intraocular pressure (IOP), greater diurnal pressure fluctuations, marked pressure spikes, higher frequency and severity of optic nerve damage, more rapid visual field loss, poorer response to medications and more frequent surgical intervention.<sup>2</sup> Apart from glaucoma development, PXS may be associated with a broad spectrum of other ocular, surgical and systemic complications including cardiovascular and cerebrovascular disease.<sup>3</sup>



As retinal nerve fiber layer (RNFL) damage may present before any detectable visual field loss; early glaucomatous changes in PXS, despite normal IOP, optic nerve appearance and visual field; can be detected by measuring RNFL thickness using optical coherence tomography (OCT).<sup>4</sup> The aim of our study is to detect early RNFL damage in unilateral pseudo exfoliative patients without glaucoma by measuring RNFL thickness using spectral OCT and comparing the results with the other eye as control, hence it can help in detecting early glaucomatous changes. This study therefore will provide clinically relevant information in detecting early glaucomatous changes in pseudo exfoliative patients.

### **Subjects and Methods:**

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The cross-sectional comparative study was conducted after approval by the hospital ethical committee. The study was conducted from June 2013 to March 2014 in the Ophthalmology Department of Al-Shifa Trust Eye Hospital, Rawalpindi. An informed written consent was taken from all the subjects. All participants underwent the following examinations: Visual acuity (BCVA), slit lamp biomicroscopy, Goldmann applanation tonometry, gonioscopy, ophthalmoscopy, automated refraction and visual field examination.

Inclusion criteria included unilateral pseudo-exfoliative patients with the other normal eye. Normal optic nerve head appearance i.e. cup to disc ratio (CDR)  $\leq$  0.3 and asymmetry of  $\leq$  0.2 between fellow eyes) and a normal retina. Normal intraocular pressure i.e. IOP  $\leq$  21 mmHg with normal diurnal variation and difference  $\leq$  three mmHg between fellow eyes). BCVA for all patients is of least 0.9 with refractive error between plus three and minus three diopters sphere and not exceeding two diopters cylinder. Visual field tests were within normal range as per Anderson criteria.

Exclusion criteria included glaucomatous patients or having a family history of glaucoma. Media opacity interfering with visualization of OCT images, history of any ocular diseases & systemic diseases such as diabetes mellitus and hypertension, history of previous intraocular surgery, previous ocular trauma, retinal pathology and bilateral pseudo-exfoliative patients.

The RNFL thickness assessed in all patients using Spectral domain OCT. A circular OCT Scan with a diameter of 3.4mm was placed around the optic nerve head. The RNFL thickness map was displayed along with its ratio to normative RNFL thickness. The global RNFL thickness data was collected. Results were analyzed by using SPSS (V.17). t-test was used to calculate the p value between the study and the control eyes. P value less than 0.05 was considered as statistically significant.

### **Results:**

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Eighty eyes of 80 patients were included in the study; 40 eyes with non-glaucomatous PXS (group A) and 40 age- matched free control subjects (group B). Age of the patients ranged from 55 to 80 years with a mean age of  $66.75 \pm 6.36$  years. The median and mode ages were 67 and 75 years respectively. We matched each patient in PXS group with a control of same age. 36 (45%) were males and 44 (55%) were females. There were 19 (47.5%) males and 21 (52.5%) females in group A and 17 (42.5%) males and 23 (57.5%) females in group B. The difference between both groups was statistically insignificant;  $p=0.653$ .

The BCVA in PXS group ranged from 0.00 to 0.9 with a mean of  $0.497 \pm 0.231$ . BCVA in control group ranged from 0.00 to 0.9 with a mean of  $0.490 \pm 0.241$ . This difference was not statistically significant;  $p= 0.888$ . The intraocular pressure in PXS group ranged from 13.9 to 17.5 with a mean of  $15.47 \pm 0.983$  mmHg. The

intraocular pressure in control group ranged from 13.2 to 16.9 with a mean of  $15.127 \pm 0.934$  mmHg. This difference was not statistically significant;  $p= 0.114$ . (Table 1) The CDR in PXS group ranged from 0.1 to 0.3 with a mean of  $0.24 \pm 0.059$ . CDR in control group ranged from 0.1 to 0.3 with a mean of  $0.255 \pm 0.059$ . This difference was not statistically significant;  $p= 0.262$ . (Table 2)

There were no abnormal visual field tests in either group. The global average RNFL

thickness of the eyes in PXS group ranged from 80 to 135  $\mu\text{m}$  with a mean of  $105.13 \pm 11.53$   $\mu\text{m}$ . The median and mode RNFL thicknesses were 106 and 102  $\mu\text{m}$  respectively. The global average RNFL thickness of the eyes in Control group ranged from 88 to 156  $\mu\text{m}$  with a mean of  $118.6 \pm 15.94$   $\mu\text{m}$ . The median and mode RNFL thicknesses were 118.5 and 110  $\mu\text{m}$  respectively. The mean RNFL thickness was significantly lower in eyes with pseudoexfoliation syndrome;  $p= 0.05$ . (Table 3).

Table 1- Comparison of Intraocular pressure between PXS versus Control groups

Group	N	Mean	Std. Deviation	Std. Error Mean	P value	
<b>IOP</b>	PXS group	40	15.4700	.98324	.15546	0.114
	Control group	40	15.1275	.93425	.14772	

Table 2- Comparison of CDR between PXS versus Control groups

Group	N	Mean	Std. Deviation	Std. Error Mean	P value	
<b>CDR</b>	PXS group	40	.2400	.05905	.00934	0.262
	Control group	40	.2550	.05970	.00944	

Table 3 - Comparison of RNFL thickness between PXS versus Control groups

Group	N	Mean	Std. Deviation	Std. Error Mean	P value	
<b>RNFL Thickness (<math>\mu\text{m}</math>)</b>	PXS group	40	105.13	11.534	1.823	0.05
	Control group	40	118.60	15.945	2.521	

**Discussion:**

PXS is a complex systemic disorder of the extracellular matrix primarily affecting the eye and visceral organs. PXS appears as ‘dandruff-like’ material in the anterior

chamber or most characteristically on the anterior lens capsule. Ocular complications of PXS include peripupillary transillumination defects, mild trabecular meshwork hyperpigmentation, secondary

open-angle glaucoma and zonular dehiscence. The primary cause of chronic pressure elevation appears to be production of Pseudoexfoliation material by trabecular meshwork with subsequent degenerative changes of Schlemm's canal and juxta canalicular tissues.<sup>5</sup>

PXS is the most common identifiable cause of open-angle glaucoma (OAG). In the Blue Mountain study (BMES) performed on an Australian population of European origin, patients with PXS in either eye have a two to threefold higher risk of OAG, while eyes with PXS had fivefold increased risk for OAG.<sup>6</sup> Retinal and optic nerve head pathology of PXG is considered to be similar if not identical to that of POAG.<sup>7</sup>

Secondary chronic OAG associated with PXS accounts for approximately 25% of all glaucoma and represents the most common identifiable cause of glaucoma overall.<sup>8</sup> The exact mechanism of progression of PXS to PXG remains unknown. The higher IOP in PXS, vascular change with variation in ocular blood flow or the Pseudoexfoliation material itself may be the main factors in causing RNFL damage. The RNFL defect, which may be presented before any detectable IOP elevation, optic nerve head and visual field damage, is a main sign of early glaucomatous damage.<sup>9</sup> This suggests that visual field testing; fundus image and IOP may not be sensitive to detect this early damage. The high diagnostic accuracy of the spectral OCT allows for rapid, reproducible OCT scanning of the RNFL thickness and monitors changes in thickness for the detection of early glaucoma.

It has been seen in studies that measurement of RNFL thickness by OCT is useful in detecting early RNFL damage which in turn provides clinically relevant information in detecting early glaucomatous changes in pseudo

exfoliative patients. Sihota et al evaluated the role of (OCT) in detecting differences in peripapillary RNFL thickness among normal and glaucomatous eyes and also among different severities of glaucoma. The average RNFL in control subjects, early glaucoma, moderate glaucoma, severe glaucoma, and blind glaucoma were  $102.30 \pm 10.34$ ,  $77.68 \pm 15.7$ ,  $66.07 \pm 15.5$ ,  $53.65 \pm 14.2$ , and  $44.93 \pm 4.95$  micron, respectively. There was a significant difference in all RNFL thickness parameters between normal and all glaucoma subgroups ( $p$  less than 0.001).<sup>10</sup>

We included 80 patients; 40 in non-glaucomatous pseudoexfoliation syndrome group and 40 in age matched control group. The mean age was  $66.75 \pm 6.36$  years. 36 (45%) were males and 44 (55%) were females. The difference in gender distribution between two groups was statistically insignificant;  $p=0.653$ . The global average RNFL thickness of the eyes in PXS group was  $105.13 \pm 11.53$   $\mu\text{m}$ . The global average RNFL thickness of the eyes in Control group was  $118.6 \pm 15.94$   $\mu\text{m}$ ;  $p=0.00$ . We concluded that PXS without glaucoma is associated with a thinner RNFL compared with those of age-matched normal subjects. Our study showed a insignificant female preponderance as opposed to study by Shafiq et al which showed a male to female ratio of 2.5:1 and a study by Rahman et al which showed a male to female ratio of 3:1.<sup>11, 12</sup> Aasved showed that PXS was 3 times more common in women than in men.<sup>13</sup>

In a study by Rao on Pakistani population, 1860 patients were recruited. 120 patients were found to be having PXS with an overall prevalence of 6.45%. The male to female ratio was 1.27:1. 75% of the patients with PXS were 70 years old or above. High IOP was noted in 48 patients (40%). It was also noted that prevalence of high IOP increased with increasing age.<sup>14</sup>

In a study by Mohamed 20 non-glaucomatous pseudo exfoliative patients and 20 aged matched healthy control subjects were compared. The RNFL thickness (global and four quadrants) was assessed using OCT and compared with age matched normal control subjects. The RNFL in patients with PXS was significantly thinner in all quadrants except the nasal quadrant compared to the control group ( $p$  less than 0.05).<sup>15</sup> This could be explained by the fact that higher axonal density and higher proportion of large fibers occupies the supero and inferotemporal portions of the optic nerve head compared to the nasal portion. These fibers are in addition; most susceptible to early glaucomatous damage. In the early stage of PXG; RNFL defect usually progresses to affect mainly local areas in the superior and/or inferior pole. However, with more progression of disease it becomes more extensive and shows diffuse and combination RNFL defects.

Yüksel et al assessed the RNFL thickness in patients with unilateral PXS without glaucoma and their normal fellow eyes using Stratus OCT. 22 patients with unilateral PXS were evaluated. Group 1 included the eyes with the pseudoexfoliation, group 2 included the fellow eyes; 18 age-matched normal control eyes were assessed in group 3. The RNFL in patients with PXS were significantly thinner than controls in all quadrants except the nasal quadrant with regard to segmental analysis ( $p < 0.05$ ). In the fellow eyes, no significant difference in RNFL measurement was found except the temporal quadrant when compared with the controls. The RNFL in patients with PXS were significantly thinner than controls in all quadrants except the nasal quadrant with regard to quadratic and segmental analysis ( $p$  less than 0.05). In the fellow eyes, no significant difference in RNFL measurement was found except the temporal quadrant when compared with the controls.<sup>16</sup>

Liu et al. investigated image characteristics and thickness of RNFL in 83 normal eyes and 83 patients with primary open angle glaucoma with different stages using OCT. They documented a significant difference in RNFL thickness among the four quadrants and the mean overall RNFL thickness except for the nasal quadrant in the early POAG. It was seen that more severe the glaucoma, thinner the RNFL thickness.<sup>17</sup>

Asaoka et al reported also a significant decrease in RNFL thickness measurement in the superior ( $p$  less than 0.05), superotemporal and inferotemporal sectors ( $p$  less than 0.01); in early glaucomatous eyes with normal perimetric visual fields and SLO compared to the age matched control subjects.<sup>18</sup> Our study suggests that PXS without glaucoma may be associated with a thinner RNFL compared with those of age-matched control subjects and non-PXS fellow eyes. Further studies are needed to clarify the relationship between the decrease in RNFL thickness and the development of glaucomatous damage in eyes with pseudoexfoliation.

In conclusion PXS without glaucoma is associated with a thinner RNFL compared with those of age-matched normal subjects. This provides evidence that structural damage precedes functional loss and that early RNFL thickness assessment using OCT is important in the early diagnosis, intervention and follow-up of Pseudoexfoliation glaucoma.

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## Reasons for poor visual outcome in ocular trauma in the paediatric age group

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### Abstract:

**Purpose:** To study the visual outcome, complications and reason for poor visual outcome in eyes with ocular trauma in the pediatric age group.

### Material & Methods:

**Study Design:** Prospective hospital based case series.

**Participants:** Patients with ocular trauma presenting in the Pediatric Ophthalmology Department of a tertiary care eye hospital over a period of five years.

Patients reporting to the hospital with eye injuries were examined. Visual acuity was recorded, anterior segment and fundus examination was done. Intra ocular pressure was recorded with Goldman Tonometer or Tonopen where possible. B-scan ultra sound and x-rays orbit or CT scan was done where needed. Penetrating or perforating injuries were repaired by the trained Paediatric ophthalmologist. Patients were followed at 1 week, 1 month, 3 months and at 6 months intervals.

**Results:** Total number of patients registered in the study was 509 ranging in age from 2 days to 18 years (mean  $8.66 \pm 3.88$  years). Most affected age group was between 5-10 years of age. There were 351(69%) male and 158 (31%) female patients. Open globe injuries were 387(76%) and blunt injuries were 117 (23%). Sixty-three (12.4%) eyes attained full visual recovery with 6/6 best corrected vision. Forty-two eyes (8.3%) ended having no perception of light (NPL vision). Ratio of trauma was more in rural (65.4% n=333), than in urban population (34.6%, n=176). Reasons for poor visual recovery below 3/60 were corneal opacity in 58 (11.4%), phthisis bulbi in 41(8.1%).

**Conclusion:** Ocular trauma is a major cause of unioocular blindness in children. Preventive measures to reduce the incidence of trauma in pediatric age group needs to be highlighted to decrease the morbidity. *Al-Shifa Journal of Ophthalmology 2016; 12(1): 22-26. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

### Introduction:

Ocular trauma is a leading cause of monocular blindness in children worldwide.<sup>1</sup> Paediatric ocular trauma

presents late as the child cannot recognize it early in most cases. It comes to the notice of parents only when either it is very extensive or when its complications are manifested. It is a serious problem which should be prevented at best or managed as early as possible. In cases of penetrating or perforating injuries, surgery should be done by the senior ophthalmologist to minimize the trauma related ocular complications.<sup>2</sup> Visual rehabilitation of these children is especially difficult. In the developing countries where the socio economic conditions are extremely poor these cases

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maybe mismanaged specially in the rural areas. The incidence of trauma is more in rural areas than urban. Males are affected more than females due to their outdoor activities. There is a need of spreading awareness about preventive measures through media and all other resources. Education of mothers specially will help to reduce the incidence of ocular trauma and the related morbidity. We designed a study to document the results of visual outcome, reason for poor outcome and complications of pediatric ocular trauma in our setup.

### **Subjects & Methods:**

Patients reporting to the hospital with eye injuries were examined by the pediatric ophthalmologist after initial assessment by the junior on call ophthalmologist. Visual acuity was recorded in cooperative children. Anterior segment was evaluated with diffuse light using slit lamp. Fundus examination was done with direct ophthalmoscope, indirect ophthalmoscope with 20D lens or using 90 D with slit lamp. Intra ocular pressure was recorded with Tonopen or Goldman Tonometer where required. B-scan ultra sound and X-ray of the orbits were done where needed. Penetrating or perforating injuries were repaired by the trained pediatric ophthalmologist. Findings were recorded in a predesigned performa and data was managed in SPSS. It was described in terms of mean  $\pm$  SD (standard deviation) for the quantitative variable of age. Frequencies and percentages were given for qualitative variables of sex, type and mode of injury, age groups, the groups according to record of best corrected visual acuity and rural and urban distribution of patients.

### **Results:**

Total number of patients registered in the study were 509 ranging in age from 2 days to 18 years (mean  $8.66 \pm 3.88$  years). Most affected age group was between 5-10 years. (Table 1) There were 351(69%)

male and 158 (31%) female patients. Right eye was involved in 263 (51.7%) and left eye in 246 (48.3%). Open globe injuries were 387(76%) and blunt injuries were 117 (23%). Cornea was affected in 227(44.6%) eyes. Corneoscleral wound was present in 58(11.4%) and scleral in 20(3.9%).

The most common cause of injury was by vegetative material. This was more common in children belonging to the rural areas. Metallic objects were the second most common cause. Trauma with sharp objects like knives, pencils, syringes was more common in age group between 5-10 years of age (Table 2). Cataract was the most common entity associated with lens related trauma in 276 eyes (54.2%). 16 eyes (3.1%) had subluxated lenses while 4 eyes had lens dislocation and 6 eyes were rendered aphakic.

Among vitreo-retinal findings vitreous haemorrhage was present in 51 eyes (10%) and foreign bodies in vitreous in 2 eyes. Commotio retinae were present in 10 eyes, macular hole in one eye, macular hemorrhage in 3 eyes (0.6%) retinal detachment in 37 eyes (7.3%) and 17 eyes (3.3%) had choroidal rupture. Endophthalmitis occurred in 17 eyes (3.3%). One hundred and forty-four (28.3%) patients attained good vision of 6/18 or better, and 216 (42.4%) of the patients had visual recovery below 3/60. Among the later, 42 (8.3%) patients lost their vision to NPL as a result of ocular trauma. (Table 3).

Ratio of trauma was more in rural than in urban population, rural 333 (65.4%) versus urban 176 (34.6%). Reasons for poor visual recovery below 3/60 were corneal opacity in 58 (11.4%), phthisis bulbi in 41(8.1%), endophthalmitis in 17(3.3%), amblyopia in 22(4.3%), vitreo-retinal causes such as macular hole, choroidal rupture, retinal traction or scarring in 49 (9.6%) and glaucoma in 29 (5.7%) eyes.

Table 1. Age groups.

	Number of patients	Percentage
0-5 yr	125	24.6
<5-10 yr	219	43.0
<10-16 yr	152	29.9
<16-18 yr	13	2.6
Total	509	100.0

Table2. Object groups

	Frequency	Percentage (%)
plastic/rubber	25	4.9
metallic	128	25.1
Fist/foot	14	2.8
Vegetative/wood	179	35.2
firearm	19	3.7
animal	12	2.4
glass	31	6.1
chemical	4	0.8
Stone /lead pencil	73	14.3
unknown	24	4.7

Table 3: Comparison between Visual outcome.

vision	Vision at presentation		Vision after management	
	No of patients	Percentage %	No of patients	Percentage %
6/6	7	1.4	63	12.4
6/9-6/18	21	4.1	81	15.9
6/24-6/36	29	5.7	41	8.1
6/60	11	2.2	18	3.5
3/60	18	3.5	22	4.3
1/60	64	12.6	48	9.4
HM+	59	11.8	21	4.1
PL+PR+	62	12.2	13	2.6
Only PL+	152	29.9	70	13.8
NPL	15	2.9	42	8.3
Missing	71	12.8	90	17.7
Total	509	100.0	509	100.0



**Discussion:**

Trauma is often the most important cause of unilateral loss of vision, particularly in developing countries.<sup>3</sup> Statistics from around the world show that young age and male sex are risk factor for ocular injuries of all types and in all environments and situations.<sup>4,5,6</sup> Children suffer a higher percentage of open globe injuries than adults, comprising 19%-58% of all cases of ocular trauma.<sup>7</sup> The causes of injury varied with the living environment of the children. Maximum injuries were caused by wooden or vegetative material like branches, sticks, bow and arrow made with straws etc. In rural areas such injuries were more common. At our tertiary care centre the open globe injuries were 76% (n=387), versus 23% of closed globe injuries (n=117). This pattern has been observed in other studies as well 80.4% open globe injuries vs 19.6% closed globe injuries.<sup>8</sup> Another study involving pediatric ocular trauma reports the reverse pattern of more closed globe injuries (59.4%) compared to 40.6% open globe injuries.<sup>9</sup>

The description according to the Birmingham Eye Trauma Terminology System helps in uniformity while comparing studies. The ocular trauma score is a good predictor of the final visual outcome in cases of pediatric traumatic cataract.<sup>10</sup> Satisfactory visual outcome has been reported in traumatic cataract extraction in open and closed globe injuries in a study carried out in patients of the pediatric age group.<sup>11</sup> Delayed repair, lens disruption, extent of wound, vitreous prolapse, posterior location of wound, foreign body and rural setting are the known risk factors for poor visual outcome in ocular trauma.<sup>5</sup> Rahman et al, showed a statistically significant improved visual outcome in patients suffering sharp injuries compared to blunt injuries (p=0.004).<sup>12</sup>

Blunt injury can cause traumatic optic neuropathy adversely affecting the visual

outcome. Extent of the wound posterior to insertion of the recti can result in poorer final visual outcome.<sup>13</sup>

Endophthalmitis (n=17, 3.3%) seen in our study was lesser than 11.91% reported in a study with a larger sample size.<sup>14</sup>

Significant burden of ocular trauma in the community requires its prevention and early management as a public health priority. Studies have indicated that up to 90% of eye injuries could be prevented with better education, supervision and proper safety eye wear.<sup>15, 16</sup> Visual rehabilitation of these children is challenging for the pediatric ophthalmologists. Incidence of amblyopia in traumatized eye is much high. At times it may be difficult to treat amblyopia if there is lack of cooperation by children and their parents. Because of frequency of eye injuries in children and the potential of impaired vision and a life time disability, a national program is needed to inform health care professionals, teachers and parents about ways to minimize and prevent injuries and its consequences.<sup>17</sup> Similarly, protective polycarbonate glasses should be worn while lightening and watching fireworks and at places such as welding and motor mechanic workshops.

**Conclusion:**

Ocular trauma is a major cause of unioocular blindness in children. Preventive measures to reduce the incidence of trauma in pediatric age group needs to be highlighted to decrease the morbidity.

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## Level of satisfaction in patients using prosthesis

Saira Noreen, Tayyab Afghani

### Abstract

**Objectives:** There were two objectives of the study, first to assess the level of satisfaction in anophthalmic patients using ocular prosthesis and second to identify the factors which affect the patient's satisfaction.

**Methodology:** 25 subjects who have anophthalmos in one eye, already wearing prosthetic eye were enrolled in this study, who were interviewed using a structured questionnaire. Through this we evaluated the level of satisfaction in anophthalmic patients and the factors which significantly affect the patient's satisfaction.

**Results:** A total of 25 subjects (13 males, 12 females; mean age  $23.68 \pm 11.55$ , range 5-50 years) were enrolled in this study. The overall rate of satisfaction with ocular prosthesis was 80%. The variables significantly correlated to patient satisfaction were comfort with ocular prosthesis, movement of ocular prosthesis, other people response, and type of prosthesis.

**Conclusion:** The level of satisfaction was 80%. Comfort, other people response, mobility of prosthesis and type of ocular prosthesis were significantly related to patient satisfaction. *Al-Shifa Journal of Ophthalmology 2016; 12(1): 27-35. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

### Introduction:

Anophthalmosis the medical term for the absence of one or both eyes. In this condition both the globe (human eye) and the ocular tissue are missing from the orbit.<sup>[1]</sup> The absence of the eye will cause a small bony orbit, a constricted mucosal socket, short eyelids, reduced palpebral fissure and malar prominence.<sup>[2]</sup>

Congenital anophthalmia has been reported to be present in 3 out of every 100,000 births.<sup>[3]</sup> Many instances of anophthalmia also occur with microphthalmia. A recent study in the UK

indicated that anophthalmia and microphthalmia had a combined average of 1 in every 10,000 births.<sup>[1]</sup> The annual rate of occurrence of anophthalmia/microphthalmia in the United States is about 780 children born/year.<sup>[4]</sup> Parents that already have a child who suffers from anophthalmia have a 1 in 8 chance of having another child with anophthalmia.<sup>[5]</sup> Approximately 2/3 of all cases of anophthalmia are determined to be of genetic basis. Anophthalmia is one of the leading causes of congenital blindness and accounts for 3-11% of blindness in children.<sup>[6]</sup> Anophthalmia and microphthalmia together make up 1.7-1.8% of reconstructive surgical cases in the domain of plastic surgery and ocular prostheses.<sup>[7]</sup> An ocular prosthesis or artificial eye is a type of prosthesis that replaces an absent natural eye that may be absent by birth or following an enucleation, evisceration, or orbital exenteration. The prosthesis fits over an orbital implant and under the eyelids. Ocular prosthesis is also

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sometimes referred to as glass eye (Fig 1).The purpose of this study was to determine the level of satisfaction using

ocular prosthesis and factors which affect patient's satisfaction.



**Fig 1.** Ocular prosthesis

### **Subjects and Methods:**

The study was conducted from August 2014 to February 2015 at Oculoplastics department of Al-Shifa Trust eye hospital after approval of the institute's ethical committee. The study included all anophthalmic patients using ocular prosthesis. Informed consent was taken from the patients. 25 patients form age 5 to 60 years were selected to assess the level of satisfaction using ocular prosthesis.

Following instruments were used.

1. Vernier caliper used to measure the dimensions of ocular prosthesis
2. Digital Weighing Scale to measure the weight of ocular prosthesis
3. Modified Al-Shifa-Kestenbaum spectacles used to measure the mobility of ocular prosthesis
4. Millimeter ruler to measure the level of eyelid position
5. Camera for photograph

### **Measuring methodology:**

**Vernier caliper** was used to measure the length, width and depth of ocular prosthesis. Lower jaws were used to measure length and width in mm while the depth was measured with its bar through Vernier scale .Vernier caliper had no zero error. Fig 2

**Millimeter ruler** was used to measure the level of upper eyelid. The distance between corneal reflection to the upper lid margin in normal eye and similarly in prosthetic eye was measured and the

difference between two eyes determined the ptosis as mild, moderate and severe.

**Digital weighing scale** was used to measure the weight of ocular prosthesis which had no zero error. It measured weight in grams.

**Modified Al-Shifa-Kestenbaum spectacles** were used to measure prosthesis mobility in adduction, abduction and elevation. Mobility was not measured in depression because the upper eyelid covers the eye when looking downward. Mobility readings were performed with the temporal limbus as a landmark for adduction and the nasal limbus as a landmark for abduction .the inferior papillary border was used as a landmark for measuring elevation. The position of these landmarks in the primaryposition (when looking straight ahead) was used as a point of reference. These spectacles had millimeter scale in a grid pattern for measuring mobility. Fig 3

### **Inclusion criteria:**

Age group 5-60 years

Patients with unilateral prosthesis

### **Exclusion criteria:**

Patients with bilateral prosthesis

Patients under the age of 5 and above 60

Patients with any other disability

### **Classification criteria for level of satisfaction:**

1. No comment
2. Dissatisfied
3. Satisfied
4. Highly satisfied



**Fig 2.** Vernier caliper



**Fig 3.** Al-Shifa Kestenbaum spectacles for measuring ocular prosthesis mobility

## **Results:**

### **Demographic characteristics:**

The total subjects consisted of 25 out of which 13(52%) were males and 12(48%) were females. The mean age was  $23.68 \pm 11.55$  ranging from 5 to 50 years. Majority 76% of the patients were single and 24% patients were married.

Of all the subjects 56% patients were from urban and 44% patients were from rural area. Among the personal variables, 24% patients belonged to low ,36% to middle and 40% to high economic status as given in Fig 4.

### **Education status:**

Of all subjects 16% were illiterate, 32% less than matriculation, 28% were intermediate and 24% were bachelors as given in Fig 5. Surgical procedure was enucleation in 18(72%) patients and evisceration in 7(28%) patients. Orbital implant was present in 20(80%) patients while 5(20%) patients were without such implants.

### **Anophthalmos causes:**

Trauma was responsible for 52% of anophthalmos followed by infection. For details please see Table 1.

### **Ocular symptoms recorded of patients wearing prosthesis:**

64% patients had complained about mucopurulent discharge, 28% had watering, 12% complained about pain while 16% patients had no symptoms.

### **Other variables:**

#### **Ptosis in eye with prosthesis:**

Ptosis was classified in three grades as given below:

1. Mild (up to 2mm)
2. Moderate (3mm)
3. Severe (4mm or more)

24% patients wearing prosthesis were with Mild Ptosis, 16% with Moderate, 4% with Severe and 56% had no Ptosis.

#### **Duration of wearing ocular prosthesis:**

Regarding the duration of wearing ocular prosthesis, 20% patients had been wearing it for less than 6 months, 48% patients for

6 to 2 years, 24% patients for 3 to 8 year, 8% patients longer than 8 years.

**Other people’s (Observers, onlookers) response:**

With regard to the other people’s response, in 44% patients, all the observers were able to notice it as prosthesis, in 36% only few were able to notice while in 20% onlookers did not notice the prosthesis. Please see Fig 6.

**Blinking characteristics:**

Rate of blinking in wearers were recorded. 20% patients were incomplete blinkers, 52% were partial blinkers and 28% were normal blinkers.

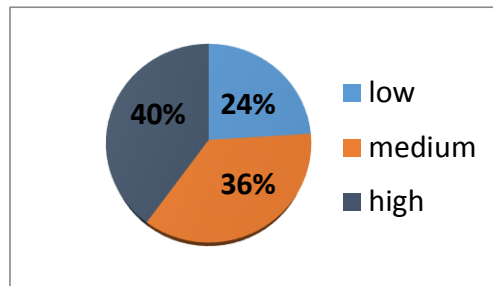
**Color matching:** Regarding the color matching of ocular prosthesis, categories of color matching was:-

1. Not matching
2. Slightly matching
3. Matching
4. Exact matching

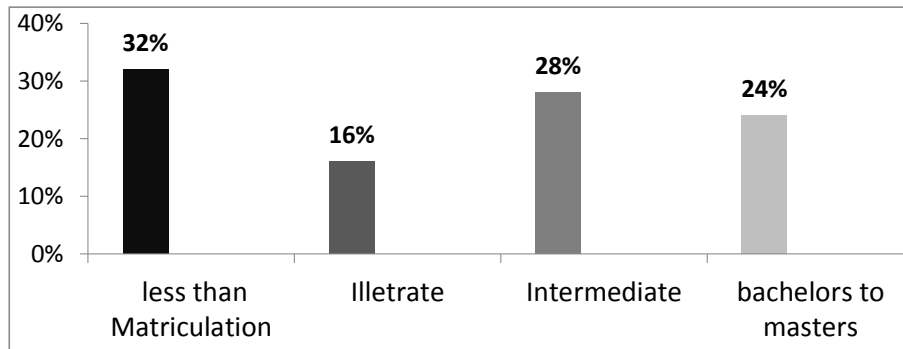
Color matching was assessed by visual perception of the principal investigator. Details are given in the Fig 7.

**The level of satisfaction:**

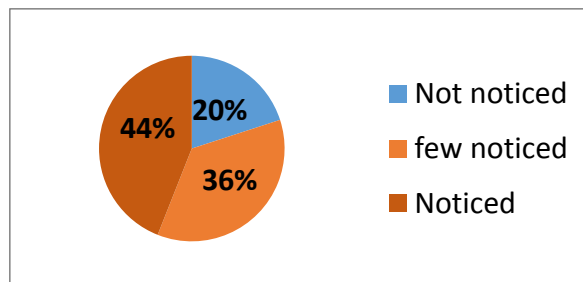
Regarding the level of satisfaction with ocular prosthesis, 8% were highly satisfied, 72% were satisfied, 16% were dissatisfied and 4% were those who did not comment, as shown in the Fig 8.



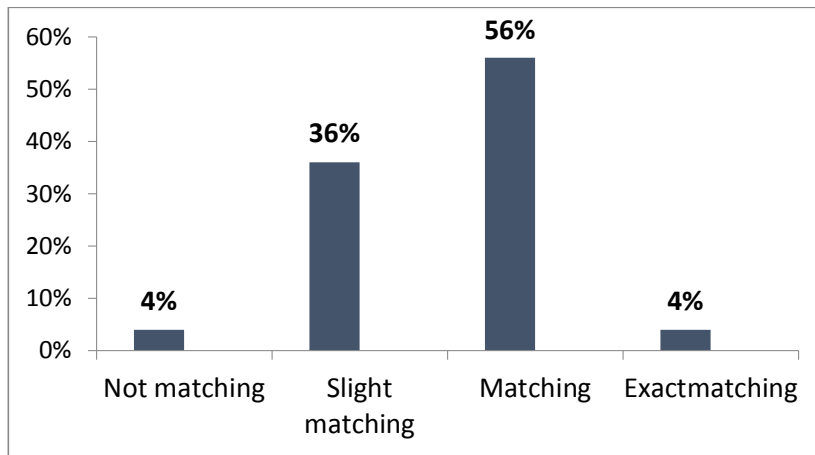
**Fig 4.**Economic status distribution among patients



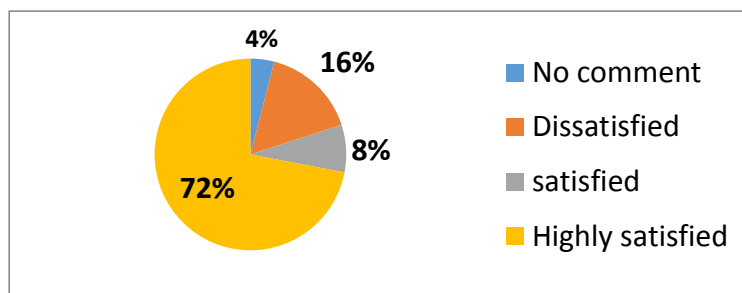
**Fig 5.**Subjects distribution according to their education



**Fig 6.** Distribution according to the onlookers response.



**Fig 7. Color matching of ocular prosthesis**



**Fig 8. Distribution according to level of satisfaction**

**Association between satisfaction and different variables:**

To correlate the different variables with level of satisfaction, chi square test was used.

Value of  $P < 0.05$  showed statistically significant relationships with satisfaction. These details are outlined in Table 3.

Value of  $P > 0.05$  showed statistical insignificant relationship between different variables with level of satisfaction Details are given in the Table 4:

**Mobility of ocular prosthesis:**

Regarding mobility of ocular prosthesis in anophthalmic socket details are given in the Table 2.

**Table 1. Causes of anophthalmos**

Sr.	Causes of anophthalmos	Frequency	Percentage
1.	Tumor	2	8
2.	Trauma	13	52
3.	Infection	8	32
4.	Congenital	1	4
5.	Other	1	4

**Table 2.** Mobility of ocular prosthesis in different gazes

	movement(mm) in adduction	movement(mm) in abduction	movement(mm) in elevation
N	25	25	25
Mean	2.36	2.32	1.46
SD	1.319	1.314	0.889
Min	0	0	0.0
Max	6	6	3

**Table 3.** Result of significant correlation analysis between patient satisfaction and each variable (chi square [ $\chi^2$ ], P value)

Variables		Satisfied	Not satisfied	N	$\chi^2$	df	P value
Comfort with ocular prosthesis	Comfortable	19	1	25	6.640	1	0.031
	Not comfortable	3	2				
Movement of ocular prosthesis	Moved	14	6	25	4.167	1	0.041
	Not moved	1	4				
Other people response	Noticed	5	4	25	5.252	1	0.040
	Not noticed	15	1				
Type of prosthesis	Custom	17	2	25	4.441	1	0.035
	Stock	3	3				



**Table 4.** Result of insignificant correlation analysis between patient satisfaction and each variable (chi square [ $\chi^2$ ], P value)

<b>Variables</b>		<b>Satisfied</b>	<b>Not satisfied</b>	<b>N</b>	<b>Df</b>	$\chi^2$	<b>P value</b>
Residency of patient	Urban	10	4	25	1	1.461	0.227
	Rural	10	1				
Color matching	Matching	13	3	25	1	1.042	0.307
	Not matching	7	2				
Cosmetic appearance	Improved	18	2	25	1	2.679	0.166
	Not improved	3	2				
Economic status	Low	6	3	25	2	1.667	0.435
	Middle	9	1				
	High	5	1				
Gender	Male	10	3	25	1	0.160	0.689
	Female	10	2				
Marital status	Single	15	4	25	1	0.055	0.815
	Married	5	1				
Education status	Illiterate	4	0	25	3	2.716	0.438
	>Matric	5	3				
	Matric to F.A	6	1				
	B.A to >M.A	5	1				
Type of surgery	Enucleation	15	3	25	1	0.446	0.540
	Evisceration	5	2				
	Non surgical eye	0	0				
Ocular symptoms	Pus	11	5	25	3	3.516	0.319
	Pain	3	0				
	Watering	2	0				
	No symptom	4	0				
Cause of anophthalmos	Trauma	11	2	25	4	1.923	0.705
	Tumor	1	1				
	Infection	6	2				
	Congenital	1	0				
	Other	1	0				
Duration of wearing	< 6 months	5	0	25	3	3.125	0.373
	6 months to two years	10	2				
	3 to 8 years	4	2				
	> 8 years	1	1				

## Discussion:

Our main objective was to estimate the level of satisfaction in anophthalmic patients using ocular prosthesis. Sub objective was to identify the factors which affect the patient's satisfaction.

The study population consisted of 25 out of which 13(52%) were males and 12(48%) were females.

J.S Song et al<sup>8</sup> conducted a study to ascertain the level of satisfaction in anophthalmic patients wearing ocular prosthesis after evisceration or enucleation and to determine which variables were correlated to their satisfaction in order to find how to increase patient's satisfaction. They reported in his study that 71.8% of patients were satisfied with surgical result and their ocular prosthesis ( $P < 0.05$ ). Variables such as economic status, other people response, insertion of mobility coupling post or mobility peg were significantly correlated to patient satisfaction.

In the current study, 80% patients were satisfied with their ocular prosthesis ( $P < 0.05$ ). 72% were optimally satisfied while 8% were highly satisfied. Variables such as other people response, comfort with ocular prosthesis, movement of prosthesis were significantly correlated to patient satisfaction while economic status, gender, education status, symptoms, duration of wearing were insignificantly correlated to patient satisfaction ( $P > 0.05$ ).

Ton J Smit et al<sup>9</sup> conducted a study to measure the ocular prosthesis mobility after enucleation. In all patients a noticeable lag of movement of the prosthetic eye was measured: in the extreme directions of gaze the excursions of the prosthesis were far less in comparison with the contra lateral normal eye. A motility loss of 50% or more was found. They concluded that the insertion of an implant, even when inserted some time after the enucleation (a secondary

implant), improves the motility of the prosthesis markedly. They recommend the primary baseball implant as the correction of choice after enucleation. In the current study, mobility of ocular prosthesis was assessed by using Al-Shifa Modified Kestenbaum spectacles with grid metric scale. Mobility was measured with the patients looking straight forward in three directions of gaze: abduction, adduction and elevation, depression was not measured because upper eyelid covers the eye while looking downward. A noticeable lag of movement of the prosthetic eye was measured in the extreme directions of gaze. This loss of motion may be due to structural changes which follow enucleation, shortcomings in the current prosthesis fitting techniques and/or surgical techniques, fibrosis of the extraocular muscles, and inadequate transmission of movement from the anterior surface of the socket to the posterior surface of the prosthesis. However, in our study, there is no significant relationship between mobility of ocular prosthesis and its weight but have significant correlation to the patient satisfaction ( $P = 0.041$ ).

The anophthalmic patients wearing ocular prosthesis complained few symptoms. The common complaint was discharge (64%) which results from immunological response to the surface coating on the prosthesis or by mechanical trauma on the conjunctiva by the prosthesis, length of time patients worn the prosthesis, reactivity to the material of prosthesis etc.. However, the symptoms were not correlated to patient satisfaction. Anophthalmic patients can tolerate mild symptoms such as ocular discharge. Anophthalmic patient should be fully aware of how to wear and how to manage their prosthesis in order to reduce these symptoms.

**Conclusion:**

The level of satisfaction with ocular prosthesis was 80%. Four factors significantly correlated with level of satisfaction: these were comfort with the prosthesis, other people response, mobility of prosthesis and type of ocular prosthesis.

**Recommendations:**

1. Patient’s satisfaction can be increased by improving color matching of ocular prosthesis with contra lateral normal eye in order to improve cosmetic appearance and onlooker’s response.
2. Strict instruction about how to manage ocular prosthesis is essential for anophthalmic patients to reduce ocular symptoms.
3. Ocular Prosthetic Units should be developed in all tertiary eye care centers of the country where properly trained Ocularists should provide this service.

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## Refractive changes after ptosis surgery

Kunza Zafar, Tayyab Afghani

### Abstract

**Objective:** There were two objectives, first, to analyze the refractive change in children with congenital ptosis who have undergone levator resection/ sling surgery during the period of study. And second, to find out the relationship between preoperative severity of ptosis and postoperative magnitude of change in refractive error.

**Study Design:** Prospective follow-up study design was used.

**Methodology:** Twenty patients with isolated congenital ptosis were taken through convenient sampling who fit the inclusion criteria. Two techniques were used for the surgery- sling and levator resection. Preoperative and postoperative visual acuity was measured by age-appropriate methods, VA was then converted to LOGMAR. Pre-op and post-op eyelid measurements were done. Refractive error was measured before and after surgery for both eyes by cycloplegic refraction.

**Results:** There was no change observed in spherical refractive error of ptotic eye before & after the surgery as well as in non-ptotic eye baseline & after 3 months. Mean myopic spherical change of non ptotic eye was 0.41D ( $p > 0.05$ ) while ptotic eye was -0.37D ( $p > 0.05$ ), mean hyperopic change in non-ptotic eye was 0.16D ( $p > 0.05$ ) while ptotic eye was 0.13D ( $p > 0.05$ ) and those with emmetropia non-ptotic eye mean was -0.15D ( $p > 0.05$ ) & ptotic eye was 0.05D ( $p > 0.05$ ). A statistically significant change was noticed in cylindrical refractive error of ptotic eye and an increase in WTR astigmatism was observed after surgery. Change in cylinder in patients with WTR astigmatism in nonptotic eye was mean 0.15D ( $p > 0.05$ ) while in ptotic eye -0.47D ( $p < 0.05$ ) and those with emmetropia in non-ptotic eye was -0.13D ( $p > 0.05$ ) and ptotic eye mean -0.50D ( $p < 0.05$ ). There was no relationship found between pre-op severity of ptosis with post-op magnitude of change in astigmatism.

**Conclusion** It is demonstrated that not only ptosis itself but also the surgical correction of ptosis can change astigmatic refractive error so post-op cyclorefraction is necessary in children to correct refractive error in order to prevent amblyopia and improve visual performance of patient postoperatively. *Al-Shifa Journal of Ophthalmology 2016; 12(1): 36-44.* © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

### Introduction:

Ptosis is a lowering of the eyelid to below its normal position. The word 'ptosis'

derives from the Greek word 'πτωσις', which translates as 'to fall'. It is an abbreviation of 'blepharoptosis'—a fallen eyelid<sup>1</sup>. Ptosis is broadly classified into congenital and acquired, based on age of onset of the ptosis. Ptosis that is present at birth or within the first year of life is called congenital ptosis. This is usually an isolated presentation and rarely may be associated with other findings when it is considered to be non-isolated. In almost 75 percent of the cases only one eye is affected<sup>2</sup>. Ptosis that presents after the age of one year is termed acquired ptosis. This

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may again be an isolated or a non-isolated presentation. Ptosis may also be classified by etiology: aponeurotic, neurogenic, myopathic, neuromuscular, neurotoxic, mechanical, traumatic, and pseudoptosis. The majority of congenital ptosis is due to myogenic dysgenesis of the levator muscle. In these cases, rather than having normal muscle fibers, fibrous and adipose tissue are present in the muscle belly instead. Thus there is a reduction or absence of functional muscle, impairing the ability of the levator to contract and elevate the eyelids. Most congenital ptosis is isolated and does not affect vision. In severe cases, the drooping eyelid may occlude all or part of the pupil and may interfere with vision, resulting in amblyopia.<sup>3</sup> The droopy eyelids may “compress” the eyeball leading to astigmatism. A compensatory head posture, such as chin-up position, may be adopted by children with severe bilateral congenital ptosis to obtain good vision<sup>2</sup>. Some children may mechanically lift the ptotic eyelid with their finger in order to see clearly. Congenital ptosis may occur through autosomal dominant inheritance<sup>2</sup>. Common familial occurrences suggest that genetic or chromosomal defects are likely<sup>3</sup>.

#### **Aims and Objectives:**

1. To analyze the refractive change in children with congenital ptosis who have undergone levator resection/ sling surgery during the period of study.
2. To find out the relationship between preoperative severity of ptosis and postoperative change in magnitude of refractive error.

#### **Subjects and Methods:**

##### **Study Design**

Prospective follow-up study.

##### **Study Population and sampling**

The study population included pediatric patients of simple congenital ptosis coming to Al-Shifa Trust Eye Hospital and

underwent ptosis surgery during time of data collection.

##### **Study duration**

Study duration was 7 months.

##### **Inclusion Criteria**

- Patients having isolated simple congenital ptosis (ptosis present at birth or developed within one year after birth)
- Age group 0-16 years
- Both genders

##### **Exclusion criteria**

- Pseudo-ptosis
- Non isolated congenital ptosis (blepharophimosis ptosis syndrome, jaw winking syndrome etc)
- Other ocular anomalies (affecting VA) e.g. cataract
- Previous ptosis surgery
- Isolated acquired ptosis (e.g traumatic etc)
- Ptosis with other medical conditions (e.g. Horner Syndrome etc)

##### **Techniques and data collection methodology**

Twenty patients with isolated congenital ptosis were taken through convenient sampling who fitted the inclusion criteria. Two techniques were used for the surgery -sling and levator resection. Preoperative and postoperative visual acuity was measured by age-appropriate methods which included Lea Gratings, Cardiff Cards, Snellen & ETDRS, VA was then converted to LOGMAR. Pre-op and post-op eyelid measurements were done that included levator function & marginal reflex distance. Refractive error was measured before and after surgery for both eyes by cycloplegic retinoscopy and cyclopentolate was used for cycloplegia. Cylinder was considered along the axis 90°. Statistical analysis was done separately for spherical refractive error and cylindrical refractive error. All the information was recorded on a structured

proforma. The surgical protocol followed for levator resection is outlined in Table 1.

**Data Analysis**

- Statistical analysis was performed using a paired sample t test to compare preoperative and postoperative data, such as refraction data and one way Anova.

- The statistical analysis was carried out using Microsoft Excel 2011 (Microsoft Corp, Redmond, Wash.) and IBM SPSS statistics software version 17.0  
P-value <0.05 was considered significant.

**Table 1.** Surgical protocol followed for Levator Resection (Authors own criteria)

Levator Function	Degree of ptosis	Amount of resection	Desired level of eyelid at the end of surgery
Good	Mild	18mm	Above pupillary border
	Moderate	19-20mm	Above pupillary border
Fair	Mild	20mm	Midways b/w pupillary border & limbus
	Moderate	21-22mm	2mm below limbus
	Severe	23mm	1mm below limbus
Poor	Moderate	24mm	At the level of limbus
	Severe	24mm+	At the level of limbus

**Table 1A Optimum correction criteria:**

- 1.Upper margin reflex distance- 3 to 5mm
- 2.Inter lid margin reflex distance-1mm or less
- 3.Inter lid crease difference -2mm or less
- 4.Presence of symmetrical lid contour

**Results:**

A total of twenty patients with isolated congenital ptosis in one eye were included in the study. Fourteen were males (70%) and six were females (30%). Age of patients was ranging from 3 years to 16years, mean age was 8.28±SD4.20.

**Laterality of ptosis** Eleven patients had ptosis in right eye (55%) while nine (45%) had ptosis in left eye.

**Grade of ptosis**

Two patients had mild, ten had moderate and eight had severe ptosis.

**Levator Function:**

Six patients had fair, fourteen had poor while no patient who underwent surgery had good levator function.

**Surgical Techniques**

Two surgical procedures were used. Levator resection and Frontalis sling

.Sixteen patients underwent levator resection and upon four patients sling was performed.

**Visual Acuity** Visual acuity was recorded preoperatively as well as three months after surgery and was converted into LogMAR. Table 2 shows the mean visual acuity preoperatively and postoperatively of both ptotic and nonptotic eyes.

**Correction**

Sixteen patients were optimal corrected, while four patients remained under corrected and had residual ptosis.

**Spherical Refractive Error**

Spherical refractive error was recorded for both ptotic and nonptotic eyes preoperatively and postoperatively (after three months). Their mean and SD is reported in Tables 3 and 4.

After recording means assumptions were carried out for parametric tests. As the value of skewness was <2 and the data was normally distributed so **paired t test** was applied for statistical analysis to compare the difference between spherical refractive error before and after surgery in ptotic as well as nonptotic eye. No statistically significant difference was observed between ptotic eye pre-op & post-op and non ptotic eye baseline and after three months .Results are being shown in Table 5.

**Cylindrical Refractive error**

Cylindrical refractive error was recorded along axis 90°. Fifteen patients had with-the-rule astigmatism preoperatively and five patients had no cylindrical refractive

error preoperatively. Assumptions were carried out for parametric tests. Data was normally distributed.

- Comparison of pre-op and post-op readings was done using paired sample t test
- It was observed that there was no statistically significant difference in cylindrical refractive error between non ptotic eye baseline and after three months.(Table 6)
- A statistically significant difference was noted in cylindrical refractive error between ptotic eye before and after surgery and an increase in with-the-rule astigmatism was observed p-value<0.05 (Table 7).

**Table 2** Mean and standard deviation of Visual Acuity of ptotic and nonptotic eyes

	Normal Eye		Eye with Ptosis	
	Baseline VA	VA after 3 months	Pre Op VA	Post-Op VA after 3 months
Mean	0.15	0.14	0.28	0.32
SD	0.15	0.15	0.28	0.25

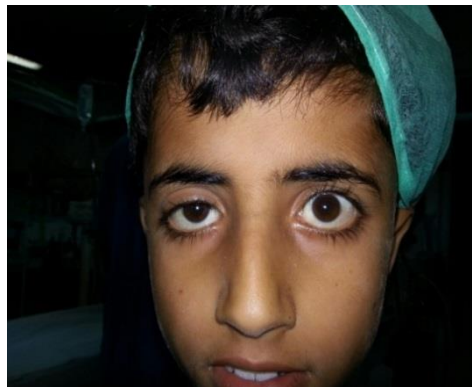


Fig 1: Before surgery

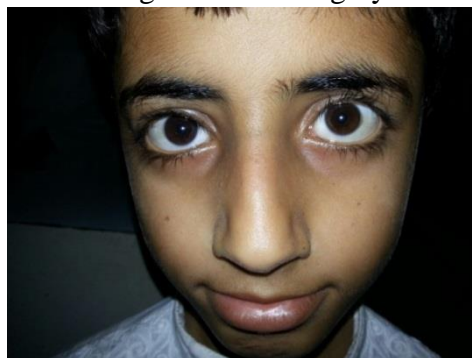


Fig 2: After ptosis surgery



Fig 3: Before surgery



Fig 4: After ptosis surgery

**Table 3** Spherical refractive error of nonptotic eye

Ref error	Pre-op			Post-op		
	N	Mean	SD	N	Mean	SD
<b>Myopia</b>	6	0.66	0.46	3	0.50	0.00
<b>Hypermetropia</b>	9	1.05	0.65	8	1.09	0.61
<b>None</b>	5	0.00	0.00	9	0.00	0.00

**Table 4** Spherical refractive error of ptotic eye

Ref. error	Pre-op			Post-op		
	No.	Mean	SD	No.	Mean	SD
<b>Myopia</b>	5	0.70	0.59	7	0.79	0.39
<b>Hypermetropia</b>	12	1.14	1.07	9	1.38	1.27
<b>None</b>	3	0.00	0.00	4	0.00	0.00



**Table 5** Paired T test for comparison of spherical refractive error

Sph ref error			Mean	SD	df	Sig2(tailed)
Myopia	Pair 1	Baseline sph nonptotic eye-after 3 months	0.41	0.49	5	0.093
	Pair 2	Sph before surgery ptotic eye-sph after surgery ptotic eye	-0.37	0.44	5	0.091
Hypermetropia	Pair1	Baseline sph nonptotic eye-after 3 months	0.16	0.55	8	0.39
	Pair2	Sph before surgery ptotic eye-sph after surgery ptotic eye	0.13	0.53	8	0.45
None	Pair 1	Baseline sph nonptotic eye-after 3 months	-0.15	0.33	4	0.37
	Pair 2	Sph before surgery ptotic eye-sph after surgery ptotic eye	.050	0.20	4	0.62

**Table 6** Paired t test statistics for the change in cylinder pre-op and post-op

Type of astigmatism		N	Mean	SD	t	df	Sig (2-tailed)
With-the-rule astigmatism	Baseline Cyl of nonptotic eye-After three months	11	0.15	0.58	0.90	10	0.38
	Cyl before surgery of ptotic eye-cyl after surgery of ptotic eye	11	-0.47	0.45	-3.4	10	0.006
None	Baseline Cyl of nonptotic eye-After three months	9	-0.13	0.22	-1.89	8	0.09
	Cyl before surgery of ptotic eye-cyl after surgery of ptotic eye	9	-0.52	0.50	-3.12	8	0.01

Table 7 Relationship between preop severity of ptosis and post-op increase in with-the-rule astigmatism

Grade		N	Mean	SD	df	F	Sig
With-the-rule	Mild	1	0.25		14	0.95	0.91
	mod	9	0.43	0.40			
	severe	5	0.50	0.63			
none	mild	1	0.00		4	4.28	0.18
	mod	2	0.62	0.17			
	severe	2	1.00	0.35			

**Discussion:**

The effect of ptosis surgery on refractive error has been the topic of interest for researchers since long. It is the change in astigmatic refractive error which is however mostly observed. The change can be due to the force applied by the eyelid on cornea after ptosis<sup>4</sup>. Studies<sup>5</sup> report that patients undergoing eyelid surgery have a change in astigmatic error of as much as 1.0 D during the first 3 postoperative months. The longest reported follow-up period of astigmatic changes in adult patients following eyelid ptosis surgery is 1 year and a considerable number of patients had a change in cylinder of up to 0.3 D postoperatively. Blepharoplasty is also reported to cause astigmatic changes postoperatively, significantly more if entire fat pads are removed.

In the current study, evaluation of change in refractive error was carried out after ptosis surgery and the relationship of post-up change in magnitude of refractive error with the severity of ptosis was examined.

A total of twenty patients with isolated congenital ptosis in one eye were included in the study. Fourteen were males (70%) and six were females(30%).

According to our study no change was observed in spherical refractive error in ptotic eye after surgery while change of astigmatic refractive error was seen in patients after surgery and an increase in with the rule astigmatism was noticed. Also there was no relationship found between pre op severity of ptosis and magnitude of post-op refractive error.

Klimek et al<sup>6</sup> reporting 28 eyes over a period of 14 years observed that significant cylindrical change is seen in eyes that underwent levator resection for unilateral congenital ptosis. The preoperative mean ptosis was 3.5 mm (range, 1.5-6 mm). At the last postoperative visit (mean, 20 months; SD, 11 months), the mean refractive change in the operated eye was 1.23 D sphere (range, 0-3.50 D; P =.061) and 0.83 D cylinder (range, 0-3.00 D; P =.002). Within the

group of control eyes, no significant mean spherical or cylindrical changes were found at the last postoperative visit. In the current study we found that there was no change in refractive status of non ptotic eye mean myopic spherical change while there was significant change in cylindrical error but not as marked as in Klimek et al. Savino et al<sup>7</sup> studied corneal topographic changes after ptosis surgery. They concluded that eyelid ptosis modifies anterior corneal surface inducing refractive errors and modifying corneal astigmatism in patients, thus affecting the quality of vision.

The surgical correction of blepharoptosis induced anterior corneal surface modification, restoring corneal symmetry and regular corneal astigmatism. In contrast to our observation, however, Skaat et al<sup>8</sup> reporting 162 cases, observed that the mean postoperative VA, SE, and mean cylinder at 90 remained unchanged after ptosis surgery between the ptotic eyes before and after surgery and compared with the sound eyes. The mean cylinder at 180 changed from -0.34 D to 0.36 D ( $P = 0.04$ , paired sample t test), and the mean astigmatism correction by vector analysis after ptosis surgery was  $1.10 \pm 0.68$  D. Similarly a study by Byard et al<sup>2</sup> and Gingold et al<sup>9</sup> did not show a significant change in refractive error following levator resection surgery for congenital ptosis.

Brown et al<sup>10</sup> concluded that repositioning of the upper eyelid after ptosis repair or blepharoplasty may result in visually significant astigmatic changes in the central and peripheral cornea and may alter the patient's spectacle or contact lens correction. The average preoperative astigmatism of the study group was 1.50 diopters. Approximately 70% of these patients had with-the-rule astigmatism. As measured by keratometry, the average dioptric change at 1 & 3 months after surgery was 0.60Ds. Almost 30% of patients showed astigmatic changes greater

than 1.00D one month after ptosis repair. Similar changes were found with corneal video keratoscopy (CVK); the average dioptric changes at 1 month and 3 months after surgery were 0.68 and 0.61D, respectively. By keratometry, 29% and 42% of patients had with-the-rule change at 1 & 3 months, respectively. CVK at 1 and 3 months after ptosis repair showed more than 50% of the patients had a vertical steepening. Similarly Zinkernagel et al<sup>11</sup> also found a statistically significant correlation between the severity of upper eyelid abnormality and topographical corneal changes after eyelid surgery.

In general, the studies conducted across the globe, show mixed results, few indicating a significant change in astigmatism, while others did not record such change. Others<sup>12</sup> have shown that these changes, though significant appear to be temporary in most patients and by 12 months after surgery, all of the operated eyes showed a regression toward the amount and pattern of preoperative astigmatism. According to current study there was no change observed in spherical refractive error after ptosis surgery but a statistically significant change in with the rule astigmatism was seen post-op in ptotic eyes while no change was seen in nonptotic eyes in spherical or cylindrical refractive error during the period of 3 months suggesting that the change was due to surgery and was not the part of the process of emmetropization. However, small sample size and short duration of follow up is a limitation in this study.

### **Conclusion**

- It is demonstrated that not only ptosis itself but also the surgical correction of ptosis can change astigmatic refractive error so post-op cyclorefraction is necessary in children to correct refractive error in order to prevent amblyopia and improve visual performance of patient postoperatively.

- Pre-op severity of ptosis has no relationship with the post-op magnitude of change in astigmatism.
- Apparently type of surgery does not play any part in post-op change and magnitude of astigmatism, but due to small sample size it could not be statistically proven.

### **Recommendations**

- Patients should be followed in order to evaluate the change in astigmatism
- Parents should be properly counseled for timely checkup of their child

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Drafting: Kunza Zafar

Statistical expertise: Kunza Zafar

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# Prevalence and pattern of refractive errors in school age children between 5 and 15 years

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## Abstract.

**Objective:** To determine the frequency of refractive error and its types in school age children between 5 and 15 years.

## Material and Methods

**Study Design:** Descriptive Cross Sectional Study.

**Setting:** The study was conducted at Pediatrics Eye OPD of Al-Shifa Trust Eye Hospital Rawalpindi.

**Sample Size:** The sample size was 170 children.

**Results:** The mean  $\pm$  SD age of the study patients was  $9.98 \pm 2.96$  years ranging from 5 to 15 years. Out of 170 children 54.71% were males while remaining 45.29% were females. Prevalence of Refractive error was found to be 21.76%. Considering the type of refractive error myopia was more prevalent 43.24% followed by astigmatism 32.43% and hyperopia 24.32%. **Conclusions:** Refractive error is common in the school age children between 05 and 15 years and if not early diagnosed and managed properly it can cause significant and permanent visual impairment. *Al-Shifa Journal of Ophthalmology 2016; 12(1): 45-52.* © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

## Introduction:

Refractive errors occur when the eye cannot clearly focus the image from outside world. It is a state of refraction wherein the parallel rays of light coming from infinity with accommodation at rest are focused either in front or behind sensitive layer of retina in one or both the meridia<sup>1</sup>. The result of refractive errors is blurred vision, which is sometimes so severe that it causes visual impairment. WHO estimates that 13 million children aged 5-15 years worldwide are visually

impaired from uncorrected refractive error<sup>2</sup>. Refractive errors are among the leading causes of visual impairment worldwide and are responsible for high rates of low vision and blindness in certain areas<sup>3</sup>. Refractive errors are present in childhood and continue in adult life<sup>4</sup>. Blindness due to refractive error usually manifest at early age and number of blind-person-years due to refractive error in developing countries is approximately twice as high as cataract related blindness<sup>5</sup>. It was estimated that blindness due to refractive error resulted on average of 30 years of blindness for each person as compared to 5 year blindness due to untreated cataract for each person<sup>6</sup>. In Pakistan, 11.4% blindness is due to uncorrected refractive error<sup>4</sup>.

Refractive errors include Myopia, Hyperopia and Astigmatism. If any one of these refractive errors is uncorrected or treated late they can lead to serious visual complications. Uncorrected myopia can result into Retinal tear, Retinal

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detachment, Complicated Cataract, Vitreous Hemorrhage and Choroidal Hemorrhage<sup>1</sup>. Uncorrected Hypermetropia can cause Amblyopia and Accommodative convergent squint<sup>1</sup>. Uncorrected Astigmatism during early development can result into Meridional Amblyopia<sup>7</sup>.

Studies on the prevalence of refractive errors among children in different parts of the world show significant differences<sup>2</sup>. In one study conducted on school children in Pakistan, prevalence of refractive error was found to be 19.8% and among them myopia was 43.0%, hyperopia was 21.5% and astigmatism was 35.5%<sup>4</sup>. In another study conducted in Ethiopia, prevalence of refractive error was found 9.4% and among them myopia was 31.6% and hypermetropia was 26.4%<sup>5</sup>. In developed countries prevalence of refractive error has been reported at 8.2% in Baltimore, 10.4% in Kazuhiro, Japan and 18.2% in Santa Monica, USA<sup>5</sup>. Studies have reported a prevalence of refractive error up to 11%<sup>5</sup>. Refractive errors cannot be prevented but can be diagnosed by eye examination and treated with corrective glasses, contact lens or refractive surgery and thus preventing from developing the severe visual impairment.

### **Subjects and Method**

The study was conducted at the Pediatric OPD of Al Shifa Trust Eye Hospital Rawalpindi. The sample size was 170.

#### **PATIENT SELECTION**

##### **Inclusion Criteria**

- All children aged between 5 and 15 years.
- Children of both genders.

##### **Exclusion Criteria**

- Children having chronic eye diseases, infective and allergic conditions diagnosed on history and examination.
- Patients with any chronic illnesses like Glycogen storage diseases, Thalassemia diagnosed on history and examination.
- Those who refused to consent.

### **Data Collection Procedure**

After an informed written consent from child's caretaker or parent the patients were screened for inclusion criteria. The physical assessment and eye examination was undertaken and those fulfilling the selection criteria were included in the study.

Children were enrolled and their demographic characteristics along with presenting signs and symptoms were recorded.

According to study objective the patient age was categorized from 5 to 15 years and the eye examination was done to look for refractive error.

### **Steps for Eye Examinations**

- Assessment of distance VA at 4 m with ETDRS logMAR charts (Precision Vision, Inc., La Salle, IL)
- Examination of the external eye and the fundus for abnormalities.
- Measurement of refractive errors 40 to 60 minutes after instillation of one drop of proparacaine (0.5%) and two drops of cyclopentolate (1%) in each eye.
- Cycloplegic refraction was performed with an autorefractometer, followed by verification of autorefractometer measurements by retinoscopy and when effects of cycloplegia vanished then by subjective refinement in subjects under cycloplegia
- The final estimate, i.e., the estimate was confirmed by Post Mydriatic Testing (PMT) by subjective refinement, and was used for determination of presence versus absence of refractive error and for the prescription of spectacles.

### **Results:**

In this study a total of 170 cases with age between 5 to 15 years were enrolled. The mean  $\pm$  SD age of study patients was 9.98  $\pm$  2.96 years. Majority of the children were of age between 11 to 15 years and constitute about 64.70% of total cases while remaining 35.30% of cases lie in

range of 5 to 10 years of age as shown in Table 1. Total numbers of male children were 93 (54.71%) and total numbers of female children were 77 (45.29%) as shown in Figure 1.

Refractive errors were found in total 37 children (21.76%), shown in Figure 2. Among these total 37 cases of refractive error Myopia was found in 16 children (43.24%), Hyperopia was present in 09 children (24.32%) and Astigmatism was present in 12 children (32.43%), shown in Figure 3. The gender distribution of

refractive error was such that among male children (total 93), 17 had Refractive error (18.28%), out of these 8 had Myopia (47.06%), 4 had Hyperopia (23.53%) and 5 were Astigmatic (29.41%). Similarly among female children (total 77), 20 were having refractive error (25.97%), out of which 8 had Myopia (40.00%), 5 had Hyperopia (25.00%) and 7 were Astigmatic (35.00%), shown in Table 2 and Figure 4 & 5.

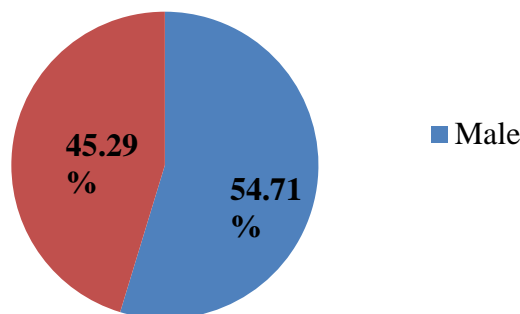
**Table 1: Age of Study Cases**

Age Range (years)	No of Cases	Percentage (%)
05 – 10	60	35.30
11 – 15	110	64.70
Total (05-15)	170	100.0

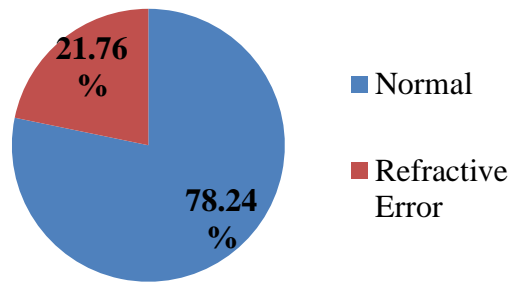
Mean Age 9.98 years  
Standard Deviation ± 2.96

**Table 2 Gender wise Prevalence of Refractive Error**

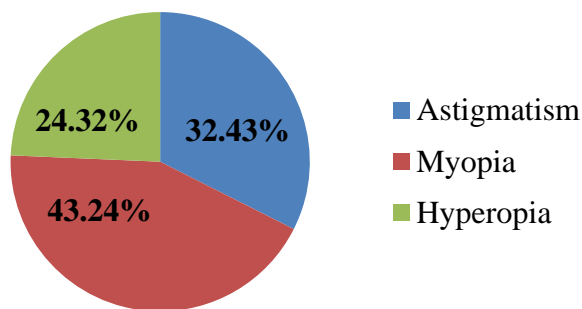
Gender	No of Cases	Refractive error	Percentage (%)
Male	93	17	18.28
emale	77	20	25.97
Total	170	37	21.76



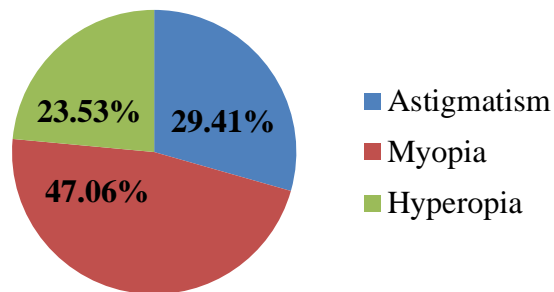
**Fig 1 Gender wise Distribution of Study Population**



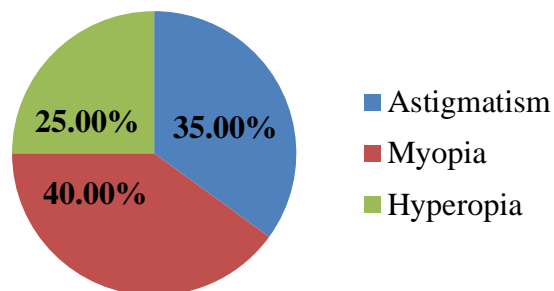
**Fig 2 Prevalence of Refractive Error**



**Fig 3 Proportion of Types of Refractive Error**



**Fig 4 Proportion of Types of Refractive Error in Males**



**Fig 5 Proportion of Types of Refractive Error in Females**



## Discussion:

Refractive errors are a world-wide problem. World Health Organization (WHO) estimates a total of 153 million people (range of uncertainty: 123 million to 184 million) visually impaired from uncorrected refractive errors and among them eight million are blind<sup>8</sup>. There are 12.8 visually impaired children due to uncorrected refractive error in age between 5 and 15 years. The world prevalence in this age is 0.96 percent<sup>8</sup>. Uncorrected refractive errors cause serious visual impairment to children and have impact on their learning and education. It is one of the avoidable causes of blindness therefore WHO launched a program Vision 2020 to tackle this problem. Studies on prevalence of refractive errors among children of different parts of world show significant differences<sup>3</sup>. In developed countries prevalence of refractive error has been reported at 8.2% in Baltimore, 10.4% in Kazuhiro, Japan and 18.2% in Santa Monica, USA<sup>5</sup>. Refractive error study in children (RESC) was conducted in China, Nepal, Chile, India, South Africa and Malaysia. The results of RESC show prevalence of presenting visual impairment from 1.2% to 14.7%<sup>9</sup>. In Pakistan a few studies also conducted on refractive error among children but these studies also show variable results.

In our study total 170 children participated. It was a hospital based study. These children were of age between 5 and 15 years and were taken from Out-Patient Department. Male children were 93 and female children were 77. Overall male participation was more (54.71%) than females (45.29%) in our study. The refractive error was found in total 37 children thus concluding a prevalence of 21.76%. We can compare our result to a study conducted in Pakistan in Lahore city where the prevalence of refractive error was found to be 19.8%<sup>4</sup> which is close to our results. However in that study children were of age between 11 to 16 years. A

similar study was also conducted in Pakistan on refractive errors among school children. They conducted study on school children of age between 4 and 15 years and concluded the prevalence of refractive error 22.21%<sup>10</sup>. Let's take another study which was also conducted in Pakistan among children between 6 and 15 years of age. That study was done to determine refractive errors in those children who used to play video games. In their study prevalence of refractive error was 18%<sup>11</sup>. A similar study was conducted in Nepal on refractive errors among school children between 7 and 15 years. They found prevalence of 19.8%<sup>12</sup>. Another study was conducted on refractive errors among school children in Tafila city of Jordan. In that study prevalence of refractive error was found 25.32% which is more than that of our study<sup>13</sup>. However they did study on 1,647 school children and also children were of age between 12 and 17 years while our study includes 170 children and of age between 5 and 15 years. Moreover prevalence of refractive error also varies in different parts of world so these might be reasons of difference in results of two studies.

In our study among those refractive error children (37), myopia is present in 16 children (43.24%), hyperopia is present in 9 children (24.32%) and astigmatism is present in 12 children (32.43%). So in our study myopia is more prevalent followed by astigmatism and then hyperopia respectively. The pattern of these various types of refractive error among children is similar to that study conducted in Lahore on school children<sup>4</sup>. Similarly we can also compare the pattern of these various types of refractive error found in our study to a study conducted in Chittagong, Bangladesh. That was also hospital based study conducted on 500 children of age 5 to 15 years. That study included only those children who had refractive errors. In that myopia was prevalent 64.6%, astigmatism 56% and hyperopia 22.6%<sup>14</sup>. So we see in

that study myopia is more prevalent followed by astigmatism and then hyperopia. Thus pattern of refractive error found in that study is similar to that of our study. Now again come to the study conducted in Tafila city Jordan, here prevalence of myopia determined was 63.5%, astigmatism 20.4% and hyperopia 11.2%. So pattern found in Tafila study is that myopia is more prevalent than astigmatism and least prevalent is hyperopia which is similar to that of our study results<sup>13</sup>. Let's consider another study conducted on refractive error among the school children in Nepal. Here myopia was found more prevalent (44.8%) followed by astigmatism (34.9%) and then hyperopia (20.3%). Thus pattern of refractive errors found in that study matches with pattern of our study<sup>15</sup>.

In our study regarding gender, the prevalence of refractive errors in female is 25.97% (20 of 77) and in males it is 18.28% (17 of 93). Thus refractive errors are found to be more prevalent in females. In one study conducted on school children of Karachi the refractive error was significantly associated with female gender which supports our results<sup>6</sup>. Another study was done on one million school children of district Rawalpindi and Islamabad and in that study refractive errors were found to be more prevalent in females which is similar to our study<sup>16</sup>. Similarly another study was done on refractive errors among school children in Saudi Arabia and they also found higher prevalence of refractive error in females like to that of our study<sup>17</sup>. However there are also various studies done which show no any gender association of refractive error, such as study conducted in Bangladesh at Chittagong eye hospital shows no any significant gender association<sup>14</sup>. Similarly in one study conducted on children based on population surveys in Asia, Africa and Latin America, prevalence of refractive error found to be

more in females than males but not at a statistically significant level.<sup>18</sup>

This study has some weaknesses and strengths. The weakness lies in the fact that our study is not population based while all over the world such kind of studies is mostly done in a specific population. We conduct study in hospital due to various limiting factors such as time limitations, hospital responsibilities, logistic and financial unavailability. The strength of study lies in the fact that we use rigorous method for determination of refractive error including cycloplegia to eliminate accommodation related variability in refractive error measurement, initial determination of refractive error with an unbiased objective instrument (Retinomax autorefractor) and verification by retinoscopy and then by subjective refraction. Moreover our study is a good source of information for development of infrastructure of eye care services to our population.

This study is an effort to report the burden of loss of visual acuity due to refractive errors at a tertiary care eye hospital setting in Pakistan. Data from this study will be helpful to plan strategies for the enhancing awareness about refractive errors in general population and to transform this increased awareness to actual utilization of services. The calculation of frequency of refractive errors and their different types in our setting will help to determine the various strategies to tackle this problem on the government side e.g. training of expert personnel, development of infrastructure at a community level and provision of spectacles according to a type of error to our poor people at a low cost etc. It will also help to educate the public about this problem. For example poor vision during childhood affects the performance in a school or at work resulting in a negative impact on the present and future life of a person as planning of a career of youth is very much dependent on the visual acuity

especially in the jobs for military, railway, navy and aviation. Hence the significance of such a study is many folds as it helps us to better understand the intensity of this problem in our society where these kind of quantitative studies are lacking.

### **Conclusion:**

According to our study findings we concluded that Refractive errors are fairly common among the school age children and it is this age group which is vulnerable to the disastrous effects of uncorrected refractive error, thus causing visual morbidity and decrease in the functional vision which may be permanent if not diagnosed and managed early.

It is thus suggested that screening programs for refractive errors shall be started at a mass level and also every child, at the time of its admission to the school must undergo ophthalmic examination by a trained Ophthalmologist or an Optometrist at least, so that the Refractive error is diagnosed and thus managed early to prevent permanent visual disability. Moreover there must be a system for provision of free or low cost good quality spectacles to those children who have refractive error. As refractive error is among those leading causes of blindness that can be preventable and if a person get visually handicapped just because of a reason that he or she was unable to get his or her eye examination or unaware of decrease vision due to refractive error or unable to buy a spectacle for treatment then it would be a large stigma to our health care system and services towards the community. These measures can help in the early diagnosis and treatment of refractive error and thus preventing the persons from the permanent visual impairment.

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Drafting: Muhammad Adeel

Statistical expertise: Muhammad Adeel, Abdul Hannan

Critical revision: Muhammad Adeel

## A newborn child with Peters anomaly and Hydrocephalus

Muhammad Kashif Habib<sup>1</sup>, Saad Alam Khan<sup>1</sup>, Muhammad Saqib Habib<sup>2</sup>

### Abstract:

A one month old female child presented with complaints of watering and discharge from her right eye. On examination her right eye had sticky eyelashes due to the presence of discharge, conjunctival hyperemia and corneal abscess with descemetocele and perforation. B-Scan ultrasonography of her right eye showed microphthalmos, hyperechoic membranous shadow in posterior vitreous and chorioretinal thickening. On examination of her left eye she had microcornea and corneal opacity with central irido-corneal and lenticulo-corneal adhesions (Peters anomaly). She had a hypoplastic iris and an intraocular pressure of 22mm of mercury. B-Scan ultrasonography of her left eye showed microphthalmos and Persistent hyperplastic primary vitreous. On systemic examination she was having hydrocephalus. She was admitted as emergency and underwent conjunctival flap and tarsorrhaphy of her right eye. She is also being managed & followed-up for hydrocephalus by neurosurgeons. *Al-Shifa Journal of Ophthalmology 2016; 12(1): 53-57* © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

### Introduction:

Peters Anomaly is the most common cause of corneal opacification related to anterior segment dysgenesis. It is usually characterized by central or paracentral leukoma with associated irido-corneal or keratolenticular adhesion.<sup>[1]</sup> Currently its etiology is uncertain and most probable factors include genetic, infectious, traumatic and toxic effects.<sup>[2]</sup> Usually it is an autosomal recessive<sup>[3]</sup> condition but autosomal dominant inheritance has also been reported.<sup>[4]</sup> Usual mutations are found in genes related to ocular embryogenesis and development.

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### Case Report:

Parents of a one month old female brought their daughter to the Pediatric ophthalmology department of Al Shifa Trust Eye Hospital, Rawalpindi with the presenting complaints of watering and discharge from the right eye of the child. The child was born with hydrocephalus and had a family history of the hydrocephalus as two of her elder siblings had died because of it. Her visual acuity could not be recorded as the child was asleep. On examination the right eye had sticky eyelashes due to the presence of excessive discharge matting the eyelashes and associated conjunctival hyperemia. There was central corneal abscess with associated descemetocele and area exhibiting corneal perforation. Her left eye had microcornea and corneal opacity with irido-corneal and keratolenticular adhesions (Peters anomaly). The left eye also had a hypoplastic iris and intraocular pressure was 22 mm of mercury measured with Tonopen. Fundal examination was not possible due to corneal opacification so bilateral B-scan was performed. B-scan of the right eye showed microphthalmos, hyperechoic membranous shadows in the

posterior vitreous and chorioretinal thickening. B-scan of left eye showed microphthalmos and persistent hyperplastic primary vitreous. On systemic examination she was having hydrocephalus. She was admitted as emergency and underwent a conjunctival

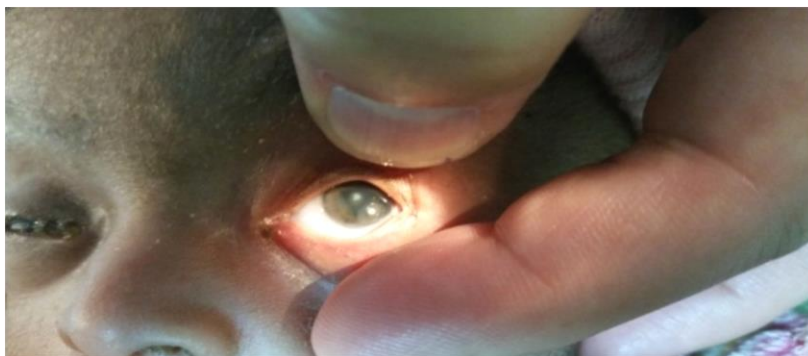
flap and tarsorrhaphy of her right eye. She is being observed regularly for the intraocular pressure of her left eye. She is also being managed & followed-up for hydrocephalus by neurosurgeons.



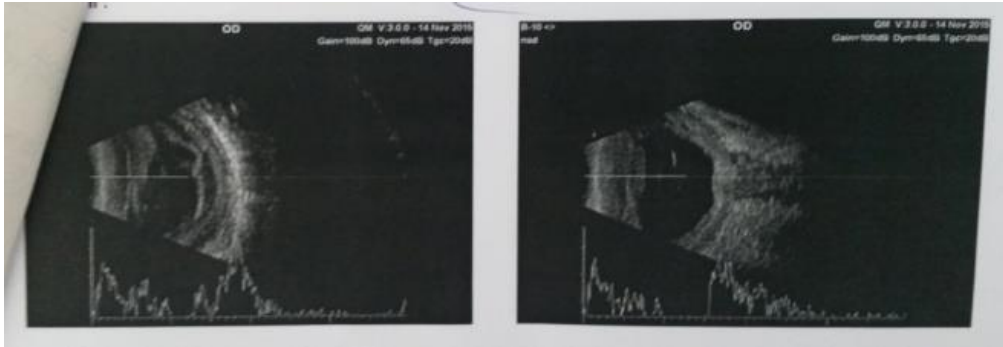
**Figure 1: Matted lashes Right Eye**



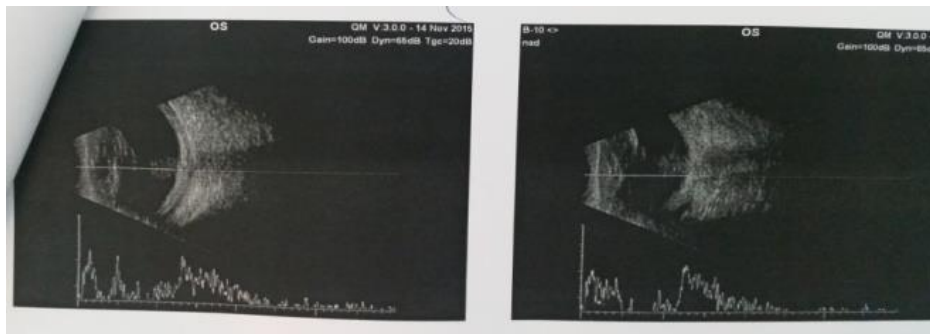
**Figure 2: Corneal abscess with descemetocoele Right Eye.**



**Figure 3: Central corneal opacity because of Lenticulo-corneal & Irido-corneal adhesions in Left Eye.**



**Figure 4: B-Scan ultrasonography Right Eye.**



**Figure 5: B-Scan Ultrasonography Left Eye.**



**Figure 6: Hydrocephalus.**

**Discussion:**

Peters Anomaly is the most common cause of congenital corneal opacity which can be unilateral or bilateral<sup>[5]</sup> with a prevalence of approximately 3 in 100,000.<sup>[6]</sup> It has an equal distribution in both sexes.<sup>[7]</sup> Histopathological and Embryological studies suggest that at least four different developmental defects may lead to Peters anomaly.<sup>[5]</sup> It affects fetal development during 6<sup>th</sup> to 16<sup>th</sup> week of gestation.<sup>[8]</sup> Developmental defects can be either:  
1- Intrauterine keratitis commonly referred to as Internal Corneal Ulcer of van Hippel.  
2- There is defected separation of the lens

vesicle from the surface ectoderm, causing a posterior corneal defect caused by a persistent keratolenticular adhesion blocking the ingrowth of secondary mesenchyme.

3- Incomplete central migration and differentiation of mesenchymal tissue destined to form corneal endothelium and Descemet's membrane<sup>[5]</sup> as a result of defective migration of neural crest cells<sup>[2]</sup>.  
4- Secondary anterior displacement of iris lens diaphragm due to a retrolental mass. Basic mechanism in this was a passive increase in pressure due to anteriorly displaced lens against cornea at a time in

development when Descemet's membrane was still a delicate thin structure.<sup>[5]</sup>

Genetic mutations in many developmental genes have been found associated with Peters anomaly. Pax 6 is a homeobox gene controlling embryogenesis expressed in corneal and conjunctival epithelium in animal models. Mutation in Pax 6 is found associated with aniridia. PITX 2 is a transcription factor gene; mutations in this gene may result in iris hypoplasia with glaucoma and iridodysgenesis syndrome. PITX 3 is a transcription factor gene and its mutations can cause anterior segment mesenchymal dysgenesis.<sup>[5]</sup> Mutations in PAX6<sup>[9]</sup> and FOXC1<sup>[10]</sup> genes are also seen which are found responsible in ocular embryogenesis. Peters anomaly has a diverse range of clinical features varying a lot in severity. It is classified into three groups: (1) Posterior corneal defect with leukoma. (2) Posterior corneal defect with leukoma and adhesion of iris strands. (3) Posterior corneal defect with leukoma, adherent iris strands and keratolenticular contact or lenticular opacification. Type 1 includes isolated leukoma and corneal defect is least documented.<sup>[5]</sup> Type 2 is characterizes iris strands adhering to cornea in form of a collarete. Affected cornea is usually opaque surrounded by clear cornea. Cornea is mostly avascularized but vascularization of cornea has also been reported rarely.<sup>[2]</sup> Type 3 constitutes posterior corneal defect with leukoma with keratolenticular adhesions or cataract. Associated lenticular features include anterior dislocation in absence of adhesion and pyramidal cataract axially aligned with corneal defect.<sup>[5]</sup>

Ocular associations include aniridia, microphthalmia, persistent hyperplastic primary vitreous and retinal dysplasia, sclerocornea, iridocorneal angle and iris dysgenesis, ptosis and optic nerve hypoplasia.<sup>[11]</sup> Systemic abnormal associations include craniofacial abnormalities, congenital heart diseases,

pulmonary hypoplasia, ear abnormalities, dwarfism, fetal alcohol syndrome.<sup>[5]</sup> A case with post axial polydactyly, bilateral camptodactyly and club foot has also been reported.<sup>[1]</sup> Chromosomal abnormalities like trisomy 13-15, ring chromosome 21, Norrie disease, partial deletion of chromosome 11 q, mosaic trisomy 9 and 49XXXXY syndrome have also been associated.<sup>[12]</sup> Sensory deprivation amblyopia and Glaucoma are the most significant sequelae of Peters anomaly.<sup>[13]</sup>

Peters plus syndrome is characterized by anterior segment abnormalities and systemic features. Most common ocular features are Peters anomaly, central corneal clouding, thinning of posterior cornea, iridocorneal adhesions, glaucoma and cataract. Systemic features present are short limbs and broad distal extremities, intellectual disabilities, characteristic facial features and cleft lid or palate. It is usually genetic with an autosomal recessive pattern of inheritance. Mutations in B3GLCT gene are associated with Peters plus Syndrome.<sup>[14]</sup>

Management of Peters anomaly is difficult despite early diagnosis and availability of treatment because of presence of multiple abnormalities in the anterior segment. Peripheral iridectomy is the treatment of choice for patients presenting with a clear peripheral cornea.<sup>[15]</sup> It has good prognosis in eyes with discrete opacities without cataract. In cases associated with considerable corneal opacification, Penetrating keratoplasty is the treatment of choice to avoid amblyopia and assist in development of visual acuity.<sup>[11]</sup> Early penetrating keratoplasty within first three months offers the best prognosis. Alternative to penetrating keratoplasty is Autorotational keratoplasty.<sup>[5]</sup> 35% successful surgery rates were reported with minimum following of up to three years. Pre-operative glaucoma increased the rates of graft rejection. The presence of other ocular disorders, central nervous system



abnormalities and larger corneal transplants also increased the risk of graft rejection. Other post-operative complications include cataract development (21%), glaucoma (19%), retinal detachment (22%) and pthisis bulbi (10%).<sup>[16]</sup> Isolated cataracts should be treated with vitrectomy and lensectomy.<sup>[15]</sup>

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 Drafting: Saad Alam Khan, Muhammad Saqib Habib  
 Critical revision:Muhammad Kashif Habib, Saad Alam Khan

**CORRIGENDUM**

Article title: Intraocular pressure control after combined manual small incision cataract surgery augmented with mitomycin-c

Volume: 11(2)

Author: Irfan Ullah et al

Place of study may be read as "Hayatabad Medical Complex Peshawar" instead of "Khyber Teaching Hospital Peshawar"