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Al-Shifa Journal of Ophthalmology

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EDITORIAL

Evolution of Cataract Surgery: Past, Present and the Future

Sunday Okonkwo

Cataract has been a burden to mankind since ages. Current available World Health Organization (WHO) report[1] reveal that cataract is still the leading cause of blindness globally. Of 39 million blind people in the world, 51% is due to cataract. Same reports also reveal that it is a significant cause of low vision accounting for 33% of the cause among 246 million people with the condition worldwide. Man's quest for solution to the huge burden of cataract gave birth to cataract surgery, the practice of which dates back to antiquity.

The first documented treatment for cataract is couching. This was first described by Marharshi Sushruta, an ancient Indian surgeon around 600 BC [2]. This technique involved using a sharp instrument inserted posterior to the limbus to push the cloudy lens into the vitreous cavity thus clearing the visual axis [2]. Although, the visual recovery from this procedure is minimal due to absence of corrective lenses, nevertheless, it is life changing for the patient as some ambulatory vision and self dependence is gained. It is still being practiced today in developing countries [3]. Complication rates of couching was high and a recent study reports that 33.3% of patients who has had couching ended up with no light perception vision [3].

The first significant advance in cataract surgery since invention of couching was extraction of cataract from the eye credited to the French physician Jacques Daviel. He performed extracapsular cataract extraction (ECCE) in 1748 [4]. Through a large inferior cornea incision, he incised the anterior lens capsule and expressed the nucleus and removed the cortex by curettage [2,5]. Daviel's ECCE was an improvement over couching. However, the operation did not become immediately popular because of the attendant problems of wound healing; uveal, vitreous or retinal prolapse; infection and disastrous inflammatory reactions from residual cortex [2, 5]. Surgeons now sought for ways of removing the lens with intact capsule. In 1753, Samuel Sharp performed the first successful intracapsular cataract extraction (ICCE) by removing a cataractous lens with intact capsule through a limbal incision, using pressure from his thumb. The birth of ICCE came with the challenge of how to lyse or break the zonular fibres [2]. This was overcome with the discovery of the enzyme α-chymotrypsin to facilitate zonulolysis and eventually the introduction of cryoextraction [4]. By the beginning of 20th century ICCE was the standard. From about the middle of the 20th century a number of major events raised the quality of cataract surgery to a new level.

First was the renaissance of ECCE. The shift from ICCE procedures back to new ECCE techniques was driven by the realization that leaving the posterior lens capsule intact enabled anterior and posterior compartments of the eye to maintain their separation, thus eliminating forward movement of the vitreous and its associated complications[2].

The second was the introduction of intraocular lens (IOL) implant made of polymethylmethacrylate to practice of cataract surgery by Harold Ridley in 1949 [5,6]. The acrylic plastic material was chosen because Ridley noticed it was inert after observing surprising tolerance of pieces of shattered Plexiglas from cock pit in the eyes of British pilots of World War II [5].

Thirdly was the introduction of extracapsular small incision technique of phacoemulsification surgery in 1967 by Dr Charles Kelman [4]. In this technique, an ultrasound device is used through a small incision to break a cloudy lens into minute fragments that can be aspirated. This revolutionized the practice of cataract surgery, leading to smaller and smaller wounds. Today, routine wounds are <3 mm long and 1 mm wounds are on the horizon [5]. This technique of ECCE is the basis of modern cataract surgery today.

Several other important events in the 20th century also contributed immensely to the development of cataract surgery. Ophthalmic sutures were introduced and anaesthesia techniques improved. Intraocular visualization was enhanced by the development of loops and then, the operating microscope in the 1970s which allowed for better intraocular visibility. Viscoelastics introduced in 1979 allowed intraocular manipulation with greater safety [4]. Also is the subsequent technological developments in intraocular lens designs leading to introduction of foldable IOLs.

Presently, the gold standard for cataract surgery is phacoemulsification and intraocular lens implant. And with technological improvements in intraocular lens designs and phacoemulsification techniques over the past years, the quality of cataract surgery that is now possible is incredible. The concept of cataract surgery has evolved from an extractive procedure designed to solely address obstructive visual impairment to the present day new broader paradigm of refractive cataract surgery. This began slowly in the 1980s when the first clear lens surgeries were performed for refractive error [4]. Today management of corneal astigmatism at the time of cataract surgery is an area of increasing importance and active research. Several approaches to correct corneal astigmatism have been successfully tried and are being used now. These include main corneal incision placement on the steep axis of the cornea, single or paired peripheral corneal relaxing incisions and/or toric IOL implantation. Refractive cataract surgery outcome has greatly improved with the introduction of femtosecond laser assisted surgery. Also, there has been increasing interest in correcting presbyopia at the time of cataract surgery by using accommodating and multifocal IOLs [6].

One thing that has helped drive the developments in cataract surgery in recent years is the increasing expectations on its outcome by patients undergoing the surgery. One of such expectations is spectacle freedom after cataract surgery. This is the goal of refractive cataract surgery that is trending. Despite the current technological advancements, the present methods of aphakic correction is yet to adequately recuperate the dynamic or accommodative function of the crystalline lens that enables us to focus at every distance. A new method of cataract surgery known as phaco ersatz that aims at recreating a physiologic lens whic has been in the pipeline since 1980s may turn out to be the standard in the future [4]. The procedure involves the removal of the cataractous cortex and nucleus while preserving the lens capsule and its zonular attachments. The empty lens capsule is then refilled with biocompatible and optically suitable clear gel [7]. Research on phaco ersatz cataract surgery is ongoing and results are promising [8].

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ORIGINAL ARTICLE

Comparison of Peripapillary Retinal Nerve Fibre Layer (RNFL) Thickness in Type II Diabetics and Normal Population

Muhammad Irfan Sadiq[1], Muhammad Usman Sadiq[2], Waseem Ahmed Khan[1], Sara Najeeb[2]

ABSTRACT

Objective: To compare the mean peripapillary retinal nerve fibre layer (RNFL) thickness in type II Diabetics with normal population using optical coherence tomography (OCT).

Study Design: Case Control Study

Place and duration of study: Al-Shifa Trust Eye Hospital, Rawalpindi, from 1st January 2015 to 30th September 2015.

Methodology: In each group, 68 patients of age between 40 to 50 years, of both genders were included by non-probability (Consecutive) Sampling Technique. After complete ophthalmological examination, patients having diabetes were selected as cases, and non-diabetic patients were selected as controls for the study. OCT was performed by using "Carl Zeiss Meditec Stratus OCT" to determined the peripapillary retinal nerve fibre layer thickness of all patients. All the observations were noted on pre-designed structured proforma. Data was entered and analyzed by using Statistical Package for Social Sciences (SPSS) version 10.

RESULTS: Mean RNFL thickness had significant difference between the two groups. The cases had a mean RNFL thickness of 90.04 with a standard deviation of 8.65, whereas the controls had a mean of 104.97 of RNFL thickness with a standard deviation of 8.64. The independent t-test confirmed the existence of significant difference between the two groups.

CONCLUSION: This study revealed that there was a statistically significant difference in the peripapillary RNFL thickness in diabetics and non-diabetics. This proves my hypothesis that retinal nerve fibre layer thickness is less in subjects with diabetes as compared to subjects with no history of diabetes. *Al-Shifa Journal of Ophthalmology 2017; 13(2): 59-64.*

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Introduction:

The retina is a light-sensitive layer at the back of the eye that covers about 65 percent of its interior surface[1]. Photosensitive cells called rods and cones in the retina convert incident light energy into signals that are carried to the brain by the optic nerve[2]. The retina is composed of 10 layers. Retinal nerve fibre layer (RNFL) is that layer of the neural retina which transmits axons of the ganglion cells of the retina to the optic nerve[3]. The peripapillary retinal nerve fibre layer (RNFL) is formed by retinal ganglion cell axons and represents the innermost layer of the fundus[1]. The thickness of the RNFL increases toward the optic disc where the

axons bend and pass through the scleral canal and form the neuroretinal rim of the optic nerve head[4]. Its thickness will be measured in micrometers using OCT[5]. Normal range is from 106.4µm to 108.8µm[6]. Increased cup disc ratio (CDR) represents the area that does not contain nerve fibres while peripapillary is the retinal area about one disc diameter around the optic nerve head[5].

Diabetes Mellitus is a common metabolic disorder characterized by sustained hyperglycemia of variable severity[7]. Diabetic retinopathy is one of the leading causes of blindness in developed countries[8]. There is clinical and experimental evidence showing that neuroglial tissue loss may occur at the early stages of diabetic retinopathy and even precede vascular changes[9]. Etiology is multifactorial. However several studies have shown neural apoptosis[10], loss of ganglion cell bodies and reduction in thickness of the inner retinal layers in the earliest stages of diabetic retinopathy[8]. Metabolic changes in diabetes may directly affect neural tissue, but importantly, neurodegenerative changes are precipitated by compromised nerve vascular supply[11]. By the time neuronal injury is reflected in routine clinical visual acuity testing, retinopathy has usually progressed to advanced stage[12].

Retinal nerve fibre layer thickness can be measured by optical coherence tomography (OCT)[13]. It is a medical imaging technique in which light is used to capture micrometer-resolution, three-dimensional images from within optical scattering media (e.g., biological tissue)[6] and is based on low-coherence interferometry, typically employing near-infrared light[14]. RNFL is measured in the peripapillary region with circular scans of 3.4 mm diameter centered around the optic nerve head[15]. Measurements of RNFL thickness are shown in a Temporal-Superior-Nasal-Inferior-Temporal quadrant (TSNIT) orientation and are compared to age-matched controlled individuals[16].

There are conflicting statistics regarding effect of diabetes on RNFL thickness[17]. The purpose of this study is to clear this ambiguity and manage patients accordingly.

Subjects and Methods:

It was a case control study conducted in Al-Shifa Trust Eye Hospital, Rawalpindi, from 1st January 2015 to 30th September 2015.

Sample size was calculated from a recent study by using WHO calculator. In each group 68 patients were included by non-probability (consecutive) sampling technique. Patient of any gender between age 40-50 years were included in this study while patients with previous ocular surgery or any other pathologies that may affect RNFL thickness were excluded from the study. Each of them ruled out by complete ophthalmological slit lamp examination. A total of 136 eyes of 136 different subjects were included in the study. The subjects were divided into 2 groups categorized as controls and cases. Controls were those subjects with no history of diabetes whereas cases included subjects with type II diabetes.

After that their OCT was performed using "Carl Zeiss Meditec Stratus OCT" to determine the peripapillary retinal nerve fibre layer thickness by a trained technician of all the patients. All the observations were noted on pre-designed structured proforma. Data was analyzed by using Statistical Package for Social Sciences (SPSS) version 10.

Results:

Mean peripapillary RNFL thickness with significant difference between the two groups. The cases had a mean RNFL thickness of 90.04 ± 8.65, whereas the

controls had a mean RNFL thickness of 104.97 ± 8.64 (Table 1).
In cases, there were 68 subjects in total, of ages between 40 and 50 years, with a mean age of 45.13 ± 3.264 (Table 2). Of the noted observations of RNFL thickness, 30 were related to the right eye and 38 were those of left eye (Table 3). There were 46 males and 22 females (Table 4).
Whereas in remaining 68 controls, of ages between 40 and 50 years, mean age was of 45.18 years ± 3.323 (Table 2). 41 of the observations were related to the right eye and 27 were those of left eye (Table 3). There were 44 males and 24 females (Table 4).

Table 1: Mean RNFL thickness in two groups

	N	Mean	Std. Deviation	P Value
Type II Diabetics (Cases)	68	90.04	8.65	<.001
Non-Diabetics (Controls)	68	104.97	8.64	

Table 2: Age distribution in two groups

	Mean	Std. Deviation	Maximum	Minimum
Type II Diabetics (Cases)	45.13	3.264	50	40
Non-Diabetics (Controls)	45.18	3.323	50	40

Table 3: Eye distribution within each group

Group	Eye		Total
	Right	Left	
Type II Diabetics (Cases)	30	38	68
Non-Diabetics (Controls)	41	27	68
Total	71	65	136

Table 4: Gender distribution within each group

Group	Gender		Total
	Female	Male	
Type II Diabetics (Cases)	22	46	68
Non-Diabetics (Controls)	24	44	68
Total	46	90	136

Discussion:

Diabetes Mellitus (DM) is a common metabolic disorder which is characterized by persistent hyperglycemia, severity of which may vary[18]. This long-standing metabolic imbalance frequently results in anatomical as well as physiological changes in the cells all over the body[11], the vascular system being most commonly affected. It also affects the eye, the kidney and the nervous system[7].

Diabetic retinopathy (DR) has emerged as one of the leading causes of visual loss in developed countries[12]. Clinically, its diagnosis is made on the basis of appearance of micro aneurysms, vascular anomalies, hemorrhages and exudates[6]. This has resulted in the assumption that diabetic retinopathy is primarily a microvascular disease[16]. But there are several studies which have shown loss of ganglion cells and thinning of the inner retinal layers in the early stages of diabetic retinopathy[1].

The purpose of this study was to compare the mean peripapillary retinal nerve fibre layer thickness (RNFL) in type II Diabetics with normal population using optical coherence tomography (OCT).

The study revealed that there was a statistically significant difference in the peripapillary RNFL thickness in diabetics and non-diabetics. Diabetics had a mean RNFL thickness of 90.04 ± 8.65, whereas non-diabetics had a mean of 104.97 ± 8.64.

Van Dijk et al[19] conducted a study to determine the role of type II diabetes in thinning of retinal layers. Results showed thinner retinal nerve fiber layer (difference 1.9 μm), ganglion cell layer (GCL) (difference 5.2 μm), and inner plexiform layer (IPL) (difference 4.5 μm) in the pericentral area of the macula in patients with minimal DR compared to controls.[5] RNFL (difference 3.2 μm) and IPL (difference 3.3 μm) were also thinner in patients in the peripheral area of the macula, in subjects with minimal DR compared to controls.

Chhablani et al[20] also conducted a study to analyze changes in the neural retina in different stages of DR and the results were compared with age-matched healthy controls. Average or sectoral RNFL thickness difference was insignificant among groups, but the minimum RNFL thickness was decreased in diabetics as compared with controls ($P < 0.05$).

In a study by Araszkiewicz et al[21], comparison of retinal thickness, retinal nerve fibre layer thickness, and ganglion cell layer (GCL) thickness was done by using OCT in type 1 diabetic patients with and without clinically diagnosed retinopathy. Results showed increased thickness of the perifoveal retina ($P = 0.05$), mean RNFL ($P = 0.002$), inferior RNFL ($P < 0.0001$), and superior and

inferior ganglion cell layer (P = 0.05 and P = 0.04, respectively) in diabetic subjects Biallosterski et al[22] also showed similar results in type 1 diabetics. In his study, OCT was used for retinal thickness (RT) measurements in patients with type 1 diabetes mellitus. In type I diabetics with minimal DR, mean RT was decreased in the pericentral area (267 μm ± 20 μm; n = 23) as compared to healthy controls (281 μm ± 13 μm; p = 0.005; n = 28).[118] Mean pericentral RT in patients without DR (276 μm ± 14 μm; n = 30) was less than pericentral.

Conclusion:

The results of this study showed a statistically significant difference between peripapillary retinal nerve fiber layer thickness values in type II diabetics (Cases) & normal population (Controls). It is concluded that retinal nerve fiber layer thickness is decreased in subjects with type II diabetes as compared to normal healthy individuals. The results might suggest neuroglial tissue loss of retina in type II diabetic patients without any clinical retinopathy. Based on these results, it is recommended that, even in the absence of clinical signs of diabetic retinopathy, RNFL thickness of every diabetic patient should be measured by OCT as its thinning could serve as the early sign of neurodegeneration in diabetic retina.

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Statistical expertise: Sara Najeeb
Critical revision: Muhammad Usman Sadiq, Waseem Ahmed Khan

ORIGINAL ARTICLE

Comparative evaluation of conventional extracapsular cataract extraction versus manual small incision cataract surgery in terms of visual outcome

Muhammad Naeem[1], Hussain Ahmad[2], Yousaf Jamal Mahsood[3], Naseer Ahmad[4], Hina Mehwish Khan[5], Mushtaq Ahmad[4]

ABSTRACT:

Aim: To study the surgical outcome of conventional extracapsular cataract extraction versus manual small-incision cataract surgery.

Subjects and Methods: A randomized clinical trial was carried out including ninety eyes (78 patients) which were divided into two groups using systematic randomization: groups of conventional extracapsular cataract extraction with posterior chamber intraocular lens (ECCE with PCIOL) implantation and manual small-incision cataract surgery (MSICS). The postoperative parameters/variables studied were the unaided and best-corrected visual acuity and astigmatism.

Results: In the immediate postoperative period, unaided visual acuity of =/> 6/18 was achieved in 21 subjects in MSICS group versus 7 in ECCE with PCIOL group, whereas the same at 6 - 8 weeks postoperatively was found in 26 and 20 subjects in those groups respectively. The astigmatism of =/> 2 at 6 - 8 weeks was found in 33 and 15 subjects from the conventional and MSICS groups respectively.

Conclusion: Both MSICS and conventional ECCE with PCIOL are safe and effective techniques for treatment of cataract patients. A more rapid recovery of good vision can be achieved with MSICS than with conventional ECCE with PCIOL in the immediate postoperative period. *Al-Shifa Journal of Ophthalmology 2017; 13(2): 65-71.* *© Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Introduction

Cataract is the single most important cause of avoidable blindness globally.[1] Extracapsular cataract extraction (ECCE) with posterior chamber intraocular lens implantation (PCIOL) was the most frequent surgical technique to treat cataracts until the past two decades.[2] Phacoemulsification and manual small incision cataract surgery (MSICS) are the predominant cataract surgeries being preferred to ECCE due to shorter surgical time, quicker rehabilitation, and reduced postoperative astigmatism.[3] Two main goals of cataract surgery in recent times are to minimize induced astigmatism and achieve rapid visual recovery. Hence, the aspect of increasing surgical volumes involves choice of surgical technique. The

ideal goal is to provide high quality, high volume eye surgery in the face of limited resources in developing nations [4]. The cost incurred in phacoemulsification does not allow it to be the ideal method of surgery of cataract extraction for the mass in developing countries where possession of sophisticated expensive instruments is not viable for most institutions [5]. MSICS is an appropriate technique to tackle the backlog of cataract surgery in the developing countries [6]. Hence, it is termed as the "cataract surgery for the 21st century"[3]. This study was carried out with the objective to compare the surgical outcome of conventional ECCE with PCIOL implantation versus manual small-incision cataract surgery.

Subjects and Methods:

The study was conducted at Hayatabad Medical Complex ophthalmology unit from March 2013 to August 2014. A total of 90 eyes of 78 patients of cataract were selected using systematic randomization sampling technique for their division into two groups: ECCE with PCIOL (Group A) and MSICS (Group B). Cataract patients with no local or systemic diseases were included in the study. The exclusion criteria were any ocular co-morbidity capable of compromising vision, for e. g. patients with central corneal opacity, glaucoma, diabetics with significant fundus changes, patients with inflammatory eye diseases, etc. Informed consent was obtained from the patients for enrollment in the study. Pre-operative assessment of the cataract patients included visual acuity measurement, extraocular motility evaluation, examination with slit lamp, fundus evaluation, intraocular pressure measurements, biometry and general physical examination. Macular function tests, syringing of the lacrimal passage, blood sugar and blood pressure measurement were also performed pre-operatively. The two planned treatments were ECCE and MSICS. In both techniques, a posterior chamber IOL was implanted.

In ECCE, a 10-12 mm corneo-scleral section was made, the lens capsule opened and the lens nucleus expressed with wire vectis after hydro-procedures. The Simcoe cannula was then used to remove the remaining cortical matter and PCIOL was inserted into the capsular bag. The incision was closed by continuous shoelace suture with 10-0 nylon. In MSICS, a 6.5 to 7mm scleral tunnel was created with a frown incision. A side port was created to facilitate intraocular manipulations. After can opener capsulotomy, the nucleus was brought into the anterior chamber. Viscoelastic was injected around the nucleus. The nucleus was then delivered through the scleral tunnel. The remaining cortex was removed with Simcoe cannula and PCIOL was implanted in the bag. The integrity of the tunnel was confirmed by injecting basal salt solution (BSS) through the side port at the conclusion of the surgery.

Visual outcome and postoperative complications were assessed from the first postoperative day. Subsequent examination of the operated eye was done daily for 2-3 days and the patient was discharged on the 1st to 3rd postoperative day, depending on the condition of the eye. Subsequently, the patients were reviewed at 1-2 weeks, 3-4 weeks, and 6-8 weeks post-operatively. At the end of 6-8 weeks, the final unaided visual acuity was recorded. The best-corrected visual acuity with the type of astigmatism was noted by objective and subjective refraction. An informed consent was obtained in a pre-designed consent form for enrollment in the study; surgical and medical treatment was provided for the patients. The patients were not imposed to any risk due to the treatment provided as the standard protocol was followed for patient management.

Results

Forty five eyes each were operated on using conventional ECCE with PCIOL implantation and manual small incision cataract surgery. The age of the patients ranged from 35years to 93 years. Female patients were more in number 52.3% versus 47.7%. All 78 patients presented with painless progressive diminution of vision with duration ranging from 1 month to 30 months, with the mean ± SD of 15.5 ± 8.803 months. Visual acuity was measured with Snellen's chart and Illiterate E chart. Preoperative visual acuity was 6/24 in 1%, 6/36 in 8%, 6/60 in 13%, 3/60 in 12%, 1/60 in 15%, counting finger in 13% of patients, hand movement in 10% and perception of light in 25%. On funduscopy, 35% were normal and in 65%, the fundus was not visible and a B scan was done where the posterior segment was normal. Postoperative visual acuity at discharge was 6/18 or better in 13% in conventional ECCE with PCIOL and in 45% in Manual Small-Incision Cataract Surgery. Postoperative visual acuity at 6-8 weeks was 6/18 or better in 42% in ECCE with PCIOL and in 56% in MSICS. Corrected visual acuity was 6/18 or better in 88% in conventional ECCE with PCIOL and 97% in MSICS.

Postoperative corneal edema was present in 62% in conventional ECCE with PCIOL and in 48% of MSICS at discharge. The edema was of epithelial type and was located at the superior part of the cornea, the cause of edema being excessive manipulation and retained viscoelastic. Cornea was clear in all eyes at the end of 6-8 weeks. One patient had Descemet membrane detachment in MSICS which was reattached by 6-8 weeks with no obscuration of vision. Anterior chamber reaction was present in mild to moderate intensity in 74% in conventional ECCE with PCIOL and 69% in MSICS at the time of discharge which was well controlled by topical steroid at the end of 6-8 weeks in both types of surgeries.

Posterior capsule opacification was present in 4% in conventional ECCE with PCIOL and in 6% in MSICS. But the density of opacification was not significant enough to obscure the vision. Regarding the type of astigmatism, with the rule astigmatism was present in 54% of conventional ECCE with PCIOL implantation and in 8% of MSICS. Against the rule astigmatism was present in 18% of conventional ECCE with PCIOL and in 62% of MSICS. Oblique astigmatism was present in 16% of conventional ECCE with PCIOL implantation and in 26% of MSICS. The amount of astigmatism was > 3 D in 56% of conventional ECCE with PCIOL implantation and in 12% of MSICS. Overall, the majority of the eyes after MSICS after 6 weeks had less than 2 D of astigmatism.

Table 1: Preoperative visual acuity (90 eyes of 78 patients)

Visual acuity	Number	Percentage
6/24	1	1
6/36	8	8.8
6/60	12	13.3
3/60	11	12.2
1/60	14	15.5
Counting Fingers	12	13.3
Hand Movement	9	10
Perception of light	23	25.5

Table 2: Unaided postoperative visual acuity at discharge according to the type of surgery

Visual acuity	ECCE		MSICS		Total	
	No	%	No	%	No	%
6/9			3	6.6	3	3
6/12	2	4	7	15.5	9	10
6/18	4	9	11	24.4	15	16
6/24	18	40	9	20	27	30
6/36	11	24	6	13.3	17	18
6/60	8	17	8	17.7	16	17
Counting finger	1	2	1	4.4	2	2
Hand movement	1	2			1	1
Total	45	100	45	100	45	100

Table 3: Unaided postoperative visual acuity (6-8 weeks) according to type of surgery

Visual acuity	ECCE		MSICS		Total	
	No.	%	No.	%	No.	%
6/6	0	0	1	2.2	1	1.1
6/9	4	8.8	2	4.4	6	6.6
6/12	3	6.6	13	28.8	16	17.7
6/18	13	28.8	10	22.2	23	25.5
6/24	5	11.1	7	15.5	12	13.3
6/36	7	15.5	8	17.7	15	16.6
6/60	10	22.2	3	6.6	13	14.4
3/60	3	6.6	1	2.2	4	4.4
Total	45	100	45	100	45	100

Table 4: Best corrected visual acuity (6-8 weeks)

Visual acuity	ECCE		MSICS		Total	
	No.	%	No.	%	No.	%
6/6	4	8.8	7	15.5	11	12.2
6/9	12	26.6	24	53.3	36	40
6/12	16	35.5	11	24.4	27	30
6/18	8	17.7	2	4.4	10	1.1
6/24	4	8.8	1	2.2	5	5.5
6/36	1	2.2			1	1.1
Total	45	100	45	100	45	100

Discussion

In this study, a postoperative complication seen was corneal oedema which was present in 62% cases in conventional ECCE with PCIOL implantation and 48% in MSICS. Iritis was present in 74% in conventional ECCE with PCIOL implantation and 69% in MSICS. One patient had descemete membrane detachment in MSICS. Posterior capsule opacification was present in 4% patients in

conventional ECCE with PCIOL and in 6% in MSICS. In the study by Gogate et al, iritis, Descemet's folds and posterior capsule opacification were the commonest postoperative complications [3.] Pham et al reported iris prolapse, wound dehiscence and hyphema at a rate of 2% [7]. Uusitalo & Tarkkanen, reported 3.7% of posterior capsule opacification [8]. Balent et al reported the major post-operative complications as captured iris, hyphema, iris prolapse and corneal oedema [9]. PCO was present in 5.5%. These results suggest that both types of surgeries are safe and reliable. There is a difference between the two groups for uncorrected visual acuity in the present study. The uncorrected visual acuity of 6/18 or better was 14% in conventional ECCE with PCIOL implantation and 48% in MSICS. Best-corrected visual acuity of 6/18 or better was found in 90% after conventional ECCE with PCIOL and 98% in MSCIS. This result was compared with the study done by Hennig et al in which they reported uncorrected visual acuity of 6/18 or better in 76.8% at discharge and 70.5% at 6 weeks [5].

Corrected visual acuity of 6/18 or better was found in 96.2% at 6 weeks. The poor uncorrected visual outcome of <6/60 was seen in <2% cases. The main cause was high against the rule astigmatism Hennig et al, Gogate et al in a study of 706 eyes reported uncorrected visual acuity of 6/18 or better at 6 weeks in 37.3% and 47.9% in conventional ECCE with PCIOL and MSICS respectively, which is slightly more in the present study [3,5]. Post-operative visual acuity of 6/18 or better after retinoscopic refraction was found in 86.7% and 89.6% in conventional ECCE with PCIOL and MSICS respectively Levy et al [10]. The result is better in the present study. In the review of 362 consecutive sutureless cataract surgeries by Ruit et al , uncorrected visual acuity of 6/18 or better after 2 months was found in 87% [11]. In a study of 90 patients done by Sood et al, the uncorrected visual acuity was 6/6 in 36.6% in conventional ECCE with PCIOL and 40% in MSICS [12]. This result is slightly better in the present study. Balent et al reported corrected visual acuity of 6/6 to 6/ 18 in 38% in conventional ECCE with PCIOL, whereas 60.10% attained visual acuity of 6/24 or better in MSICS, which is less than that of the present study [9]. Studies of the outcome of cataract extraction in Asia have shown that presenting acuity following surgery is < 6/60 in 15- 20% of eyes. Most of the poor outcomes are due to uncorrected refractive error and postoperative astigmatism. Regarding the type of astigmatism, with the rule astigmatism was present in 54% of conventional ECCE with PCIOL implantation and in 8% of MSICS. Against the rule astigmatism was present in 18% of conventional ECCE with PCIOL and in 62% of MSICS. Oblique astigmatism was present in 16% of conventional ECCE with PCIOL implantation and in 26% of MSICS. The amount of astigmatism was > 3 D in 56% of conventional ECCE with PCIOL implantation and in 12% of MSICS. The cylinder > 3D was found in 56% in conventional ECCE with PCIOL whereas in MSICS, it was 12%. The against the rule astigmatism was more in MSICS whereas the amount of cylinder was more in conventional ECCE with PCIOL. Sood et al reported the pattern of astigmatism as WTR astigmatism in 72.2% and ATR astigmatism in 20% in conventional ECCE with PCIOL implantation, and WTR astigmatism in 40.2% and against the rule astigmatism in 40% in MSICS which is comparable with our study [12.] Levy et al stated that there is a tendency towards against the rule astigmatism induced cylinder throughout the postoperative period [10]. According to Olsen et al , in the scleral incision groups, the induced astigmatism decreased slightly after 1 week and after that no significant change was detected [13]. Feil et al , in their study of 22 patients, reported that there was little

change in cylinder from 1 week to 1 month in self-sealing incisions [14]. In the study of Pandey et al , the astigmatism was < 1D in 71.7% at 6 weeks in self-sealing corneal incision and was >1D in conventional ECCE with PCIOL [15]. Change in corneal curvature after an incision is continuous until the wound stabilizes. Merriam et al reported that the average behaviour of the cornea after cataract surgery is predictable and provides models that describe change on the horizontal and vertical meridians as a function of time [16]. Incisions on the superior meridian lead to an immediate steeping of the vertical meridian and flattening of the horizontal meridian followed by a gradual flattening of the vertical meridian and steeping of the horizontal meridian. The follow-up of the patients was longer for the large incision group than for the small-incision group.

Conclusion

The uncorrected visual acuity is better after MSICS at the time of discharge and also at 6-8 weeks, showing that the visual recovery is faster in MSICS than in conventional ECCE with PCIOL implantation. The cause of poor visual outcome after cataract surgery is astigmatism. With the rule astigmatism is more in conventional ECCE with PCIOL implantation than in MSICS and against the rule astigmatism is more in MSICS than in conventional ECCE with PCIOL. As a large proportion of patients do not wear their postoperative refractive corrections, MSICS is recommended as the procedure of choice for effective rehabilitation of cataract patients. It can, therefore, be recommended that the upcoming ophthalmologists be trained in MSICS.

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ORIGINAL ARTICLE

Manual Small Incision Cataract Surgery, Evaluation of Visual Outcome and Complications Following Surgery in Patients with Pseudoexfoliation

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Abstract:

Objective: The aim of this work was to study the visual outcomes and the intra and postoperative complications of manual small incision cataract surgery(MSICS) in patients with Pseudoexfoliation(PXF).

Material and methods: Study sample comprised of 56 eyes of 56 patients having cataract and Pseudoexfoliation, undergoing manual small incision cataract surgery. All patients were aging 60 years old or more. Parameters like nuclear grading at baseline, dilatation of pupil during surgery was studied with respect to the final visual outcome and intra operative and postoperative complication of cataract surgery. Best corrected visual acuity (BCVA) at 2 weeks and 6 weeks after surgery were reported.

Results: Patients mean age was 60 years and there were 34 male and 22 females. Best corrected visual acuity ranging from 6/6 to 6/9 was seen in 34(60.7%) at 2 weeks and 36(64.2%) eyes at 6 weeks. Visual outcome were lower in patients with high nuclear sclerosis of grade III- IV, poor pupil size (≤5 mm) compared to patients with nuclear sclerosis grade I-II and pupil size (>5 mm).Iris prolapsed in 5(8.9%) and rent in posterior capsule in 4(7.1%) patients intraoperatively and corneal edema in 26(46.4%)postoperatively that subsided within 2-3 days were the most commonly reported complications.

Conclusion: PXF is a common age-related disorder in patients with age-related cataract. Presence of associated PXE in cataract patients significantly increases the risk of vision threatening complications. MSICS technique in patients with PXF is cost effective and is associated with good visual outcomes. Early diagnosis, proper preoperative and postoperative planning, knowledge and surgical skills of handling the possible complications can increase the success rate of cataract surgery in patients with PXF. *Al-Shifa Journal of Ophthalmology 2017; 13(2): 72-78.*

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Introduction

Cataract is the leading cause of blindness globally[1] and according to World Health Organization (WHO) estimates there are 37 million people worldwide who were blind in 2002 [2,3]. Pseudoexfoliation (PXE) was first described by Lindberg in 1917 [4]. The main and full description was made by a Swiss Ophthalmologist Alfred Vogt[5] in 1918. PXE is now recognized as an accumulation of grey white fibrogranular extracellular pseudoexfoliative material produced by abnormal basement membranes of ageing epithelial cells in

trabeculum, equatorial lens capsule, pupillary margin of iris and ciliary body of the eye [6]. Exfoliative fibrillopathy has been reported in the skin and visceral organs[7] as well, thereby suggesting that it may be an ocular manifestation of a systemic disorder.

Deposition of exfoliative material results in predictable alterations of tissues in the anterior segment making cataract operation potentially challenging in PXF patients [8].The problems are mainly initiated by zonular instability and insufficient pupillary dilatation [9]. Other factors associated with zonular instability are age, shallow anterior chamber depth, cataract density, pupil size, IOP / glaucoma status, atrophy of pupillary ruff and pigment in the angle. Interestingly, the degree of PXF material visible in the eye does not seem to correlate with the degree of zonular weakness8. Zonular instability was reported to possess a significantly higher risk for intraoperative complications [10]. In this study we assessed grading of cataract, phacodonesis, pupil size, distribution of pseudoexfoliation in relation to nuclear grading of cataract, in terms of final visual outcomes of MSICS and assessment of intraoperative and early postoperative complications.

Subjects and Methods:

All eyes that were scheduled to have MSICS at Ophthalmology department Hayatabad medical complex (HMC), Peshawar from January 2014 to june 2015 were included in the study. The study was approved by the local ethical committee. The sample size includes 56 eyes of 56 patients of either sex, aged 60 years and above diagnosed to have cataract with pseudoexfoliation on the basis of slit lamp examination before and after pupillary dilatation. The exclusion criteria included patients below 50 years of age, patients with history of previous intraocular surgeries and those with congenital, developmental, traumatic, as well as complicated cataracts. Patients with lens dislocation or subluxation without pseudoexfoliation and patients diagnosed with uveitis. Patients with uncontrolled diabetes, hypertension and or other severe systemic disorders like cardiovascular diseases were also excluded.

Complete ophthalmic history and relevant personal medical history as well as family history were recorded. The ophthalmic history included diminutionof vision, its onset, duration and progress, redness of eyes, pain, watering or any discharge from eyes, intolerance to light, ocular surgery etc. Medical history included trauma, steroid exposure or drug intake, diabetes mellitus, asthma, hypertension, tuberculosis, past history of any other surgery. Ophthalmological examination including visual acuity, refraction, slit-lamp examination, Goldmann applanation tonometry, gonioscopy, and dilated-pupil fundus examination was performed. Pseudoexfoliation was diagnosed on slit-lamp biomicroscopy by the presence of white dandruff -like material at pupillary margin, on the anterior lens capsule, and trabecular meshwork, in one or both eyes.

All patients were operated by the same surgeon using a manual small incision cataract surgery (MSICS).All patients were put on topical antibiotic drops 1 day prior to surgery. Patients were dilated with mydriatic cycloplegic drops and non-steroidal anti-inflammatory drops were used to maintain the dilatation. Peribulbar block with 5 ml of 2% xylocaine and 5 ml of 0.5% bupivacaine. Povidine-iodine 5% was instilled into the conjunctival sac. In cases of poor pupillary dilatation with difficulty in nucleus prolapse into anterior chamber, sphincterotomy was performed. After an adequate sized capsulorrhexis careful hydrodissection was carried out with minimal stress on the zonules. In cases of posterior capsular rent, a good anterior vitrectomy was done and PCIOL was placed in the sulcus. In cases of a large posterior capsular rent, where PCIOL

could not be implanted an anterior chamber intraocular lens (ACIOL) was placed.

Post-operatively, patients were put on topical antibiotics and steroids tapered over 4-6 weeks depending upon the post-operative inflammation. Patients were followed postoperatively at 1week, 2 weeks, and 6 weeks to evaluate for intraocular pressure spikes, presence of intraocular inflammation, decentration of intra ocular lens and corneal decompensation. On each follow up visual acuity testing and anterior segment examination was performed on slit lamp. Uncorrected visual acuity (UCVA) was measured after one and two weeks and BCVA was measured at 6 weeks.

Results:

The age of the patients was in the range of 55-80 years. Maximum patients were in the age group of 65 –75 years. The total number of males in the study was 34 (60.7%).The preoperative visual acuity was less than 6/60 in most of the patients. When the cataract grading was done 2(3 %) patients had NS I, 11 (19%) had NS II, 9 (16%) had NS III, 33 (58%) had NS IV. Out of 56 patients, 18(32.1 %) had poor pupillary dilatation (≤5 mm).

PCIOL was placed in 50 eyes. However IOL was placed in sulcus in 3 patients (because of posterior capsular rent), while anterior chamber IOL was implanted in 3 patients. The most common intraoperative complication observed in our study was iris prolapse and posterior capsular (PC) rent. PC rent with vitreous loss was seen in 2 (3.5%) patients and without vitreous loss was seen in 2 (3.5%) patients. Of the 56 patients, 24 (42.85%) patients had corneal edema on the first postoperative day either in the form of epithelial edema or striate keratopathy, which subsided within one to two days after treatment except in 2 (3.5%) patients where it took one week for the corneal edema to subside. No prolonged inflammation or IOL related complications were reported in any of the patients (Table 1).

Postoperatively after one week the UCVA in the range of 6/6 to 6/18 was seen in 26 (46.4 %) eyes (Table 2). At the end of 6 weeks, all the patients had BCVA ≥ 6/24 except for six patients [lost to follow up (n=2), 6/36 (n=1), 6/60 (n=2), CF (n=1)] (Table 2).The incidence of postoperative complications was higher in patients with nuclear sclerosis grade IV-V compared with grade I-III. The incidence of both the intra and postoperative complications were higher in patients with poor pupil size (≤5 mm).We did not see any effect on the incidence of postoperative complications with the presence or absence of phacodonesis. The incidence of intraoperative complications were slightly higher in patients with the presence of phacodonesis 2 (28.5%) compared to patients without any, 8 (16.3%).

Table 1: Intraoperative and postoperative complications of cataract surgery in patients with pseudoexfoliation

Complications	N=56 No. of cases ,n(%)
Intraopertive Complications	
Iris prolapse	6(10.7)
Posterior capsule rent with vitreous loss	2(3.5)
Posterior capsule rent without vitreous loss	2(3.5)
Difficulty during nucleus delivery	2(3.5)
Zonular dialysis	1(1.7)
Iridodialysis	1(1.7)
Postoperative Complications	
Corneal edema	24(42.85)
Pigment dispersion on intraocular lens	2(3.5)
Updrawn pupil	2(3.5)
Optic capture	1(1.7)

Table 2: Visual acuity scores at 1 week, 2 weeks and 6 weeks after cataract surgery in patients with pseudoexfoliation

Visual acuity	Baseline visual acuity, n(%)	UCVA at 1 week, n (%)	BCVA at 2 week, n(%)	BCVA at 6 week, n(%)
6/6	0(0.0)	1(1.7)	5(8.9)	7(12.5)
6/9	0(0.0)	4(7.1)	26(46.4)	27(48.2)
6/12	0(0.0)	9(16.0)	9(16.0)	8(14.2)
6/18	0(0.0)	12(21.4)	8(14.2)	7(12.5)
6/24	0(0.0)	16(28.5)	1(1.7)	1(1.7)
6/36	6	10(17.8)	1(1.7)	1(1.7)
6/60	6	2(3.5)	1(1.7)	2(3.5)
CF	26	2(3.5)	1(1.7)	1(1.7)
HM/PL	18	0(0.0)	0(0.0)	0(0.0)
Lost to follow up	0(0.0)	0(0.0)	4(7.1)	2(3.5)

Table3: Effect of phacodonesis, pupil size and nuclear sclerosis on the incidence of intra and postoperative complications in cataract eyes with PXF.

Variable	(N=56)n(%)	Any intra operative complication, n(%)	Any postoperative complication, n(%)
Phacodonesis			
Yes	7(12.5)	2(28.5)	2(28.5)
No	49(87.5)	8(16.3)	21(42.8)
Pupil size			
Good(>5mm)	39(69.6)	6(15.3)	9(23.0)
Poor(≤5mm)	17(30.3)	8(47.0)	10(58.8)
Nuclear sclerosis grading			
I-III	22(39.2)	6(27.2)	7(31.8)
IV-V	34(60.7)	7(20.5)	16(47.0)

Discussion:

Pseudoexfoliation is a relatively common condition that coexists in elderly patients with age related cataracts [11]. In our study the prevalence was comparable between both genders with slightly higher prevalence in males (58%). In PXF patients the small pupillary diameter and zonular instability are presumed to be the most important risk factors for capsular rupture and vitreous loss during cataract surgery [12-15]. Vitreous loss was shown to be five times more common in PXF compared to patients without this disorder [16]. It was reported that there is a ten times increase in the risk of lens subluxation, zonular dialysis or vitreous loss with zonular instability [15,17]. In our study poor pupil dilatation was seen in 35.5%of patients which was consistent with that reported in similar type of study [18,19]. Some studies reported a higher incidence of poor pupillary dilatation to be 48.4% and 94.1%[19,20]. In our study sphincterotomy was done in patients with non-dilating pupil with difficulty in nucleus prolapse. The use of intraoperative highly cohesive viscoelastics, pupil expansion devices and capsule tension rings might also increase the margin of safety. Iris prolapse and posterior capsular rent were the commonly reported intraoperative complications. Corneal edema that subsided within one to two days after surgery was the most frequently reported postoperative complication, the incidence of which is high with higher grades of nuclear sclerosis and inadequate pupil dilatation. In our study the number of patients with phacodonesis was very less 9 (11.8%) and hence we could not see any major effect on the incidence of complications with the presence of phacodonesis. Our study results also show that operating cataract eyes with PXF at early stages of nuclear sclerosis will reduce the intraoperative and postoperative complications and provide good visual outcomes. Unimproved visual acuity was seen in 1 (1.3%) patient who had higher nuclear sclerosis grading of IV-V at baseline and poor pupillary dilation. This patient also had coexisting age related macular degeneration. Most of the patients in our study achieved good visual acuity by the end of 4 weeks.

In our study we observed that the preoperative use of non-steroidal anti-inflammatory drugs maintained good pupillary dilatation. Depending on the grading of the nucleus an adequate or slightly large size capsulorrhexis with relaxing cuts minimized the stress on the zonules and the capsular bag. Meticulous hydrodissection achieved gentle decompression of capsular bag and minimized the stress on the zonules. Further the tissue handling during nucleus delivery was minimized by selecting the appropriate nucleus delivery method on an individual basis.

Treating cataract blindness worldwide continues to be a formidable challenge. It is important to increase the awareness of PXF condition in the detection and preoperative determination of patients inclined to be at greater risk for complications during cataract surgery. Significant barriers include cost, lack of population awareness, shortage of trained personnel and poor surgical outcomes. The MSICS is faster, less expensive and less technology dependent and provides excellent visual outcomes with lower complication rates and might be the preferred technique for cataract surgery in the developing world where high volume surgery is a priority [11,21] . Early diagnosis, detailed examination, anticipation of the possible complications during surgery, knowledge and surgical skills to manage such complications and meticulous postoperative follow up in cataracts with PXF can increase the success rate of the surgical outcome.

Conclusions:

Pseudoexfoliation is a risk factor in cataract surgery because of the increased weakness of zonular apparatus and reduced pupillary dilatation. Good visual acuity was observed in our study with MSICS technique in patients with PXF though it required an optimized surgery.Intra operatively iris prolapse and posterior capsule rent and post operatively corneal edema was the most commonly reported complications. Early detection and conduction of cataract surgery in the PXF patients with less nuclear sclerosis and use of highly cohesive viscoelastics, pupil expansion devices and capsule tension rings can increase the margin of safety and bring out goodvisual outcomes. Proper preoperative evaluation and postoperative follow up and the knowledge and surgical skills of handling the possible complications might help in minimizing the risk and providing a very favorable outcome in cataract surgery even in patients with PXF.

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ORIGINAL ARTICLE

Efficacy of Dorzolamide plus Timolol Maleate in the Treatment of Primary Open Angle Glaucoma Presented to a Tertiary Care Centre of Khyber Pukhtunkhwa

Mir Ali Shah[1], Mohammad Idris[1], Bilal Khan[2], Mehfooz Hussain[1], Kaleemullah[1]

ABSTRACT

OBJECTIVE: To determine the efficacy of dorzolamide plus timolol maleate in the treatment of primary open angle glaucoma presented to a tertiary care centre of Khyber Pukhtunkhwa.

METHODOLOGY: This interventional case series study was conducted in the Department of Ophthalmology, Lady Reading Hospital, Peshawar from November 2013 to July 2014 with 4 weeks follow up. A total of 153 patients presenting with primary open angle glaucoma were subjected to combination of Dorzolamide plus Timolol maleate eye drops. Efficacy was defined as achievement of 25% reduction from baseline IOP.

RESULTS: The mean age of the patients was 52.3 $\pm$ 8.4 years. The mean baseline IOP was 28.7 $\pm$ 1.78 which was reduced by 20.7 $\pm$ 3.9. The efficacy (25% reduction from baseline IOP) was observed in 46.4% patients which was statistically significant (P value 0.000).

CONCLUSION: Primary open angle glaucoma is common in females and commonest age at presentation is 52.3years. Mean baseline IOP was 28.7 $\pm$ 1.78. Fixed combination of topical Dorzolamide plus Timolol maleate is effective in the treatment of primary open angle glaucoma. *Al-Shifa Journal of Ophthalmology 2017; 13(2): 79-85. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

Introduction:

Glaucoma is the second leading cause of blindness after cataract globally as well as in most regions according to the World Health Organization survey 2002. It accounts for 12.3% of global blindness (Vision <20/200 in better eye.[1] It was suggested that an estimated 60.5 million people in the world may have glaucoma in the year 2020 [2] and glaucoma was found to be the fourth most common cause of blindness in Pakistan[3]. In Pakistan Primary open angle glaucoma (POAG) is the most common type followed by primary angle closure, aphakic, secondary and congenital glaucoma[4].

POAG is a multifactorial optic neuropathy characterized by progressive retinal ganglion cell death and visual field loss. Elevated intraocular pressure (IOP) is the only currently treatable risk factor for POAG, although a high percentage of individuals with elevated IOP do not develop glaucoma[5].

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Commonly used medical treatments for glaucoma are topical or oral agents that decrease aqueous humor production or augment outflow. Other procedures to decrease IOP include laser trabeculoplasty, incisional surgery (such as trabeculectomy and aqueous drainage device surgery), and a host of newer procedures[6]. Various classes of intraocular pressure lowering drugs have been identified in the last two decades either individually or in combination however, to improve the patient adherence and quality of life, various fixed combinations are usually advised to patients with primary open angle glaucoma[7,8]

Fixed combinations of IOP-lowering medications have been developed by combining different pharmacologic classes of ocular hypotensive drugs commonly prescribed for the treatment of elevated IOP. Modern fixed combinations pair beta-blocker with either prostaglandin analogs or carbonic anhydrase inhibitors[9]. While monotherapy with a single class of medication may be effective in lowering IOP, many patients require more than one medication for the adequate, long-term control of IOP[10]. Therefore, in clinical practice, a two-drug regimen, consisting of a topical beta-blocker in combination with a carbonic anhydrase inhibitor or prostaglandin analog, is commonly administered to patients with insufficient IOP control with monotherapy. Fixed combinations of a beta-blocker and a carbonic anhydrase inhibitor that are currently available include brinzolamide 1%/timolol 0.5% (BT) and dorzolamide 2%/timolol 0.5% (DT). In a previous clinical study, the IOP-lowering efficacy of brinzolamide/timolol was not inferior to dorzolamide/timolol in patients with open-angle glaucoma or ocular hypertension[11].

While the IOP-lowering efficacy of any glaucoma therapy is critical, selection of a suitable topical ocular medication for glaucoma also depends on other factors that may influence patient adherence to therapy, such as drop comfort upon instillation and overall tolerability[12].

The present study is designed to determine the efficacy of fixed combination of Dorzolamide/Timolol in the treatment of primary open angle glaucoma in our local population. The idea behind doing this study was subjected to our mind while observing patient turnover with POAG and failures with monotherapy. In the literature though a variety of studies are available but these are either done on insufficient sample size but also the results show to be inconclusive and controversial and cannot favor any of the drug combinations. This study will provide us with local statistics for the efficacy of DT in the treatment of POAG and we will share the results of this study and will suggest local ophthalmologists for further research and routine use of these drug combinations for the treatment of POAG.

Subjects and Methods:

Study Design: Interventional case series
Study Settings: Department of Ophthalmology, Lady Reading Hospital Peshawar.
Sample Size: 153 patients with primary open angle glaucoma.
Sampling Technique: Consecutive (non probability) sampling.
Study Duration: 06 months from 1/11/2013 to 30/07/2014 with 4 weeks follow up.
SAMPLE SELECTION
Inclusion Criteria:

- All patients with primary open angle glaucoma with baseline IOP of at least 25mmHg.
- Adults with age above 18 years
- Either gender.

Exclusion Criteria:

- Patients with history of chronic glaucoma on medical records.
- Patients with blast injuries on history.

- Any history of ocular or refractive surgery.
- History of Argon Laser trabeculoplasty.

The above mentioned conditions act as confounders and if included would have introduced bias in the study results.

The study was conducted after approval from hospital ethical and research committee. All patients meeting the inclusion criteria i.e. with primary open angle glaucoma and having baseline IOP of at least 25mmHg (as mentioned above in operational definitions) were included in the study through outpatient department. The purpose and benefits of the study were explained to all patients and a written informed consent will be obtained.

A detailed history followed by completed ophthalmologic examination done on all patients which included slit lamp examination, fundoscopy, gonioscopy and ultrasonographic bimicroscopy. Patients were subjected to fixed twice daily combination of dorzolamide 2% plus timolol maleate 0.5% (DT). All the ophthalmologic examinations and treatment supervision were done by a single expert ophthalmologist. All the patients were followed up at 4^{th} week of treatment and IOP was measured to determine the efficacy of the combination in terms of reduction of more than 25% of IOP from baseline.

All the above mentioned information was recorded in a pre designed proforma. Exclusion criteria were strictly followed to control confounders and bias in the study results. Data collection was completed and analyzed. Mean $\pm$ SD was calculated for numerical variables like age and baseline IOP and follow up IOP. Frequency and percentages were calculated for categorical variables like gender and efficacy. Chi square test was used to compare the efficacy, keeping p value of $\leq$ 0.05 as significant. All results were presented as tables.

Results:

The study comprised 153 patients of POAG which were subjected to fixed twice daily combination of dorzolamide 2% plus timolol maleate 0.5% (DT).The mean baseline IOP was 28.7 $\pm$ 1.78. (Table 1). While distributing the sample with regards to gender, 81 (52.9%) were males and 72 (47.1%) females. (Table 2). The patients were divided into four age group i.e. up to 40 years, 40.01 to 50 years, 50.01 to 60 years and 60.01 and above. POAG is more common in the age group above 40 years. (Table 3). The mean follow up IOP was 20.7 $\pm$ 3.9 (Table 4). Reduction of 20 % (efficacy) from baseline IOP was recorded in 46.4% of patients. (Table 5).

While stratifying the efficacy among gender, out of 81 males efficacy was recorded in 49.4% and out of 72 females efficacy was seen in 43% of patients. (Table 6). We also stratified the age groups wise efficacy of combination therapy. (Table 7)

TABLE NO 1: BASELINE IOP (n = 153)

	Group of the Patient	N	Mean	Std. Deviation	Std. Error Mean
Baseline IoP	DT	153	28.7739	1.78476	.14429

TABLE NO 2: GENDER WISE DISTRIBUTION OF PATIENTS (n=153)

		Group of the Patient
		Group DT
Gender of the Patient	Male	81
	Female	72
Total		153

TABLE NO: 3: AGE WISE DISTRIBUTION OF PATIENTS (n=153)

		DT
Age Groups	upto 40 years	20
	40.01 to 50.00 years	62
	50.01 to 60.00 years	35
	60.00 and above	36
Total		153

TABLE NO. 4: Mean FOLLOW UP IOP (n = 153)

	Group of the Patient	N	Mean	Std. Deviation	Std. Error Mean
Follow up IOP	DT Combination	153	20.7647	3.94336	.31880

TABLE NO. 5: Drug EFFICACY (n = 153)

		25% reduction from baseline IoP		Total
		Yes	No	
Group of the Patient	DT combination			
		71	82	
Total				153

TABLE NO. 6: GENDER STRATIFICAITON (n = 153)

		Gender of the Patient		Total
		Male	Female	
Efficacy of the Drug	Yes	40	31	71
	No	41	41	82
Total		81	72	153

TABLE NO. 7: AGE GROUPS WISE STRATIFICAITON (n = 153)

		Efficacy of the Drug		Total
		Yes	No	
Age Groups	upto 40	0	20	20
	40.01 to 50.00	41	21	62
	50.01 to 60.00	16	19	35
	60.01 and above	15	21	36
Total		71	82	153

Discussion:

IOP can be lowered by pharmacological therapy, laser therapy or surgery. The reduction in IOP achieved with a fixed combination of two agents is greater than that with either agent alone. Fixed-combination products like DT have the potential to further facilitate IOP reduction. In addition, they may reduce "washout" effects that may occur with the administration of two topical medications (where the first medication may be washed away by the second), and may provide better patient compliance.[13]

A common combination treatment for glaucoma is a fixed single dose combination of timolol maleate 0.5% (a nonselective beta-blocker) and dorzolamide 2.0% (a carbonic anhydrase inhibitor) . Combination therapy with DT has been consistently proven to be more effective in IOP reduction than monotherapy.[14,15] It has also been demonstrated that treatment with DT is as safe and effective as concomitant treatment with Timolol maleate and Dorzolamide.[16,17] The efficacy of DT has been shown in various studies to decrease IOP by 10.6%–40%, with an average of 25%–30% reduction of IOP.[18,19]

In present study, the mean IOP reduction from baseline with DT is 46.4%. One trial found that 1% Brinzolamide/0.5% Timolol maleate was superior in IOP-lowering efficacy to either brinzolamide 1% or timolol 0.5%.[20]

Previous meta-analysis including 28 randomized clinical trials evaluated the IOP lowering effects of all commonly used mono-therapies in patients with POAG, and revealed that the relative peak IOP reductions was 27% for Timolol, 25% for Brimonidine and 22% for Dorzolamide.[21] The present study found that using fixed combinations of DT is an effective choice in the treatment of POAG.

So treatment with DT caused a mean IOP reduction of 46.4%, of patients which is comparable to the results of previous studies as well.[18,22,23,24] Fixed combinations, ie, two drugs contained in a single bottle, have emerged as a treatment option, offering several advantages and fewer side effects .[25] A number of studies have evaluated the efficacy and safety of these combinations and it has been demonstrated that combinations are superior to monotherapy.[26,27]

In our study, POAG was found to be most prevalent in age group above 40 years and more prevalent in males than females. These findings are consistent with those reported from India.[28,29]

Use of two or more bottles of IOP-lowering medication may be associated with an increase in noncompliance and the advantage of fixed combinations is that a single bottle can contain up to two or three medications, thus minimizing the number of bottles and drops that need to be used by the patients and facilitating adherence to treatment. Another drawback could be that it is not possible to change the drug concentration or dosing schedule for one component medication independently of the other when using a fixed combination like DT. Further studies will be needed to determine the long-term safety and efficacy of a fixed combination of DT as well as its effectiveness in providing additional IOP-lowering over 24 hours.

Conclusion

Our study proves that in the treatment of POAG, fixed combination of Dorzolamide plus Timolol maleate is an effective treatment regime and is preferred over monotherapy. Primary open angle glaucoma is common in females and commonest age at presentation is 52.3years. Mean baseline IOP was 28.7 $\pm$ 1.78.Fixed combination of DT is effective

in the treatment of primary open angle glaucoma.

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ORIGINAL ARTICLE

Frequency of Different Types of Manifest Strabismus in Children

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ABSTRACT:

Objective: To observe the frequency of different types of manifest strabismus in children attending ophthalmology out-patient department at Al-Shifa Trust Eye Hospital Rawalpindi.

Design: Descriptive Cross-sectional study.

Duration of Study: Six months (from 1st July 2016 to 31st Dec 2016).

Patients and Methods: By using Consecutive Sampling technique, a total of 711 strabismus patients were examined attending the paediatric outpatient department of Al-Shifa Trust Eye Hospital Rawalpindi. Data was recorded on a proforma. Detailed strabismus evaluation was performed by orthoptists . All these tests were performed both at near and distance when possible. Cycloplegic refraction was performed with cyclopentolate 1% eye drops. Ophthalmic examination was carried out by paediatric ophthalmologist.

Results: The total number of patients was 711, with mean age (in years) ± SD as 5 ± 3.27. The minimum age was 3 months and maximum age was 12 years. Males were 337(53%) and females were 334(47%).The results revealed that majority of the patients had constant tropias, esotropia(ET) 30.1%, followed by exotropia (XT) 20.4%, congenital ET 14.2%, intermittent XT 12%, accommodative ET 11.8%, pseudo squint 7.7%, vertical deviation 1.3%, Duane's retraction syndrome (DRS) 0.7%, monocular elevation deficiency(MED) 0.7%, congenital fibrosis of the extraocular muscles(CFEOM) 0.6%, nystagmus 0.3%, 6th nerve palsy 0.1%) and bilateral DRS 0.1%. The congenital ET, constant ET, constant XT, intermittent XT and MED was found more common among males compared to females.

Conclusion: Comitant strabismus is more occurring than incomitant type. Most occurring types of strabismus in children are, constant ET, constant XT, congenital ET, intermittent XT and accommodative ET. *Al-Shifa Journal of Ophthalmology 2017; 13(2): 86-92. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Introduction:

Strabismus, which is also known as heterotropia, squint, and tropia, is a common ocular disorder having a prevalence of 1% to 4%[1,2]. The types of strabismus include both incomitant and concomitant strabismus. In the concomitant strabismus the angle of deviation of the eye remains the same in different directions of gaze. The types of concomitant strabismus include exotropia, esotropia, hypertropia, hypotropia and microstrabismus. In the incomitant strabismus, which is also known as complex or paralytic strabismus, the angle of deviation or misalignment varies with

the direction of gaze. The prevalence of congenital cranial disinnervation disorders is approximately 5% which comprises of CFEOM, various forms of DRS and horizontal gaze palsy[3]. The horizontal strabismus is the most prevalent form of concomitant strabismus[4]. In strabismus, when a child fixates on an object, one eye is either intermittently or constantly not aligned to the fixating point with the other eye. Consequently, the fovea of deviated eye fails to form the image of the object being fixated. Exotropia is the outward misalignment of the eye and esotropia is an inward deviation or misalignment of the eye. Similarly, an upward deviation of eye is called hypertropia and downward deviation is called hypotropia. The top inward wheel-like deviation of the eye is called incyclotorsion and the top outward wheel-like deviation of the eye is called excyclotorsion[5].

This study was conducted to find out the frequency of different types of manifest strabismus in children attending the department of pediatric ophthalmology and strabismus at Al-Shifa Trust Eye Hospital Rawalpindi.

Subjects and Methods:

It was a Descriptive Cross-Sectional study which started on 1st July 2016 and continued till 31st December 2016. The Consecutive sampling technique was used to collect the sample. After proper slit-lamp examination, patients were referred to the orthoptic clinic from OPD to rule-out any anterior or posterior segment pathology. After taking complete history of the patients, their visual acuity was recorded for each eye separately by using an age appropriate visual acuity assessment tests. It was assessed by using, teller acuity card, Cardiff cards, lea symbols, Allen pictures and the Snellen chart in older children Our orthoptists performed the detailed orthoptic examination of all children. The Bruckner reflex and Hirschberg reflex was observed by direct ophthalmoscope for the qualitative assessment of the deviation. Cover tests was performed to differentiate between heterotropia and well compensated heterophoria. For quantitative measurement of the angle of deviation, prisms were used for performing Krimsky test and Prism cover test. For infants and in children with poor fixation, evaluation was relied upon qualitative assessment. All these tests were performed at near (40cm) and distance (6m), with and without glasses (in patients having previous prescription). The EOM motility was assessed in 9 positions of gaze to see whether there is normal or abnormal muscle action. Presence or absence of diplopia was assessed and stereopsis was checked with Titmus Fly test when possible. The Worth - 4 - Dot test was used to assess sensory anomalies. Cycloplegic refraction was performed on all children by instilling 1% Cyclopentolate eye drops, 3 times in each eye, 10 minutes apart and then retinoscopy was performed. Any available previous prescription was determined by the Lensmeter. Final refraction was prescribed as full cycloplegic refraction in accommodative (hyperopic) esotropes and in myopic exotropes. Management plan also included the visual rehabilitation followed by strabismus surgery if required. The clinical eye examination was performed by the pediatric ophthalmologists which included the anterior and posterior segment examination.

Data was entered and analyzed using SPSS 22. The continuous variable was analyzed as Mean ± SD and Median, and categorical variables as Frequency.

Results:

Total patients were 711 with mean age (in years) ± SD as 5 ± 3.27. The minimum age was 3 months and maximum age was 12 years. The male to female ratio was 337 : 344 (53% : 47%).

The results revealed that majority of the children had constant tropias, ET 30.1%, followed by XT 0.4%, congenital ET 14.2%, intermittent XT 12%, accommodative ET 11.8%, pseudo squint 7.7%, vertical deviation 1.3%, DRS 0.7%, MED 0.7%, CFEOM 0.6%, nystagmus 0.3%, 6th nerve palsy 0.1% and bilateral DRS 0.1% . The frequency of constant ET, congenital ET, constant XT and intermittent XT was higher in males while accommodative ET and pseudo squint was more frequent in females. The frequency of different types of strabismus in both genders is shown in figure 1. The frequency of types of squint in different age group is given in Table1. Table 2 shows the descriptive statistics of age with respect to different types of strabismus.

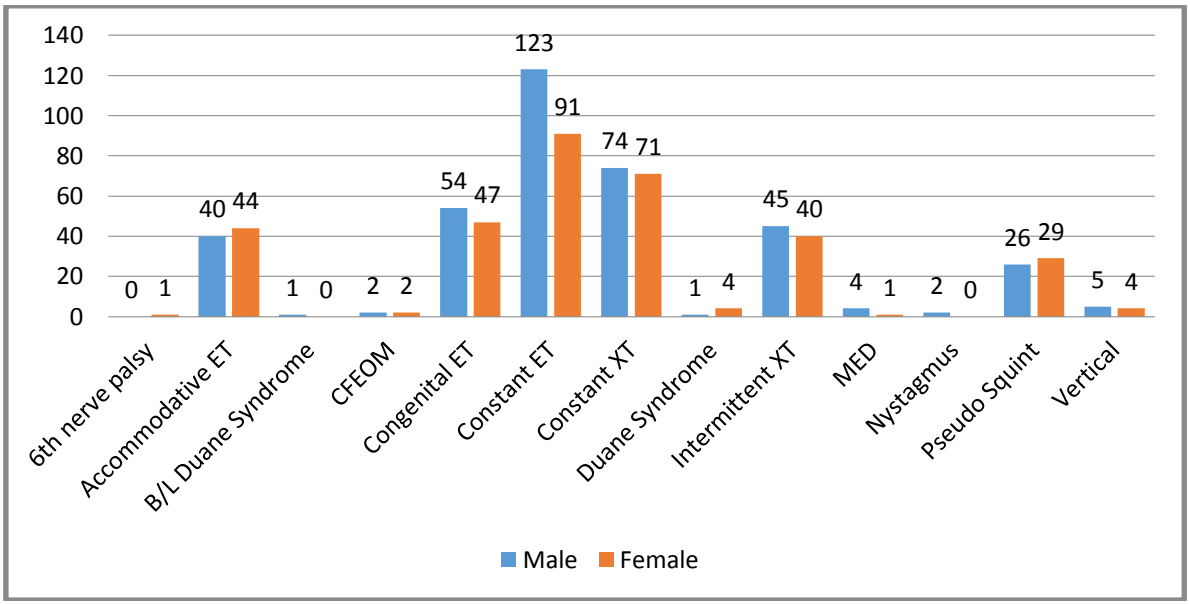

Figure 1: Frequency of different types of Strabismus among males and females

Table 1: Frequency of different types of Strabismus in different Age Groups

Diagnosis	3 month to 3 Years	4 – 6 Years	7 – 9 Years	10 – 13 Years
	N (%)	N (%)	N (%)	N (%)
6th nerve palsy	0	0	0	1 (0.9)
Accommodative ET	22 (7.6)	34 (15.9)	13 (12.9)	15 (14.2)
Bil Duane's Syndrome	0	0	1 (1)	0
CFEOM	1 (0.3)	1 (0.5)	1 (1)	1 (0.9)
Congenital ET	101 (34.8)	0	0	0
Constant ET	43 (14.8)	96 (44.9)	35 (34.7)	40 (37.7)
Constant XT	58 (20)	40 (18.7)	21 (20.8)	26 (24.5)
Duane's Syndrome	0	1 (0.5)	3 (3)	1 (0.9)
Intermittent XT	27 (9.3)	24 (11.2)	19 (18.8)	15 (14.2)
MED	2 (0.7)	2 (0.9)	0	1 (0.9)
Nystagmus	1 (0.3)	1 (0.5)	0	0
Pseudo Squint	35 (12.1)	11 (5.1)	7 (6.9)	2 (1.9)
Vertical	0	4 (1.9)	1 (1)	4 (3.8)
Total	290 (100)	214 (100)	101 (100)	106 (100)

Table 2: Descriptive Statistics of Age in different types of Strabismus

Diagnosis	N	Minimum Age (in years)	Maximum Age (in years)	Range of Age (in years)	Mean Age (in years)	SD	Median Age (in years)
6th nerve palsy	1	12	12	0	12.00	--	12
Accommodative ET	84	2	12	10	5.93	2.95	5
Bilateral Duane's Syndrome	1	7	7	0	7.00	--	7
CFEOM	4	1	10	9	6.00	3.92	6 ½
Congenital ET	101	½	3	2 ½	1.48	0.59	1
Constant ET	214	1	12	11	6.00	2.91	5
Constant XT	145	½	12	11 ½	5.24	3.34	4
Duane's Syndrome	5	5	12	7	7.80	2.59	7
Intermittent XT	85	1	12	11	5.65	3.18	5
MED	5	1	12	11	5.00	4.53	5
Nystagmus	2	1	6	5	3.50	3.54	3 ½
Pseudo Squint	55	3 months	12	11.7	3.56	2.83	3
Vertical	9	4	12	8	8.00	3.35	8
Total	711	3 months	12	11.7	4.99	3.27	4

Discussion:

Strabismus is a common paediatric eye problem with visual and cosmetic consequences. It is a common cause of amblyopia, because most deviations occur in the critical period of visual development (period of plasticity), so if it is not diagnosed and treated in time, it can cause irreversible amblyopia. Strabismus also results in confusion or diplopia in adults, because of the brain's inability to suppress one image. It leads to loss of binocularity and depth perception (stereopsis)[6].

The male to female ratio in this study is 53% : 47% is almost the same reported as 54% : 46% in another study of fifty patients from Peshawar, Pakistan[7].

The results of this study revealed that majority of the patients had constant ET, followed by constant XT, congenital ET, intermittent XT, accommodative ET and pseudo squint, vertical deviation, Duane syndrome, MED, CFEOM, nystagmus, 6th nerve palsy and bilateral Duane's syndrome. Most of the patients having strabismus were less than three years of age.

In this study the prevalence of esotropia was found more than exotropia. Among all the types of strabismus, esotropia accounted for 56% of cases, whereas the exotropia accounted for 32% of cases. Similar to the findings of this study, Tekle and Bejiga in their study conducted on pre-school children, observed that the most common type of strabismus was esotropia with a prevalence of 69% followed by exotropia having a prevalence of 24%[8]. The Baltimore Pediatric Eye Disease Study demonstrated that the prevalence of manifest strabismus was found as 3.3% among white children and 2.1% among African American children. Among both these groups the esotropia and exotropia comprised of nearly half of all forms of strabismus[9].

In a study carried out on elementary school children in Japan, Matsuo observed that the occurrence of strabismus was 1.28% among these children and the most

frequent type of strabismus was exotropia[10]. In our study, the constant esotropia was most common, accounted for 54% of all the esotropia cases. Another study revealed that among all the cases of esotropia the prevalence of fully accommodative esotropia was 36.4%[11]. It is noteworthy that in various studies carried out among East Asian population, the most common type of strabismus was exotropia. According to a survey conducted on Korean school children, among all the cases of strabismus there were 81.4% cases of exotropia and 18.6% cases of esotropia[12]. Stidwill in his study observed that the paretic strabismus accounts for 10% of all the forms of strabismus[13].

Prevalence of strabismus has been estimated through school & clinic based studies[14]. However discrepancy in disease classification and study design could be responsible for some variation in results[15]. The ratio between esotropia and exotropia in Caucasians is 60:40. Whereas in Asians, the ratio is 33:67. This difference is thought to be due to anatomical variations between these two races[16].

After conducting a number of community-based studies, esotropia has been reported five times more frequently than exotropia in Ireland and twice as frequently in Australia[17,18]. In the current study, the accommodative esotropia was found more common among females (52%) compared to males (48%), whereas, the congenital ET, constant ET, constant XT, intermittent XT and MED were found more common among males than females. In a similar study, with respect to gender, females comprised 60 to 70 percent of patients with exotropia[19].

In Pakistan, children under the age of 15 years account for 45% of the total population [20,21]. The overall estimated prevalence of strabismus in Pakistan is 5.4%[19], in US 4%[20], 2.1% among Afro-American and 3.3% in white children[14]. In our study, most of the children having strabismus were under the 3 years of age (40.8%), followed by 30% of children between 4-6 years of age, 15% of children between 10-13 years and 14% of children were between 7-9 years of age. In a study conducted by Nusz et al, the highest frequency of the patients was in the age group of 7-10 years i.e. 31%, followed by 3-6 years age group i.e. 27%. 78% of the patients were children (3-14 years). Remaining 22% were adults, indicating that concomitant strabismus is an anomaly of childhood[19]. The difference in this study can probably be attributed to the different age group considered, sampling technique used, and the racial differences between Asian and American population. Our study highlights that 70% of the strabismus was seen in children under 6 years of age. It's difficult to perform orthoptic exam in this age group as compared to older age group. It is very important for the eye departments in public and private sectors to have trained orthoptist and pediatric ophthalmologist for timely diagnosis and treatment of strabismus.

The population based study should be conducted in other hospitals with larger sample size and for longer study duration so that the exact prevalence can be estimated. We should have strabismus awareness programs for the community. This will help the parents to bring their children for eye examination as soon as they notice a slight deviation of eye in their children to prevent them from visual impairment. Similarly, it is also significant to conduct strabismus awareness workshop at the primary and secondary healthcare levels to transfer the knowledge and skills for early diagnosis and timely management of strabismus.

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ORIGINAL ARTICLE

Refractive Errors in Intellectually Disabled People at a Special School

Maria Kanwal[1], Tayyab Afghani[1]

ABSTRACT

Purpose: To assess the magnitude of refractive errors in intellectually disabled population.

Design: Cross-sectional study.

Methods: Forty children and adults who were intellectually disabled, studying in special school were enrolled in this study. Auto refraction, visual acuity, objective refraction, and subjective refraction were done. The level of intellectual disability was divided into mild (IQ 50-69), moderate (IQ 35-49), severe (IQ <34). The frequency of refractive errors was estimated as well as presence of any significant relationship between level of intellectual disability and refractive errors.

Results: A total of 40 subjects (27 boys, 13 girls; mean age 14.38 years, range 7-22 years) were enrolled in this study. There were 07 students with mild intellectual disability (17.5%), 16 with moderate intellectual disability (40.0%), and 17 with severe intellectual disability (42.5%).Visual acuity was taken by Snellen picture charts, while Cardiff Cards were applied to subjects who were unable to be tested with the Snellen picture charts. Refractive error was found to be present in 57.5% of students, in which hyperopia was 35%, and myopia in 22.5%. The other ocular problems identified were strabismus (7.5%), ptosis (5%), nystagmus (7.5%) and few others. The relationship between level of intellectual disability and refractive error was not significant as p value was more than 0.05.

Conclusion:

A high percentage of refractive errors was seen in intellectually disabled school children and adults. Children and adults with mental retardation should undergo annual eye check up. Early detection and correction of refractive error in these can bring significant improvement in their quality of life. *Al-Shifa Journal of Ophthalmology 2017; 13(2): 93-99.*

Introduction:

Ammetropia or refractive error is the state of an eye, in which the eye cannot focus distant object or an eye cannot focus parallel rays of light on the retina, when accommodation is at rest[1].

Ammetropia includes myopia, hyperopia and astigmatism. They are categorized as spherical errors and cylindrical errors. Uncorrected refractive error is the main cause of low vision and an important cause of blindness. At global level a total of 153 million people are visually impaired from uncorrected refractive errors (URE) – A prevalence of 2.67%. Eight million are blind from URE, 153 million are visually

impaired from distance vision, 1200 million are with near vision defect, and a

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total of 1353 million people are having one or other form of refractive error[2]. In Pakistan the Prevalence of visually disabling refractive errors is about 3.5–4.5% in children & 4% in the overall population. 3% of blindness is due to refractive errors. In Pakistan 50,000 people are blind because they had no access to refractive services. There are 68 million people with refractive errors in Pakistan: 41million myopic and 27 million hypermetropic. Spectacle coverage rate is 15%. 57 million people in need are not wearing spectacle, 26% of those wearing spectacles are not adequately corrected [3].

Intellectual disability (ID), once called mental retardation, is characterized by below-average intelligence or mental ability and a lack of skills necessary for day-to-day living. People with intellectual disabilities can and do learn new skills, but they learn them more slowly. There are varying degrees of intellectual disability, from mild to severe [4].

Intellectual disability affects about 2-3 percent of the general population. 75-90% of the affected people have mild intellectual disability. Non-syndromic or idiopathic intellectual disability accounts for 30–50 percent of cases. About a quarter of cases are caused by a genetic disorder[5].

IQ (intelligence quotient) is measured by an IQ test. The average IQ is 100. A person is considered intellectually disabled if he or she has an IQ of less than 70 to 75 [6]

Classification of intellectual disability with respect to I.Q [7]
Mild (IQ 50-69)
Moderate (IQ 35-49)
Severe (IQ <34)

The purpose of this study was to evaluate the refractive errors in intellectual disable children and adults which may associate with other ocular abnormality.

Subjects and Methods:

The study was approved by the ethical committee of Al-Shifa Trust Eye Hospital Rawalpindi. The principal of the special education schools with mental retardation in a Rawalpindi district were sent a letter proposing the ocular examination of all the children. Parents were requested to be present on the day of examination. The intelligence quotient was assessed by psychologist. The team consisting of senior optometrists and optometry students examined all the students. Examination was done at school. Age, sex, residential address, birth history, systemic history, ocular complaints, and previous refractive error were noted. Visual acuity was tested on Snellen chart in the language preferred by the student. E-chart was used for children who were not able to read but can interpret the symbol. Picture chart or Cardiff card was used for more disabled children. Routine ocular examination was done by ophthalmoscopy in all students, ocular motility was tested using alternate cover uncover test, cycloplegic refraction and ophthalmoscopy was performed in the indicated students. Glasses were prescribed to all children having visual acuity less than 6/9 according to the retinoscopy. Uncooperative and students needing special examination were referred to the hospital for the detailed examination. The data were entered in an excel sheet (SPSS software, 17.0) and was subjected to statistical analysis. The refractive errors were categorized according to the Intelligence Quotient (IQ) score. One-Way ANOVA was used to study the strength of association between refractive error and intellectual disability. An association between the +ive family history of students in the study and the severity of mental retardation was studied by Chi-square. P value less than 0.05 was considered significant.

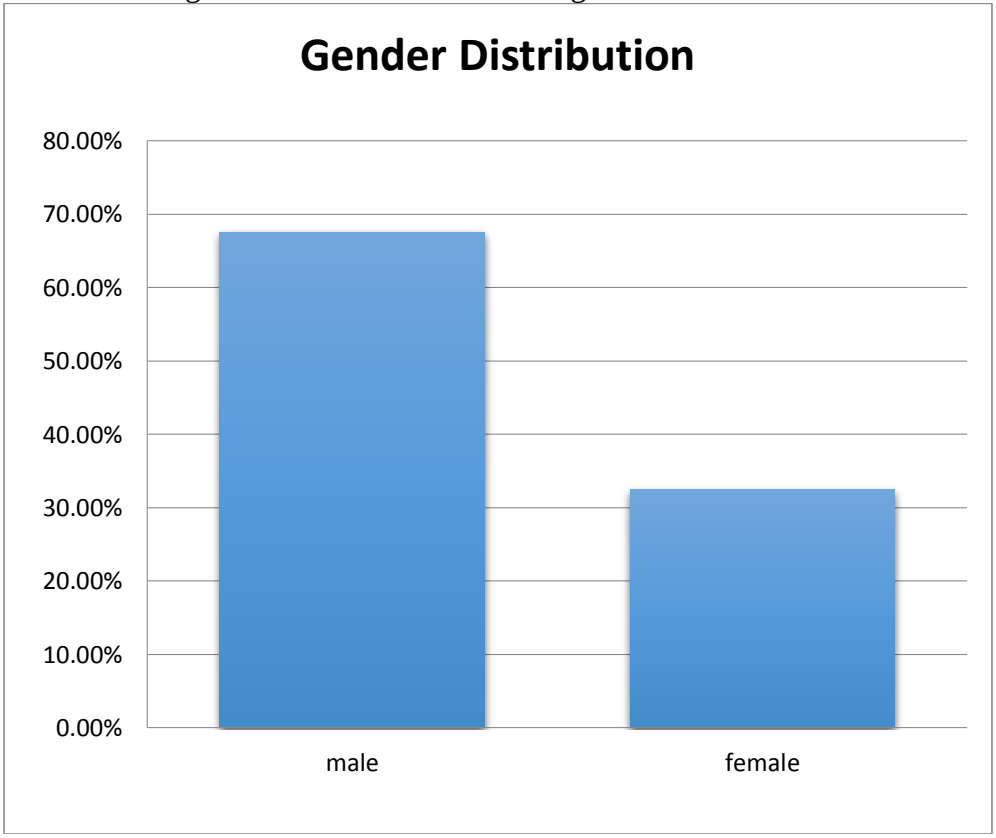
Results:

A total of 40 intellectually disable children and adults in the age group of 5-22 years

in which 67.5% were male while remaining were female, the mean age was14.38±4.06, ranging from 7 to 22 years. Among these subjects, 42.50% children and adults had severe ID while children and adults with moderate and mild ID were 40% and 17.50% respectively. The mean I.Q was 2.24±0.74 Frequency of systemic association in intellectual disable children and adults showed that 62.5% were associated with systemic diseases while remaining was not associated. Refractive error was considered in the study if retinoscopic refraction revealed an error of ≥ ±1.00 and visual acuity less than 6/9. 23 out of 40 students with ID had refractive error a prevalence of 57.5%. The mean refractive error was 1.87±2.00. Eleven students presented with ocular disorders such as strabismus, ptosis and nystagmus.

One way ANOVA was carried to assess the relation between the level of intellectual disability and refractive. There was no significant association between them (P=0.804). Relation between the level of intellectual disability and family history assessed by Chi-Square test.

Fig 1. Gender distribution among children and adults



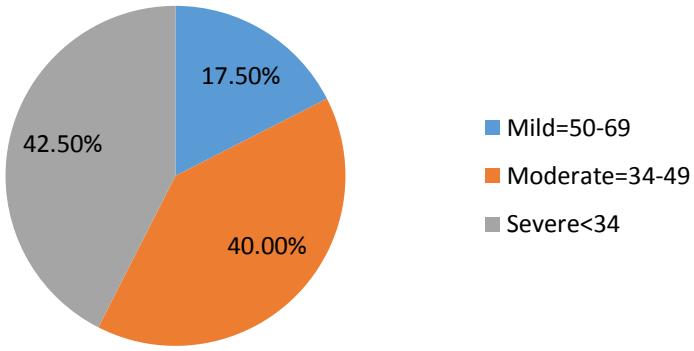


Fig 2. Level of intellectual disability of children and adults

Table 1. Frequency of systemic diseases among the subjecs

Systemic Diseases	Frequency	Percentage
Autism	1	2.5
Birth Anoxia	3	7.5
Cerebral palsy	1	2.5
Down syndrome	6	15
Dwarfism	1	2.5
Epileptic history	6	15
Hydrocephaly	2	5
Microcephaly	4	10
muscutoskeletal problem	1	2.5
None	15	37.5
Total	40	100

Table 2. Distribution of refractive errors among the subjects

Refractive Error	Frequecy	Percentage
Hypropia	14	35
Myopia	9	22.5
Emetropes	17	42.5
Total	40	100

Table 3. Associated ocular disorders

Ocular Disorder	Frequency	Percentage
Strabismus	3	7.5
Ptosis	2	5.5
Nystagmus	3	7.5
Others	3	7.5

Table 4. Show association of refractive error with level of I.Q

Intelegence Quotient/ I.Q	N	Mean	Std. Deviation	Df	F	Sig/value P
Mild (50-69)	7	2	1	2	0.22	0.804
Moderate (49-30)	16	1.9375	0.92871	37		
Severe (<34)	17	1.7645	0.90342			
Total	40	1.875	0.91111			

Table 5. Association of family history with level of I.Q

Variable	χ^2	df	p Value
Family History	5.936[a]	2	0.051

Using "**Chi-Square**" test we assessed the relation between family history and intellectual disability. We can see here that χ^2 (2) = 5.936, p = 0.051.This tells us that there is statistically significant association between positive family history and level of intellectual disability.

Discussion:

Our main objective was to rule out the refractive error in intellectually disabled children and adults, and correlate the level of intellectual disability and refractive error. Sub-objectives were to relate the family history and level of intellectual disability and frequency of other ocular abnormalities.

Visual disorders were seen in significant number of intellectually disabled children and adults. Refractive error was the common ocular problem seen in the study. The present study has found out 57.5% of refractive error. Hyperopia was the common refractive error in the study group. This correlates with the study done by Gogate et al. [8], in Indian population. Hyperopia was found in 35% of intellectually disabled children and adults, myopia in 22.5% while remaining were emmetropes. Other ocular abnormalities were seen in 27.5% of children and adults. This correlates with the study done by Joshi and Somani, according to whom the most prevalent cause of visual impairment was uncorrected ametropia. Hypermetropia of >+1.50 was found in 151 of 710 subjects (21%), and spectacles were used by 106 (15%); myopia <−1.0 was present in 213 individuals (30%) [9].

The family history was found positive in 37.5% of children and adults while remaining had negative family history. Family history played a major role in severity of intellectual disability in students. Spectacles were recommended for 13 children while remaining was referred to hospital due to severe mental retardation, poor cooperation or had very dull glow on retinoscopic examination. Eleven children were referred to ophthalmologic consultation for other ocular disorders.

The highlight of the study was the significant correlation between severity of the intellectual disability and the ocular problem suggesting high risk of getting ocular problems in severely intellectually disabled children and adults. However, no relationship was seen between the level of intellectual disability and refractive error. Such correlation was studied by Koslowe et al., in the children having Down syndrome. They have found out significant correlation between strabismus with the increased level of mental disability.

However, no correlation was seen with refractive error [10].

This study has shown a high prevalence of visual problems which were not previously detected in these children and adults. The cooperation from the parents was good. However, children in the grade of moderate and severe mental retardation took more time for the examination. Sufficient time was devoted for the examination of the children and adults by all the examiners. The drawback of the study is that, only children and adults admitted to the special schools for mental retardation were examined. This is a captive population which can make the results biased.

Conclusion:

In intellectually disable population high prevalence of refractive error was found. The prevalence of hypermetropia was greater among different types of refractive errors. Other ocular abnormalities were also associated with refractive error in some cases.

Recommendation:

- All intellectually disable population should be screened regularly for identification and management of their refractive errors in order to improve their quality of life.
- For corrective spectacles, polycarbonate lenses are most appropriate in intellectually disable population because of its high impact resistance which provides them protection.
- Accommodation is poor in Down syndrome, so near vision glasses should also be prescribed to improve near work.
- A population based study with large sample size or a multicenter study may be conducted to accurately estimate the magnitude of ocular and visual disorders in children with intellectual disability.

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ORIGINAL ARTICLE

Anatomical and Physiological Outcomes of Scleral Buckling with Subretinal Fluid Drainage

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ABSTRACT

Objectives: Evaluate the anatomical and functional outcome of scleral buckling with sub retinal fluid drainage in patients with rhegmatogenous retinal detachment.

Study Design: Descriptive Case Series.

Subjects and Methods: In this study, 80 patients (N=80) fulfilling the inclusion criteria were registered. Scleral buckling along with subretinal fluid drainage and cryopexy was performed in the studied patients. Apart from demographic data (name, age, gender), best corrected visual acuity and clinical assessment of retina (attached or detached) were recorded pre-operatively and post-operatively on 1st & 7th day and then at 4thand 6thweeks. The data was analyzed through SPSS and the study was conducted at Lahore General Hospital.

Results: Out of the studied patients (N=80), 55% (N=44) were males and 45% (N=36) were females. The average age was 49.8 years (19-65 years). The retina got attached in 88.8% (N=71) patients whereas 68.7 % (N=55) patients showed visual improvement after scleral buckling.

Conclusion: Scleral Buckling procedure combined with cryopexy and subretinal fluid drainage is an effective procedure to attain early favourable anatomical and functional outcome. *Al-Shifa Journal of Ophthalmology 2017; 13(2): 100-105. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

Introduction:

Retinal detachment (RD), defined as separation of neurosensory retina from the retinal pigment epithelium(RPE), is traditionally classified into Rhegmatogenous , Tractional and Exudative types[1]. Rhegmatogenous retinal detachment (RRD) affects 1 in 10,000 of the population each year and both eyes may eventually be involved in about 10% of patients[2].It typically affects patients between 45-65 years in general population[3].

RRD can be repaired by a number of surgical procedures, which include, scleral buckling (It is the closure of retinal breaks by scleral indentation)[4], Pneumatic retinopexy (involves injection of an expandable gas bubble into the vitreous cavity and postoperative positioning to temponade the break[5]) and Vitrectomy[6].

Scleral buckling is a surgical procedure in which material sutured onto the sclera (explants) creates an inward indentation (buckle). Its purpose is to close retinal breaks by opposing the retinal pigment epithelium to neurosensory retina and to reduce the dynamic vitreoretinal tractions.

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Explants are made up of soft or hard silicon. Explants which are used for buckling are radial, segmental, circumferential or encircling[7].

Drainage of sub-retinal fluid (SRF) during scleral buckling not only allows retina to settle on the elevated buckle mostly during surgery, but it also decreases the intraocular volume so as to allow elevation of the buckle without elevating intraocular pressure (IOP)[8]. In certain clinical conditions, like old standing retinal detachment with thick viscous sub-retinal fluid and PVR, drainage of sub-retinal becomes important part of the scleral buckling. However, SRF drainage can give rise to certain grave complications which includes retinal incarceration, sub-retinal bleeding, and hemorrhagic choroidal detachment.

In a study[9], eighty eyes underwent scleral buckling procedure with sub retinal fluid drainage for primary rhegmatogenous retinal detachment, out of which, seventy six eyes (92.7 %) achieved successful anatomical re attachment. The average visual improvement seen was three lines of Snellen's acuity chart.

Subjects and Methods:

A descriptive case series study was conducted in the Department of Ophthalmology, Lahore General Hospital, which is a tertiary care hospital affiliated with Post Graduate Medical Institute Lahore. The total duration of the study was 6 months.

A total 80 patients were taken by non-probability consecutive sampling. Patients with rhegmatogenous retinal detachment (RRD) due to equatorial or pre-equatorial break(s) were included in the study. Patients with a previous history of retinal detachment surgery**,** uncertain retinal break localization, hazy or no fundal view, multiple retinal breaks that cannot be covered with a single tier, grade C proliferative vitreoretinopathy (PVR), retinal detachment with vitreous hemorrhage and combined tractional plus rhegmatogenous retinal detachments were excluded from the current study.

The approval for the study was taken from the Ethical Committee of Lahore General Hospital. The study was conducted in the in-patients department and operation theatre of Lahore General Hospital. Informed consent was taken from all the studied patients; personal profiles of the patients (age, sex and postal address) were noted. Pre-operative proforma, which included the preoperative visual acuity, the status of retina, the location of break and the grade of PVR, was filled in. All the cases were operated upon by two surgeons. Postoperative data regarding retinal anatomical status and post-op visual acuity was collected at 1st and7th post-operative day and then after six weeks of surgery.

Standard method for scleral buckling was adopted (Band, Tier, sponge). After taking the appropriate antiseptic measures and draping the eye, a 360 degrees conjunctival peritomy was performed. The four recti muscles were isolated with the help of a squint hook and tied with 4-0 silk. A band was passed beneath the four recti muscles. Indirect ophthalmoscopy with scleral indentation was then performed, all the breaks localized and the site(s) of break(s) marked with a marking pen. The band was then tied with a sleeve and 6-0 ethibond suture. Cryotherapy was done at the site of the break(s) and a silicon tier was placed beneath the band at the site of retinal break(s). Indirect ophthalmoscopy was repeated to confirm the height of the indent and placement of the tier over the break(s). With the help of indirect ophthalmoscope, the quadrant with maximum sub-retinal fluid was marked. A 27-gauge needle held with needle holder was used to give stab incision in the sclera at the posterior border of the buckle. The intraocular pressure was maintained by holding the

recti sutures tight. After drainage, intraocular air was injected if the eye ball was found to be soft. The conjunctiva was then closed with 6-0 vicryl sutures.

Data was analyzed through SPSS system version 13. The variables were age,gender, status of retina(attached or detached) and improvement in visual acuity. The quantitative data like age and visual acuity (pre and post-op) was presented by mean and standard deviations. The qualitative data like gender, attachment of retina and improvement in visual acuity was presented by frequency and percentages.

Results:

A total of 80 patients were included in this study. Out of the studied patients, 44 (55 %) patients were males and 36 (45 %) were females. The mean age of the patients included in this study was 49.81 years ± 10.28 years. Moreover, 27 (33.75%) patients were pseudophakic, 4 (5%) patients were aphakic while 49 (61,25%) patients were phakic. A total of 63 (78.75%) patients presented with a single break while 17 (21.25) patients had more than one break. Out of 63 patients with single break, 40 (63.49%) patients had superior breaks while 13 (20.63%) patients had inferior breaks. Posterior vitreous detachment was seen in 15 (18.75) patients. Out of 80 patients, 71 patients achieved anatomical reattachment of the retina, while in 9patients; theretina remained detached on the first postoperative visit. This showed that 88.8 % of the patients had anatomical success and in 11.3% of the studied patients, the procedure failed to achieve retinal reattachment. The results are shown in both graphical and tabular form.

Out of the 80 studied patients, 55 patients showed improvement in vision. In 9 patients, there was a decrease in final visual acuity and in 16 patients; final visual acuity remained the same. The vision was improved by three Snellen Visual Acuity Chart lines in 68.8 % patients. The results are shown in both tabular and graphical form.

Table 1: Frequency and percentage of Gender

Gender	Frequencies	Percentages
Male	44	55%
Female	36	45%
Total	80	100%

Table 2: Frequency and percentage of Improvement in visual acuity

Visual Activity (improvement)	Frequencies	Percentages
Yes	55	68.7%
Decrease in Vision	9	11.3%
Same Vision	16	20.0%
Total	80	100%

Table 3: Frequency and percentage of Retina Attached

Retinal Attachment	Frequencies	Percentages
Yes	71	88.8%
No	9	11.2%
Total	80	100%

Table 4: Descriptive Statistics

Descriptive Analysis (Mean and Standard Deviation) of Quantitative Data

Variables	Sample Size	Mean	Standard Deviation
Age (Years)	80	49.81	10.28
Pre-Op Visual Acuity	80	2.625	1.08
Post-Op Visual Acuity	80	3.59	1.635

Table 5: SPSS Coding For Pre-Op and Post-Op Visual Acuity

Codes	Values
0.00	NPL
1.00	PL
2.00	HM
3.00	CF
4.00	6/60
5.00	6/36
6.00	6/24

Discussion:

The surgical management of rhegmatogenous retinal detachment (RRD) remains debatable. Although many studies have been conducted to show the effectiveness of different procedures to treat this blinding condition, however no clear consensus has been developed on the procedure of choice[10,11]. With rapid advances in minimally invasive Pars Plana Vitrectomy (PPV) and its short learning curve, there has been a growing trend towards adopting primary vitrectomy for uncomplicated RRD[12]. Scleral Buckling (SB) has multiple advantages over PPV which entails reducing the risk of cataract formation and endophthalmitis. It has faster visual rehabilitation as compared to PPV, which requires intravitreal gas or silicone oil injection[13,14].

One of the major factors determining the success of scleral buckling is the identification and closure of all the retinal breaks. Retinal break as a cause of retinal detachment, and importance of its closure to treat RRD was first postulated by Jules Gonin in 1929[13], and to this day, this factor remains the most important factor in treating a case of RRD, irrespective of the selected procedure[14]. Cryopexy, as a method to seal retinal breaks, has been

long applied and found very useful in increasing the success rate as well as decreasing the complications seen during scleral buckling procedure[15].

High grade PVR (grade C PVR) has been shown to decrease the success rate of scleral buckling procedure16. Therefore, primary vitrectomy with silicon oil injection is preferred over scleral buckling procedure to increase the likelihood of success[17].

Subretinal fluid drainage is an important step of the surgery and the author advocates that it should be carried out in every case unless there is a contraindication. It helps in precise localization of the break, quick chorioretinal adhesion and also reduces the risk of pigment dispersion and vitreoretinal retraction process[18].

The anatomical success rate after scleral buckling procedure in patients with RRD has been different in different centers. A study was conducted in India and showed an anatomical success rate of 76.8%[18]. In Iran, the success rate has been found to be around 84.6%[19], while in United Kingdom, it has been reported as 86.8%[20]. In our study, the primary success rate of scleral buckling for retinal detachment was 88.8%, which is higher than the success rate reported in the international literature.

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