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لَنْ تَنَالُوا الْبِرَّ حَتَّى تُنْفِقُوا مِمَّا تَحِبُّونَ ۗ وَمَا تُنْفِقُوا مِنْ شَيْءٍ فَإِنَّ اللَّهَ بِهِ عَلِيمٌ ﴿٩٢﴾

تم ہرگز بھلائی نہ حاصل کر سکو گے جب تک تم اپنی پسندیدہ چیز کو اللہ تعالیٰ کی راہ میں خرچ نہ کرو گے اور جو کچھ بھی خرچ کرو گے اللہ تعالیٰ اسے بخوبی جانتا ہے۔ سورۃ العمران آیت ۹۲

Editorial

OPHTHALMOLOGY UPDATE - Celebrating 10TH Anniversary

A Journey of Commitment & Conviction

Ophthalmology Update started its journey from Islamabad in 1998 as a quarterly periodical 'Ophthalmic Newsnet'. Over a period of time with constant and concerted efforts it earned credible identity in the Ophthalmic community and a creditable position in the ranks of medical journalism. The credit for achieving an enviable standing goes to the untiring efforts and leadership of its chief editor Prof. M. Yasin Khan Durrani, who guided the periodical from odd to even through generating a team spirit in its managing and editorial staff. After receiving good response from our readers we were encouraged to devolve the periodical from 'Ophthalmic Newsnet' to a full-fledged scientific journal 'Ophthalmology Update'. It has now completed 10 years of its existence, weathering numerous difficulties and daunting challenges. During this period the journal has maintained an impeccable credentials in the field of medical journalism.



Many of our friends and well wishers know that it has never been an easy sailing through out this journey. There came moments when we were stuck with external pressures and obstacles but we continued our efforts without compromising our principles. Our strong conviction enabled us to seek help of Almighty Allah and we succeeded in maintaining an independent and non-partisan posture.

We launched this venture to pursue certain objectives to encourage young scientists who aspire for research and to help them by providing latest information and development in the field of Medicine especially Ophthalmic Sciences. In fact, it has been the hallmark of our policy and we are proud of sustaining our endeavors in strengthening our ideology 'Service to the ailing' by highlighting the needs of deprived section of our society, who suffer from diseases especially the blinding disorders.

Ophthalmology Update has always resisted various temptations which were very harmful to our

social fabrics. Our editorials do not reflect opinions of any Society or school of thought. These are purely scientific and ethical to encourage scientific debate. The question arises, why have we opted for medical journalism as our career? It was not a whimsical decision rather a deliberate and conscious step so evident in our ideological moorings. We have never considered it a commercial venture rather a sacred mission helping eradication of blindness in the developing world as well as promoting medical sciences.

In order to promote wider readership we have, recently, introduced a general section of Medicine. Al-Hamdo Lillah, it is now 'an official Journal of Peshawar Medical College' which is attached to Riphah International University, Islamabad. The journal stands approved and indexed by the Pakistan Medical & Dental Council, PakMedinet and ISSN- International Center of France & UK., as a standard international scientific journal after being registered with the Govt. of Pakistan under Press & Publication Ordinance '98, which shows that the journal is now an impregnable identity.

Introduction of computer technology, laser printing with color production have greatly facilitated our work, but on the other hand put an extra financial burden through sky-rocketing prices of good quality of paper, ink and finally the labor. We have taken the challenge seriously, assuring smooth publication on 'no profit no loss basis'

We are especially thankful to the Principal and faculty of Peshawar Medical College and the team of our young and dedicated ophthalmologists on the editorial board who are committed with conviction to carry forward our mission with renewed zeal, ensuring regular and well-in-time publication of Ophthalmology Update.

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ORIGINAL

Central Retinal Vein Occlusion, Study of Risk Factors in 93 Patients

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Tehniyat Ishaq Khattak⁴ & Baghdad Khan⁵



Dr. Alam

ABSTRACT

Objective: To identify and review the risk factors in central retinal vein occlusion in 93 patients in hospital.

Materials & Methods: This study was conducted in DHQ hospital Karak, and Group of Teaching Hospitals Bannu, from August, 2007 to December 2010. In near about three and half years of this study 93 patients with central retinal vein occlusion comprising of 51 (58.83%) male and 42 (45.20%) female were documented. Age ranged from 21 to 80 years, nearly the same in both gender. They were examined and investigated for risk factors in collaboration with opinion of cardiologist, physician, gynecologist and pathologist if required.

Results: Out of 93 patients, 29 (31.18 %) were hypertensive, 20(21.50 %) were diabetic, 23 (24.73%) were glaucomatous, 5(5.37%) had blood disorders, 4(4.31%) had kidney diseases, 2(2.15%) had pregnancy and in 2(2.15%) had SLE, 8(8.6%) patients the risk factor were unknown. As for as the age factor is concerned, 4(4.30%) patients were in a age range from 21 to 30 years, 3(3.22%) were in 31 to 40 years, 10(10.71%) were in 41 to 50 years, 13(13.97%) were in 51 to 60 years, 34(36.55%) were in 61 to 70 years, and 29(31.18%) were in the range of 71 to 80 years of age.

Conclusion: Central retinal vein occlusion is a devastating situation of visual loss as well as other ocular complication. The risk factors must be addressed for proper management.

Key Words: Central Retinal Vein Occlusion (CRVO), Diabetes Mellitus (DM), Intraocular Pressure (IOP).

INTRODUCTION

CRVO is a common vascular disorder of the retinal vessel. It is characterized by intra-retinal haemorrhages in all four quadrants of the fundus, with increased tortuosity of retinal veins, dilatation, cotton wool spots, optic disc swelling and retinal oedema.¹ Histopathological study shows that there is thrombus formation near lamina cribrosa.² In the centre of optic nerve Central Retinal Artery and Central Retinal Vein lie side by side, enclosed in common fibrous tissue envelope.

Klein³ postulated the following three occlusive mechanism in CRVO

- a. Occlusion of vein by external compression by sclerotic adjacent structure and secondary endothelial proliferation.
- b. Occlusion by primary venous wall disease

- (Degenerative or inflammatory in nature).
- c. Hemodynamic disturbances produced by a variety of factors e.g subendothelial atheromatous lesion in central retinal artery, arterial spasm, sudden reduction of blood pressure, blood dyscrasias and further aggravated by arteriosclerosis or unfavorable anatomic relation. These produce stagnation of the blood flow in the vein and result in primary thrombus formation in susceptible eyes. Hematological disorder contributes to decrease in blood perfusion pressure.

Recent study with ambulatory blood pressure monitoring have established that during sleep there is fall of blood pressure. This may convert partial thrombosis to complete thrombosis because of poor and sluggish circulation during sleep.⁴ CRVO is associated with many ocular and systemic risk factors. First it was attributed to old age but multiple studies revealed that it also occurs in young.^{5,6,7,8} Cardiovascular risk factor is the important factor suggesting that a thickened sclerotic Central Retinal Artery as occur in systemic hypertension may play an important role in the pathogenesis of CRVO.⁹

CRVO is classified into ischemic and non-ischemic types based on the amount of capillary non perfusion noted on fluoroscene angiography.¹⁰ Hayreh suggested that the site of occlusion in eyes with non-ischemic CRVO may not be in the area of lamina cribrosa but

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further back in the orbit. The more posterior location of occlusion would make more collateral channels available for venous blood flow and this could explain the less damage presentation.¹¹

Most patient of CRVO are old¹² and there is close association of CRVO with DM, Hypertension and glaucoma.^{13,14} CRVO has also been reported with some type of yoga posture - Sirsasana¹⁵ (head stand posture) which is attributed to elevation of IOP¹⁶ reverting to normal after cessation of the same posture. Bilateral thrombosis of conjunctival vessels following habitual head standing also leads to CRVO¹⁷.

This study was focused on the risk factors to be reviewed in patients who visited hospital suffering from visual loss due to CRVO.

MATERIALS AND METHODS

This study was conducted on patients in DHQ Hospital Karak and group of teaching hospitals Bannu from August 2007 to December 2010. All the patients with CRVO were properly evaluated for risk factors including the opinion of cardiologist, physician, gynecologist, and pathologist, if required. In this duration of nearly three and half years 93 patients were diagnosed of CRVO. Out of 93 patients 51(54.83%) were male and 42(45.20%) were female. Table 01. Age ranges in both the gender was nearly the same from 21 to 80 years. Hypertension was considered when the diastolic blood pressure was above 90 mm Hg or patients already taking anti hypertensive therapy. IOP was considered high if it was above 21 mm Hg with Perkin tonometer or using anti-glaucoma therapy. Blood disorder patients were already diagnosed or opinion of physician was asked for workup. In case of pregnancy and DM opinions of gynecologist and pathologist were asked.

RESULTS

Out of 93 patients, 29 (31.18 %) were hypertensive, 20(21.50 %) were diabetic, 23 (24.73%) were glaucomatous, 5(5.37%) had blood disorder, 4(4.31%) had kidney diseases, 2(2.15%) had pregnancy, SLE 02 (02.15%) and in 8(8.6%) the risk factors were unknown. Table. II. As far as the age factor is concerned, 4(4.30%) patients were in a age range from 21 to 30 years, 3(3.22%) were in 31 to 40 years, 10(10.71%) were in 41 to 50 years, 13(13.97%) were in 51 to 60 years, 34(36.55%) were in 61 to70 years, and 29(31.18%) were in the range of 71 to 80 years of age. Table. III

Table I. Showing Gender Distribution

Male	51 (54.83%)
Female	42(45.22%)

Table II. Showing Risk Factors in Patients

Risk Factor	Number of Patients
Hypertension	29(31.18%)
Diabetes Mellitus	20(21.5%)
Glaucoma	23(24.73%)
Blood disorder	05(05.37%)
Kidney disease	04(04.30%)
Pregnancy	02(02.15%)
SLE	02(02.15%)
Unknown	08(08.6%)

Table III. Showing Patients according to age Factor

Age Range	Number of Patients
21-30 Years	04(04.3%)
31-40 Years	03(03.22%)
41-50 Years	10(10.71%)
51-60 Years	13(13.97%)
61-70 Years	34(36.55%)
71-80 Years	29(31.18%)

DISCUSSION

This prospective study regarding the risk factor for CRVO shows that it is associated with multiple risk factors. Increased risk factor were found to be hypertension, glaucoma, diabetes mellitus, kidney diseases, blood disorders. Our finding are nearly consisted with underlying risk profile of persons with CRVO.^{18,19}

Patients with the history of hypertension had more than five fold increase risk of CRVO. Diabetes mellitus and high IOP have strong correlation with CRVO. Multiple studies have revealed that high IOP exerts pressure over the lamina cribrosa causes stagnation and thrombus formation^{20,21}. Our study revealed that CRVO can occur at any age i.e young and old but this study also reflects higher prevalence in old age. The study also reveals CRVO cases in pregnancy which is usually due to hemodynamic changes or due to worsening of pre-existing morbidity in eyes. Our patients also reflect some cases in blood disorder which is important cause of hemodynamic changes and stagnation of blood flow at the level of lamina cribrosa. Study of Hideky Koizumi, Daniela C. Ferrara et.al shows that CRVO is associated with high risk factors of hypertension, DM, Glaucoma and atrial fibrillation. Their study also shows that CRVO was more common in post menopausal women, patients taking ACE inhibitors and warfarin

use. This study concludes that although the finding suggests the vasculopathic and prothrombotic risk in some patients for CRVO, they also suggest that pathogenesis of this disease may be more complicated than just the development of a primary thrombus in the vein.²²

ML Shahsuvaryan, A.K. Melkonyan case control study on 408 patients with CRVO age range from 21 years and older demonstrated that high risk of CRVO was found in persons with systemic hypertension but odd ratios were greater in older patients. This study also shows that risk of CRVO increases with age, hypercoagulability, DM, kidney diseases and glaucoma and prevalence of higher ESR was present in young adult compared with older patients.²³

CRVO is devastating ocular problem associated with many risk factors. Even variation in prevalence is there with geographical location. In USA the Beaver Dam Eye study group reported the 15 years cumulative incidence of CRVO to be 0.5%²⁴. In Australia the prevalence of CRVO ranges from 0.7% in patients with age range 49 - 60 years to 4.6% in patients older than 80 years.²⁵

Fabio B. Aggio, Angilino J et.al study has demonstrated bilateral CRVO in patients suffering from multiple myeloma.²⁶ CRVO in multiple myeloma and dysproteinemia is frequently related to hyperviscosity states of the blood which causes stagnation of the blood flow.^{27,28,29}

CONCLUSION

CRVO is a grave problem of the eye which has strong association with risk factors. To prevent CRVO all the risk factors i.e hypertension, DM, Glaucoma, blood disorder etc. must be addressed for proper treatment.

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ORIGINAL

Factors associated with Central Serous Chorioretinopathy in our setup

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Dr. Afzal Qadir

ABSTRACT

Objectives: The purpose of this study was to identify risk factors associated with central serous chorioretinopathy in our setup.

Methods : This was hospital based descriptive case series study of 50 diagnosed patients of central serous chorioretinopathy who visited eye OPD, Khyber Institute of Ophthalmic Medical Sciences , Peshawar from December 2006 to March 2008, were selected for study and interviewed through a structured questionnaire.

Results: Fifty eyes of fifty patients were included in this study. There were more male patients than female (92% : 8% females). Majority of patients (48%) presented between the ages of 31-40 years. No cause was found in 78% cases. Risk factors observed were steroid / anti-allergic drugs used in 14% patients, hypertension in 2%, gastrointestinal disturbances in 2%, pregnancy 1% and stress in 1%. Inkblot appearance was seen in 74% cases. Visual acuity at presentation was 6/18 in 26%, followed by worse than 6/18 in 22%, 6/12 in 20%, 6/9 in 16% and 6/6 or better in 16%.

Conclusions: Central serous chorioretinopathy is more common in males in the age group 30-40 years. Most cases were idiopathic. Steroids and antiallergics are the most common associated risk factor.

Key Words: Central serous chorioretinopathy, Fluorescein Fundus Angiography, Smoke stack, Ink blot.

INTRODUCTION

Central Serous Chorioretinopathy (CSCR) has been known by several names since its first description by von Graefe in 1866 and its oldest name was Central Recurrent Retinitis, coined by Von Graefe¹

CSCR is a disorder characterized by neurosensory retinal detachment associated with retinal pigment epithelial (RPE) detachment, RPE leakage, and angiographic RPE and choroidal hyperpermeability². The serous detachment of the inner (sensory) retina due to leakage from the choroidal vessels as a results of interface with the barrier and pumping function at the retina pigment epithelial level is known as central serous retinopathy.

CSCR is thought to occur most commonly in middle age adults between 30 and 50 years of age.² Male to female ratio is of at least 6:1 in the 20 – 50 years age group. In patients older than 50 years the male/ female ratio decreases to 2:1, as female are more affected in this age group.³

Predisposing factors are pervious cataract or glaucoma surgery, allergic respiratory tract diseases and toxic factors. Male gender, age between 30 to 50 years, Type A personality, hypertension, systemic lupus erthematosus (SLE) and Pregnancy, are reported to have been association with CSCR. Systemic steroids,

anti-histamine drugs, endocrine disorder like Cushing's syndrome, steroids-producing tumors, organ transplant, antibiotic, tuberculosis, gastro esophageal reflux disease and auto immune disorders all have been reported as the risk factors.

The most common presenting symptoms are decreased vision and distorted central vision, usually metamorphopsia, micropsia and occasionally macropsia. In acute phase, visual acuity is usually reduced to between 6/9 and 6/18 and can be partially corrected with low power convex lenses.

The macular elevation can be better visualized by indirect ophthalmoscopy or slit lamp biomicroscopy than with direct ophthalmoscopy. Fluorescein Fundus Angiography (FFA) reveals one or more area of leakage of dye from RPE into sub retinal space. The two main patterns of leakage are ink blot type (80-90%) and smoke stack (10-20%). Between 80 – 90 % of CSCR cases resolve spontaneously with absorption of sub-retinal fluid.⁵ The average time for resolution is between 3 and 4 months.⁵ Recurrence occurs in 45% of patients.⁴ Photocoagulation of the leaking area is followed by prompt resolution.^{4,5}

MATERIALS AND METHODS

Risk factors associated with CSCR in our population needs to be evaluated and compared with other ethnic and regional surveys. Therefore, we designed this descriptive study comprising 50 eyes with the objective to determine the risk factors associated with CSCR presenting to Khyber Institute of Ophthalmic Medical Sciences (KIOMS), Hayatabad Medical Complex (HMC), Peshawar .After the diagnosis of CSCR which was based on history, clinical examination and FFA finding and with the help of

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practicing vitreoretinal surgeon, A performa was designed and completed for all the patients. Each patient's name, age, sex, address, occupation and date of examination were noted. Then a detailed history about the visual complaints, history of ocular trauma, any systemic or ocular comorbidity, previous surgery and intake of drugs was taken. Past medical and family history of any disease and CSCR was inquired. For evaluation of stress and type A personality, Hemilton Anxiety and depression Scale and questionnaire was filled by each patient. Then a thorough ocular examination was carried out including visual acuity check up, added and unaided and if needed refraction was done. Pupillary reaction and anterior and posterior segment examination with direct and indirect ophthalmoscopes were carried out for each eye. Slit lamp biomicroscopy with 78 D or 90 D lens for fundus examination was done to detect the presence of CSCR. Fluorescein fundus angiography was performed for each patient to detect the site of leakage and its pattern.

RESULTS

Age distribution was analyzed among 50 patients as most of the patients 24(48%) were in age group 31-40 years followed by 16(32%) patients in age group 41-50 years while 10(20%) patients were in age group 21-30 years.

Gender distribution was analyzed as 46(92%) patients were male while 4(8%) patients were female. Risk factors associated with central serous chorioretinopathy was analyzed among 50 patients as most of the patients 39(78%) were Idiopathic followed by 7(14%) were using steroid and anti allergic drugs and 1(2%) had hypertension, 1(2%) had gastro-esophageal reflex, 1(2%) was pregnant and 1(2%) was in stress. (As shown in Table :1).

Fundus fluorescein Angiography patterns of central serous Chororetinopathy shows most of the patients i.e 37(74%) had Ink blot while 13(26%) had Smoke stack appearance. Among 50 patients at presentation, 13(26%) had visual acuity of 6/18 followed by 11(22%) with visual acuity of >6/18, 8(16%) had visual acuity at 6/12, 10(20%) with visual acuity of 6/9 and 8(16%) had visual acuity of 6/6. In ink blot group most of the patients 35(70%) had no cause while in smoke stack group most of the patients 5(10%) were using steroid and anti allergic drugs followed by 4 (8%) patients who were idiopathic.

Association of risk factors with visual acuity was analyzed among most of the patients 39(78%) who were idiopathic presented with visual acuity 6/6-6/60, followed by 7(14%) who were using steroid and anti allergic drugs had the visual acuity of 6/12-6/36. followed by 1(2%) were hypertension with visual acuity

6/9, 1(2%) had gastro esophageal reflex with visual acuity 6/18, 1(2%) was pregnant with visual acuity 6/12 and 1(2%) was in stress and had visual acuity 6/24. (As shown in Table: 2). Among 13 patients who had severe visual acuity loss, most of the patients (11) had no cause (4 patients were in age group between 25-35 years, 4 patients in age group between 36-40 years while 3 patients were in age group of 41-45 years). The remaining two patients had risk factors (one patient was found in stress at the age of 28 years while one patient was using steroids / anti allergic drugs at the age of 36 years.

Idiopathic vs risk factors with visual acuity defects was analyzed among 50 patients as 8(16%) patients with idiopathic had visual acuity 6/6, 8(16%) patients with idiopathic had visual acuity 6/9, 4(8%) patients with idiopathic had visual acuity 6/12, 11(22%) patients with idiopathic had visual acuity 6/18.

Table I
Risk Factors Associated with Central Serous Chorioretinopathy (n = 50)

	Frequency	Percent
Idiopathic	39	78.0
Hypertension	1	2.0
Steroid/Anti-allergic	7	14.0
Gastro-esophageal Reflux Diseases	1	2.0
Pregnancy	1	2.0
Stress	1	2.0
Total	50	100.0

Table II
Presenting Visual Acuity Range in Different Associations of Central Serous Chorioretinopathy (n=50)

RISK FACTOR	FREQUENCY	VISUAL ACUITY
Idiopathic	39	6/6 - 6/60
Hypertension	1	6/9
Steroids/ Antiallergics	7	6/12 -6/36
GERD*	1	6/18
Pregnancy	1	6/12
Stress	1	6/24
Total	50	

*GERD - Gastroesophageal reflux disease

Table III
Idiopathic Vs risk factors with visual acuity defect and total number of patients
(n=50)

Idiopathic/risk factors	V/A 6/6	V/A 6/9	V/A 6/12	V/A 6/18	V/A <6/18	Total no: of patients
Idiopathic	08	08	04	08	11	39
Hypertension	01					01
Steroids / Antiallergics			04	02	01	07
Pregnancy				01		01
GERD			01			01
Stress					01	01

DISCUSSION

In CSCR, there is accumulation of fluid in the subretinal space at the posterior pole of the fundus causing a localized detachment of the retina. Patients experience metamorphopsia, positive scotoma and micropsia when this detachment involves the central macula. CSCR is diagnosed clinically with slit lamp biomicroscopy and confirmed with FFA and OCT. Spontaneous resolution within few months is the rule with recovery of visual acuity to 6/6 or 6/9. But in some cases, small fundoscopic RPE alterations remain resulting in metamorphopsia, micropsia, colour vision defects and or dark appearance of the visual field. Recurrences occur in 30- 50% patients.⁵

In this study, there were 50 patients who presented with acute CSCR. The number of patients reported in previous studies ranged from 1-312.^{6,7} In most of studies the number of patients were comparable to our study.^{3,6,8,9} Majority 48% of our patients were between 31-40 years of age. This finding is consistent with earlier reports.^{8,10,11} In this study, 92% patients (46) were males while 8% were females. Sahu et al had 100% (11) male patients supporting our observation that CSCR is more common in males.¹¹ Tiwari et al had 42 (93%) male patients.⁶ Haimovici et al had 230 (73%) males¹², Hiramani et al had 27 (90%) males.¹³ All these testify this study that CSCR is more common in males. We found no cause of CSCR in 78% cases. This included 2% females and 76% males. This evidence is also supported by Perkins et al.⁹ They had idiopathic CSCR in 87% cases. Hypertension was the culprit for causing CSCR in 2% of patients. Tittl et al also supported our observation by saying that they had patients with hypertension.¹⁴ Perkins et al reported a higher frequency of patients (14%) in whom hypertension was the cause for CSCR.⁹ Similar, Hamovaici et al had 25% patients with CSCR in whom hypertension was the cause.¹²

In this study, 14% patients were using anti-allergic medicines and steroids which could be the possible

cause. Hamovaici et al supported our study.¹⁵ Mansuetta et al had 33% patients who had used oral and nasal steroids which were responsible for CSCR which is quite different from our observation.⁸ Steroid inhalation used for asthma has been reported to be the cause of CSCR in a patient.¹⁶ as reported by Perkins et al⁹ and Loo et al.¹⁰ The same way, raised glucocorticoids level caused CSCR in 16 patients.¹³ Antihistamines were offenders for CSCR in 20% patients which is also contradictory to our finding.⁸

Gastro-esophageal reflux disease was associated with CSCR and was found in 2% of our male patients having VA of 6/18. This is different from the observation of 4% who were suffering from gastro-esophageal reflux disease (GERD).⁸ Similarly, Cottecelli et al observed that *Helicobacter pylori* caused CSCR in 23 patients which is inconsistent with our study.¹⁷ Among these 23 patients, the prevalence of *Helicobacter pylori* was 78% as compared normal controls, in which the prevalence was 43.5%.¹⁷ This suggests that *Helicobacter pylori* has strong correlation with CSCR but was not observed in our study.

In this study, 2% of the patients had pregnancy and VA of 6/12. There are two other studies which support our observation.¹⁸ Haimovici et al had 18 patients with CSCR who were pregnant. They had 312 patients over a period of 3 years in the U.S.A. where healthcare system is at its zenith point.¹² In our study, VA in patients having idiopathic CSCR were 6/6 and 6/9 in 16% patients, 6/12 in 8%, 6/18 in 16% and worse than 6/18 in 22% cases. Patients with known risk factor like hypertension had VA of 6/9 in 2% cases. Steroid/ antiallergics users had VA of 6/12 in 8% cases and 6/18 in 4% cases and 2% had VA less than 6/18. In this work, stress is observed as risk factor for CSCR in 2% of male patients having VA of less than 6/18. Haimovici et al had 50 patients with CSCR who were suffering from stress. At the same time, it will be worthwhile to mention that he has a large series of patients as compared to ours.¹² Other risk factors

mentioned in literature are alcohol use, autoimmune diseases, diabetes mellitus, asthma, stress¹² and tobacco use, SLE and organ transplant.^{7,8} but non is found in our setup.

Visual acuity in our patients ranged from 6/5 to worse than 6/18. In our study, in females, visual acuity was 6/12 and 6/18 in 25% of cases each while it was worse than 6/18 in 50% cases. While in male patients, 17% had VA of 6/6, 21% had VA of 6/9, 15% had VA of 6/12, 22% had VA of 6/18 and less than 6/18 in 20%. Visual acuity was also affected similarly in other studies. Loo et al had only three patients and they have given VA for each patient separately which ranges from 6/9 to CF.¹¹ Wynn had only patient with VA of 6/12.¹⁹ Sahu et al had VA in the range of 6/18 to 6/120.¹¹ According to Levy et al, VA was 6/60 and 6/36 for each patient respectively.¹⁶ Loo et al had 61 patients involving 101 eyes and VA ranging from 6/6 and worse than 6/12.³ Perkins et al had VA which ranged from 6/9 to 6/90.⁹ Visual acuity varied between 6/4 to 6/60 in study conducted by Hiramani et al.¹³ While VA in bone marrow recipient was 6/6 with glasses.⁷ In this study, severe visual loss (VA less than 6/18) was observed in 85% (11 patients) of idiopathic CSCR. While in 7% (1 patient) in stress and in 1 patient (7%) using steroid and anti-allergic drugs. The age of patients with idiopathic CSCR with severely decreased VA was between 21-35 years in 4 patients, 36-40 years in 4 patients and 41- 45 years in 3 patients. Age of patient having associated risk factor like stress was 28 years while it was 36 years in steroid/ anti-allergic patients.

FFA is the most widely used test done for CSCR. In our study, 74% patients had ink blot appearance on FFA. Shukla et al² and Loo et al contradicts our findings by saying that they had one ink blot pattern on FFA.¹⁰ Sahu et al has different findings of FFA pattern¹¹ Fawazi et al records a 17 cases of bone marrow recipient who had multiple leaks.⁷

CONCLUSIONS

CSCR is idiopathic in most of the cases. Associated risk factors for CSCR include hypertension, steroid and antiallergic drugs use, gastroesophageal reflux disease, pregnancy, stress and so on. VA is usually mildly decreased and there is acquired hypermetropia.

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ORIGINAL

Frequency of Raised IOP in Presbyopic Patients by Non Contact Tonometer

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ABSTRACT

Objectives: To find out the incidence of raised intraocular pressure in presbyopic patients with age more than 40years, visiting outdoor department (OPD) of Ophthalmology, Lady Reading Hospital, Peshawar

Material and Methods: It was a cross sectional study on seven hundred and fifty presbyopic patients who visited the OPD of Ophthalmology department, Lady Reading Hospital, Peshawar from 1st June 2009 to 30th November 2009. They had no past history of intraocular inflammation, chronic use of steroids, any intraocular surgery or trauma. They were checked for their IOP in both eyes with non-contact tonometer (NCT) and the average of three readings were recorded.

Results: Frequency of raised IOP in presbyopic patients in this study was 22 cases out of 750 i.e. 2.9%. Female to male ratio was 1:1.45. Mean age of patients was 50.06±6.72 years. Mean IOP in right eye was 15.10±3.32 and in left eye was 14.47±3.32.

Conclusion: High IOP is frequently common in older age group. To detect it in time is only possible if regular screening for glaucoma, at least in the form of IOP check up done in the population of age > 40yrs.

Key Words: Glaucoma, intraocular pressure, presbyopia.

INTRODUCTION

Glaucoma is a neurodegenerative disease of the optic nerve characterized by accelerated ganglion cell death, subsequent axonal loss and optic nerve damage and eventual visual field loss.¹ Glaucoma is a potentially blinding condition. Primary open-angle glaucoma (POAG) is the most prevalent type of glaucoma, affecting 1 in 100 of general population over 40 years.² The prevalence of POAG increases proportionally with advancing age.³ It affects both sexes equally and responsible for about 12% of all cases of blind registration in the UK and USA.⁴

Prevalence of glaucoma worldwide will be 60.5 million in year 2010 will increase up to 79.6 million in year 2020.³ The prevalence of glaucoma is also high in our country. According to national survey of preventable blindness glaucoma (7.1%) is the fourth leading cause of blindness⁵

Increased intraocular pressure (IOP) is the common risk factor in the pathogenesis of glaucoma.⁶ Among different methods for IOP measurement NCT (non contact technique) is an easy way to use and its reading is independent of operator. NCT, is an air-puff tonometer, which measures the IOP by producing a jet of air to flatten the corneal surface, more the IOP, more is the forceful jet of air required to flatten it. The use of NCT is more suitable and easy for screening large population, therefore, it is mostly used in glaucoma

screening programs.

The purpose of our study was to provide baseline data about the frequency of high IOP (> 21mmHg) in people over 40 years in our setup who were otherwise normal. Moreover, knowledge of these statistics will help us in decisions concerning glaucoma screening with NCT.

MATERIAL AND METHODS

It was a hospital based cross sectional study done in six month duration on seven hundred and fifty presbyopic patients who visited the OPD of Ophthalmology, Lady Reading Hospital, Peshawar from 1st June 2009 to 30th November 2009.

An approval of ethical committee of Post Graduate Medical Institute (PGMI), Peshawar approval was obtained for this study. All those patients coming to Ophthalmology OPD with complaints of dimness of near vision and they improved with near glasses i.e. presbyopic patients and their age was more than 40 year were included in this study and for exclusion criteria, past ocular history was taken in the form of no past ocular surgery, trauma or intraocular disease. Past drug history was asked for the use in the form of eye drops or oral steroids. After a written informed consent, IOP was checked in both eyes with NCT-10 made by Shin-Nippon and it was calibrated two weeks before the start of the study. The average of three readings were recorded. Timing of IOP check up was between 8:00 am to 12:00 noon because of IOP fluctuations with in 24 hrs.

All statistical analysis were carried out by using SPSS 10.0. Data is presented in tabular form to get meaningful results. 95% confidence interval (CI) for quantitative variables is calculated by WHO confidence

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interval calculating software.

RESULTS

Total seven-hundred and fifty (750) presbyopic patients were included in our study in six (6) months duration, ranging from 1st June 2009 to 30th Nov 2009 who visited Ophthalmology OPD of Lady Reading Hospital, Peshawar for correction of their near vision. . Number of males are 444 (59.2%) and number of females are 306 (40.8%). Female to male ratio is 1:1.45. Mean age of patients was 50.06 ± 6.72 years (range 41-66). Mean IOP in right eye was 15.10±3.32 and in left eye it was 14.47±3.32 i.e shown in table No 1 and Table No 2. Ninety-five percent (95%) confidence interval for IOP of right eye was ±0.24 (14.86-15.34) and 95%

Table No. 1
IOP of Right Eye

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
10.00	21	2.8	2.8	2.8
10.50	4	.5	.5	3.3
11.00	91	12.1	12.1	15.5
12.00	84	11.2	11.2	26.7
13.00	94	12.5	12.5	39.2
14.00	78	10.4	10.4	49.6
15.00	40	5.3	5.3	54.9
16.00	95	12.7	12.7	67.6
17.00	33	4.4	4.4	72.0
18.00	87	11.6	11.6	83.6
19.00	61	8.1	8.1	91.7
20.00	18	2.4	2.4	94.1
21.00	22	2.9	2.9	97.1
22.00	4	.5	.5	97.6
23.00	6	.8	.8	98.4
24.00	9	1.2	1.2	99.6
26.00	1	.1	.1	99.7
28.00	2	.3	.3	100.0
Total	750	100.0	100.0	

Table No. 2
IOP of Left Eye

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
9.00	3	.4	.4	.4
10.00	16	2.1	2.1	2.5
11.00	134	17.9	17.9	20.4
12.00	155	20.7	20.7	41.1
13.00	68	9.1	9.1	50.1
14.00	60	8.0	8.0	58.1
15.00	17	2.3	2.3	60.4
16.00	116	15.5	15.5	75.9
17.00	20	2.7	2.7	78.5
18.00	61	8.1	8.1	86.7
19.00	21	2.8	2.8	89.5
20.00	42	5.6	5.6	95.1
21.00	15	2.0	2.0	97.1
22.00	12	1.6	1.6	98.7
23.00	4	.5	.5	99.2
24.00	3	.4	.4	99.6
26.00	3	.4	.4	100.0
Total	750	100.0	100.0	

confidence interval for IOP of left eye was ±0.24 (14.23-14.71). Frequency of high IOP (IOP > 21mmHg) was found in 22 cases (2.9%) i.e. shown in table 1 and 2 .All the patients responded positively to take part in the study, so the response rate was full (100%).

DISCUSSION

This study was conducted on 750 patients, of which males were 444 (59.2%) and number of females were 306 (40.8%) which is almost similar to the study done by Hashemi et al ⁷ but in a population based study done by Leske et al ⁸ the number of females was more. In our study the mean age of patient was 50.06 ± 6.72 years (range 41-66) which is similar to other studies done ^{7,8,9,10} This study showed that frequency of high IOP (> 21 mmHg) in presbyopic patients with more than 40years was 2.9%. It meant that nearly one in every thirty-five presbyopic patients coming to tertiary care hospital for his/her near vision correction has high IOP on average and can be suffering from undetected glaucoma. The mean IOP in right eye (15.01±3.32) was higher than the mean IOP in the left eye (14.47±3.32), this difference is statistically significant (P = 0.007) by using student-t test. Mean IOP in right eye in male versus female was 14.97±3.24 and 15.29±3.41 respectively. While mean IOP in left eye in male versus female was 14.45±3.27 and 14.49±3.41 respectively.). Mean IOP in right eye i.e. 15.01±3.32 and mean IOP in left eye i.e. 14.47±3.32 in our study is almost similar to mean IOP in the study done by Hashemi et al on Asian populations i.e. 14.50±2.6. ⁷ A study done by Malik et al showed that intraocular pressure measured in the first eye, whether right or left, is higher than IOP measured in the fellow eye; this may partially because of ocular squeezing.⁸ The mean IOP was measured as higher in the right eye than the left eye in study of almost 6000 normal eyes using Goldmann tonometry as well as in study using pneumotonometry in which right eyes were measured before left eyes by Liu et al.⁹

All patients (100%) in our study with high IOP (range 22-28mmHg) were > 50years of age (range 53-66). Frequency of high IOP in our study i.e. 2.9% was low as compared to the study done by Varma et al which was 3.56%,¹¹ the reason that, most of the presbyopic patients are more than 50years (66.93%) and the prevalence of high IOP increases with advancing age.¹⁰

Limitation of our study was that it was a hospital based study. It would be better if it was done in the community on normal population on much larger scale, as it would then reflect the population in a much better way.

This study emphasizes further the role of community based studies in future for better understanding of exact prevalence of high IOP in our

adult population > 40 years. In addition to this, there should be population based glaucoma prevalence studies to detect undiagnosed glaucoma in normal individuals of the community.

CONCLUSION

High IOP is common in older age group. High IOP is the commonest risk factor in the pathogenesis of glaucoma. Glaucoma is a common vision threatening disease in older people. Glaucoma is undetected most of the time, it causes severe irreversible damage to the vision before it is diagnosed. Regular screening of the population >40yrs of age is required to diagnose glaucoma in time. This screening should be done in the form of IOP checkup and disc evaluation at the least. Those people with high IOP should be thoroughly evaluated for the presence of any glaucoma and if detected should start treatment in time. In this way we can succeed in fight against glaucoma.

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*The participants of
6th Khyber Eye Symposium 2011
are cordially welcomed.*

ORIGINAL

Outcome of Congenital Nasolacrimal Duct Obstruction with conservative Management

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Dr. Samina Karim

ABSTRACT

Objective: To determine the success rate in treating congenital nasolacrimal duct obstruction (CNLDO) with hydrostatic pressure.

Study Design: Hospital based cross-sectional, observational study.

Place and duration of study: The study was carried out at Department of Clinical Ophthalmology, Khyber Institute of Ophthalmic Medical Sciences (KIOMS), Postgraduate Medical Institute (PGMI), Hayatabad Medical Complex (HMC), Peshawar from 1st Aug 2010 to 31st January 2011.

Materials and Methods: Patients who fulfill the inclusion criteria were included in the study after taking informed written consent by their parents. Patients then underwent thorough ophthalmological examination including Anterior segment and posterior segment examination. Epiphora was diagnosed clinically. Lacrimal sac massage was administered to all children (10 pushes/time, four time daily). The lacrimal sac massage was taught to the parents so that they can perform it correctly. The child was examined every month to see the improvement in Epiphora. If there was associated conjunctivitis then it was treated by giving antibiotics. Other forms of epiphora, such as epiblepharon, congenital entropion and ectropion, congenital glaucoma, keratitis, uveitis and patients with facial malformations were excluded from the study. The resolution of CNLDO was judged by the improvement of epiphora and from the fluorescein disappearance test.

Results: Total of 38 eyes of 31 patients was included in my study. In which male were 13 (41.94%) and female were 18 (58.06%). Bilateral involvement occurred in seven infants (22.58%) while unilateral involvement occurred in 24 (77.42%) infants. The success rate at 6 month is 87.09%. Four nasolacrimal ducts in 3 patients did not get resolved with massaging. They underwent probing under general anesthesia at 12 months of age; all were confirmed as resolved after the procedure.

Conclusion: Congenital obstruction of the nasolacrimal duct is very common problem in infants with natural history. Ophthalmic consultation should be sought if the diagnosis is in question or if the obstruction persists for more than a year. Lacrimal massage is beneficial in treating this condition.

Key words: Congenital nasolacrimal duct obstruction (CNLDO),

INTRODUCTION

Tears are secreted by the lacrimal and accessory glands, which circulate over the corneal and conjunctival surface, and are then pass through the punctum. From the punctum, tears move through the canalicular system into the sac where they accumulated. From there, they travel through the nasolacrimal duct and exit into the nasal cavity. The nasolacrimal duct lies in the maxillary bone. Embryologically, the duct arises from a primitive ectoderm buried in the naso-optic groove¹. It develops from above downward. Canalization of the nasolacrimal duct frequently is not complete at the time of birth, and up to 70% of infants have evidence of membranous obstruction at the distal

end of the duct². Congenital naso-lacrimal duct obstruction is the most common cause of Epiphora in infants³.

20% of all neonates show epiphora during their first month of life.¹ However, during their first year of life, most CNLDO patients resolve spontaneously or with just conservative management such as lacrimal massage or antibiotic eye drops⁴

Different studies show that there is a high rate of spontaneous resolution of congenital nasolacrimal duct obstruction, which occur in 70% of the cases by 3 months of age and 90% resolved within 12 months of age. The incidence of spontaneous resolution is so high that the condition could be regarded as within the range of normal development.³ Lacrimal massage, which consists of placing an index finger over the common canaliculus to prevent exit of fluid from the lacrimal punctum and stroking downward firmly to increase hydrostatic pressure within the nasolacrimal sac, has been proven beneficial in treatment of this condition⁵.

Limited data exists regarding the proper conservative management of congenital nasolacrimal duct obstruction in our community and no such

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studies have been reported in Khyber Pakhtoonkhwa population. Therefore we designed this study to determine the conservative management of nasolacrimal duct obstruction in the patients presenting to Khyber Institute of Ophthalmic and Medical Sciences (KIOMS), Peshawar.

MATERIAL AND METHODS:

Patients who fulfilled the inclusion criteria were included in the study after taking informed written consent from their parents. Patients then underwent thorough ophthalmological examination including anterior segment and posterior segment examination. Epiphora diagnosed clinically. Lacrimal sac massage was administered to all children (10 pushes/time, fourtime daily). The lacrimal massage was taught to the parents so that they can perform it correctly. The child was then examined every month to see the improvement in epiphora. If there is any associated conjunctivitis it was treated by giving antibiotics.

Other forms of epiphora, such as epiblepharon, congenital entropion and ectropion, congenital glaucoma, keratitis, uveitis and patients with facial malformations were excluded from the study. The resolution of CNLDO was judged by the improvement of epiphora and by the fluorescein disappearance test. Syringing was not performed to confirm CNLDO and its resolution. Patients with symptoms after 12 months of age underwent probing, the success of which was confirmed by syringing using normal saline solution with fluorescein. For these patients, lacrimal massage was continued up to the day probing was undertaken. Data was analyzed by using the software SPSS 10.

RESULTS

Total of 38 eyes of 31 patients were included in our study. In which male were 13 (41.94%) and female were 18 (58.06%). Bilateral involvement occurred in seven infants (22.58%) while 24 (77.42%) infants have unilateral involvement. In unilateral infants, the right side involved in 13 (54.17%) infants and left side involved in 11 (45.83%) infants. Resolution of the nasolacrimal duct obstruction is given in table.

In thirty one patients 9 (29.03%) resolved in the first 3 months in which 2 patients were bilateral and 7 were unilateral. While 18 (58.06%) patients resolved in next 3 months, in which 4 patients were bilateral and 14 had unilateral obstruction.

Four nasolacrimal ducts in 3 patients did not resolve with conservative management during the observational time (1 male (bilateral), 3 females (2 right side and 1 left)). They underwent probing under general anaesthesia at 12 months of age; all were confirmed as resolved after the procedure. There were no significant differences in sex or laterality for the rate of the CNLDO resolution under conservative management.

Table
Numbers of patients in whom CNLDO resolved by conservative management at 3 and 6 month of age (n= 31)

Patients	3 months	6 months	Total	Non-resolved
Bilateral	2	4	6	1
Right side	3	8	11	2
Left side	4	6	10	1
Total	9 (29.03%)	18 (58.06%)	27 (87.09%)	4 (12.91%)

N= Number of patients

DISCUSSION

This study which was carried out at the department of ophthalmology, Khyber Institute of Ophthalmic Medical Sciences, HMC, Peshawar. The duration of our study was six months i.e from 1st Aug 2010 to 31th January 2011.

Congenital nasolacrimal duct obstruction is the most common cause of epiphora and sticky eyes in infants³ and because of these symptoms every year thousand of neonates are taken to their general practitioner. Congenital naso-lacrimal duct obstruction is by far the most common cause of these symptoms, and an understanding of the natural course of this condition is the key to planning the management of affected infants. While most children can be managed without referral to a specialist ophthalmic service, it is important to recognize that watering and discharge can occasionally be among the presenting features of rarer, more serious conditions.¹

The characteristic presentation of congenital lacrimal obstruction is persistent watering (epiphora) and mucopurulent discharge observed from the first month or even first few days of life.³ This usually affects only one eye, however both eyes may be affected in up to 20% of cases³. The affected eye is usually normal with no evidence of inflammation, although episodes of increased discharge with conjunctival hyperemia may occur, indicating a secondary conjunctivitis. Crusting on the lid margin is also common, and parents will often say that the eyelids being stuck together on awakening³.

There were 15 male and 18 female in Shivpuri D and Puri A study. In one of the local study by Nasir J et al, female (60%) involved more than male (40%), which is similar to our study in which male were 13 (41.94%) and female were 18 (58.06%).

The unilateral congenital nasolacrimal duct obstruction is more than bilateral obstruction. In Hirohiko K et al study bilateral involvement occur in 8 (38.09%) while unilateral involvement occur in 13 (61.90%) patients⁶. While in our study the bilateral

involvement occur in 22.06% cases and unilateral involvement occur in 77.42% cases. In unilateral cases the right side obstruction occur in 54.17% and left side occur in 45.83% cases in our study.

The percentage of spontaneous resolution or resolution of CNLDO by conservative management in other studies were 89%: before 16 months in Paul et al study⁹. While in Nucci et al, MacEwen et al and in Piest et al study the spontaneous resolution was 93.3%, 96% and 80% respectively^{10,11,12}. While Noda et al reported CNLDO in Japanese infants, all resolved with conservative management by 9 months of age.¹³ While in Hirohiko K et al study, More than half (16 of 29) of the resolutions of CNLDO patients were observed before 6 months of age. However, a considerable number of patients resolved in the final 6 months⁶.

In MacEwen and Young study, patients with CNLDO in the 1st month of age were expected to resolve spontaneously in 96% of the cases before 12 months of age, in 75% at 6 months, in 36% at 9 months and in just 5% at 11 months¹¹. In Paul's study, with the conservative management showed a similar tendency, ie, 86% of patients with CNLDO at 3 months of age were expected to resolve before 12 months of age, in 70% of those at 6 months and in 52% at 9 months. In each study, a high percentage of the estimated resolutions occurs in the patients' early life periods, but the rate decreases with age. While in my study, 29.03% cases the spontaneous resolution occur in 3 months while in next 3 months 58.06% resolved spontaneously. So 87.09% resolved in 6 months.

Lacrimal sac massage is usually performed in conservative management for CNLDO.^{13,14} Putting pressure on the lower part of the nasolacrimal duct by pressing the common canaliculus is a useful procedure.¹⁴ Although Noda and colleagues described the efficacy of lacrimal sac massage for the resolution of CNLDO, it was not made clear whether lacrimal content actually moved downward.¹³ However, Foster and colleagues demonstrated this downward movement of tears break of the membrane at opening of the nasolacrimal duct.¹⁵

Early probing performed before 12 months of age has been recommended in Japan.^{14,15,16} This is because fixation of patients is much easier^{17,18} and prolonged inflammation is thought to promote fibrosis of obstructed sites with a decrease in the cure rate. However, no evidence has been shown that early probing has a higher cure rate than that for spontaneous resolution.¹ There was no such reports that recommended early probing included controls; thus their results may potentially be flawed. As well, there is no evidence that prolonged inflammation promotes fibrosis of obstructed sites.¹⁹ In general, prolonged

obstruction of the nasolacrimal duct is thought to be caused by a bone malformation of the lacrimal passages²⁰, and not by the membranous obstruction of the lower aperture of the nasolacrimal duct.¹ Although the resolution rate from early probing is 92 to 100% before 12 months of age, this result is similar to that of spontaneous resolution or resolution by the conservative management before 12 months of age 4.

Probing sometimes produces false passages. Injuries to the lacrimal duct epithelium may cause a cicatricial stricture and prevent the spontaneous resolution of CNLDO.¹¹ The cure rate from a 2nd probing is greatly decreased. When bleeding is observed during a probing, it usually indicates false passage formation.¹ When there is a probing failure, iatrogenic canalicular obstructions occur in 44% of patients.²¹ To prevent such iatrogenic obstructions, a "wait and see" policy with conservative management is the best option. More over a proper massaging technique should also be taught to the parents.

CONCLUSION:

Congenital obstruction of the nasolacrimal duct is very common problem in infants with a common history. Ophthalmic consultation should be sought if the diagnosis is in question or if the obstruction persists for more than a year. Lacrimal massage is beneficial in treating this condition.

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ORIGINAL

Role of Axial Length and its Variability in Calculating Intraocular Lens Power in Cataract Patients

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Dr. Alam

ABSTRACT

Objective: To review and evaluate the role of Axial Length and its variability in calculating intraocular lens power in consecutive 630 patients suffering from age related Cataract.

Materials & Methods: This study was conducted from January 2009 to December 2010 on 630 consecutive patients suffering from age related Cataract. Out of 630 patients 384 (60.96%) were male with age range from 45 to 80 years and 246 (39.04%) were female with age range from 45 to 83 years. As a whole they were divided into 6 groups according to the measurement of axial length and its variability. Axial length was measured in mm by applanation. A scan after putting a single drop of Alcaine (local anaesthetic) into the eyes. Axial length in mm and its variability effects in biometry for calculating intra ocular lens power were studied.

Result: 43 (6.82%) patients had axial length of d" 22 mm, 160 (25.39%) had 22 to d" 23 mm, 269 (42.69%) had 23 to d" 24 mm, 130 (20.63%) had 24 to d" 25 mm 24 (3.8%) patients had 25 to d" 26 mm while 4 (0.63%) had d" 26mm.

Conclusion: This study shows that axial length has key predictor role in calculating intra ocular lens power and there is great variation of it from patient to patient.

Key Words: Axial length (AL) Intra ocular lens (IOL)

INTRODUCTION:

The expectations of patients who have IOL implantation are high because they believe that they will have little or no dependence on spectacles postoperatively. Meeting these expectations requires eliminating errors in IOL power. Despite advances in biometry and increasingly sophisticated cataract surgery techniques, inaccurate preoperative measurements, post operative astigmatism, or variability in the final position of the IOL in the eyes can lead to the need of spectacles postoperatively to achieve emmetropia.^{1,2} The IOL offers the aphakic patients vision of normal quality which is superior to the magnified and distorted vision of aphakic spectacles. It is now generally accepted that the visual benefits of the IOL outweigh the risks of additional intraocular manipulation at operation³. The post-operative refractive status is an important aspect of the optical correction and a number of studies have demonstrated the unpredictable refractive outcome with a standard power IOL and the control which can be exercised over

the postoperative refraction by the proper calculation of IOL power^{4,5,6}. For IOL power AL and keratometry measurement are the two proper components from which actual power of IOL can be derived. Normal axial length ranges from 23-24mm but its variability from eye to eye had a great role in IOL power because one mm variability will cause 2.5 diopter change in IOL power. The largest study to evaluate the biometry of cataractous eyes was published in 1980 by Hoffer⁷. Cataract surgery with IOL is the most frequent ophthalmic surgical procedure today. To optimize the accuracy of predicting postoperative refraction, formulas have been developed to calculative IOL power on the basis of preoperative measurement of intraocular distances, especially AL and keratometry. 54% of the error in predicted refraction after IOL implantation is attributed to error in AL measurement⁸. At present, the most common method for AL measurement in cataract surgery is the applanation ultrasound A Scan technique, which is used by 95% of surgeons in USA⁹. It measures the AL with longitudinal resolution of about 150-200 μ m and an accuracy of approximately 100-150 μ m^{10,11}. Our study is focused on the role of AL in IOL power and its variability effects, so that postoperative patients expectations can be met.

MATERIALS AND METHODS:

This study was conducted from January 2009 to December 2010 spanning over two years on 630 consecutive patients eyes suffering from age related cataract. Out of these patients 384 (60.96%) were male and 246 (39.04%) were female. Table: I. Age range of

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male patients was 45-80 years while in female it was from 45-83 years. Table :II. Some parameters for inclusive and exclusive Criteria were adopted.

Inclusive Criteria:

- Patients with age related cataract
- Both sexes
- Patients who have potential for good vision

Exclusive Criteria:

- Patients with poor visual prognosis like diabetic retinopathy, hypertensive retinopathy and age related macular degeneration.
- Patients with known corneal curvature abnormalities, previous corneal refractive procedure and keratoplasty.

All the patients were divided into six groups from A-F according to the AL

Group A had patients of AL ≤ 22 mm, group B $22 < 23$ mm group C $23 < 24$, Group D $24 < 25$ mm, Group E $25 < 26$ and Group F had patients with AL ≥ 26 mm. Table III. AL measurement was made in mm with applanation A. Scan after instillation of single drop of Alcaine. The measurements were made by single observer to avoid study bias.

RESULTS:

Group A revealed 43 (6.82%), Group B 160 (25.39%), Group C 269 (42.69%), Group D 130 (20.63%), Group E 24 (3.8%) and Group F had 4 (0.63%) patients. Table IV.

Table : I Showing Gender Distribution

Gender	No of Patients
Male	384 (60.96%)
Female	246 (39.04%)

Table: II Showing age Range

Gender	Age Range
Male	45-80 years
Female	45-83 years

Table: III Group Showing AL

Group	AL
A	≤ 22 mm
B	$22 < 23$ mm
C	$23 < 24$ mm
D	$24 < 25$ mm
E	$25 < 26$ mm
F	≥ 26 mm

Table: IV Showing patients AL in mm

Group	Number of Patients
A	43 (6.82%)
B	160 (25.39)
C	269 (42.69%)
D	130 (20.63%)
E	24 (3.8%)
F	4 (0.63%)

DISCUSSION

As evident from this study AL is an important component of biometry in calculation of IOL power. This study also shows that although majority of the patient have AL 23-24mm but its variability strongly reveals invalidity of standard IOL power being practiced previously because one mm change in AL will cause 2.5 diopters change in IOL power.

Cataract extraction with IOL is the most frequent surgical procedure in ophthalmology for which visual impairment is by for the most common indication¹². For best post-operative visual status, proper biometry is mandatory in which AL is the most critical step¹³. Study of Irum Abbas, M.A Atif and M. Tahir shows AL slightly lesser than our study which may be either due to immersion method they used or due to less sample size¹⁴. Hennessey et al study revealed that AL was longer with contact method than with immersion method but the repeatability of the two techniques were similar¹⁵. Watson and Armstrong study has shown that AL with immersion method is longer than contact method which has implication for choice of IOL^{16, 17}.

Eyes with co-morbidity have variation in AL particularly with retinal detachment irrespective of myopic or emmetropic error. Study by Gerd, Meyer shows that AL was more in eyes with retinal detachment¹⁸. AL is not only variable in different patients, there is also interocular difference in AL in two eyes of the same patients. Study of Madharan S, Rajan, MD et al shows that 24% patients have intraocular variation in AL of 0.3mm. This reflects that AL has critical role in both eyes of the patients for IOL power to be refractive error free post surgically¹⁹.

The effect of sex, race and age on AL had been examined in large population study. The Los Angeles Latino Eye study examined 5588 phakic adults and found no significant change in AL with age, although women had significantly shorter AL than men^{20,21}. Renue jivrajka. BS, Maya C, Shamas MD et al conducted AL study on 450 eyes, the result of which are comparable to our study²². This study revealed mean AL of 23.46mm with also greater variation to both side of the curve. Hoffer conducted study on 7500 eyes and recorded mean AL 23.65mm which is also comparable to our study⁷. Norrby et al AL study shows mean AL of 23.44mm²³. while Oslen et al²⁴ and Packer et al²⁵ study show mean AL of 23.47mm and 23.40mm respectively which are comparable to our study.

According to some research patient's education, occupation and socio economic status has also close relation with AL. TY Wong et al conducted study on 951 phakic subjects; according to which after controlling age, sex occupation, income and housing type, higher education was associated with longer AL and more

myopic refraction²⁶.

CONCLUSION:

From our study and other multiple national and international studies it is clear that AL is important component of biometry which affects the postoperative visual out come of the patients. The study reflects that there is good account of variation of AL from majority of patients who have AL of 23-24mm. Hence the standard IOL power is now being invalidated and every patient should undergo proper biometry to fulfill the ambition and wishes of patients postoperatively who should be spectacles free

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ORIGINAL

**Visual Prognosis observed in Combat Ocular injuries
in Pakistan Armed Forces Personnel Fighting
on the Pak Afghan border
(June 2006 to Dec 2009)**



Dr. Azam Khan

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Rizwan Hashim⁴, Lateef Ur Rehman⁵

ABSTRACT

Introduction: Ocular trauma is extremely common and accounts for a significant percentage of the morbidity associated with the management of trauma, patients in spite of consistently improved therapeutic techniques for the management of patients with ocular injuries in the recent past.

Purpose/Objective: To determine the visual prognosis in Pakistan Armed Forces Personnel with combat ocular trauma as a result of fighting on the Pak Afghan border.

Design (Study): Prospective and interventional study.

Methods:

Setting: Department of Ophthalmology and Ocular Surgery, Combined Military Hospital, Peshawar.

Duration: From June 2006 to Jun 2009.

Study Population: Pakistan Armed Forces personnel fighting on the Western Front who received ocular trauma isolated or in association with other war injuries and were evacuated to CMH Peshawar. Age, gender, laterality, best corrected visual acuity, ocular findings; medical and surgical interventions were recorded in all cases.

Main Outcome Measure(s): Best corrected visual acuity (BCVA) at the first and final visits were recorded.

Results: Out of the patients who were evacuated to this hospital 6% (119) had ocular and/or ocular adnexal injuries. Comparing BCVA at the first and final clinical visits, 36% (43) eyes were blind by WHO definition (< 3/60 –NPL) and 39 % (46) were visually impaired by WHO definition (<6/18-3/60). The ocular injuries with the worst visual outcomes included global perforation/rupture, combined eye ball injuries with neuro-ophthalmological or oculoplasty injury, retinal detachment/IOFB (FB in posterior segment), sub macular hemorrhage.

Conclusion: Combat ocular injuries are frequently severe, visually devastating, generally result in poor visual outcome and cosmetic disfigurement despite immediate and planned surgical intervention. Prophylactic measures, such as eye protection by polycarbonate glasses are highly recommended.

Keywords: Adnexal injury, Ocular injury, Best Corrected Visual Acuity.(BCVA)

INTRODUCTION

One, who is stricken blind, can not forget the precious treasure of his eye sight lost. Eye can be injured in a variety of ways, by chemicals, heat variation and

mechanical trauma¹. Ocular trauma in general can occur in a variety of situations. These include industrial accidents, assault of blunt, penetrating or firearm injuries, house hold accidents with blunt or sharp objects, sports injuries and combat ocular injuries².

Visual loss in young population has a great physical, psychological and social impact on the individual in particular as well as on the society in general³. Ocular trauma is extremely common and account for a significant percentage of morbidity associated with the management of trauma patients inspite of consistently improved therapeutic techniques for the management of patients with ocular injuries in the past century⁴.

Ocular injuries are broadly divided in two categories; open globe with full thickness defect in the corneoscleral coat of the eye and closed globe without a full thickness defect in the corneoscleral coat of the eye. The management of the patients ranges from emergency management and discharge from the hospital to prolonged hospitalization and multiple surgical interventions. The mechanism of war eye

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NOTE: (Dr. Muhammad Azam Khan, the principal author, is a retired Brigadier and a classified Eye Specialist of Pakistan Armed Forces. He has served the Armed Forces for 30 long years including 9 years in the Province of Khyber Pukhtunkhawa. His studies were approved by the Ethical Committee of Combined Military Hospital, Peshawar. He has been closely attached with the security forces engaged in the anti-terror activities in Malkand (Swat) and the Western Front (Pak-Afghan Border)...Chief Editor)

injuries includes primary and secondary blast wave front effects⁵ causing eye injuries in 60% of blast survivors⁶. When a mine or Improvised Explosive Device (IED) blast occurs, eye is showered with minute metallic, plastic particles, dust, sand, organic debris and gun powder resulting in superficial or a wide spectrum of penetrating ocular injuries.⁷ Laterality is another feature of combat ocular injuries which differentiates it from non combat eye injuries^{8,9,10}. Fragments of ammunitions have been the most common cause of ocular injuries during Operation Desert Shield (ODS)¹¹, and Desert Storm (DS) and Operation Iraqi Freedom (OIF)^{12,13}. The most common source of these fragments was IED in present conflicts in Iraq and Afghanistan¹³.

The present study was planned to collect data and analyze the information regarding visual prognosis in combat ocular injuries in Pakistan Armed Forces personnel fighting on the Western Front from June 2006 to June 2009. This was a prospective and interventional study aimed to collect the experience regarding the management of war ocular trauma in a tertiary care military hospital.

Once the conflict at the western front began steps were taken to record the data regarding the types of ocular injuries that could possibly be encountered in such a war theatre. The data included immediate and planned management along with follow up of such cases; the aim was to bring back maximum visual acuity. Moreover the management also included the cosmetic repair of disfigurement of periorbital structures. The ongoing conflict with changing terrorist techniques and strategies also provided a wide spectrum of the combat ocular injuries and chance for their specific management modalities. Upon search of both regional and international literatures, not a single study could be found that envisages the variety of different ocular injuries alone and in variety of combinations for a period of consecutive three years. Hence posing the challenge for ophthalmologists to salvage and restore the most vital organ of the body having multiple functions out of which only one of the many functions is called "sight".

PATIENTS & METHODS

This descriptive and interventional study was planned and conducted in the Department of Ophthalmology and Ocular Surgery Combined Military Hospital (CMH) Peshawar from June 2006 to June 2009. All patients who had ocular injuries caused by blunt and penetrating trauma, isolated or associated with other injuries, were included in the study. All the patients included in the study were males (because all soldiers fighting on the Pak Afghan border were males).

These patients were given first aid at the nearest primary care units immediately after the ocular injury

and were subsequently evacuated to CMH Peshawar, Department of Ophthalmology and Ocular Surgery where specialized ophthalmic examination and required management was carried out after detailed evaluation.

All the patients were received in either Trauma Centre or Medical Reception Centre (MRC) and immediately examined for ocular injuries along with other associated injuries. A complete ophthalmic examination was carried out. Visual acuity was recorded by Snellen's chart at the time of arrival. Slit lamp examination (Takagi, Japan), ophthalmoscopy and indirect ophthalmoscopy (Heine, Germany) were performed where ever feasible and required. B-scan ultrasonography (Compact II, Quantel Medical B scan, France) of the eye and orbit was carried out to assess the integrity of the structures lying behind the opaque media, X ray examination (with Schimatzu FH-21HR Kyoto, Japan) of the orbit (anteroposterior, lateral and oblique views) and CT scan (Siemens, Somotan 4, Germany) was carried out to identify and locate foreign bodies where suspected. The ocular, periocular and other parameters evaluated were; preoperative visual acuity, extent of ocular tissue damage, associated injuries to other parts of the body, nature of surgical repair, number of surgical procedures performed, length of hospital stay and final visual outcome. The data was collected on a specially designed proforma; entries were made in the SPSS version 14 for statistical analysis.

RESULTS:

2289 wounded patients were evacuated to CMH Peshawar. Their ages ranged from 19-39 years (mean: 27 years). The patients who sustained ocular injuries were 6 % (119) either isolated 69% (82) or associated with other injuries 31% (37). Those who had damage to both eyes were 14% (16) and with single eye involvement were 87% (103). None of these patients were recorded to have worn any type of protective goggles because for the soldiers it was the first experience of its kind and no published data of previous military conflicts/wars (1965, 1971& Kargil) was available for authorities to induct any protective eye care along with combat uniform. Visual acuities of these eyes with injuries are shown in Table 1. 49% (58) eyes were blinded by WHO definition¹⁴ (ICD-10 year 2000) i.e., VA < 3/60 - NPL (No Perception of Light) and a further 30% (35) eyes were visually impaired <6/18-3/60, 26% (n 31) of the patients had adnexal injuries and a significant number of patients, had lid lacerations 23% (27), conjunctival foreign bodies were present in 37% (44) of cases and most of them also had conjunctival tear, corneal foreign bodies were present in 22% (26) of the cases. These foreign bodies were removed

followed by eye padding. Corneoscleral lacerations were found in 26% (31) of the cases that were repaired. In some eyes, other procedures were also performed along with corneoscleral repair (e.g lid repair, iris abscission) hyphaema was noted in 45% (53) of eyes, traumatic cataract developed in 18% (21) of cases and intra ocular lenses (IOLs) were implanted in 11% (12) of these cases and simple cataract surgery (ECCE- Extra Capsular Cataract surgery) was performed in rest of the cases. Retinal detachment was seen in 16% (18) of the cases and foreign bodies were seen in the posterior segment in 12% (14) of the cases. In 15% (18) cases eyes were severely damaged and anatomically totally disorganized and were subjected to evisceration/enucleation followed by artificial eye implantation. Final visual outcome is given in Table 2. There were no cases of sympathetic ophthalmitis or endophthalmitis

DISCUSSION

The data includes all the ocular injury patients that were evacuated to the Department of Ophthalmology and Ocular Surgery CMH Peshawar. The pattern and spectrum of combat ocular trauma differs from ocular trauma occurring in routine civil life in many aspects. In civilian ocular trauma, male-female ratio is 4:1 which is 24:1 in combat ocular trauma^{15,16}, female accounted for only 2:1 of the military wounded during OIF¹⁷. Non combat ocular trauma is associated with low rates of associated injuries whereas 85% of war ocular injuries have associated severe injuries. Bilaterality is another feature of combat ocular trauma. Conjunctival and corneal foreign bodies (FBs) were found in 37% (44) and 22% (26) cases respectively, while another study showed much higher percentage of the conjunctival (77%) and corneal foreign bodies (45%)¹⁸. In 15% (18) of the cases, the eyes were disfigured, severely damaged and had to be eviscerated. Despite frequent and staged surgical interventions, many eyes were functionally poor. Best Corrected Visual Acuity (BCVA) at presentation was correlated with final BCVA indicating that nature and severity of the original injury played a vital prognostic role¹⁹. Based on this data, it was noted that the other important factors that affect the prognosis and outcome are elapsed time between injury and specialized ophthalmic intervention²⁰, extent of the laceration^{7,10,21}, laceration posterior to rectus muscle insertion²², presence of uveal prolapse, vitreous loss, lens damage, cataract formation,²³ hyphaema²⁰, retinal detachment and foreign body in posterior segment. Cases of retinal detachment were referred to highly specialized unit of Vitreo-retinal surgery at Military Hospital, Rawalpindi. Of Many previous studies determined risk factors for poor visual outcome after trauma which included the presence of an afferent pupillary defect, vitreous hemorrhage or poor initial

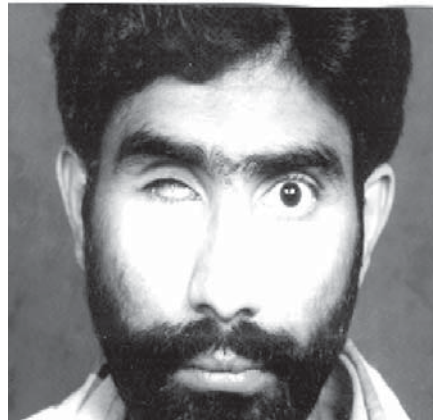
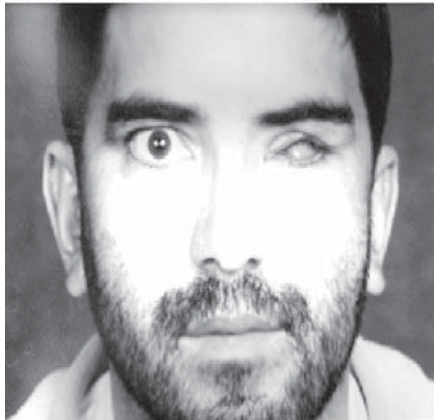
visual acuity^{24,25}. All patients in this study were males, their age ranged between 19-39 years with mean age 27 years, this was similar to age reported in the literature^{10,16}. Fragmentation or splinters were the most common cause of ocular and adnexal injuries in the war; similar observation was noted in other studies¹³. It is documented that the vast majority of combat ocular injuries are preventable through the scrupulous use of protective eye wear (specially designed polycarbonate glasses)²⁶. Fragmentation and splinter injuries are preventable form of injuries which can be avoided by the use of such glasses (also called ballistic glasses) and these cost about \$ 100-120 each, that is much less than the cost incurred on the treatment of a single eye injury,²⁷ Moreover the loss of trained soldier for future deployment is hampered by eye injury and lack of provision of goggles. This study provides a unique insight regarding the spectrum and type of ocular injuries, modalities of management; both immediate and planned along with factors that can effect the outcome and prognosis. This study also recommends the safety eye gear that can prove effective to save the eye from various types of ocular injuries and reduce the loss of precious trained military human resource in war theaters.

This study also displays and demonstrates that excellent results can be achieved despite prolonged war engagement of a poor country when expert trained eye specialists are available at the tertiary care military hospital in a developing country with limited financial and trained human resource. This study also makes available a base line data-base that is peculiar to this prolonged conflict within the territories and boundaries of Pakistan, a scenario entirely different from the previous three war conflicts.

CONCLUSION:

Combat ocular injuries are frequently severe and visually devastating and generally result in poor visual outcome and cosmetic disfigurement despite immediate and planned surgical intervention and as a result there is high likelihood of persistent psychological trauma to the patient and their families. Prophylactic measures, such as eye protection by polycarbonate glasses are highly recommended as part of combat military uniform. To provide protection is one issue but to ensure a high compliance of wear is even more essential. This combined with a better understanding and awareness of the biomechanics of ocular injuries, meticulous primary microsurgical repair and secondary closed intraocular microsurgery, can produce a significant reduction in visual loss secondary to war ocular trauma.

2 months after repair/visceration



Artificial eye in place:

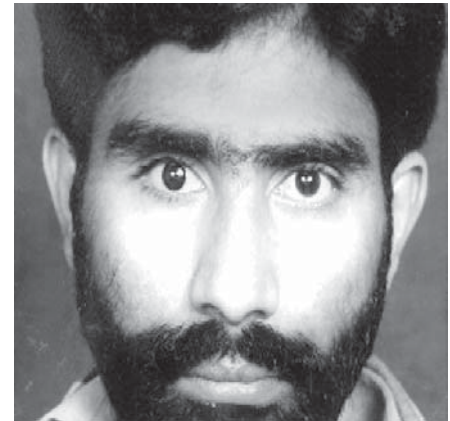


Table 1: Best corrected visual acuity (BCVA) of war traumatized eye at initial presentation

BCVA	% (n)
6/6- 6/18	18% (22)
6/18-3/60 (Visually impaired by WHO Definition)	30% (35)
3/60-NPL (Blind by WHO Definition)	49% (58)

Table 2: Best corrected visual acuity (BCVA) of war traumatized eyes at the time of final clinical visit

BCVA	% (n)
6/6- 6/18	26% (30)
6/18-3/60 (Visually impaired by WHO Definition)	39% (46)
3/60-NPL (Blind by WHO Definition)	36% (43)

Table 3: Type and frequency of ocular and adnexal injuries in Pakistan Armed Forces personnel fighting on the Pak Afghan border (Jun 2006 to Jun 2009). (n=2289)

Type of Lesion	Percentage of Lesion
Adnexal injuries	26
Lid lacerations	23
Conjunctival tear	35
Conjunctival foreign bodies	37
Corneal foreign bodies	22
Foreign bodies in the posterior segment	12
Corneoscleral laceration requiring repair	16
Self sealed corneal laceration	21
Hyphaema	45
Traumatic mydriasis/iridodialysis	30
Traumatic cataract	18
Subluxated cataract	3
Vitreous haemorrhage	3
Retinal detachment	16
Ruptured and totally disorganized globe	15

Note: Cases of Retinal Detachments were referred to specialized Vitreo-retinal unit of Military Hospital, Rawalpindi

Table 4: Types of surgical procedures in ocular and adnexal injury patients of Pakistan Armed Forces fighting on the Pak Afghan border (Jun 2006 to Jun 2009). (n=2289)

Surgical Procedure	Percentage of Patients
Removal of corneal/conjunctival foreign bodies with eye padding	59
Corneoscleral tear repair	11
Corneoscleral tear repair with eye lid tear repair	16
Corneoscleral tear repair with abscission	10
Simple lens aspiration	10
Lens aspiration with PC IOL implantation	6
Lens aspiration with AC IOL implantation	4
Evisceration	15

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ORIGINAL

Prevalence of Refractive Errors in School going Children in age Group of 11-15 years

Rahil Malik¹, Nuzhat Rahil², Omar Khan³



Dr. Rahil Malik

ABSTRACT

Objectives: The objective of study was to determine the prevalence, the type and gender wise distribution of refractive error in school going children at the age of 11-15 years.

Methods: This was a cross sectional descriptive study done on 2017 school children in age group 11 to 15 years in middle and high schools of the lower Union council Batkhela Town, Malakand division, Khyber Pakhtoonkhwa in year 2008. The study included male and female children and all the registered school, Govt as well as private school. The services of a Refractionist and two ophthalmic technicians were obtained to conduct the screening.

Results: Out of 2017 school children, 1657 were examined, as 360 were absent. Nobody refused examination. Hence the respondents were 82.15% and the non respondents were 17.84%. Among 1047 male children, 822(78.5%) were screened whereas among total of 970 female children, 835(86.08%) were screened.

Among 1657 school children, 66(3.98%) had refractive error with uncorrected visual acuity less than 6/12 in both eyes. So prevalence of refractive error in this study was 66(3.99%) in which male children were 24(02.92%) out of 822 and female children were 42(5.02%) out of 835.

Out of 66 school children, 50 were myopes (3.017%), 8 (0.482%) were Hypermetropes and 8 (0.482%) were the cases of astigmatism. The prevalence of myopia in male students was 2.19% and in female it was 3.83% hypermetropia in male was 0.364% and in female was 0.60%. The astigmatism in male was 0.364% and in female it was 0.60%.

CONCLUSIONS: The study shows that the refractive error is the major cause of ocular morbidity among the school children in Town Batkhela Malakand Agency. Myopia is an important major health problem in the school children. The school children diagnosed, as the case of refractive error would definitely benefit from screening and the provision of spectacles.

KEY WORDS: Refractive error, myopia, hypermetropia, astigmatism.

INTRODUCTION

Refractive errors contribute significantly to the visual impairment problems especially in children. Vision 2020 declared by WHO is the "right to sight" and global initiative to eliminate the five major ocular causes of avoidable blindness by the year 2020 known as **vision 2020**. They are Cataract, Trachoma, Onchocerciasis, Vitamin A deficiency and Refractive Error¹. The prevalence of child hood blindness in the world is estimated as 1.5 million (0.75/1000) The quartet of blind children live in the developing countries and one million of them live in Asian continent². According to the census of 1998, the population of Pakistan is 130 million. The children contribute 46.2% of the population less than 16 years. The prevalence of child hood blindness in Pakistan is 1/1000 and there may be 50,000-60,000 blinds in the country³.

The refractive error in Pakistan is 11.4% according

to the National Survey conducted in 1987-1990 and found that the refractive errors was the largest cause of avoidable/preventable blindness⁴.

In a study conducted by R.Dandona and L.Dandona, it has been noticed that Refractive error treated easily with spectacles, was responsible for one third of blindness⁵. School going children are the back bone of the nation, affected children become depressed and lag behind the normal. Correction of refractive error by spectacles provide remedy, which are cheap, effective and associated with functional improvement.

The objective of the study was to find out the prevalence of refractive error in a remote area as Batkhela Malakand Agency.

MATERIALS AND METHODS

Before starting the study all the ethical issues were addressed by taking consent from the EDO (education) of Malakand, head masters/head mistress, Principals and administrators of the schools for conducting the survey. Written consent was taken from all children who were included in the study. It was the right of the child to refuse examination.

The pilot study was carried out in Oxford Education Academy for boys in Batkhela town. The services of a refractionist and two ophthalmic technicians were obtained to conduct the screening. They were trained in the areas of inclusions, exclusion

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criteria, testing visual acuity. Performa with coded questionnaire at necessary variables was redesigned with references to the problems faced during the study.

Inclusion criteria: School children in the age group 11 to 15 years with visual acuity <6/12 vision were screened.

Exclusion criteria: The school children who had not celebrated their 11th birthday (the age below 11 years), and those who had celebrated 16th birth day (more than 15 years).

Field Methodology: Total number of school going children in the age group 11 to 15 years were screened. Unaided visual acuity was tested binocularly, if it was <6/12. Refraction was conducted if vision improved with pinhole. However, children who needed further treatment were referred to secondary hospital. Myopia ranging from 0.5 to 8.0 diopters, Hypermetropia from 1 to 8 diopters and Astigmatism from 0.50D and more were recorded and coded. Children needed glasses were provided and Performa were filled up for all the students screened. Absentees were recorded. Entry and analysis of Performa was done through Epi.6.

RESULTS

Total registered school children in age group 11 to 15 years in Government as well as private school were 2017 in Lower Union Council Batkhela Town Malakand. Out of 2017 school children 1657 were examined, While 360 were absent. No body refused examination. Hence the respondents were 82.15% and the non respondents were 17.84%.

Among 1047 male children 822(78.5%) were screened while 255(21.48%) were absent. Whereas there were 970 female children, 835(86.08%) were screened while 135(13.9%) were absent. In non respondent, Male students were more.

Among 1657 school children, Refractive errors in this study were 66(3.99%) in which male children were 24 (02.92%) out of 822 and female children were

Frequency of Myopia, Hypermetropia and Astigmatism in students:

Result	Frequency	%
Normal	1591	96
Myopic	50	3
Hypermetropia	8	0.5
Astigmatism	8	0.5
Total	1657	100

Age wise refractive error and prevalence in students

Age	Total students	Refractive	Prevalence
11 years	147	4	2.72%
12 years	253	8	3.16%
13 years	437	14	3.20%
14 years	455	22	4.83%
15 years	365	18	4.93%

Age wise refractive error in female school students

Age	Myopia frequency	%	Hypermetropia frequency	%	Astigmatism frequency	%
11 years	3	9.4	0	0	0	0
12 years	5	15.6	0	0	0	0
13 years	8	25	1	25	1	20
14 years	10	31.3	3	60	4	80
15 years	6	18.8	1	20	0	0
Total	32	100.00%	5	100.00%	5	100.00%

Age wise refractive error in Male school students

Age	Myopia frequency	%	Hypermetropia frequency	%	Astigmatism frequency	%
11 years	0	0	1	33.33	0	0
12 years	1	5.6	0	0	2	66.7
13 years	4	22.2	0	0	0	0
14 years	4	22.2	1	33.33	0	0
15 years	9	50	1	33.33	1	33.33
Total	18	100.00%	3	100.00%	3	100.00%

42(5.02%) out of 835. It reveals that the prevalence of refractive error is more in female school children than the male school children.

Out of 66 school children, 50 were Myopes (3.017%), 8(0.482%) were Hypermetropes and 8 (0.482%) were the cases of astigmatism. The prevalence of myopia in male students was 2.19% and in female it was 3.83%. Hypermetropia in male was 0.364% and in female was 0.60%. The astigmatism in male was 0.364% and in female it was 0.60%

Out of 1657 school children, there were 1591 (96%) with normal vision and needed no treatment but 66(3.99%) with refractive error were prescribed glasses, One by one child had right phthisical eye and there was no child with Cataract or corneal opacity. Total students were 2017, Total male were 1047 (50.89%) and female were 970(48.09%).

DISCUSSION:

Refractive errors contribute significantly to the visual impairment problems especially in children. The purpose of this study was to highlight the graveness of the problem in our district. The prevalence of refractive error in the study population is 3.99% which is less than the prevalence in China⁶ and Chille⁷ i.e 12.8% and 15.8% respectively. The reason for this could be that studies in China and Chille were conducted on large scale and with large sample size.

The prevalence of refractive error in Benin city , Southern Nigeria is 3.9% Because of possible reason that this study was done on 571 females of age 11 to 21 years. The cut off point for visual acuity was worse than 6/9 on snellen's chart in either eye. The concentration was on the females only. The age range was wider and the cut off point for visual acuity was less than 6/9⁸. as compared to this study i.e. less than 6/12. But in the study of school children in Batkhela town Lower Union council the prevalence of refractive error is high and the difference is because of possible reason that both the male and female were involved and the age group was 11 to 15 years. The sample was also large i.e. 1657 as compared to Benin i.e.571 only.

An Indian study has found that Refractive error were responsible for 12.5% of the blindness and 59.4% moderate visual impairment⁹, which is higher than the prevalence of Refractive error in the study of Batkhela town i.e. 3.99%.

The prevalence of refractive errors was found to be slightly more common among female. (In female it was 5.02% and in male it was 2.92%. Myopia among male was 2.19% while in female was 3.83%. Hypermetropia in male was 0.364% and in female was 0.60% while astigmatism contributed 0.364% among male and 0.60% among female.

In this study, the prevalence of myopia increased

across the age group being 0.18% at the age 11 years to 4.11% at the age 15 years. In the refractive error study done in La Florida Chille myopia was present in 3.4% of years old children, and increased to 19.4% in males and 14.7% in female by age 15 years revealing that the prevalence of myopia is associated with older age.¹⁰

In another study carried out in Chinese school children the prevalence of myopia was 37% in the 6 to 12 years age group and 5% in the 13 to 18 years age group. Here different age groups were studied. Refractive error, due to myopia, was also a major cause of reduced vision in school age children in La Florida, Chille.¹⁰

The school eye screening done in Kathmandu showed that myopia is the commonest cause of refractive error (4.3%). The prevalence of myopia is low as compared to this study, because it include all the children of the school visited irrespective of age.¹¹

The prevalence of hypermetropia was 0.48% and it was 0.364% in males and 0.60% in females. It is more among females, which is also shown in the study in Nepal that associate s hypermetropia with female gender.¹²The prevalence of hypermetropia was 1.3% in Kathmandu schooling. In that study all the ages were included; therefore, the hypermetropia was more than the study done in Batkhela town.

The overall prevalence of Astigmatism of 1.00 or more than 1.00 Diopter was found to be 0.482%. It was 0.181% in males and 0.302% in females as compared to myopia a very small proportion of refractive error due to hypermetropia and astigmatism. In the study of Nepal the prevalence of astigmatism 0.75 diopter cylinder or greater was present in 2.2% of right eyes and 2.3% of left eyes. Approximately 25% of astigmatism was 2 Diopter or greater.¹²While in a study conducted in Pakistan¹³ showed that astigmatism was 1.78% and also slightly more in female. In this study the astigmatism is high in females as compared to males school children.

CONCLUSIONS AND RECOMMENDATIONS

The study shows that the Refractive error is the major cause of ocular morbidity among the school children in Town Batkhela Malakand Agency. The study also reveals that the defective vision due to Myopia is an important major health problem in the school children. It creates a lot of of problems in the growing age, So, early detection, treatment and management may improve their learning capacity, educational potential and career.

There is lack of acceptable, affordable, accessible and equitable eye health care particularly optical services enabling children to make their spectacles, because most of the children are poor and can not afford to purchase the expensive glasses. The school children

diagnosed, as the case of Refractive error would definitely benefit from screening and the provision of spectacles. More attention is needed on the part of health department and NGOs to take initiative and provide eye health care services including screening program for refractive errors in the school as to lessen the ocular morbidity.

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ORIGINAL

Intraocular Pressure Control following Primary Trabeculectomy with and without Mitomycin-c in patients of Primary Open Angle Glaucoma



Dr. Saber Mohammad

Saber Mohammad¹, Sanaullah Khan², Samina Karim³, Sanaullah Jan⁴

ABSTRACT

Objectives: To study the results of intra ocular pressure control following primary Trabeculectomy with and without Mitomycin-c in patients of Primary Open Angle Glaucoma.

Material and Methods: This study was conducted on patients presenting to the Department of clinical ophthalmology, Khyber Institute of Ophthalmic Medical Sciences, HMC, Peshawar from 7th October 2005 to 8th October 2006.

Results: The results of two groups, those which had primary Cairns type Trabeculectomy and those with Trabeculectomy with MMC, were compared in term of lowering of IOP in POAG. The mean age of the patients were 54 years with standard deviation of 12.90. There were 27 male and 33 female in both groups. The success rate of surgery in intraocular pressure control of 20 mmHg or less without medication in primary Cairns type Trabeculectomy was 90% and while in Trabeculectomy with MM-C was 94%. The difference between the two groups were not statically significant (P-value .640 > 0.05) as the sample size was small and the follow up period were 3 months.

Conclusion: Trabeculectomy with intraoperative use of Mitomycin-C gives better control of IOP as compare to simple Trabeculectomy.

INTRODUCTION:

Glaucoma is considered as the second leading cause of blindness after cataract¹ and fourth commonest cause of blindness in Pakistan.² Amongst the glaucomas, primary open angle glaucoma (POAG) is the most prevalent type of glaucoma, affecting approximately 1% of the general population over the age of 40 years.³

Trabeculectomy is the surgical procedure of choice if the medical therapy fails. It lowers the intraocular pressure by creating a fistula, which allows aqueous outflow from the anterior chamber to the sub tenon space.³ It is successful between 86% and 90% of cases of primary open angle glaucoma.⁴

Antiproliferative agents such as Mitomycin-c (MMC) and 5-fluorouracil (5-FU) have markedly improved the success rate of glaucoma filtering surgery and are widely used to treat glaucomatous eye with a poor surgical prognosis.⁵ The success rate of Mitomycin-

c is 85%.⁶ The use of this agent results in better control of postoperative intra ocular pressure with less antiglaucoma medication.⁵ Mitomycin-c is a naturally occurring antibiotic-antineoplastic compound that is derived from *Streptomyces ceaspius*. It acts as a alkylating agent after enzyme activation resulting in DNA cross linking and is a strong antifibrotic agent.⁷ The concentration in current usage is typically 0.2mg/ml with duration of application for 3 minutes.⁸ 5-fluorouracil (5-FU) inhibit fibroblast proliferation and has proven useful in reducing scarring after filtration surgery.⁶ Mitomycin-c is more effective than 5-fluorouracil in improving the success rate of IOP control with trabeculectomy.⁹

Trabeculectomy is not free of postoperative complications but if managed properly, visual acuity in majority of cases is shown to be good.¹⁰ The complication of trabeculectomy with antimetabolite are avascular cystic bleb, persistent wound leakage, shallow anterior chamber, possibility of hypotony, endophthalmitis, superficial punctate keratopathy, corneal epithelial defect, choroidal detachment and maculopathy.¹¹

MATERIAL AND METHODS

This study was conducted at the KIOMS, HMC, Peshawar, on 60 patients who underwent glaucoma filtration surgery for POAG from 07th October, 2005 to 6th October, 2006. Only patients having primary open angle glaucoma were included in the study. Patients who had history of previous surgery like cataract extraction and Trabeculectomy were not included in

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this study.

A total of 60 patients were selected for the study and randomly divided into two groups. All the patients had symptoms of POAG with elevated IOP, enlargement of the optic nerve head and visual field defects. The first groups consist of 30 patients including 15 males and 15 females, while the second group included 30 patients of which 12 were males and 18 were females patients. The mean age was 54 Years, most of the patients being above 40 years of age and only 5 patients in simple Trabeculectomy group and 8 patients in Trabeculectomy with MMC group were below 40 years of age. Gonioscopy were performed in every case with Goldmann three mirrors and IOP were measured by Goldmann tonometer. Visual field examination was done preoperatively for every case.

OPERATIVE PROCEDURE

A fornix based conjunctival flap was made by cutting conjunctiva along with Tenon's capsule about 2.0mm from the limbus with the help of scissors. The conjunctiva and Tenon's capsule were separated from the episcleral tissue through blunt dissection about 8-10mm from the limbus. Bleeding points were cauterized with wet field bipolar cautery upto this point, the procedure in both groups [group A with Mitomycin-C and group B without MMC] was the same. In group A the Mitomycin-C were applied on the scleral bed in a dose of 0.2mg/ml for 2 minutes. The sponge was removed and the area was thoroughly rinsed with balanced salt solution. After this, the procedure was same in both the groups. A limbal based scleral flap about 3×4 mm two-thirds of scleral thickness was dissected upto the clear cornea. Paracentesis was performed through superotemporal clear corneal incision. Anterior chamber was entered and a block of scleral tissues about 1×2mm was excised and peripheral iridectomy was performed. A scleral flap was secured by applying two stitches of 8/0 vicryl at the two corners of the flap. Conjunctival flap was sutured by the same 8/0 vicryl by applying continuous stitches, making sure that the wound was water tight. Anterior chamber and bleb was formed with balance salt solution through Paracentesis port.

DATA COLLECTION PROCEDURE:

The procedure done under local or general anesthesia. Thirty patients underwent standard trabeculectomy without Mitomycin-C as described by Cairns in 1968¹² and later modified by Watson in 1970¹³ and placed in group B. The group A included the remaining thirty patients who were operated with standard trabeculectomy with Mitomycin-C. Mitomycin-C applied on the scleral bed and under surface of the conjunctiva before making an opening into anterior chamber. The contact time of Mitomycin-

C was 2 minutes and the dose was 0.2 mg / ml.⁴All surgeries done by single consultant. The procedure was defined as successful if the intraocular pressure was below 20mmHg without any antiglaucoma medication in our study in either group and follow up period were 3 months.

RESULTS

The results of two groups, those which had primary Cairns type trabeculectomy and those trabeculectomy with Mitomycin-C, were compared in term of lowering of IOP in POAG. The success rate of surgery in intraocular pressure control of 20 mmHg or less with out medication in primary Cairns type trabeculectomy was 90% and given in figure No: 2, while in trabeculectomy with MM-C was 94% which was given in figure No: 3. The comparisons of post op IOP in both groups are given in figure No: 4. The preoperative IOP was given in figure No: 1 in both groups.

The incidence of complications in both groups were given in figure No: 5. The visual acuity returned to the normal within one month after surgery. Two cases in primary Cairns type trabeculectomy and five cases in trabeculectomy with MM-C, the cause of the drop of visual acuity was progression of lenticular opacities. The higher incidence of complications in MMC group was due to higher incidence of flat anterior chamber in this group and the other complications being almost equal. The flat anterior chamber was treated by double padding to which the response was seen in 24 to 48 hours.

There were 5 cases in which the pressure remained above 21mmHg mark, 3 cases in primary Cairns type Trabeculectomy and 2 cases in Trabeculectomy with MM-C group. They were given the option of using antiglaucoma medication initially upto the follow up period but later on they refused the option of repeat surgery.

DISCUSSION

Glaucoma is a progressive optic neuropathy with characteristic changes in the optic nerve head and corresponding loss of visual field. Glaucoma is considered as the second leading cause of blindness after cataract worldwide¹ and fourth commonest cause of blindness in Pakistan.² Amongst the glaucomas, primary open angle glaucoma (POAG) is the most prevalent type of glaucoma, affecting approximately 1% of the general population over the age of 40 years.³

In this study, we selected uncomplicated cases of primary open angle glaucoma with achievement of target pressure of 20 or less without medication in 93.3% in Mitomycin-C group, whereas in primary Cairns type Trabeculectomy, the target pressure was achieved in only 90% of cases without the use of medications. The

difference between the two groups were not statically significant (P-value .640 > 0.05) as the sample size was small.

The numbers of patients included in this study were 60 with primary open angle glaucoma, which is consistent with other studies carried out abroad. O'Brart et al conducted a study which included 50 eyes of 45 and 48 patients' respectively.^{51,52} But this study included patients suffering from open angle glaucoma and they compared trabeculectomy with MMC with visco-canalostomy respectively. Beatty et al conducted a study comprising of 69 high risk patients whose glaucoma were not controlled medically.⁵³ Work done by Hye included 9 patients with POAG including young patients ranging in age from 24 years to 50 years.⁵⁴ Adeqbehinqbe conducted a study, which consisted of 53 primary open angle glaucoma patients.⁵⁵ Study done by Babar TF included 81 patients of POAG which is consistent with our study.¹⁰

In our study, 32 (53.3%) patients were using glaucoma medications respectively, while 28 (46.7%) patients were not using medicines. This observation in our study is in sharp contrast to the study carried out by Casson et al and Hye in which all patients were using glaucoma medications.^{56, 54} Our study is also inconsistent with that one conducted by Dandona et al, in which only 2 patients out of 27 with POAG were using glaucoma medications.⁵⁷ Our study is consistent with Edmunds et al in which 50% patients were on glaucoma treatment.⁵⁸ Adeqbehinqbe noted success of glaucoma drugs in lowering IOP in 13% patients.⁵⁵ In this study, 15 patients each had a preoperative IOP of 20 mm Hg or less with glaucoma medications in group A while in group B 17 patients had preoperative IOP of 20 mm Hg Or less without glaucoma medications.

In study carried out by Dandona et al, 66.7% patients had an IOP less than 22 mm Hg and 33.3% had an IOP of more than 22 mm Hg.⁵⁷ Edmund et al showed that POAG patients had a mean IOP of 29.5 mm Hg at diagnosis and 26.5 mm Hg at the time of listing for surgery.⁵⁸ Mean preoperative IOP recorded by Hye was 26.43 mmHg.⁵⁴ Mean preoperative IOP recorded by Adeqbehinqbe et al was 35.5 mm Hg ± 6.2 mmHg.⁵⁵

In our study, operative complications included shallow A/C in 33.3% patients, hyphema in 11.7%, cataract in 11.7%, flat bleb in 3.3% and failed trab in 1.7%. There were no complications in 38.3% patients. Hye noted conjunctival wound gap, shallow A/C, choroidal detachment, cataract formation, hypotony maculopathy, hyphema in 6.66% of cases. Casson et al noted that 10% patients required another surgery in the first year, hypotony maculopathy in 5% and cataract in 35%.⁵⁶ There was blebitis / endophthalmitis at 4 years

in 4%and hypotony maculopathy in 4% in study done by Betty et al.⁵³ O'Brat et al noted hypotony in 52% cases at one week and 8% needed another trabeculectomy.⁵² Hyphema was the main complication in 15.3% patients.⁵⁵

Post operative IOP in our case series was 20 mmHg or less in 91.7% patients without medication and 20mm Hg or less in 8.3% patients with medication. Postoperative IOP in Betty series was 16.63mm Hg. Hye noted an average postoperative reduction in IOP of 14.04 mm Hg. His mean postoperative IOP was 13.3mm Hg.⁵⁴ O'Brat et al noted a mean IOP was 7.3mm Hg at 1st post operative day, 8.3mm Hg at one week.⁵¹ In another study they noted a mean IOP of 7mm Hg and 7.88mmHg at one week.⁵² Mean post operative IOP recorded by Adeqbehinqbe et al was 10.6mm Hg ± 2.3 mmHg.⁵⁵ Mean preoperative IOP at 3 months was 14.6mmHg ± 4.2 mm Hg.⁵⁵ All these studies were consistent with our study. In our study, 8.3% operated patients required glaucoma medications. Betty et al reported that 11.1% patients required topical antiglaucoma medications postoperatively.⁵³ None of the patients operated by Adeqbehinqbe et al required postoperative medication.⁵⁵ Karger and Basel reported in their study that the target pressure was achieved in 73% with MM-C and 68% with out MM-C.⁵⁹ It showed that our results were satisfactory.

S. Beatty et al reported in their study that the success rate of achieving target IOP was 83.3% in MM-C group.⁵³ Babar TF reported in their study that the target pressure of 21mmHg was achieved in 91.3 %.¹⁰ This study is also consistent with our study group B. Mandal et al reported a success rate of 94.7% with trabeculectomy supplemented with antimetabolites in older children.⁶⁰ So in comparison with other studies

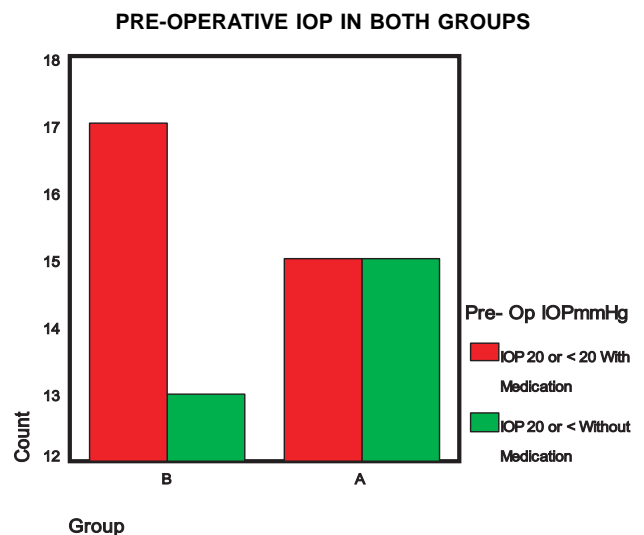


Figure 1. Pre-Op IOP mmHg

Post- operative IOP mmHg in Simple Trabeculectomy

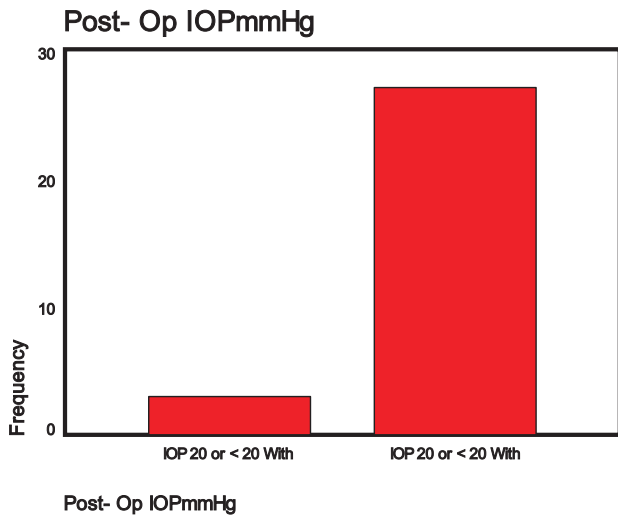


Figure 2. Post- Op IOP mmHg in simple trabeculectomy

P-Value .640 > 0.05*
* Difference is not significant

POST-OPERATIVE IOP MMHG IN TRABECULECTOMY WITH MMC

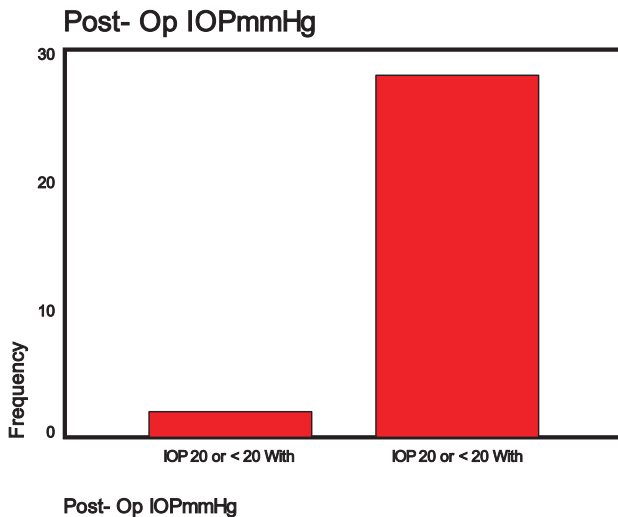


Figure 3. Post- Op IOP mmHg in trabeculectomy with MMC

P-Value .640 > 0.05*
* Difference is not significant

our results for augmented and unaugmented trabeculectomies regarding intraocular pressure control in POAG were satisfactory.

CONCLUSION:

Trabeculectomy with intraoperative use of Mitomycin-C gives better control of IOP as compare to simple Trabeculectomy because Mitomycin C (MMC) is an antimetabolite used during the initial stages of a trabeculectomy to prevent excessive postoperative scarring and thus reduce the risk of failure.

COMPARISON OF POST-OPERATIVE IOP MMHG BETWEEN GROUP A AND B

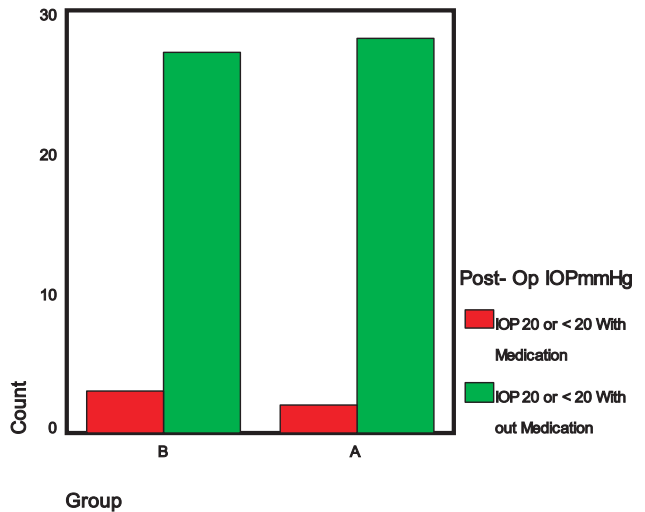


Figure 4. Comparison between group A and B

P-Value .640 > 0.05*
* Difference is not significant as the sample size is small
Group-A-With MM-C
Group-B-Without MM-C

POST OPERATIVE COMPLICATIONS IN BOTH GROUPS

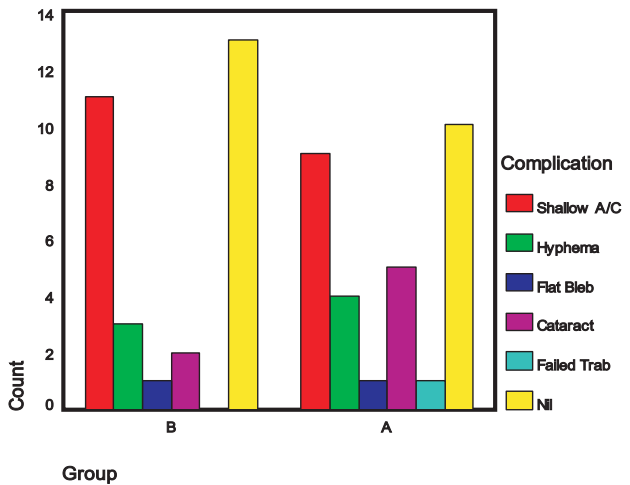


Figure 5. Complications

P-Value .697 > 0.05*
* Difference is not significant

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ORIGINAL

What lies beneath Non-traumatic Swollen Lids

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Dr. Nuzhat
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ABSTRACT

PURPOSE: To analyze the different types of ocular pathology in patients presenting with non traumatic swollen lids.

MATERIALS AND METHODS: It was a cross-sectional analytical study on all consecutive patients between ages 1 month and 70 years, admitted with the non traumatic swollen lids at Khyber Institute Of Ophthalmic Medical Sciences PGMI, Lady Reading Hospital, Peshawar from 1st January 2009 to 31st December 2009. After detailed history and exclusion of any ocular trauma, all patients were examined for the type of lid swelling, any associated proptosis, ocular movements, pupil examination, anterior segment and post segment examination. Where needed examination under general anesthesia was performed. The workup in the form of investigations was carried out. The clinical features, examination, investigation and diagnosis were entered on a specially designed performa.

RESULTS: The results revealed the pathology beneath the non-traumatic swollen lids. Male constituted 33 (48.52%) and females 35 (51.47%) of the total. Children between ages of 0-10 years are more vulnerable 22 (32.35%) followed by 19(27.94%) patients belonging to age group over 60 years. The commonest cause of swollen lids was preseptal cellulites 27 (39.70%) followed by 13(19.11%) patients of orbital cellulitis and 12(17.65%) patient of panophthalmitis, while 8 (11.76%) patients had retinoblastoma.

CONCLUSION: In developing countries, swollen eyelids may be the most important presenting sign of a sight threatening and life-threatening problem such as orbital cellulites and Retinoblastoma. Early diagnosis and prompt treatment with proper antibiotics and/or surgical intervention can achieve a good prognosis.

INTRODUCTION

Lid swelling is perhaps one of the most disconcerting conditions we encounter in clinical practice, especially when the swelling is so severe that the patient cannot open the affected eye. The swelling may have a vast number of etiologic factors, may be from something as mild as a chalazion or seasonal allergy, or it may pinpoint a life-threatening problem such as orbital cellulitis¹ and retinoblastoma². Often at times, the patient's appearance and presenting signs and symptoms will guide our diagnosis. A proper history and evaluation, and careful consideration of the associated signs and symptoms will allow us to properly diagnose and manage these patients².

The most common etiology of non traumatic lid swelling is preseptal cellulitis^{1,2} which involves an infection of the lid tissue or its associated sebaceous and sweat glands. As the name implies, preseptal cellulitis involves all the tissues of the lid anterior to the septum orbital. Presenting signs and symptoms include acute pain and pronounced, diffuse lid edema³,

often to the point that patients cannot voluntarily open the involved eye. While the other common cause of swollen lids is orbital cellulitis which involves an infection of the lid tissues both anterior and posterior to the septum orbitale⁴. Symptoms and signs of orbital cellulitis include swelling and redness of the eyelid and surrounding soft tissues, conjunctival hyperemia and chemosis, decreased ocular motility, pain with eye movements, decreased visual acuity, and proptosis caused by orbital swelling². The latter may cause significant morbidity and even mortality. The infection can spread through a valveless venous system, leading to cavernous sinus thrombosis, meningitis, intracranial infection and septicemia^{2,3}. (Cavernous sinus thrombosis itself may contribute to eyelid edema, usually bilaterally. Proptosis and chemosis usually characterize this.⁵)

Other disorders to consider for the causation of swollen lids beside trauma include insect or animal bites without cellulitis, retained foreign bodies, allergic reactions, tumors, and inflammatory orbital pseudotumor. Infection of the lacrimal system as dacryocystitis and dacryoadenitis too, may result in significant lid swelling^{1,6}. The other major life threatening conditions which can present with swollen lid are retinoblastoma, rhabdomyosarcoma and panophthalmitis especially after cataract surgery^{2,5,6,7}. Some times tumors of the lids as basal cell carcinoma and squamous cell carcinoma can also present with this condition.

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Orbital Cellulitis

Eyelid swelling may require the use of lid retractors for evaluation of the globe. Eye findings are normal except for lid swelling in preseptal cellulitis as local nidus of infection may be present on the skin. If findings are equivocal, the examination is difficult (as in young children), or nasal discharge is present

(suggesting sinusitis), CT or MRI should be done to confirm orbital cellulitis, exclude tumor and pseudotumor, and diagnose sinusitis if present⁴. MRI would be better than CT if cavernous sinus thrombosis is considered. Blood cultures are often done (ideally before beginning antibiotics) in patients with orbital cellulitis but are positive in < 33 %².

The purpose of this study was to find out the true picture of ocular pathology which caused the swollen lids.

MATERIAL AND METHODS

The study was conducted on 68 patients who presented with non traumatic lids swelling caused by ocular pathology in year 2009. After receiving these patients in casualty or through OPD they were admitted in the eye ward, Khyber Institute of Ophthalmic Medical Sciences, PGMI, LRH, Peshawar.



Retinoblastoma

Those patients who were admitted with swollen lids were included in the study by considering the exclusion criteria that was trauma and inclusion criteria that was both gender, age from 0 to 70 years and any lid swelling caused by ocular pathology. Informed consent was obtained from all the patients before entry into study. All the patients were divided into 7 age groups, 10 years for each one. A separate data collecting performa was filled for every patient. Past and present history of any pre-existing ocular pathology, surgery and trauma was recorded. Inquiry was made about any systemic disease. After detailed history including duration of symptoms ,any associated systemic disease ,any previous treatment and the status of vision, causative agents and systemic examination, complete ocular examination was done including visual acuity and torch examination, examination of the lids, ocular motility, pupillary examination ,anterior and posterior segment examination and measurement of proptosis, intra-ocular pressure and where required use of lid retractors

for evaluation of the globe and examination under anesthesia was done .

Diagnosis was made mostly on the clinical findings and investigations were aimed at identifying the root cause of the infection, particularly in the case of orbital cellulitis. Investigations carried out in our setting included a full blood count and blood culture..CT of the sinuses as well as the orbit ± brain(if intracranial abscess was suspected), remains the gold standard imaging modality, carried out to differentiate between preseptal and orbital cellulitis, paranasal sinusitis or cavernous sinus thrombosis and for conformation of retinoblastoma .An MRI of the orbit and brain complimented the CT in diagnosing a few complicated cases. A liaison was made with otorhino-laryngologist for the proper diagnoses where required.

RESULTS

68 patients between the ages of 0 and 60 years and above admitted with non traumatic swollen lids were included in the study. The male constituted 33 (48.5%) and females 35 (51.47%) . Out of these 68 cases 22(32.35%) patients were in the age group 0 to 10 years. Age group 11 to 50 years constituted 16 (23.53%) in total while 11 (16.17%) patients were in age group of 51 to 60 years and the second most common group admitted was 60 years and above and that was 19(27.9%). Majority of the patients were admitted with preseptal cellulitis 27(39.70%).The cause of preseptal cellulitis could be established in majority of the patients. Out of these ,8(29.62%) patients had history of insect bite ,3 (11.11%)patients had acute dacryocystitis and 6(22.2%) patients had orbital cellulitis with preseptal cellulitis as well. Out of these who had preseptal cellulitis ,16(59.25%) were in the age group of 0 to 10 years. Lids swelling caused by orbital cellulitis affected 13 (19.11%) patients .The diagnostically differentiating point between preseptal and orbital cellulitis was proptosis and CT scan. Majority of the orbital cellulitis was secondarily because of poorly managed preseptal cellulitis. Post cataract panophthalmitis caused swollen lids in 12 (17.44%) patients and 9(75%) patients were above 60 years Retinoblastoma was diagnosed in 8 (11.76%) patients who presented with swollen lids and proptosis .The diagnosis was made on B-scan and on CT scan. Rhabdomyosarcoma was the cause of swollen lids in 2(2.94%) patients. While in 3 (4.41%) patients the cause of swollen lids was Basal cell carcinoma and in 1(1.47%) patient, Squamous cell carcinoma caused the pathology. 2 (2.94%) patients had herpez zoster ophthalmicus leading to swollen lids.

DISCUSSION

In developing countries, non traumatic swollen eyelids may be the most important sign of neglected, severe , sight and life threatening ocular pathologies¹.

Factors for causation of swollen lids are mostly periocular and periorbital inflammation leading to preseptal and orbital cellulitis but beside that panophthalmitis and retinoblastoma are other serious culprits forcing the patients to be admitted with swollen lids^{2,3}. The purpose of this study was to find out the ocular pathologies causing the patients to be admitted with swollen lids in our tertiary hospital.

This study had total of 68 cases in year 2009, who were admitted with non traumatic swollen lids, out of that 33 were males and 35 were females. The difference in gender is negligible in our study. No sex predilection was observed in study done by Uy et al¹. In the study conducted by Chaudhry et al⁴ on 218 patients with the diagnosis of periocular inflammation (136 male, 82 female) male patients outnumbered female counterparts. This significant difference between the gender revealed that trauma affects male more than the females and it was not included in our study. Infection of the orbital structures can affect all age groups, but is more frequent in pediatric populations⁴. In this study the most common age group effected was under 10 years of age 22 (32.35%) and they had mostly preseptal cellulitis¹⁶ which is comparative to the study done by Chaudhry et al⁶. According to the study done by Ho et al⁴ Preseptal cellulitis is primarily a pediatric disease with approximately 80% of patients younger than 10 years and most patients younger than 5 years⁵. In our study orbital cellulitis affected 13 patients and again the majority were under 16 years which is similar to the other international and national studies^{1,2,3,5}. The important sign of Orbital Cellulitis was proptosis and ophthalmoplegia in 12 patients as similar in study done by Chaudhry et al³. In this study preseptal cellulitis caused by insect bite was seen in 8 patients. For preseptal cellulitis, insect bite was the most common cause in study done by Tariq et al⁷ and trauma was the leading cause for orbital cellulitis. The frequency of orbital cellulitis was 0.1% of total admission in a study done by Tariq et al⁷. In this study sinusitis was a contributing factor only in 3 patients which is in contradiction to the study done by Chaudhry et al⁵, according to him untreated sinusitis and prior history of orbital trauma were the 2 major causes of orbital cellulitis in patients referred to a tertiary care eye center in the Middle East. This retrospective study reviewed 80 children admitted to Chang Gung Children's Hospital with a diagnosis of orbital cellulitis who were staged by computed tomography (CT), between January 1999 and August 2005.

In this study the second most common cause of swollen lids was panophthalmitis affecting 12 patients in total and out of these 8 patients were above the age of 60 years. All of these patients had cataract surgery

in missionary or remote hospital and even in tertiary care hospitals. In study done by Khan. BS, the commonest indication for evisceration was post-operative Endophthalmitis / Panophthalmitis found in 21(61.7%)⁸

The most horrifying feature of this study was that 8 children had neglected retinoblastoma who was admitted with either orbital or periorbital cellulitis and proptosis with fungating mass. This corresponds with other international studies as well especially in developing countries⁹. In a study done by Bakhshi et al enrolled Children < 18 years with malignant proptosis in ophthalmic tumor clinic at a tertiary cancer center from July 2003 to December 2006 and were retrospectively analyzed. The incidence of proptosis among the pediatric cancer patients was 4.9% with retinoblastoma (51%) being the commonest cause of proptosis¹⁰. In a study done in our province during 1999–2002, Forty (57.10%) cases of retinoblastoma presented as leukocoria and 10 as fungating mass or proptosis¹¹. In a study done in Nepal by Badhu et al on 43 patients with retinoblastoma, The commonest mode of presentation of retinoblastoma was proptosis¹². So it is important to examine and investigate all the patients who present with lids swelling.

Two of our patients were diagnosed as having Rhabdomyosarcoma which is different from other studies. In a study done by Kaliaperumal¹³ studied only 6 patients who were diagnosed and treated for rhabdomyosarcoma between January 1999 and June 2004¹³. In our study swollen lids caused by basal cell carcinoma and squamous cell were 3 in number and those were the patients who presented very late with distorted lids and fungating masses and this is comparative with other studies as well^{14,15}.

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ORIGINAL

Role of NFLT and GCC in Glaucoma, an Optical Coherence Tomography Study

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ABSTRACT

Objectives: To evaluate the loss of macular nerve fiber layer (NFL) and ganglion cell complex in glaucomatous damage by optical coherence tomography (OCT).

Material and Methods

Study design: Cross-sectional, observational study.

Setting: This study was conducted at Said Anwar Medical Centre Dabgari Garden from 25th November 2010 to 25th March 2011.

Duration of study: Four months.

Data Collection Procedure

Patients who fulfilled the inclusion criteria of glaucoma were included in the study after taking informal written consent. Patients underwent thorough ophthalmological examination including visual acuity with snellen chart, intraocular pressure (IOP) checked up with Goldmann tonometer, Anterior segment examination with slit lamp and posterior segment by slit lamp biomicroscopy with 78D lens. Participants also underwent OCT imaging with optic nerve head (ONH) and Ganglion Cell Complex (GCC) mode and Retinal Nerve Fibre Layer (RNFL) thickness within a single day. The relationship between structure and function was evaluated by measuring GCC and RNFL thickness or loss. All the above mentioned examinations and tests were done in order to diagnose the patients having glaucoma or glaucoma suspect, so that they could be included in the study.

Results: Total of 138 eyes of 75 patients were included in our study. The mean age of the patient was 55 years. Male (54.67%) were affected more than female (45.33%). In which 84% were bilateral and 16% were unilateral. In 31.6% eyes there was moderate loss of nerve fiber layer while in 23.19% there was mixed type of nerve fiber loss. While severe loss of ganglion cell complex was more common and it was 41.30% then the other type of GCC loss. Both the nerve fiber loss and GCC loss was more severe in those eyes in which the CDR was 0.8-0.9. All the patients were using anti-glaucoma medications.

Conclusion: OCT is a useful method for the diagnosis of RNFL and GCC loss. It helpful for early diagnosis and monitoring of glaucoma. It is also very effective in normal tension glaucoma and other types of glaucoma suspects.

Key Words: RNFL= Retinal nerve fiber layer, GCC= Ganglion cell complex, CDR= Cup-disc ratio, OCT= Optical coherence tomography.

INTRODUCTION

Glaucoma affects over 70 million people worldwide and the second leading cause of blindness.¹ In which the optic nerve and retinal ganglion cells are injured, leading to loss of the peripheral visual field and eventually profound vision loss and blindness.^{1,2} Usually an automated perimetry was used for the diagnosis and severity of glaucoma. However, Quigley et al reported that up to 40% to 50% of the RNFL lost before visual field defects are detected by conventional perimetry. Thus, RNFL assessment has emerged as an

important parameter for preperimetric diagnosis of glaucoma and may aid ophthalmologists in making an accurate and early diagnosis. Various imaging technologies have been introduced for an objective assessment of RNFL.^{1,3,4}

Optical coherence tomography (OCT) is a non-contact, noninvasive diagnostic technique that allows measurement of RNFL thickness by in vivo visualization of the retina and RNFL with good reproducibility.^{3,5,6} OCT-determined RNFL thickness has been shown to be significantly reduced in patients with glaucoma, although with inter-individual variability may be present.^{7,8}

Optical coherence tomography (OCT) is a technique that allows cross-sectional imaging of the anterior and posterior segment of the eye. OCT has a resolution of approximately 10 microns, with extremely high sensitivity (approximately 10⁻¹⁰ of incident light). OCT is analogous to computed tomography (which uses x-rays), magnetic resonance imaging (which uses spin resonance), or B-scan ultrasound (which uses sound waves) but OCT uses only light to

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derive its image. It is a non-contact, noninvasive system by which retinal substructure may be analyzed in vivo. It is useful in the evaluation of retinal pathologies and glaucoma.⁹

Glaucoma diagnosis was previously based on characteristic optic nerve cupping with corresponding visual field deficits. However, since a significant loss to Retinal Ganglion Cell (RGC) population can occur prior to detectable visual field deficits and that structural loss can precede detectable function loss by up to 5 years, developing methods to quantify RGC-related glaucomatous changes could lead to glaucoma detection at an earlier stage and more accurate tracking of glaucoma progression.¹⁰

In glaucoma the macular thickness is reduced as compared to the normal eyes. This reduction is attributable mainly to the loss of retinal ganglion cells and retinal nerve fibers. The macular OCT used to measured macular retinal (MR) thickness and GCC thickness.^{11,12}

Macular ganglion cell complex (MGCC) is the sum of the thicknesses of the retinal nerve fiber, ganglion cell, and inner plexiform layers, which is lost earlier in glaucoma as compared to the NFL.¹³ In glaucoma, retinal nerve fiber layer (NFL) thickness and GCC is measured at standardized locations around the optic nerve head. A circular scan produces a cylindrical cross-section of the retina, from which the NFL can be analyzed. In addition, radial scans through the optic nerve head are used to evaluate cupping and juxtapapillary NFL thickness. OCT, a new imaging technology by which the anterior and posterior segment are seen in cross-section, may permit the early diagnosis of glaucoma, and the early detection of glaucomatous progression.¹⁴

Limited data exists regarding OCT characteristics of ONH, NFL thickness and GCC in our community and no such studies have been reported on Khyber Pakhtoonkhwa population. Therefore we designed this study to determine the early diagnosis and damage caused by glaucoma by measuring the NFL thickness and Ganglion Cell Complex in patients of glaucoma in Khyber Pakhtoonkhwa.

DATA COLLECTION PROCEDURE

Patients who fulfill the inclusion criteria were included in the study after taking informal written consent. Patients then underwent thorough ophthalmological examination including visual acuity with snellen chart, intraocular pressure (IOP) check up with Goldmann tonometer. Anterior segment examination with slit lamp and posterior segment by slit lamp biomicroscopy with 78D lens was also carried out.

The OCT was used to map the macula over a 7x6 mm region. The macular OCT images were exported for automatic segmentation using software we developed. The program measured macular retinal (MR) thickness and ganglion cell complex (GCC) thickness. The GCC was defined as the combination of nerve fiber, ganglion cell, and inner plexiform layers. Pattern analysis was applied to the GCC map and the diagnostic power of pattern-based diagnostic parameters were investigated. All the above mentioned examinations and tests were done in order to diagnose the patients having glaucoma or glaucoma suspect, so that they could be included in the study. Data was analyzed by using the software SPSS 10.0.

RESULTS

Total of 138 eyes of 75 patients were included in my study. The age of the patients range from 27 years to 82 years. The mean age of the patient was 55 years. The gender distribution and laterality is shown in Table I. Male (54.67%) were affected more than female (45.33%). In which 84% patients were bilateral and 16% were unilateral. Nerve fiber loss was given in table II. In which 31.6% eyes have moderate loss of nerve fiber layer while 23.19% have mixed type of nerve fiber loss. Loss of ganglion cell complex was given in table III. Sever loss of ganglion cell complex was more common and it was 41.30% then the other type of GCC loss. Both the nerve fiber loss and GCC loss was more sever in those eyes in which the CDR was 0.8-0.9. While in moderate loss the CDR ratio was 0.5-0.7. In the patient in whom the CDR ratio was less than 0.5 they have either normal or focal loss of nerve fiber and GCC. All of these patients were using antiglaucoma medication.

**Table I
Gender distribution
(n=138)**

Gender	Bilateral	Unilateral	Total
MALE	36	5	41(54.67%)
FEMALE	27	7	34(45.33%)
TOTAL	63(84%)	12(16%)	75(100%)

N= no of eyes, %= Percentag

**Table I
Loss of RNFL
(n=138)**

RNFL loss	Eyes	%
Focal Loss	20	14.5
Moderate Loss	43	31.16
Sever Loss	25	18.11
Mixed	32	23.19
Normal	18	3.04
Total	138	100

N= number of eyes, %= Percentage, RNFL= Retinal nerve fiber layer

Table I
Loss of GCC
(n=149)

Loss of GCC	Eyes	%
Normal	36	26.09
Border line	45	32.61
Sever loss	57	41.30
Total	138	100

N=number of eyes, %= Percentage, GCC= Ganglion cell complex

DISCUSSION

Glaucoma comprise a group of hereditary optic neuropathies characterized by progressive and irreversible visual field loss and damage to the optic nerve head.^{1,2} It is a complex disease with multiple molecular mechanisms underlying its pathogenesis. It is the second leading cause of blindness, in which the optic nerve and retinal ganglion cells are injured, leading to loss of the peripheral visual field and eventually profound vision loss and blindness.^{1,2} Usually an automated perimetry was used for the diagnosis and progression of glaucoma, but it can detect glaucoma when 30% to 50% retinal ganglion cells have already been lost.¹⁵ Moreover, glaucoma often may not be detected until substantial retinal nerve fiber layer damaged has occurred. However OCT is the more sensitive glaucoma diagnostic test which detect the earlier changes in the nerve fiber layer and ganglion cell loss.¹⁵ In our study the mean age of the patient is 55 years. While in Fang Yuan et al study the mean age of the patient was 58.4 years.¹⁶ In Ou Tan et al study the mean age was 60.4%.¹¹ Similarly in O'Rese J et al study the the mean age was 68.3 years.¹⁷

In Fang Yuan et al study the gender distribution was 15 (44.1%) male and 19 (55.9%) female.¹⁶ while in Ou Tan et al study there were 56% female and 44% male (11). Similarly in O'Rese J et al study the male were 32.07% and female were 51.89%.¹⁷ In our study male (54.67%) are involved more then female (45.33%). This is because in our society, approach to the medical facilities for the male are more easy then females.

O'Rese J et al study showed that in mild, moderate, and severe glaucoma the thickness of the retinal nerve fiber layer were 73.3 ± 11.8 , 60.9 ± 8.3 , and 55.3 ± 6.6 , respectively.¹⁷ which means that the RNFL loss were 27%, 39.1% and 44.7% respectively.¹⁷ In our study the focal, moderate and sever loss are 14.5%, 31.16% and 18.11% respectively. While mixed loss occurred in 23.19%. Similarly, the sever GCC loss is 32.61% in my study. The loss is more as comparable to the other studies. This is because the most of our patient present in the late stage of glaucoma. Moreover this recent new technique was also not available in our community. Even in 13.04 % and 26.09% patients the nerve fiber layer thickness and GCC are normal. The

loss of RNFL and GCC are also comparable with loss of the optic nerve. The more sever loss occurred in those patients in whom the optic disc cupping is 0.8 – 0.9. While in the patients in whom the NFL and GCC is normal the optic disc cupping is less than 0.4. The Fang Yuan et al also show the same comparison between the NFLT, GCC and optic disc cupping.¹⁷

The OCT has a novel function that can measure the thickness of the macular GCC, including RNFL, ganglion cell layer (GCL), and inner plexiform layer (IPL). According to Zeimer et al hypotheses, quantitative detection of glaucomatous damage at the posterior pole using retinal thickness mapping may provide a unique method for the early detection and monitoring of early glaucomatous tissue loss. GCC parameter has significantly higher diagnostic power than macular thickness parameters, and it has been proved to be a useful method for glaucoma diagnosis and has potential for tracking glaucoma progression in previous study.^{11,18} The GCC measurement was good enough to measure the GC damage in early glaucoma, however, it can only measure the GCC thickness in the center of macular area ($7 \times 6 \text{ mm}^2$). Thus glaucomatous damage outside this region might not be able to be detected, and at present it is also unclear if the GCC in the macular area really has the priority for early glaucomatous damage. Further clinical evidence is needed to confirm this result.⁴ However, OCT is a sensitive technique that help in the early diagnosis and progression of glaucoma.

CONCLUSION

OCT is a useful method for the diagnosis of RNFL and GCC loss. It helpful for early diagnosis and monitoring of glaucoma. It is also very effective in the diagnosis of normal tension glaucoma and glaucoma suspects.

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ORIGINAL

Evaluation of Refractive Errors between 9 to 15 years of age, along with other Ocular related Problems

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Dr. Sohail Mushtaq

ABSTRACT

Purpose: To assess the nature of the refractive errors in school going age group and to determine the association of other ocular diseases in these patients.

Materials and Methods: A cross sectional study through non probability consecutive sampling was conducted at Divisional Headquarters Teaching Hospital Sargodha from May 2007 to December 2008. Sixty eyes of 30 patients of age group from 9 to 15 years, were examined thoroughly. Myopia was characterized $\geq 0.5D$, hypermetropia as $\geq + 2.0D$ and cylindrical correction $> 0.75D$ was defined as astigmatic.

Results : A total of 60 eyes of 30 patients were assessed in this study. 53.34% were male and 46.66% were female patients. The mean age was 12.67 years. The deterioration of vision due to refractive error was from counting finger to 6/9. 50(83.33%) eyes showed astigmatism, 9(15%) eyes had myopia and 1(1.67%) eye had hypermetropic refractive error. Amblyopia was found the commonest associated ocular disorder.

Conclusion: Refractive error is one of the causes of decreased vision in school going children and amblyopia is the commonest associated ocular disorder.

INTRODUCTION

Uncorrected refractive error is one of the most common causes of the visual impairment in children. It is a treatable ocular disorder and the correction of refractive errors will not only enhance the efficiency of the affected children at school but will also improve their social participation and psychosocial development. Mostly the visual defect can be rectified by optical correction. This is a cost effective strategy to eliminate the easily treatable cause of visual impairment.

Studies from urban populations in South East Asian countries showed higher prevalence of myopia.¹ But in our study astigmatism is the most common refractive error. Similarly refractive error is a significant cause of visual disability in other countries like Bangladesh. Many children are undetected and the unilateral blindness is three times higher than bilateral blindness.²

There are also other associated ocular problems along with the refractive errors. One of these is amblyopia, if the amblyopia is not treated timely and properly then the vision cannot be restored fully. The correction of the refractive error during the period of development of vision is pivotal for the patient. There

are also other associated conditions which may co-exist with the refractive errors like; allergic conjunctivitis, coloboma of the iris and choroid and retinitis pigmentosa.

MATERIALS & METHODS

The present cross sectional study through non probability consecutive sampling was carried out from May 2007 to December 2008 in outpatient department of ophthalmology at Divisional Headquarters Teaching Hospital Sargodha. 60 eyes of 30 patients were examined and a performa was designed for the record of findings in each patient. The visual acuity was recorded by snellen's chart and extraocular motility was assessed. The refractive error was determined by the autorfractometer (Topcon). The patient's best corrected vision was determined by giving subjective correction for the particular refractive error. The cycloplegic refraction with the use of 1% cyclopentolate was not needed in our study because all the patients were above the age of 8 years. The anterior segment was examined by the slit-lamp and the posterior segment was evaluated after dilating the pupil with the topical use of 1% tropicamide eye drops. The dilated fundus examination was performed with the help of direct ophthalmoscope, indirect ophthalmoscope and by indirect slit-lamp biomicroscopy with the use of +78D lens. The anterior and posterior segments were evaluated to know the other associated ocular disorders along with refractive errors.

The spherical equivalent of $- 0.5 D$ or worse was defined as myopia, $+2.0 D$ or more was defined as hypermetropia and a cylindrical refraction greater than $0.75 D$ was considered astigmatism. The patients

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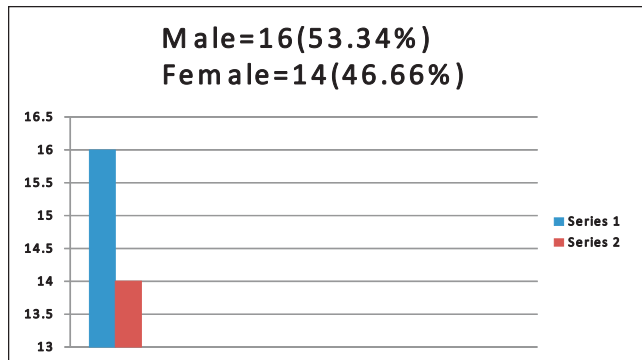
were prescribed the glasses for the best corrected vision. It was advised to the patients and their parents for re-evaluation of the refractive status after every 6 months till the refraction is stable.

RESULTS

60 eyes of 30 patients were examined. There were 16 (53.34%) male and 14 (46.66%) female patients.

Fig No. 1

The range of the visual acuity due to refractive



error was from counting finger to 6/9. The distribution of the refractive error in our study showed, astigmatism is the commonest refractive error and hypermetropia is the least one. 50(83.33%) eyes showed astigmatism, 9(15%) eyes had myopia and 1(1.67%) eye had hypermetropic refractive error.

Table.1

Results

The range of V.A. was from counting fingers to 6/9

Refractive Error	No. Eyes	%
Hypermetropia	1	1.66
Myopia	9	15.00
Astigmatism	50	83.33
Simple Hypermetropic	0	0
Simple Myopic	1	1.66
Compound Hypermetropic	2	3.33
Compound Myopic	33	55.00
Mixed	14	23.33

Amongst the astigmatism, compound myopic astigmatism refractive error was found in the most of cases. All the patients were prescribed the spectacles to achieve the best corrected vision. In our patients, mostly achieved 6/6 vision according to snellen's chart and this is the level of normal visual acuity. **Fig. No. 2.**

In our study, the maximum age of the patient who presented in our outpatient department was 14 years of age and the minimum age was 9 years. The mean age was 12.67 years. **Fig. No. 3.** All the patients were evaluated thoroughly to see the other associated ocular diseases. It was found the other ocular disorders like; allergic conjunctivitis, coloboma of the iris, coloboma

Fig. 2
Achievement of BCVA

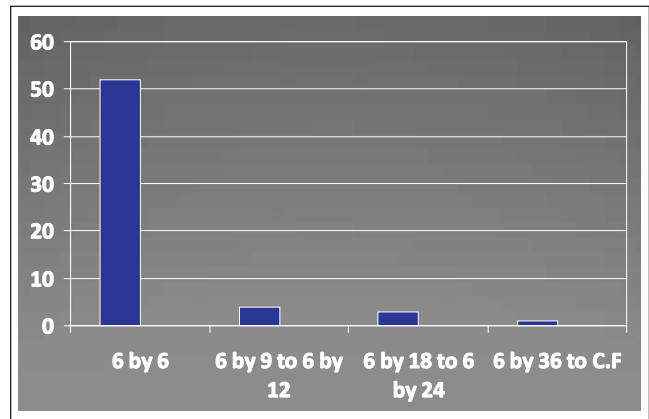
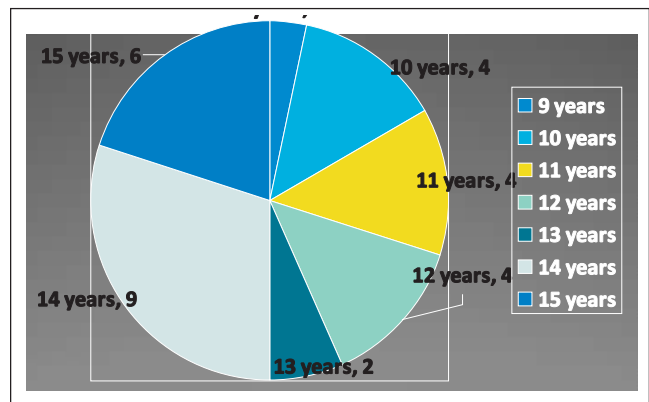


Fig. 3

Distribution of Age Versus Refractive Error



of the choroid, amblyopia, retinitis pigmentosa and nystagmoid movements. Amblyopia was the commonest associated ocular disorder.

Table. No. 2

Associated Ocular Disorders

Allergic Conjunctivitis	1
Iris Naevus	1
Coloboma of Iris	1
Coloboma of Choroid	1
Amblyopia	3
Retinitis Pigmentosa	1
Others (Nystagmoid Movements)	1

DISCUSSION:

Emmetropia is the ideal optical condition of the eye wherein the parallel rays of the light are focused upon the retina when accommodation is at rest. The opposite condition is ametropia, wherein the parallel rays of light are not focused exactly upon the retina when the eye is in state of rest.³ The refractive errors which we have noticed in our study are like; hypermetropia, myopia and astigmatism. Astigmatism is further sub classified into simple hypermetropia,

simple myopia, compound hypermetropic astigmatism, compound myopic astigmatism and mixed astigmatism. In our study, most common refractive error is astigmatism (83.33%) and out of which most of the cases (55.00%) have compound myopic astigmatism (Table.No.1). The worldwide estimated number of cases of refractive range from 800 million to 2.3 billion and the majority are uncorrected. According to the World Health Organization (WHO), correction of the refractive error is a component of the current global initiative to reduce avoidable or treatable blindness (Vision 2020) which is a top priority and challenge for all the nations of the world. We did the complete ophthalmic examination to know the cause of the visual impairment. Spherical equivalent of - 0.5D or more was defined as myopia, +2.0D or more was defined as hypermetropia and cylinder correction greater than 0.75 was considered as astigmatism.⁴

The non cycloplegic refraction was tested in our patients because the minimum age of the patients who presented to us is 9 years and the maximum is 15 years of age. After the age of 8 years, the refraction can be performed without cycloplegia.⁵ So we did not perform the cycloplegic refraction in our cases. Refractive error is one of the causes of visual impairment in school going age group. Amblyopia and reduced vision because of uncorrected refractive error is also found in this age group that was found in Qazvin Iran.⁶ In our study apart from refractive error, amblyopia was the major associated problem. Due to amblyopia we could not achieve the best corrected vision 6/6 according to snellen's chart. So the timely correction of the refractive error can save the patient from development of amblyopia resulting to permanent impairment of vision.

A study conducted for refractive error and visual impairment in school age children in Malaysia showed 2% of amblyopia⁷ and our study had 10% of this problem because in our setup there is less awareness amongst the population that is due to less literacy rate and the patients are presented late, as a result amblyopia is more in our population. In our study, we found the most common refractive error is astigmatism (83.33%), myopia (15%) and hypermetropia (1.67%). The prevalence of refractive error in the literature is very conflicting. In Brazil, hypermetropia (71%) is the most frequent refractive error⁸ but in our study astigmatism (83.33%) is commonly seen. This is noticed that there are variations of refractive error in different nations. The refractive error in children may often remain undiagnosed for a long time especially hypermetropia, this was noticed in a study conducted in Germany.⁹ This is the reason in our study the least refractive error is hypermetropia (1.66%).

If we compare our study with the study conducted by Sharma Seema et al in Haryana India¹⁰, the results are almost same, as the hypermetropia is 1.5% and in our study it is 1.66%. Similarly the study of Sharma Seema et al also showed myopic astigmatism is more than hypermetropic astigmatism. In our study, mostly the patients have also myopic astigmatism refractive error. The results of Sharma Seema and our study are nearly same because both studies were conducted in the neighboring countries of South Asia. It is needed to do screening for the detection of the refractive errors and the optical correction is also ensured.¹¹ This will not only enhance the performance of the children at school but also improve the psychophysical upbringing in this age group.

CONCLUSION:

The study reveals that refractive error is one of the causes of decreased vision in school going age group. Most of the children are unaware of their refractive errors. Due to non correction of the refractive error, very drastic ocular defect like amblyopia develops. So, screening in preschool and school age group should be carried out periodically for evaluation of refractive errors and other ocular diseases.

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ORIGINAL

Outcome of Cataract Surgery in a Community Eye Care Center: A Review of 500 Cases



Dr. Umer Khan Orakzai

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ABSTRACT

Objective: To monitor the outcome of cataract surgery performed at Future Vision Welfare Organization Eye Hospital (a charity based hospital).

Material and Methods: This retrospective study was conducted at Future Vision Welfare Organization Eye Hospital, Naghuman, Peshawar from 2007 to 2010. A total of 500 cases of cataract surgeries were analyzed. The data was retrieved from the record of the patients on a proforma. Detailed ophthalmic history and examination was recorded in the proforma.

Results: Out of the 500 cases, 350 underwent Extracapsular cataract extraction. Manual Small Incision cataract surgery was performed in 128 cases and 22 had Intracapsular cataract extraction. The overall postoperative visual acuity was e" 6/18 in 364 (72.8%), while 81 (16.2%) had a visual acuity of 6/24 – 6/60. Fifty five patients had a poor visual acuity of d" 6/60.

Conclusion: Cataract surgery is safe in community eye care settings. Such settings should be established throughout the country so as to reduce the backlog of cataract in the community.

INTRODUCTION:

Cataract is the most common eye related disease worldwide¹. Because of the population growth and increased longevity, the figure is expected to increase to 50 million by the year 2020 if no addition intervention is implemented². The vast majority of cataract blind people live in the developing world, in countries with limited resources. Many countries even today are not able to cope with the new cases, thus leading to rapidly growing backlog. To manage the large backlog of cataract blindness effectively, cost effective, high quality and high volume surgery is needed in community eye care centers³. The cost effectiveness is related to the short operative time, potential for high volume, high success rates and low cost of consumables⁴.

However, when the success rates are low, cost effectiveness is reduced⁵. So alternate ways of cataract surgery which are affordable, practicable, applicable and sustainable can be adopted in community centers and non- governmental setups to reduce the prevalence of blindness due to cataracts. Cataract extraction accounts for more than half of ophthalmic operations and is the most common surgery in many countries around the world⁶.

Historically, different cataract extraction procedures have been adopted to improve the quality of vision, minimize complications and provide early visual rehabilitation to the patient. Extracapsular cataract extraction with posterior chamber intraocular lens implantation was the most frequent surgical technique until the past decade.

Nowadays, Phaco-emulsification is the most common form of cataract surgery as with the advent of this procedure the results of cataract surgery are more predictable and early rehabilitation as well. In the era of continuous improvement and refinement, we analyzed 500 cases of cataract surgery to know their visual outcomes, complications and role of such charity based hospitals in reducing the cataract backlog, the most common cause of blindness in our country.

MATERIALS AND METHODS:

This retrospective study was carried out at Future Vision Eye Hospital, Naghuman, situated in the suburbs of Peshawar. 500 consecutive patients who underwent cataract surgery for age related cataract were included in this study. Patients with traumatic, pre-senile or cataract associated with some other disease were excluded from the study. Patients who were lost to follow-up were also excluded from the study. The data including history, preoperative visual acuity, intraocular pressure, systemic examination and biometry was retrieved from patients' record.

Extracapsular cataract extraction (ECCE), Manual Small Incision cataract surgery (MSICS) and Intracapsular cataract extraction (ICCE) were the procedures performed depending on the status of the eye and indication for surgery. Intraocular lens was

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implanted in all suitable cases. Viscoelastic was used in all cases and wound was sutured with Nylon 10/0 where required. Patient visual outcome and complications were recorded on 1st day, one week, and one month and after two months of surgery. Post operative refraction was done after 2 months and spectacles prescribed where needed.

RESULTS:

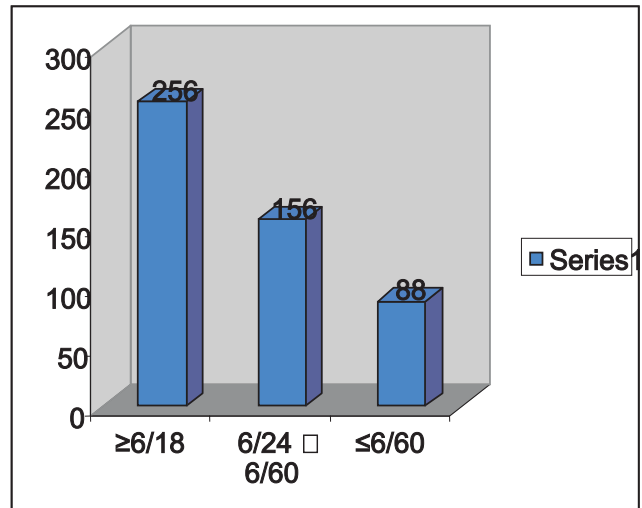
Out of 500 patients, 238 (47.6%) were males and 262 (52.4%) were female. (Fig.1) Majority (88.6%) of the patients had poor visual acuity of count finger and less preoperatively. ECCE was performed in 350 (70%) eyes while 128 (25.6%) patients underwent Manual Small Incision suture less cataract surgery and ICCE in complicated and subluxated cases. Intraocular lens was implanted in 96.6% of cases.

Main intra-operative complication was rupture of posterior capsule encountered in 21 (4.2%) eyes. The early postoperative complication were striate keratitis in 46 (9.2%), severe anterior chamber reaction in 15 (3.0%) and endophthalmitis in 2 (0.4%) eyes. (Table 1) Visual acuity on 1st postoperative day was e" 6/18 in 256 patients (51.2%), 156 (31.2%) eyes had a visual acuity of 6/24 – 6/60 while 88 (17.6%) had a poor visual acuity of d" 6/60. (Graph I) The final best corrected visual acuity was 6/6 – 6/18 in 364 (72.8%) eyes, while 81 (16.2%) had a visual acuity of 6/24-6/60 and a poor visual acuity of 6/60 or less was observed in 55 (11%) patients. (Graph II) The cause of poor visual acuity was surgical in 18 cases (32.72%) and co-morbidity i.e. glaucoma, age related macular degeneration and other retinal disorders in 37 (67.27%) cases.

DISCUSSION:

This study is an audit of 500 cases of cataract surgery at a charity based community center in a rural area of Peshawar. Our aim was to analyze the outcome of surgical procedures and the role of such centers for the benefit of lower strata of the community. In the study 88.6% of the patients had a poor visual acuity of

Graph 1: Postoperative (Day 1) visual acuity



Graph 2: Best corrected visual acuity

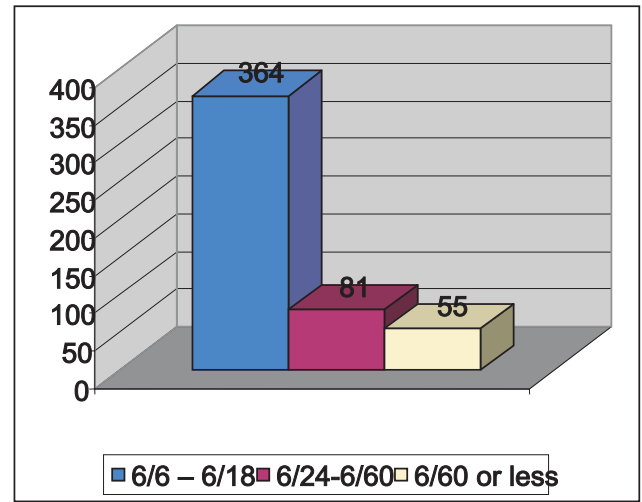


Figure 1: Gender Distribution

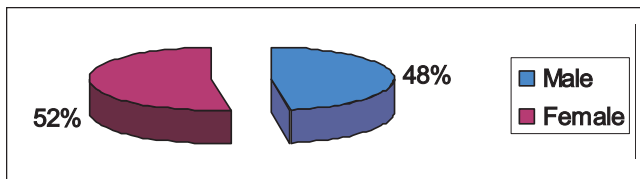


Table 1: Early postoperative complications

No.	Complication	No. of cases (N=500)
1.	Striate keratitis	46 (9.2%)
2.	Anterior chamber reaction	15 (3.0%)
3.	Endophthalmitis	2 (0.4%)

count finger and less preoperatively whereas, in a similar study Paral Desai and Angela Reidy have reported only 15% had a preoperative visual acuity of 6/60 or less⁷.

Rupture of posterior capsule was observed in 4.2% while Lemallin and Lemesuvier have mentioned it in 11% when they reviewed a large series of ECCE in Malami.⁸ Most frequent postoperative complication was striate keratitis (9.2%) while Helepota et al found it in 9.5% of eyes, in a review of 400 cases⁹. In our study the final best corrected visual acuity (BCVA) of 6/6 – 6/18 was obtained in 72.8% while Zahid Jadoon and SP shah reported the BCVA of > 6/18 in 40.7% of eyes.¹⁰ David Yorsten and Allen Foster in their study in East Africa had reported the BCVA of 6/6 – 6/18 in 94.3% of patients, whereas, a poor visual outcome (BCVA 6/60 or less) was observed in 5.7%.¹¹

CONCLUSION:

Cataract is the leading cause of blindness in developing countries. Cataract surgery is carried out at different levels of health care facilities i.e. mobile free eye camps, charity based community eye centers, at district level hospitals and tertiary care hospitals. The results of our study show that charity based community eye centers is an effective and safe way of reducing blindness due to backlog of cataract in poor communities in developing countries like ours.

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ORIGINAL

Movements of Artificial Eye with Acrylic Ball Implant in patients following Evisceration

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Bakht Samar³, Prof. Naimatullah Khan Kundi⁴



Arshad Raza

ABSTRACT

Objectives: The main purpose of my study was to compare the movements of artificial eye in up, down, lateral and medial direction with that of contralateral normal eye in patients with orbital implant following evisceration.

Material & methods: 30 patients for Primary evisceration with acrylic ball implant were included in this study at Eye "A" Unit of Khyber teaching Hospital, Peshawar from July 2006 to July 2007.

Results: Acrylic ball implants of 16-18-millimeter size were used in all cases. In one case extrusion of the implant occurred within one month of the surgery due to contraction of the scleral tissue and was replaced by smaller sphere, while in another case there was lower lid notching that was corrected with second reconstructive procedure. In the follow up, Grade-1 movements were found in eight cases (26.6%). Grade-2 in twelve cases (40.0%), and Grade- 3 motility in ten cases (33.3%)

Conclusion: Evisceration should be the procedure of choice in case of eye removal in the absence of contraindications. Implant is important to have maximum motility and maintain good cosmesis. Primary implant has much superior outcome, larger implants imparts good degree of motility but with higher rate of extrusion.

INTRODUCTION:

The ability to see and connect with the world is considered the most precious of all the bodily senses. The ophthalmologist's effort is to prevent the loss of, maintain, or regain vision. Loss of an eye is an emotive subject and most patients will be highly anxious about its profound social, physical and psychological effects, will need much support. Loss of a patient eye is the ultimate evidence of failure or limitation to restore patients to their original health. The patient's reaction to having removed his eye will vary according to his individual personality, family support, and the circumstances surrounding the cause of the removal, his age and sex.^{4,6} A very young child will not understand usually what is happening and may quickly adapt to the circumstance; however, the parents will feel differently and will require greater support.

All patients of any age will go through a period of the sense of loss for their eye, along with feelings of anger and resentment, while coming to terms with their

condition. Teenagers may be particularly concerned about their appearance and body image, which may prevent them from socializing^{2,3}. All age groups and both sexes will be very aware of their changed appearance. In such a case the ophthalmologist role is to provide technical expertise that minimize the risk of facial abnormalities and offer the best possible cosmetic outcome. Patient in whom decision has been made to remove the eye, evisceration should be the procedure of choice if there are no other contraindications⁴

For those debilitated patients evisceration is a technically simpler and faster procedure of rehabilitation, because it require less disruption of orbital anatomy with a fewer complications. Also the relationships of the eyelids tissue and extra ocular muscle to the scleral wall and fornices are relatively undisturbed. Preservation of orbital anatomy is superior in the evisceration procedure with a good final motility and cosmetic outcome.^{5,6} After evisceration aim is to restore the lost volume and the natural appearance, which is best possible with orbital implant and an ocular prosthesis. Orbital implants of various sizes impart passive mobility to the overlying ocular prosthesis by acting as smooth pivotal convex surface⁷ A primary orbital implant has much superior results than secondary implants. It has been shown that larger implants provides improved motility, which results in more dramatic prosthetic mobility, but with higher risk of extrusion.^{8,9,10}

The exposure rate of implant is variable but the silicone and acrylic implants have published extrusion

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rates of less than 1.5%. Most eviscerated adults accommodate a 16-20mm size of implant.¹¹ It is reported that implant mobility appears to decrease with advancing age¹⁵, so ageing anophthalmic patients exhibit gradual loss of large, amplitude prosthetic movements. Studies have shown that 52.23% of patients undergoing evisceration are over the age of 60 years, 19.49% between 40-60 years at all ages made (59.70%) were more often involved than female (40.29%).^{12,15} There is no consensus on which implant type is optimal, although it is now widely recognized that failure to replace orbital volume results in poor motility and cosmesis, characterized by the Post-Enucleation -Socket -Syndrome (PESS) with features of ptosis, enophthalmos and Superior Sulcus deformity.^{16,17} Keeping in view the facts if a proper size implant is placed in scleral bag assurance of the artificial eye movements increase in eviscerated eyes. Rehabilitation of the patient with a blind eye has greatly improved due to orbital implants imparting greater motility to the artificial eye and cosmetically acceptable results in most of the cases that reduces much of the psychological trauma associated with the loss of an eye¹⁸.

In this study we evaluated the motility of artificial eye fitted after the Acrylic sphere implantation in eviscerated eyes and compared it with contra lateral normal eye in millimeter. Evisceration was the procedure selected for the patients in whom the decision had been made to remove the eye without any contraindication. In all the procedures primary implants of 18mm (medium size) were placed in the eviscerated eyes.

Acrylic artificial eye was fitted in to conjunctival fornices four to six weeks following surgery. The motility of artificial eye was measured in upward, downward, lateral, and medial direction in millimeter, and were compared with the 50% of the total movements of contra lateral normal eye in all the four directions. The total movements of normal eyes were considered from primary position to the extreme of gazes. On the basis of analysis the movements were graded showing different degrees of movements.

MATERIAL AND METHODS

SETTING: The study was conducted at the Department of ophthalmology "A" Unit, Khyber Teaching Hospital Peshawar.

DURATION OF STUDY: It was a one-year study conducted from July 2006 to July 2007. A total of 30 patients scheduled for primary evisceration were included.

SAMPLING TECHNIQUE: Non-probability convenience.

SAMPLE SELECTION

INCLUSION CRITERIA: Patient having blind

painful eye due to uncontrolled postoperative endophthalmitis, trauma with irreparable globe having uncontrolled infection, pthysical eye, blind painful eye due to neo-vascular glaucoma, patient with chronic staphylomatous eye were the subjects of the study.

EXCLUSION CRITERIA: Patient with some visual potential, ocular malignancy, conjunctival shrinkage, adnexal deformities, infection, gross deformity of the globe and patients posted for secondary implants were excluded from the study.

STUDY DESIGN: COMPARATIVE STUDY:

DATA COLLECTION: A comprehensive Performa designed for patients and surgery details was completed for every subject. An informed consent was obtained from each subject after providing a detailed explanation of the procedure to the patient and their attendants. A detailed history about the nature and duration of problem, any history of trauma, any previous ocular surgery, ocular disease, any congenital abnormalities was obtained. It was followed by a thorough systemic and a detailed ocular examination including. Checking for any visual potential with the hope of any visual recovery. Measurement of enophthalmos prior to surgery was done seen in pthysical and microphthalmic eyes. Extra ocular movements were checked in up, down, and horizontal gazes and documented. Upper and lower lids position was noted for any ptosis and lower lid laxity that is important in-patient with lost volume was recorded. Detailed slit lamp examination was carried out for any significant disease like puncta position, fornices discharge, trichiasis, and blepharitis were ruled out. B-Scan U/S was done for any suspicion to exclude any potential malignancy. The author performed all the surgeries. Adult co-operative patients were operated under local anesthesia and sedation, while unco-operative patients and children were operated under general anesthesia.

SURGICAL TECHNIQUE: Following local or general anesthesia, a 360° peritomy was performed and the conjunctiva and tenon's capsule were dissected up to the insertion of the rectus muscles. A corneoscleral section was made from 9 o'clock to 3 o'clock positions, 1.0 mm posterior to the limbus. The sclerocorneal section was completed with scissor, and wedge shaped pieces of sclera was excised at the ends of the horizontal meridian of the incision. A spatula was used to separate the ciliary body from the sclera. An evisceration scoop was then slipped between the sclera and the ciliary body and the contents of the globe scooped out from the pouch.

A curette was used to remove all the gross remnants of the uveal tissues. Warm saline was poured in the scleral pouch against the optic nerve to identify

and cauterize the site of bleeding. After all the uveal tissues were removed and meticulous homeostasis was obtained, radial relaxing incisions in the scleral wound were made between the recti muscles to allow the introduction of the appropriately sized (16-18) implant. The intrascleral cavity was sized. Using silicone sphere changing in diameter between 14 and 20 mm placed in to the scleral cavity and the scleral edges were trimmed to avoid dog-ears. The sclera was then closed in a horizontal fashion by imbricating the wound edges over the surface of the spherical implant. This was accomplished by double armed 6-0 vicryl sutures in a horizontal mattress fashion beginning 1.0 mm inferior and superior to the scleral wound edge^{19,20} The conjunctiva and tenon were sutured continuously with separate 6-0 vicryl sutures in interrupted method. Following this closure, an appropriate sized PMMA conformer was placed in the fornices for at least one month, antiseptic ointment and a pressure dressing were applied in order to reduce postoperative bleeding and edema, and to immobilize the socket tissue.

The pressure bandage was removed after 4- 5 days, at which time the patient were started to use an antibiotic ointment in to the socket three times a day for an additional 2 to 3 weeks. Broad-spectrum oral antibiotics that also covered anaerobic organisms were prescribed for all the patients. Systemic antibiotics were considered for those having history of recent or chronic socket infection, or having evidence of poor socket hygiene. Systemic steroids were prescribed for 3-5 days in order to reduce surgery-induced inflammation.

Following surgery 4 to 6 weeks conformer was removed patients were evaluated, the parameter looked for included pain, lid edema, chemosis and wound gape, hematoma, exposure, extrusion of implant, discharge, infection and the objective parameter of implant mobility. Once the socket was completely healed, the patients were evaluated by an ocularist for proper prosthetic fitting. Prosthesis was applied after a month of follow up with a clear and quite socket and an objective measurement of implant and over lying prosthesis having patient looking from the primary, to up, down, lateral, and medial gazes measured with the help of a standard ruler in millimeter and graded as:

- Grade 0** No movements
- Grade 1** < 25 % movements
- Grade 2** 25-50% movements
- Grade 3** > 50% movements.

The goal of movements of the overlying artificial eye with implant in comparison to the 50% of the total movements of the contra lateral normal eye was analyzed.

Total horizontal and vertical excursion were calculated and compared. The means of upward,

downward, medial and lateral movements were calculated along with the standard deviations.

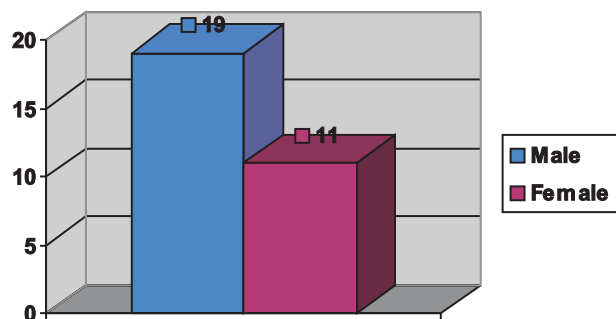
DATA ANALYSIS: SPSS software was used for data analysis. The movements of eyes in all patients were measured in millimeters; Means and Standard deviation were calculated. Means of artificial eye movements were compared with contralateral normal eye movements.

RESULTS:

Among thirty cases, 19 (63.30%) were male and 11 (36.60%) were female. The mean age was 39.00 +/- 5.6 (range 33-44). The mean follow up period for motility assessment was 5-6 weeks. The indications for evisceration in the study are shown in the Table No II. Among the subjects' endophthalmitis, blind painful eye, and trauma that were the indications for evisceration which were in major proportion (82%), and patients having corneal ulcer, phthisis, styphyloma were 18%. Acrylic spheres with diameter ranging between 16-18mm were used in all cases. Among the age group 43% subjects were above the age of 50 years, 20% between 30 and 50 years, 23% between 10+30 years while 13% were below 10 years. In present study the outcome of artificial eye movements were more pronounced (45-55%) in patients with endophthalmitis, blind painful eye, corneal ulcer, and staphyloma, while in subjects who underwent for surgery due to trauma, ruptured globe and pthisis bulbi exhibited relatively less degree of movements (25-40%).

In one of the case in which the etiology was pthisical globe, extrusion of the implant occurred after three weeks of the surgery due to extensive fibrotic contracture of the scleral tissues and it was replaced by a smaller implant. While in another case of bomb blast injury was associated with notching of the lower lid that was corrected with a second procedure for the proper positioning of the prosthesis. No infection noted, especially in eyes with endophthalmitis, as the scleral pouch was copiously irrigated with povidine, saline and antibiotics.

Fig-I:
Sex wise Distribution of Cases for Evisceration and orbital implant



One patient presented with implant exposure that was corrected with scleral graft. In three of the cases 5.0 prolene suture had been used to strengthen the scleral pouch opening, which eroded through the overlying conjunctiva, and were removed before the fitting of the prosthesis. The patient had a similar postoperative course in terms of most of symptoms and objective signs. Most of the symptoms subsided by the

end of the first week.

At the end of 6th week, motility measurements were taken and compared. The results are shown in Table No. IV,V

- Mean medial movements were: 3.10mm
- Mean lateral movement were: 3.32mm
- Mean upward movement were: 3.67 mm
- Mean downward movement were: 3.78 mm
- Mean total horizontal excursion: 6.42 mm
- Mean total vertical excursion were: 7.45 mm

The prosthetic eyes were categorized into four groups on the basis of range of movement according to a grading system. There was no case of grade O motility, Grade- 1 motility in eight cases (26.6%), Grade-2 in twelve cases (40.0%), and Grade-3 in ten cases (33.3%).as shown in Table No. VI The results are showing that the total vertical excursion is more than the total horizontal excursion. The obvious reason for that is the presence of plica semilunaris at the medial canthus and the second reason that there are no potential spaces of fornices in the horizontal meridian that obstruct the movements of artificial eye in that meridian. While the superior and inferior fornices in up and down meridian allows the artificial eye to move it as much as possible.

Table – I:
Age wise distribution of cases for Evisceration
n=30

Ages	No. of cases	Percentage
10 years or below	04	13%
10 – 30 years	07	23%
31 – 50 Years	06	20%
50 years or above	13	43%

Table – II: Indications for Evisceration

Indications	No. of cases	Percentage
Endophthalmitis	10	33%
Blind painful eye	07	23%
Ocular trauma	08	26%
Corneal ulcer	02	6%
Pthysical eye	02	6%
Staphyloma	01	3%
Total	30	100%

Table – III: Spherical implant volume assessment

Sphere diameter (mm)	Volume (Cm ²)
14	1.4
16	2.1
18	3.1
20	4.2
22	5.6

Source:modified from perry AC. Advances in implant. Ophthalmol plast reconstr Surg 1991; 4:173-83.

Table - IV: Artificial eye movements in horizontal Meridian
n=30

Parameters	Implant movements (mm)	50% of normal eye movements (mm)	Percentage
Mean Medial movements (MM)	3.10+0.48	4.0	38%
Mean lateral movements (LM)	3.32+0.45	4.0	41%
Horizontal excursion (MM + LM)	6.42	8.0	40%

Table - V: Artificial Eye movements in Vertical meridian
n=30

Parameters	Implant movements (mm)	50% of normal eye movements (mm)	Percentage
Mean upwards movements (UM)	3.67+0.38	4.0	45.8%
Mean downwards movements (DM)	3.78+0.42	4.0	47.2%
Vertical excursion (UM + DM)	7.45	8.0	46.5%

Fig - II:

Age wise Distribution of Cases for Evisceration and implant

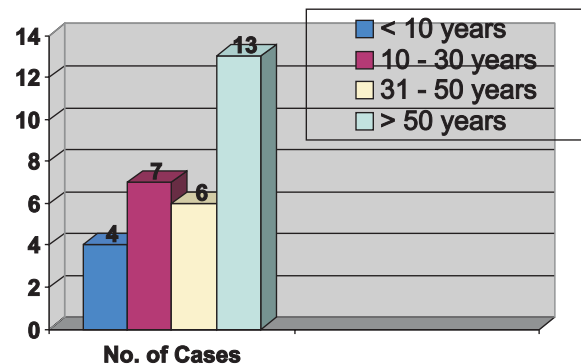


Table - VI: Grade of movements and their percentages

Parameter	No. of cases	Percentages
Grade-0	0	0%
Grade-1	08	26.6%
Grade-2	12	40.0%
Grade-3	10	33.3%
Total	30	100%

DISCUSSION

The prospect of ocular excision fills most patients and many ophthalmologists with horror. Patients fear loss of visual function and the cosmetic implications of an artificial eye. These negative perceptions may be inadvertently reinforced when we talk of losing the eye, in fact the loss of a healthy eye has already occurred. In addition some patients may have suffered pain and poor cosmesis for a longer time. The removal of a diseased eye should be regarded in a more positive light and concentration should be given on providing the patient with an ideal anophthalmic socket with the features of comfort, normal lid positions, and contour. Good prosthetic motility, and ability to blink and close the lids normally. Patients undergoing excision of the eye, lose not just their self-esteem but also social acceptability due to poor cosmesis. The conventional method of evisceration without implant hardly ever provides motility of the socket and patients have no choice but to accept sub-optimal cosmesis^{21,22}.

Greater motility of the prosthesis and good cosmesis is obtained following evisceration with a ball implant. There is less enophthalmos and deepening of the supratarsal sulcus. Firm adhesion between the tissues and the implant prevent its expulsion (particularly if the proper size employed), rotation, or migration. The six extra ocular muscles are undisturbed, thus keeping their usual anatomical and functional relationships and assuring a more normal appearance and a good motility of the globe.

In evisceration anatomy of the orbit is less disturbed resulting in an enhanced cosmesis, as orbital fat atrophy is less pronounced. Further more, retention of the scleral tissues provides an additional 0.5 ml of orbital volume compared with other eye removal procedure, thus minimizing the development of significant posterior volume loss, enophthalmos and a deep superior sulcus. Following evisceration, ptosis of the muscle cone may never occurs because the suspensory ligaments are undisturbed also there are less chances of socket contracture. Well-fitted implants are essential for tolerable cosmetic results and motility of the prosthesis^{21,23} In my study only in one case out of 30, extrusion of the implant occurred and was replaced

by a smaller sphere. That case had a pthysical eye with fibrotic contraction of the scleral tissue after the operation. According to Dortzbach, implant extrusion is caused by orbital hemorrhage, infection and lack of secure closure of Tenon's capsule.⁴

In my view the close contact of the prosthesis and underlying conjunctiva creating a friction element during motility, and that direct pressure system increases the risk of extrusion through pressure points between conjunctiva and the prosthesis.

According to Peyman, a spherical implant is easier to fit with prosthesis and minimizes pressure and friction points, thus preventing tissue necrosis and extrusion. Nunery et al reported 0.84% extrusion with silicone implants²⁴ Spherical Acrylic and Silicone implants have published extrusion rates of less than 1.5%,

In one of my patient with bomb blast injury there was exposure of the implant after three weeks follow up, that was corrected with scleral graft. Variable rates of exposure have been reported. Dutton experienced no exposures in 50 patients. Shields observed only 1 case in a report of 100 procedures.⁴⁵ Ashworth et al reported 9.1% exposure rate after primary evisceration.

In three cases, extrusion of 5.0 prolene sutures, which had been used to strengthen the scleral pouch opening, were observed that were eroded through conjunctiva. Due to irritation of these sutures, these patients suffered from gritty sensation and excess secretion. We removed those irritating sutures to relieve discomfort. Although non-absorbable prolene sutures can provide more tight closure of the scleral pouch they may have the disadvantage of exposure and irritation. Prosthetic motility is determined by a variety of factors. The size, shape, and the weight of the prosthesis affect the ultimate movement of the implant. Larger, heavier prosthesis generally demonstrate less movement. Although these factors are somewhat dependent on the spherical implant size they are independent of implant material. Extraocular muscle function is transmitted via the scleral capsule to the overlying tenon's fascia and conjunctiva. Prosthesis is indirectly coupled to the implant via the surface tension at the prosthetic-conjunctival interface. In other words actually the motility of this interface transmitted to the artificial eye was measured in the study.

It is anticipated that an identical surgical procedure would yields similar results, that confirm the observation of the Kaltreder and Newman that a nonintegrated hydroxyapatite implant offers no mechanical advantages over a non-hydroxyapatite (Acrylic, silicone) sphere implant if inserted in the same fashion.¹¹ Larger implants seem to provide improved implant motility, which results in more dramatic

prosthesis movement. Several factors must be considered in choosing the appropriate size of implant for particular patient. Excessively large implant may increase the risk of extrusion; make prosthesis fitting difficult, or results in patient's discomfort. Ideally, sufficient space must remain in the socket to allow fitting of prosthesis with at least 2 ml of volume and approximately 4-mm central thickness. According to K. Kaltreider, et al, axial length of the fellow eye, measured by B-Scan ultrasonography, can be used to predict the implant size before surgery¹¹. Thaller described the use of water displacement in a graduated measuring cylinder for predicting the implant size. In order to maintain uniformity, Thaller used the same size (18mm) implant and of same material in all patients.⁵⁴ In my study I used different size implants depending upon the space available. I have taken the overall motility of prosthesis regardless of implant size¹⁷.

Implant motility appears to decline with advancing age. An age related decrease in extra ocular muscle function has also been demonstrated in normal individuals by Colen et al.¹⁴ Aging anophthalmic patients should exhibit a gradual loss of large-amplitudes movement, while the small amplitude excursions are preserved. The motility benefits of implant may thus become less significant with advancing age. Though the development of the hydroxyapatite ocular implant has reduced greatly the problem of extrusion and poor motility, its cost, availability, instrumentation, fragility and excessive surgical manipulations required are the disadvantages compared to classic implant surgery (evisceration with acrylic ball implant)^{13,14}.

It is therefore recommended that in case of ocular excision if no contra indication exists evisceration should be performed. Optimum size implant, for better outcome of final cosmesis, and motility will play a crucial role. Results can further be augmented by the use of custom-made prosthesis. It is important to reassess treatment of patient with any suspicion of malignancy when caring for a patient with such presentation. In these patients further treatment is based on the relative risk and benefits of the surgery with consideration of the wishes of the well-informed patient. The indications and contraindications of the procedure while making the decision of eye removal should be clearly defined and will be much dependent on the case to case basis. New options for the management of the anophthalmic socket are continued to evolve.

CONCLUSION:

1. Primary orbital reconstructive surgery should be considered in case of ocular excision.
2. Evisceration should be the procedure of choice if

no contra-indication exists.

In the face of severe trauma involving the globe, evisceration offer the best chance of motility with least disturbance to the fornices and less likelihood of contracted socket, Similarly, in case of endophthalmitis, evisceration decreases the risk of further spread of infection into the orbit and subarachnoid space.

3. Primary implant should be placed at the time of surgery if there is no contraindication like radiotherapy or infection.
4. Implant size is an important factor to have good motility outcome, although larger implants are having superior results but with higher rate of extrusion and exposure, so optimum size will yield marked acceptable results.
5. As larger size implants have inverse relation with size and weight of the prosthesis, so it is likely to have medium to small, and lightweight prosthesis to enhance the motility factor.
6. Acrylic implant of adequate size placed with proper surgical technique and short systemic course of steroids gives fairly acceptable cosmetic results.
7. The use of conventional implant in a wide variety of cases in order to improve the outcome of motility and cosmesis needs further work to see for its different aspect like long-term complications, effect of age and sex, effect of follow up time, on the implant motility.

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ORIGINAL

Optic Nerve Head Stereometric Parameters in Primary Open Angle Glaucoma & Pseudoexfoliation Glaucoma

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Dr. Zakir Hussain

ABSTRACT

Objective: To determine stereometric parameters of optic nerve head in primary open angle glaucoma and pseudoexfoliation glaucoma patients.

Place and Duration of study: The study was carried out at Department of Clinical Ophthalmology, Khyber Institute of Ophthalmic Medical Sciences (KIOMS), Postgraduate Medical Institute (PGMI), Hayatabad Medical Complex (HMC), Peshawar from 1st January 2010 to 30th June 2010.

Data Collection Procedure: Patients who fulfilled the inclusion criteria of primary open angle glaucoma (POAG) and pseudoexfoliation glaucoma (PEXG) were included in the study after taking informed written consent. Patients then underwent thorough ophthalmological examination. Posterior segment was examined with special emphasis on cup disc ratio (both vertical and horizontal), asymmetry in cup disc ratio between two eyes, nerve fiber layer defects and notching (including site of notching). Humphry visual fields were also done in order to confirm the glaucomatous changes. All the above mentioned examinations and tests were done in order to diagnose the patients having either POAG or PEXG, so that they could be included in the study. Heidelberg Retinal Tomography was performed for all the cases. Optic nerve head stereometric parameters were collected through HRT II software.

Results: 247 eyes of 149 patients were included in our study. Out of which 55.7% had POAG and 44.3% had PEXG. Sixty eight (45.64%) patients were male and 81 (54.36%) patients were female. The mean age in PEXG was 65.48 (SD±4.63) while mean age in POAG was 60.92 (SD±4.69). The mean cup area in POAG was 1.14 mm² while in PEXG it was 1.17 mm². The mean disc area was 2.31 mm² in POAG while it was 2.44 mm² in PEXG. Mean value of the cup disc area ratio was 0.56 in POAG as compared to 0.59 in PEXG. Mean RNFL thickness was 0.18 mm in POAG and it was 0.17 mm in PEXG.

Conclusion: POAG is more common than PEXG. Both POAG and PEXG are more common in females than males. The mean age of patients in PEXG is more than the patients with POAG. The mean cup area in PEXG is more than the POAG patients. The mean disc area is also more in PEXG patients than POAG patients. Mean RNFL thickness is more in POAG than PEXG.

INTRODUCTION

Glaucoma is one of the leading causes of blindness worldwide.¹ It is a progressive optic neuropathy involving characteristically optic nerve head and retinal nerve fiber layer. Until recently, use of slit lamp biomicroscopy and the use of a condensing lens (78D or 90D) was the standard protocol² to detect and follow the changes in RNFL and optic disc. Measuring of cup disc ratio is still the most popular method to detect and monitor the progression of glaucomatous optic neuropathy. Because of the interpersonal and intrapersonal variations with no standardization of the procedures, the need of modern, computer assisted Optic Nerve Head (ONH) analyzing device was realized.³

Heidelberg Retinal Tomograph II (HRT II) is a computer assisted laser scanning camera with an operating software which allows acquisition and analysis of three-dimensional images of the optic disc.⁴ Its most important implication is to detect glaucomatous damage of the optic nerve head and to follow the glaucoma progression.^{5,6} The HRT examination is fast, safe and usually does not require dilation of the pupil. It uses a Diode laser (670nm) to produce a photographic map of the optic nerve head.² In a study conducted in southern India on patients aged 40 years or above, prevalence of primary open angle glaucoma (POAG) was seen to be 1%.⁷

The morphometry of the optic nerve head depends on the racial background.⁸ In a study to determine the racial differences in optic disc topography, it was reported that disc area was significantly larger ($p < 0.001$) in African American participants as compared to whites, Hispanics and native Americans.⁹ Limited data exists regarding HRT II characteristics of ONH in our community and no such studies have been reported on Khyber Pakhtoonkhwa population. Therefore we designed

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this study to determine the optic nerve head stereometric parameters in patients with primary open angle glaucoma (POAG) and pseudoexfoliation glaucoma (PEXG) presenting to Khyber Institute of Ophthalmic and Medical Sciences (KIOMS), Peshawar.

MATERIAL & METHODS

Patients who fulfill the inclusion criteria were included in the study after taking informed written consent. Patients then underwent thorough ophthalmological examination including visual acuity with snellen chart, intraocular pressure (IOP) check up with Goldmann tonometer, anterior chamber angle examination with Goldmann gonioscope (single mirror). Anterior segment examination with slit lamp and posterior segment by slit lamp biomicroscopy with 78D lens. Posterior segment was examined with special emphasis on cup disc ratio (both vertical and horizontal), asymmetry in cup disc ratio between two eyes, nerve fiber layer defects and notching (including site of notching). Humphry visual field was also done in order to confirm the glaucomatous changes. All the above mentioned examinations and tests were done in order to diagnose the patients having either POAG or PEXG, so that they could be included in the study. Heidelberg Retinal Tomography was performed for all the cases. Optic nerve head stereometric parameters were collected through HRT II software. Data was analyzed by using the software SPSS 10.0. Data was represented by drawing different tables. Mean and standard deviation were calculated for quantitative variables (age, cup area, disc area, cup disc area ratio, mean retinal nerve fiber layer thickness). Frequency and percentage were presented for qualitative variables (gender, type of glaucoma i.e.POAG or PEXG).

RESULTS

Total of 247 eyes of 149 patients were included in my study. The gender distribution and laterality is shown in Table I. Eighty three (55.70%) patients had POAG and 66 (44.3%) patients had PEXG while out of 247 eyes, 158 (63.97%) eyes had POAG and 89 (36.03%) eyes had PEXG. Both eyes were studied in 98 patients and in 51 patients only one eye was included because the patient had PEXG or POAG evident only in one eye or other eye had either dense cataract, corneal opacity or other disease obstructing the fundus view. The mean age of presentation in male was 62.14 (±4.67) years and in female it was 63.10 (±4.65) years. The minimum age of the patients was 49 years in POAG and 53 years in PEXG while maximum age was 75 years in POAG and 79 years in PEXG which shows that patients of PEXG were slightly of older age as compared to patients with POAG. The mean age of patients in PEXG was more than the patients with POAG. The mean age in PEXG was 65.48 (±4.63) while mean age in POAG was 60.92 (±4.69). Mean values in patients below 60 years and above 60 years of age are shown in Table II. The frequency and percentages of POAG and PEXG are shown in Table III. The mean cup area in POAG was 1.14 mm² while in PEXG it was 1.17 mm². The mean disc area was 2.31 mm² in POAG while it was 2.44 mm² in PEXG. Mean value of the cup disc area ratio was 0.56 in POAG as compared to 0.59 in PEXG. The results shows that the mean values of the three parameters i.e cup area, disc area and cup disc area ratios were more in PEXG as compared to POAG. Mean RNFL thickness was 0.18 mm in POAG and it was 0.17 mm in PEXG. Maximum and minimum

Table I
Gender distribution
(n=149)

Gender	POAG (n=83)		PEXG (n=66)		Total
	Bilateral	Unilateral	Bilateral	Unilateral	
Male	35	3	11	19	68 (45.64%)
Female	40	5	12	24	81 (54.36%)
Total	75	8	23	43	149 (100%)

n: Number of cases; POAG: Primary open angle glaucoma; PEXG: Psuedoexfoliation glaucoma

Table II
Mean values of stereometric parameters of optic disc in eyes of patients below 60 years and above 60 years of age

Age (Years)	Cup area mm ²	Disc area mm ²	CD ratio	RNFL thickness mm
<60	1.17 (±0.170)	2.24 (±0.286)	0.55 (±8.351)	0.17 (±2.845)
>60	1.14 (±0.191)	2.40 (±0.314)	0.58 (±8.81)	0.18 (±2.50)

RNFL: Retinal nerve fiber layer; mm²: Millimeter square; mm: Millimeter <: Less than; >: More than; ±: Standard deviation

values of stereometric parameters in both POAG and PEXG are given in Table IV, while mean values of the four parameters in males and females is shown in Table V.

DISCUSSION

Our study was a descriptive study which was carried out at the department of ophthalmology, Khyber Institute of Ophthalmic Medical Sciences, HMC, Peshawar. The duration of our study was six months *i.e* from 16th July 2009 to 31th January 2010. It is known that primary open-angle glaucoma is a major cause of irreversible blindness worldwide. Early diagnosis of optic nerve head (ONH) and peripapillary retinal nerve fiber layer (RNFL) damage and detection of progression remains the core of glaucoma management. So far, such evaluation has predominantly been subjective and full of high intra and interobserver variability.¹ With the emergence of newer optical imaging techniques, assessment of optic disc morphology has become more objective and quantitative. Confocal scanning laser ophthalmoscopy (CSLO) produces a topographic, three-dimensional image of the ONH and has become

an important investigation for detection of glaucoma and its progressive effect on the optic disc. Various studies have documented reproducible results in patients with glaucoma by using this device.

Whether a gender difference exists in the prevalence of POAG has been controversial. Numerous studies have reported that the prevalence of OAG is higher in men,¹⁰⁻¹³ others have reported a higher prevalence in women,^{14,15} and yet others have reported no gender difference in prevalence. In my study there were more female 68 (45.64%) as compared to male 81 (54.36%) but it has to be noted that my study also had patients with psuedoexfoliation glaucoma.

The prevalence of glaucoma does increase with age from about 1% at the age of 50 years to about 4% at the age of 80 years. The age-specific prevalence rates are comparable in the large population-based studies, ranging from 1.2 % to 1.4% in subjects under 65 years old to 2.0% to 8.7% in subjects of 70 – 85 years old.¹⁵ In my study the mean age of presentation in male was 62.14 (±4.67) years while in female it was 63.10 (±4.63) years. No evidence for a relationship between age, disc size and glaucoma susceptibility has been reported yet. Age does not appear to be associated with disc size in humans¹⁶⁻¹⁸. This evidence is supported by population-based studies including the Baltimore Eye Survey¹⁹, the Rotterdam Study²⁰, and the Reykjavik Eye Study²¹. One cross-sectional population-based study from Bengtsson and colleagues²¹ found a small increase in optic disc diameter with age in a population of 1,287 subjects in

Table III
Type of glaucoma
(n=247)

Type of glaucoma	Frequency	Percentage (%)
POAG	158	63.9
PEXG	89	36.1
Total	247	100.0

n: Number of eyes; POAG: Primary open angle glaucoma; PEXG: Psuedoexfoliation glaucoma

Table IV
Maximum and minimum values of stereometric parameters of optic disc in both types of glaucoma
(n=247)

Age (Years)	Cup area mm ²	Disc area mm ²	CD ratio	RNFL thickness mm
POAG (n=158)				
Minimum	0.823	1.70	0.42	0.12
Maximum	1.653	2.87	0.73	0.25
PEXG (n=89)				
Minimum	0.845	1.70	0.42	0.13
Maximum	1.654	2.90	0.76	0.24

POAG: Primary open angle glaucoma; PEXG: Psuedoexfoliation glaucoma; RNFL: Retinal nerve fiber layer; mm²: Millimeter square; mm: Millimeter

Table V
Mean values of stereometric parameters of optic disc (gender distribution)
(n=247)

Gender	Cup area mm ²	Disc area mm ²	CD ratio	RNFL thickness mm
Male (n=114)	1.12 (±0.203)	2.43 (±0.336) (±8.374)	0.55 (±2.932)	0.17
Female (n=133)	1.18 (±0.166)	2.31 (±0.286)	0.59 (±8.58)	0.18 (±2.253)
Total	1.15 (±0.186)	2.36 (±0.315)	0.58 (±8.68)	0.17 (±0.260)

RNFL: Retinal nerve fiber layer;±: Standard deviation; mm: millimeter; mm²:millimeter Square; n: Number of eyes

Sweden. Histological evaluations in two studies by Cavallotti et al^{23,24} also found an age-related increase in optic disc size in the rat and human optic nerve head, respectively.

It has been shown by many studies that measurements of ONH parameters are confounded by the optic disc size. Assessment of optic disc size is an important component of optic nerve head examination, as optic disc parameters such as neuroretinal rim area and cup-disc ratio vary with the disc size. It is debatable whether disc size is an independent risk factor for glaucoma. Disc size is known to vary largely between populations, among individuals and between eyes. Differences in the techniques of measuring disc size across studies could result in different estimates of disc size, making comparison among studies difficult and confusing. In my study the mean disc area was 2.31 mm² in POAG while it was 2.44 mm² in PEXG. This disc size is comparable with disc size in Caucasian as mentioned in other studies.^{23,24} Chi T et al reported the disc size 1.73 mm² to 2.63 mm² in Caucasians.²⁴ African-Americans have larger discs than individuals from other races. However, using a variety of methods, estimates of the mean disc area in African-Americans range from 2.14 mm² to 3.75 mm².^{19,26,27} The disc size reported in other races is 2.46 mm² to 2.67 mm² in Hispanics²⁸ and 2.47 mm² to 3.22 mm² in Asians²⁷. Burk et al²⁹ have mentioned the disc size 2.28 mm² in normal tension glaucoma (NTG) patients while it is 2.01 mm² in high tension glaucoma (HTG) patients which is smaller compared to the disc size in POAG and PEXG patients in my study. The results of Iester and Mikelberg³⁰ are comparable to my study which are 2.33 mm² in both NTG and HTG. Kiriyama and colleagues³¹ reported the mean disc area 2.23 mm² in POAG and 2.33 mm² in NTG. According to Larrosa³² the normal disc size in their study was 2.23mm² in normal subjects and it was 2.15 mm² and 2.1 mm² in ocular hypertension and glaucoma patients respectively. In my study the disc area in male was 2.43 mm². It was 2.31 mm² in female. Disc size is reported to be significantly, but only slightly larger in male than in female in some studies. According to Durukan³³ the disc size is same in male and female.

In our study the mean cup area in POAG was 1.14 mm² while in PEXG it was 1.17 mm². It was 1.12 mm² in male and 1.18 mm² in female. Larosa stated the cup area of 0.52 mm² in normal subjects and 0.75 mm² in ocular hypertension patients.³² According to his study it was 0.96mm² in glaucoma patients. Varma R et al has mentioned the cup area difference in male and female in their study.¹⁹ According to them the cup area in male was 1.12 mm² which is equal to cup area in my study while it was 1.00 mm² in female (less than cup

area in my study). They also studied the cup area in whites and blacks. They reported that the cup area in white is 0.71 mm² and in black it is 1.04 mm².

Although cup/disc ratio measurements can be easily performed by most ophthalmologists and do not require additional imaging equipment, the single measurement has limited value in the estimation of glaucomatous damage.³⁴ The mean value of the cup disc area ratio was 0.56 in POAG as compared to 0.59 in PEXG in my study. According to Larossa JM, the cup disc area ratio was noted in normal, OHT and subjects having glaucoma.³² He reported that it was 0.22 in normal, 0.34 in OHT and 0.45 in glaucoma patients. In my study the cup disc area ratio was 0.55 in males and it was 0.59 in females. Varma R et al¹⁹ also reported the cup disc area ratio in male and female in white and black. According to them it was 0.57 and 0.55 in black male and female respectively. While the ratio was 0.48 and 0.49 in white male and female respectively.

The glaucomatous disease process leads to a progressive loss of retinal ganglion cells over time. In my study the mean RNFL thickness was 0.18 mm in POAG and it was 0.17 mm in PEXG. Mean RNFL thickness was 0.17mm in male and 0.18mm in female. According to Larossa JM³¹ the RNFL thickness in normal subjects and OHT patients was 0.24 mm while it was 0.18 mm in glaucoma patients which is comparable to the value in my study.

In our study the disc size is comparable with Caucasian as compared to African-American and Hispanic population in which disc size is larger. In my study the cup area was more as compared to other international studies which is probably due to late presentation in our population. The cup disc area ratio in my study is comparable to the studies in black. The RNFL thickness in our study is also comparable to international studies. As there is scarcity of available data regarding stereometric parameters of the optic disc as measured by HRT in glaucomatous eyes of individuals of two common types of glaucoma (i.e POAG and PEXG) in our community. I hope that my study data will help to compare and correlate data obtained in our daily practice in glaucomatous eyes (optic disc parameters) as measured by HRT and will so be a step forward in proper management of our glaucoma patients.

CONCLUSION:

POAG is more common than PEXG. Both POAG and PEXG are more common in females than males. The mean age of patients in PEXG was more than the patients with POAG. The mean cup area in PEXG is more than the POAG patients. The mean disc area was also more in PEXG patients as compared to

POAG patients. Mean RNFL thickness is more in POAG than PEXG.

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General Section

ORIGINAL

Outcomes of Treatment for Hepatitis C Virus Infection by Primary Care Providers



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Note: ECHO model (Extension for Community Healthcare Outcomes) undertaken by Dr. S. Arora and his team is an effective way to treat HCV infection in rural and underserved communities. By implementing this model, other nations can potentially treat many more patients infected with HCV than are currently receiving treatment, thereby reducing the enormous burden of illness and associated mortality. There are a number of potential explanations for the success of the ECHO model. Community providers, particularly community-based health centers, provide coordinated, patient-centered care in facilities proximate to their patients. Patients are likely to have greater trust in local providers, who tend to be culturally competent with respect to their specific communities. This may enhance patients' adherence to treatment and allow for greater direct contact with the clinician. Such outcome can be very useful if tried in Peshawar, where HCV infection is readily rising. – Editor

ABSTRACT:

Background: The Extension for Community Healthcare Outcomes (ECHO) model was developed to improve access to care for underserved populations with complex health problems such as hepatitis C virus (HCV) infection.

Methods: We conducted a prospective cohort study comparing treatment for HCV infection at the University of New Mexico (UNM) HCV clinic with treatment by primary care clinicians at 21 ECHO sites in rural areas and prisons in New Mexico. A total of 407 patients with chronic HCV infection who had received no previous treatment for the infection were enrolled. The primary end point was a sustained virologic response.

Results: A total of 57.5% of the patients treated at the UNM HCV clinic (84 of 146 patients) and 58.2% of those treated at ECHO sites (152 of 261 patients) had a sustained viral response (difference in rates between sites, 0.7 percentage points; 95% confidence interval, "9.2 to 10.7; P=0.89). Among patients with HCV genotype 1 infection, the rate of sustained viral response was 45.8% (38 of 83 patients) at the UNM-HCV clinic and 49.7% (73 of 147 patients) at ECHO sites (P=0.57). Serious adverse events occurred in 13.7% of the patients at the UNM HCV clinic and in 6.9% of the patients at ECHO sites.

INTRODUCTION

The Extension for Community Healthcare Outcomes (ECHO) model was developed by the University of New Mexico (UNM) Health Sciences Center as a platform for both delivery of services and outcomes research.^{1,2} The objectives of the ECHO program are to improve the access of minorities and other underserved populations to best-practice care for hepatitis C virus (HCV) infection, to determine the

safety and efficacy of treatment for HCV infection based on the ECHO model in rural communities, and to compare the effectiveness of the ECHO model with that of university-based clinic treatment. The ECHO program increases the accessibility of populations outside urban areas to the specialized medical resources of academic medical centers.

An estimated 170 million patients worldwide have chronic HCV infection; 3.2 million of these patients live in the United States.^{3,4} Many patients were infected in the 1970s and 1980s, leading to a rising tide of cirrhosis and hepatocellular carcinoma.⁵ Chronic HCV infection accounts for 10,000 deaths each year in the United States and is the leading reason for liver transplantation.^{6,7} Fortunately, treatment for HCV is available and cost-effective; it cures genotype 2 or genotype 3 infection.⁸⁻¹¹ A sustained virologic response 45% of patients with HCV genotype 1 infection and 75% of patients with HCV permanently halts the progression of liver disease, reverses fibrosis in many patients, and

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reduces the risk of hepatocellular carcinoma. However, the treatment is complex. Pegylated interferon (peginterferon) and ribavirin are associated with serious side effects that require aggressive management by multidisciplinary experts.⁹⁻¹¹

Despite advances in treatment and remarkable improvements in cure rates, very few persons with chronic HCV infection are receiving treatment. The total number of prescriptions for HCV antiviral medications declined by 34% between 2002 and 2007. If this trend continues, it is estimated that treatment will prevent only 14.5% of potential liver-related deaths caused by HCV infection between 2002 and 2030.¹² Members of racial and ethnic minorities and older patients are less likely than other patients to receive needed care.¹³⁻¹⁶

The reasons for the inadequacy of and insufficient access to treatment for HCV infection are complex and not completely understood. Historically, few primary care clinicians have offered treatment for HCV infection in rural areas and prisons, owing to a lack of training.¹⁷ In 2004, patients from rural areas had to wait up to 6 months for an appointment at the UNM HCV clinic and had to travel up to 250 miles. A typical patient with HCV genotype 1 infection would have to make an average of 18 trips during the course of treatment. Major barriers to care also exist among prison inmates. According to data from the Department of Corrections, 40% of the 6000 inmates in the New Mexico Department of Corrections are infected with HCV. As of 2003, not a single patient in the correctional system had received treatment for HCV infection. Lack of access to specialty care services at community-based health centers is a major problem, particularly for uninsured patients.^{18,19} Community-based health centers are often the most culturally appropriate and accessible choices for care, particularly in rural areas, and providers at these centers can establish trust through ongoing relationships with patients. Therefore, these centers can be ideal places to provide complex care for HCV infection — if they have access to the needed expertise.

METHODS:

ECHO Model: With the use of state-of-the-art tele-health technology, the ECHO program offers primary care providers from underserved areas training, advice, and support in delivering best-practice care for patients with complex health conditions such as chronic HCV infection. At each of the ECHO partner sites, providers participating in the program include a lead clinician and a nurse or a medical assistant, who helps manage patient care.

Community providers take part in weekly HCV clinics, called “knowledge networks.” The providers present their cases by sharing patients’ medical histories, laboratory results, treatment plans, and

individual challenges and ask questions about best practices. Specialists at the UNM Health Sciences Center from the fields of hepatology, infectious diseases, psychiatry, and pharmacology provide advice and clinical mentoring during these clinics. Working together, the community providers and specialists manage the patients’ care according to evidence-based protocols. These case-based discussions are supplemented with short didactic presentations by interdisciplinary experts to improve content knowledge. Longitudinal co-management of illnesses with specialists allows community providers to practice their expanded knowledge and skills in a manner that builds self-efficacy in handling real-world situations with their patients, while ensuring that they follow best practices as they learn. Learning from other community-based providers who have faced similar challenges and clinical situations is facilitated through shared case-management decision making.

Currently, there are 16 community sites and 5 prisons in which treatment for HCV infection is delivered with the use of the ECHO model. Since ECHO’s inception in 2003, there have been more than 5000 case presentations, and 800 patients have been treated. We conducted a prospective cohort study to assess the safety and efficacy of treatment based on the ECHO model, as compared with treatment at a university HCV clinic. Our hypothesis was that when treatment for HCV infection is delivered in the community (or prison) with the use of the ECHO model, it is as effective as that provided at the academic medical center.

Study Population: Patients could be included in the ECHO or UNM cohort if they were between 18 and 65 years of age, had evidence of chronic HCV infection with detectable HCV RNA, had not received treatment for HCV infection before September 7, 2004, and initiated treatment between September 7, 2004, and February 29, 2008 (for patients with HCV genotype 1 or 4 infection) or between September 7, 2004, and August 15, 2008 (for patients with HCV genotype 2 or 3 infection). Since HCV genotype 1 and genotype 4 infections require a longer duration of treatment, this distinct timing allowed us to identify a definitive outcome for all subjects within the cohort before December 31, 2009. Patients were excluded if they had an absolute neutrophil count of less than 1500 per cubic millimeter, a platelet count of less than 75,000 per cubic millimeter, a creatinine level higher than 2.0 mg per deciliter (176.8 μmol per liter), coinfection with human immunodeficiency virus or hepatitis B virus, a history of a solid-organ transplantation, or decompensated liver disease.

Study Design: This study had a prospective cohort

design. All patients received standard treatment for HCV infection (according to the ECHO clinical protocol), with peginterferon administered at standard doses and ribavirin administered at doses based on the patient's weight (for patients with all genotypes). Early in the study period, the duration of treatment was based on genotype alone (48 weeks for patients with genotype 1 or genotype 4 infection and 24 weeks for patients with other genotypes). Starting in September 2006, the treatment period was extended for patients who had a slow response to therapy. Growth factors were administered as clinically indicated. Clinical adverse events were monitored throughout the study. The aspartate aminotransferase: platelet ratio index (APRI) was used to estimate the extent of fibrosis and cirrhosis. The higher the APRI score, the more likely a patient is to have extensive fibrosis or cirrhosis.

End Point: The primary end point was a sustained virologic response, which was defined as an undetectable HCV RNA level 24 weeks after the end of treatment. All patients who received at least one dose of interferon were included in the analysis. Subjects without follow-up data were considered to have had treatment failure.

Assessment of Safety: Safety was assessed by means of laboratory testing and through information obtained at visits on weeks 1, 2, and 4 and monthly thereafter. Serious adverse events were reported and investigated. An independent data and safety monitoring committee evaluated all serious adverse events.

Statistical Analysis: Continuous variables are expressed as means \pm SD. Differences between the groups in continuous variables were analyzed with the use of Student's t-test (with 95% confidence intervals) or the Mann-Whitney U-test. P values of less than 0.05 were considered to indicate statistical significance. Since this study was not randomized, multivariate analysis was used to verify that the two treatments did not differ significantly after adjustment for demographic and baseline clinical characteristics of the patients. Stepwise logistic regression was used to identify predictors of sustained virologic response that might be confounders, including age; sex; race or ethnic group; marital status; employment status; housing status; route of transmission; height, weight, and body-mass index (BMI); HCV viral load; genotype; APRI score; levels of blood urea nitrogen, creatinine, aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, total bilirubin, total protein, albumin, and hemoglobin; white-cell, platelet, and absolute neutrophil counts; red-cell distribution width; and mean corpuscular volume.

During the study period, 519 patients were started

on treatment for HCV infection. A total of 112 patients were excluded, leaving 407 who were included in the analysis Treatment and Follow-up of Patients. The ECHO cohort included a significantly higher proportion of men (96%) of the patients treated in the prison and a larger percentage of Hispanics. Approximately 56% of the patients in each group had HCV genotype 1 infection.

Virologic Response: A total of 58.2% of the patients at the ECHO sites (152 of 261 patients) had a sustained virologic response, a rate that did not differ significantly from that among patients at the UNM HCV clinic (57.5%, 84 of 146 patients). The between-group difference was 0.7 percentage points (95% confidence interval [CI], -9.2 to 10.7). The overall rate of sustained virologic response among patients with HCV genotype 1 infection was 48.3%.

Safety: Overall, more patients in the UNM HCV clinic cohort than in the ECHO cohort had a serious adverse event (13.7% vs. 6.9%, $P=0.02$). In addition, more patients in the UNM HCV clinic cohort than in the ECHO cohort had a serious adverse event leading to termination of treatment (8.9% vs. 4.2%, $P=0.05$).

DISCUSSION

In this community-based study, we found that treatment for HCV infection delivered with the use of the ECHO model was associated with high rates of cure. The rates of sustained virologic response in our ECHO cohorts (58.2% overall and 49.7% among patients with HCV genotype 1 infection) were similar to those among patients in the study's comparison group, who were treated at an academic medical center, and to the rates reported in licensing trials of peginterferon and ribavirin for the treatment of HCV infection.⁹⁻¹¹ Previous community-based treatment studies have failed to replicate the results of licensing trials. For example, in the Weight-Based Dosing of Peginterferon alfa-2b and Ribavirin trial,²⁰ the rate of sustained viral response was 34% among patients with HCV genotype 1 infection. The Veterans Affairs observational cohort study conducted at 121 facilities showed a rate of sustained viral response of 20% among patients with HCV genotype 1 infection.²¹

Our study cohort, particularly at the ECHO sites, was predominately Hispanic. We met our goal of increasing treatment for minority and other underserved patients. A recent study by the Latino Study Group (NCT00107653) showed that for patients with HCV genotype 1 infection, the rates of sustained virologic response were significantly lower among Hispanic patients than among non-Hispanic patients (34% vs. 49%).²² We did not see a difference in sustained virologic response between Hispanic and non-Hispanic patients in our study. Research suggests

that disparities in treatment according to race or ethnic group may be due to geographic differences resulting in inadequate access to high-quality care, particularly specialty care.²³⁻²⁵ Treatment with the use of the ECHO model overcomes this barrier by bringing to the rural clinician the expertise and clinical resources that may not otherwise be available, thus positively affecting the outcomes.

Our study design has three principal limitations. First, there was no comparison group comprising patients who were treated in rural settings without the ECHO model. The barriers to treatment are so formidable and concerns for safety so great that in 2004 almost no patients with HCV infection in rural and frontier areas of New Mexico were receiving treatment. Second, we were unable to randomly assign providers to a group using the ECHO model or a control group without ECHO support because we could not ethically encourage control providers to treat HCV infection without training; in addition, we could not randomly assign patients owing to the nature of the study. Third, in a prospective cohort study, multivariate models can adjust for differences in patient characteristics that are measured but do not address those that are not or cannot be measured. Although the rate of sustained virologic response did not differ significantly according to the site of treatment in the multivariate model, the confidence interval for the odds ratio was quite broad. The study was not large enough to establish equivalence.

The results of this study show that the ECHO model is an effective way to treat HCV infection in rural and underserved communities. By implementing this model, other states and nations can potentially treat many more patients infected with HCV than are currently receiving treatment, thereby reducing the enormous burden of illness and associated mortality. There are a number of potential explanations for the success of the ECHO model. Community providers, particularly community-based health centers, provide coordinated, patient-centered care in facilities proximate to their patients. Patients are likely to have greater trust in local providers, who tend to be culturally competent with respect to their specific communities. This may enhance patients' adherence to treatment and allow for greater direct contact with the clinician, including more frequent visits. As a result, local providers may be better able to comply with best-practice protocols, ensure close assessment of the results of laboratory tests, offer education tailored to the patient, and provide better and more timely management of side effects. In addition, the fact that the primary care of the patient and the management of hepatitis are provided by the same clinician ensures

better coordination of care and fewer communication challenges.

As a result of the success of the model for treatment of HCV infection, the ECHO program has been expanded to 255 sites. These clinics address common and complex health issues, including substance-use disorders, cardiac risk factors, chronic pain, asthma, rheumatologic conditions, and other disorders. The project shows that technological tools and interdisciplinary collaboration can be used to leverage scarce resources for specialty care.

CONCLUSION:

In conclusion, we found that HCV infection, which is a complex disease, can be managed as effectively at a center that uses the ECHO model as at an academic medical center. ECHO represents a needed change from the conventional approaches in which specialized care and expertise are available only at academic medical centers in urban areas. The ECHO model has the potential for being replicated elsewhere with community providers and academic specialists collaborating to respond to an increasingly diverse range of chronic health issues. The results of this study show that the ECHO model is an effective way to treat HCV infection in underserved communities. Implementation of this model would allow other states and nations to treat a greater number of patients infected with HCV than they are currently able to treat.

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The Chief Editor,
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