The number of diabetics worldwide is likely to grow to 429 million by 2030, owing to the rising frequency of obesity, increasing life span, and improved methods of detection of the disease. The increase in Diabetes Mellitus (DM) denotes an urgency to prevent retinopathy which requires both a better understanding of the mechanism and improved means of detecting retinopathy. The treatment relies almost exclusively on managing the deranged metabolism in DM until the severity of vascular lesions, which warrants laser treatment. Intensive metabolic control remains a highly effective means of controlling retinopathy and other diabetes-related complications. Recent research has identified the central role of vascular endothelial growth factor (VEGF) in the vascular lesions and the use of new agents that block VEGF action. Despite advances in diabetes care, complications persist for various reasons. Proliferative DR and other complications develop even after 30 years in up to 20% of persons with diabetes who have been treated with intensive metabolic control.

The fact that treatment of vascular complications in the retina preserves vision in diabetics, highlights the interconnectedness of the neural retina with the retinal vasculature and the functional neurovascular unit which is considered to be the basis of molecular interaction of neural, glial and vascular cells in the retina.

**Past and Present:**

The features of DR as detected by ophthalmoscopy, were described in the 19th century. They begin with micro-aneurysms and progress into exudative changes (leakage of lipoproteins-hard exudates) and blood (blot hemorrhages) that lead to macular edema. The clinical features of DR are ischemic changes (infarcts of the nerve-fiber layer-cotton-wool spots), collateralization (intra-retinal microvascular abnormalities), dilatation of venules (venous beading), and proliferative changes (abnormal vessels on the optic disc and retina, proliferation of fibroblasts, and vitreous hemorrhage). Persons with mild to moderate non-proliferative retinopathy have impaired contrast sensitivity and visual fields that cause difficulty with driving, reading and other activities of daily life. Visual acuity declines when the macula is affected by edema, ischemia, epiretinal membranes and retinal detachment.

Fifty years ago PDR was treated by means of pituitary ablation resulting in complications related to hypopituitarism including death, prompted the development of pan-retinal photocoagulation which showed the dramatic effects and significantly reduced the severe visual loss. The incidence and the risk of progression of diabetic retinopathy have both declined over the past 30 years from 90% to 50%. The population-based Wisconsin Epidemiologic Study showed that from 1980 to 2007, the estimated incidence of proliferative diabetic retinopathy (PDR) has decreased by 77% and vision impairment decreased by 57% with type 1 diabetes and much lower risk of PDR, macular edema, and visual impairment.

These improvements have resulted from the introduction of new devices for self-monitoring of blood-glucose levels, administration of insulin, new medications, surgical interventions (including vitrectomy), an increased awareness for intensive control of glycemia and blood pressure with implementation of educational and screening programs; yet the benefits of intensive control are negated by a 33% increase in the frequency of hypoglycemia and a 100% increase in the prevalence of obesity. The percentage of persons with type 2 diabetes who meet the target levels for glycated hemoglobin, blood pressure, or serum total cholesterol have increased by 30 to 50% from 2000 to 2006, but it remains uncertain whether the lifestyle changes and
A. Anatomy of the Neurovascular Unit

Under normal conditions, blood-vessels endothelial cells and pericytes, astrocytes, Müller cells, and neurons are intimately connected to establish the blood–retina barrier to control nutrient flow to the neural retina affording energy balance, to maintain the proper ionic environment for neural signaling, to regulate synaptic transmission, and to provide adaptable responses to the environment to allow vision.

B. Disruption of the Neurovascular Unit of the Retina by Diabetes.

Panel A: shows the neurovascular unit in the retina. Pericytes and glial cells, including astrocytes, promote formation of the blood–retina barrier in the vasculature, helping to create the environment for proper neural function. Microglial processes monitor the retinal environment.

Panel B: shows how normal cellular communication is altered in diabetes, with elevated VEGF from glial cells, combined with increased inflammatory cytokines, in part from activated microglia, adherent leukocytes and the loss of platelet-derived growth factor (PDGF) signaling in pericytes, contributing to the breakdown of the blood–retina barrier and, in some cases, to angiogenesis. Blocking VEGF signaling has provided new therapeutic options to improve the treatment of patients with diabetic retinopathy and restore the neurovascular unit. In addition to microvascular complications, the loss of insulin receptor signaling and damage from inflammatory cytokines may contribute to synaptic degeneration and neuronal apoptosis and impairment of visual function in patients with diabetes.
urbanization in developing countries will result in uncontrolled glycemia, blood pressure, and lipid levels.

Major Pharmacologic studies have revealed that the metabolic control, the renin-angiotensin system, peroxisome proliferator activated receptor \( \delta \) (PPAR-\( \delta \)), and VEGF contribute to human pathophysiology. Notably, renin-angiotensin system inhibitors reduce the incidence and risk of progression of DR in persons with type-1 diabetes and is now a standard therapy. The PPAR-\( \delta \) agonist fenofibrate, reduces the risk of progression by 40% among patients with non-proliferative retinopathy. However, the mechanism of action underlying this preventive effect of fenofibrate is related to its lipid-lowering action remains unclear.

Use of the VEGF-neutralizing antibodies bevacizumab and ranibizumab improves visual acuity in 25 to 30% of patients. These improvements are significantly better than the results of laser treatment alone. Sustained intravitreal delivery of glucocorticoids such as fluocinolone yields a similar improvement with a 60% increase in the risk of glaucoma and a 33% increase in cataract. The same implant technology delivering a lower dose of fluocinolone did not increase the risk of cataract or glaucoma, it certainly reduces retinal inflammation and may restore the integrity of the blood–retina barrier. These initial treatments for DR reflect the gains in our understanding of how diabetes impairs vision and set the stage for further advances.

**The Neurovascular Unit:**

New insights into retinal physiology suggest that the retinal dysfunction associated with diabetes may be viewed as a change in the retinal neurovascular unit, refers to the physical and biochemical relationship among neurons, glia and specialized vasculature and the close interdependency of these tissues in the central nervous system. The glial-cell, pericyte, and neural interactions promote formation of the blood–brain and blood–retina barriers, which control the flux of fluids and bloodborne metabolites into the neural parenchyma. Neurodegenerative conditions such as Alzheimer’s and Parkinson’s disease alter the neurovascular unit, with changes in neural function, neurotransmitter metabolism and loss of the blood–brain barrier. If the neurovascular unit is similarly involved in diabetes, then new therapeutic approaches addressing both vascular dysfunction and neural degeneration may be required.

The fact that treatment of vascular complications preserving visual acuity, highlights the interconnectedness of the neural retina with the retinal vasculature - the functional neurovascular unit which is considered to be the basis of molecular interaction of neural, glial and vascular cells in the retina.

Improved outcomes of treatment for cancer have resulted from advances in *clinical trial end points* that reflect the pathophysiology of the disease, such as molecular biomarkers of tumor activity and positron-emission–tomographic scanning. Likewise, new end points reflecting the pathophysiological features of diabetic retinopathy are needed for sensitive, quantitative, and predictive assessment of the severity of retinopathy. Vascular lesions change slowly, and photographic staging alone cannot facilitate short-term (<1 year) proof-of-concept trials to evaluate pathophysiological mechanisms and therapies.

Standard measures are now being supplemented with sensitive indexes of retinal function and structure to determine the nature of early retinopathy. Flavoprotein spectrophotometry reveals defects in mitochondrial metabolism. Reduced electroretinographic responses suggest reduced cellular signal transmission, predict subsequent microvascular lesions and responses to improved metabolic control. Subtle defects in visual function are detected by contrast sensitivity and visual-field defects. Optical coherence tomography (OCT) detects thinning of the neuronal and synaptic layers of mild retinopathy. In fact, the retinal architecture confers unique characteristics to the neurovascular unit. The inner retina has capillary beds in the ganglion-cell and inner nuclear layers. The neurovascular unit includes astrocytes and Müller cells, amacrine and ganglion neurons which reside in close proximity to microvascular segments that deliver oxygen and nutrients.

**Summary:**

Molecular causes of diabetic retinopathy reveals changes affecting all cells within the retina, including those in the microvasculature, glia, neurons, and microglia. These changes in the retina, which can be viewed as a disruption of the neurovascular unit, contribute to the pathophysiology of diabetic retinopathy. Intraocular administration of VEGF inhibitors and glucocorticoids has launched an era of biologically based pharmacologic treatment that complements surgical approaches for advanced stages of retinopathy. Further advances require an understanding of how the metabolic changes in diabetes disrupt the neurovascular unit, as well as focused efforts to develop clinical-trial end points and biomarkers. The expected increase in diabetic retinopathy due to the increasing incidence of type 2 diabetes requires the elimination of socioeconomic barriers so that research advances can be translated into effective and accessible care for all persons with diabetes. Continued epidemiologic surveillance is needed to determine trends, properly allocate resources, and develop cost-effective preventive interventions.
REFERENCES

Prof. M. Yasin Khan Durrani
MBBS., DO., MD., FRCOphth(Lond)
Editor in Chief
267-A, St: 53, F-10/4, Islamabad, Pakistan.
E.Mail>ophthalmologyupdate@gmail.com
Phones: 0092 333 5158885
Visual Outcome for Distance & Near without Glasses after Phacoemulsification with Array Multifocal Intraocular Lens*

Amber Zahid FCPS1, Intzar Hussain FCPS, FRCS2, Saqib Siddiq FCPS3
Khalid Jamal MBBS4, Prof M Tayyib FRCS, FRCOphth5

ABSTRACT:

Purpose of Study: To assess the visual outcome for distance and near without glasses after phacoemulsification with implantation of Array multifocal intraocular lens implantation.

Patients and Methods: This quasi experimental study was carried out at department of ophthalmology, Services Institute of Medical Sciences & Services Hospital Lahore from 21st January 2009 to 21st April 2010. Thirty eyes of twenty six patients were operated for cataract by phacoemulsification with Array multifocal IOL.

Results: Age of patients ranged from 22-60 years with mean of 58.1 ± 14.8 years. Preoperative best corrected distance visual acuity ranged from 6/9 to counting fingers. Postoperatively 100% patients achieved uncorrected distance visual acuity from 6/6-6/12 and 100% achieved uncorrected near visual acuity from N6-N10. Spectacle independence was encountered in 40% eyes. 60% eyes had uncorrected near vision range from N8-N10. Most of patients were satisfied with their vision post operatively however 32% reported different visual aberrations at night.

Conclusion: Array multifocal intraocular lens improves functional vision both for distance and near

Key Words: Phacoemulsification, multifocal intraocular lens, cataract surgery.

INTRODUCTION

Phacoemulsification with foldable intraocular lens is the standard and popular surgical procedure of cataract extraction over the past two decades.1 The aim of modern cataract surgery is rapid visual rehabilitation and the best uncorrected visual acuity both for distance and near.2 Currently available monofocal intraocular lens focus at one fixed distance either far or near. Therefore no matter what’s the age of patient is, his near visual acuity is significantly impaired after surgical intervention despite good recovery of distance visual acuity due to loss of accommodation.3 Even with best surgical results patient requires spectacle correction for near vision postoperatively.

To overcome this problem different types of intraocular lenses have been evolved. One of them is multi-focal intraocular lens that provide refractive correction for both distance and near simultaneously.4

The original concept of multi-focal IOL was based on the principle that pupil tends to constrict for near task so central portion of lens was designed for near and outer portion for distance.5 The disadvantage was that in bright light when pupil constricts the distance correction was not available. Now current designs solve this problem by having central and outer zones for distance correction and intermediate zones for near correction.

Array is the first multi-focal intraocular lens approved by Federal drug administration for use after cataract extraction. It uses five refractive concentric zones on its anterior surface to provide distance, intermediate and near vision. The rationale of this study was that mostly mono-focal intraocular lenses are implanted in patients after cataract surgery but post operatively patients require spectacle correction for near vision. This study was designed in our set up to evaluate array multifocal lens in terms of improvement of vision both for distance and near with reduced spectacle dependence.

MATERIAL AND METHODS

This interventional, quasi experimental study was conducted at department of Ophthalmology, Services Institute Of Medical Sciences & Services Hospital, Lahore form 21-01-2009 to 21-04-2010. Thirty eyes of 26 patients were recruited from outpatient department by non-probability purposive sampling who were advised phaco-emulsification with foldable intraocular lens above the age of 20 years. Patients were excluded from...
the study having any co-existing ocular disease, traumatic cataract or who had any complication during surgical procedure. Professional night drivers, obsessive or highly critical patients, professionals with high visual demands and patients expected high residual postoperative astigmatism were also excluded. Demographic profile for various patients including age, gender and address were noted.

A detailed history was taken from the patients. Detailed ocular examination was performed including measurement of visual acuity by Snellen chart with or without glasses, slit lamp for detailed anterior segment examination, IOP measurement and dilated fundus examination. Maximum pupillary dilatation was also determined. The type and density of lens opacities were noted.

A written consent was taken. Standard preoperative biometric measurement was taken using automated keratometry and A scan. The IOL power was calculated with SRK/T formula. Phaco-emulsification with Array multifocal intraocular lens implant was done by one surgeon so as to maintain uniformity and control the confounding variables. The procedure was carried out under local anaesthesia. Patients were advised to use combination of dexamethasone and Tobramycine topically in tapering dose postoperatively.

Postoperative follow up was done on 1st postoperative day, 1st postoperative week,1st and 3rd postoperative month.

At each visit, distance vision using Snellen chart and near vision using near vision chart was measured. Slit lamp examination was also performed for anterior segment on each visit.Data was analysed with the help of computer software program, Statistical Package for Social Sciences (SPSS) Version 10.0.

RESULTS

There were twenty six patients of whom thirty eyes underwent phaco-emulsification, Four patients had bilateral Array multifocal IOL implants while in twenty two patients only one eye was operated. The age of patients ranged from 22-80 years with mean of 58.1±14.8 years (Table-1). Sixteen were male (61.53%) and ten were female (38.46%) as shown in graph 1.No surgical complication such as posterior capsular rupture, suprachoroidal haemorrhage and endophthalmitis was reported among the patients.

Preoperative best corrected distance vision range was from6/9 to counting finger whereas near vision ranged from N8 to worse than N36. The best corrected distance visual acuity that could be achieved was 6/6 and near visual acuity was N6 at three months. Post operative unaided distance visual acuity at 1st week was 6/18 in two eyes (6.66%), 6/12 in four eyes(13.33%), 6/9 in eight eyes(26.66%) and 6/6 in sixteen eyes.(53.33%) At first and third month postoperative follow up unaided distance vision improved to 6/12 in five eyes (16.66%), 6/9 in seven eyes (23.33%) and 6/6 in eighteen eyes (60%). Final visual acuity that was at 3 months post operatively is shown in graph 2. This shows eighteen eyes (60%) had 6/6 unaided distance vision. The remaining twelve eyes (40%) also improved to 6/6 with glasses. Eighteen out of thirty eyes (60%) had uncorrected near vision range from N8-N10. They improved to N6 with correction. Twelve eyes (40%) were N6 without correction (graph 3). Five patients reported glare at night (16%), three patients reported halos around light (10%) and two patients reported streaks of lights (6%). These visual symptoms were more troublesome at night (graph 4). Total spectacle independence was achieved in twelve eyes (40%). The frequency of spectacle wear post operatively was measured at 3 levels. Spectacle dependence was encountered in 7 eyes (23.33%) for near most of the time. In 11 eyes (36.66%) of 11 patients spectacles were required sometimes for near (Table 2).

DISCUSSION

The goal of modern cataract surgery is rapid visual rehabilitation without complication and low or no postoperative refractive error.Conventional mono-focal IOL offer excellent distance visual rehabilitation, however most patients require reading glasses for near task. The restoration of near vision in pseudophakic patients without spectacles is the most challenging task of modern cataract surgery.

Multi-focal IOLs overcome this problem using the principle of simultaneous vision. Clinically multi-focal IOL have been reported to provide patients with functional near and distance vision with acceptable satisfaction. A study by Weghaupt et al has showed that

<table>
<thead>
<tr>
<th>Table 1. Distribution of patients according to the age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age Group</td>
</tr>
<tr>
<td>≤40 Years</td>
</tr>
<tr>
<td>41 – 55 Years</td>
</tr>
<tr>
<td>56 – 70 Years</td>
</tr>
<tr>
<td>&gt; 70 Years</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2. Spectacle dependence (Eyes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Sometimes</td>
</tr>
<tr>
<td>Most of the time</td>
</tr>
<tr>
<td>All the time</td>
</tr>
</tbody>
</table>
results for distance and near visual acuity are very satisfactory with a diffractive multi-focal IOL, whereas for intermediate distance visual acuity may be limited to activities that do not require optimal vision. In our study Array SA 40N refractive multi-focal IOL were implanted in thirty eyes. The results are comparable to results reported in literature in terms of efficacy and safety at three months after surgery. Our study showed total spectacle independence in about 40% of patients.

Evidence reported by Shoji et al\(^4\) showed that implantation of Array IOL in the dominant eye could have a better visual outcome as compared to non-dominant eye. In our study we couldn’t draw this conclusion, because the numbers of eyes dealt with were small and dominance of eyes with unilateral implantation couldn’t be ascertained.

Good performance on static reading chart cannot simulate the real performance of an IOL. Patients implanted with Array SA 40 multi-focal IOL have reported that they can read fine print in magazines and can perform various tasks without glasses\(^5\). Our study demonstrated that almost all our patients could perform daily living tasks without glasses after Array implantation, but for fine work like reading, sewing etc., patients require near glasses most of the time. Although our patients achieved satisfactory level of unaided distance and near vision, frequent complaint was about experiencing mild halos around light, slight general blur and overall reduction in clarity. Sen HN et al in 2004 also reported in their study about increased perception of halos and lower contrast sensitivity by subjects with Array multi-focal intraocular lens implants\(^6\). However they found that slightly lower contrast sensitivity and increased perception of halos appeared to be an acceptable compromise to enhanced near and distance vision in subjects with multifocal lens implant\(^7\).

For the implantation of multi-focal lens besides good surgical strategy, patients education and counselling is very important\(^8\). In our study it is observed that younger patients adapted to this new visual environment more readily as compared to older patients. Finally patients need to have reasonable expectation. The multi-focal IOL implantation reduced the dependency on spectacles, but not completely eliminating them\(^9\). CillinoS et al\(^10\) reported in their comparative study about spectacle independence. It was 20% in monofocal IOL group, 53.3% in refractive multifocal IOL group and 87.5% in diffractive multifocal IOL group. They found that in comparison to monofocal IOL, multifocal IOL provide greater depth of focus and higher patient satisfaction. Steinart et al\(^13\) reported that a significantly higher proportion of bilateral multi-focal (81%) could function comfortably.
without glasses at near compared with mono-focal subjects. However we found in our study that unilateral multi-focal implant also function as comfortable as the bilateral multi-focal implant.

In our study Array multifocal IOL which is a refractive IOL yields total spectacle independence in about 40%. It improves the quality of life in active and motivated patients who wish to reduce their dependence on glasses. With on-going innovations in IOL technology patients will benefit from better quality of vision and enjoy less dependence on spectacles.

CONCLUSION
Array multifocal intraocular lens improves functional vision both for distance and near after cataract surgery.

REFERENCES
Analysis and Efficacy of Dacryocystorhinostomy performed with Nasal Endoscope & its Advantage over External Dacryocystorhinostomy

Hashim Imran¹, Rizwan Ullah Chattha², Sarfraz Latif³, Naveed Aslam⁴

ABSTRACT:
Objectives: To analyze the results of Dacryocystorhinostomy performed with nasal endoscope by performing the follow up for one year and detecting its advantages over the conventional methods.
Study design: Hospital based prospective interventional study.
Place and duration of study: This study was conducted at Eye & ENT departments of Sargodha Medical College Sargodha and Sheikh Zayed Hospital, Lahore between January 2008 to July 2011
Method: The study group comprised of 30 patients who were referred by Ophthalmologist. 28 of them were females, age ranging from 12 to 60 years. These Patients were not ready to give consent for external scar. Their presentation was with complaints of epiphora, sac swelling and pain around medial canthus. These patients underwent endoscopic Dacryocystorhinostomy and tried to preserve the mucosal flap.
Results: These 30 patients remained in one year follow up and success rate was seen about 76%
Conclusion: Endoscopic Dacryocystorhinostomy is good choice to avoid external facial scars in females. Other nasal pathologies are addressed simultaneously. The procedure is safe and having less complications. It is highly indicated in young females
Key words: Nasal endoscope, dacryo cystitis, epiphora, dacryocystorhinostomy, Nasolacrimal duct.

INTRODUCTION
Nasolacrimal duct obstruction can occur anywhere in the lacrimal drainage system. It most commonly occurs at the distal end of the nasolacrimal duct at the membrane of Hasner (ie, the unopened valve of Hasner). Patients with Nasolacrimal duct obstruction present with a history of chronic or intermittent tearing, debris on the eyelashes (mattering), and occasionally redness of the conjunctiva. On physical examination, there may be an increase in the size of the tear meniscus. Palpation of the lacrimal sac may cause reflux of tears and/or mucoid discharge onto the eye through the puncta. If tearing is intermittent, and none of the above signs are present at the time of examination, the dye disappearance test can be performed to help confirm the diagnosis.

A dacryocystoce le (also known as dacryocystocele, amniocyst, or nasolacrimal duct cyst) is produced when both the proximal and distal portions of the nasolacrimal system are obstructed. The proximal obstruction typically occurs in the common canaliculus or at the valve of Rosenmuller. The proximal obstruction is a one-way valve that permits tears to enter, but not to reflux out of the canaliculi of the lacrimal drainage system. Dacryocystoceles usually are noted at or shortly after birth. A bluish swelling of the skin overlying the lacrimal sac and superior displacement of the medial canthal tendon occurs. The diagnosis can be confirmed by CT, though the diagnosis is usually obvious clinically and further work-up unnecessary. Acute dacryocystitis, indicated by erythema and tenderness of the dacryocystoce le, swelling and fever, or altered behavior. Acute dacryocystitis is a medical emergency in a newborn infant, and it must be treated promptly to prevent the development of secondary preseptal or orbital cellulitis, sepsis, meningitis, or brain abscess. Distension of the mucosal lining of the nasolacrimal duct through the entrapment of tears. The swelling may distend into the nose, forming a mucoce le, which can lead to nasal obstruction and respiratory distress in infants who are obligate nose breathers.

Decompression of a dacryocystoce le usually can be achieved with digital massage or probing of the lacrimal canaliculus and duct. Untreated, infection often ensues. The Nasolacrimal duct obstruction component is treated as it is in older children. In addition, intranasal mucoceles, if present, must be drained to relieve nasal obstruction. Drainage of
intranosal mucoceles is typically performed in the operating room under general anesthesia, with the aid of a nasal endoscope. Adeo Toti was the first surgeon who described the external Dacryocystorhinostomy in 1904. The original intranasal approach was described by Caldwell in 1937. Endoscopic dacryocystorhinostomy was first performed by Rice in 1988. Since this description, a number of modifications using LASER have also been described as a useful tool in endoscopic Dacryocystorhinostomy. In external Dacryocystorhinostomy surgeon is unaware of the size of middle turbinate, infected ethmoid sinuses, deflected nasal septum. In endoscopic Dacryocystorhinostomy we can save the external skin incision and medial canthal anatomy. This procedure is gaining popularity due to availability of endoscopes having different angles. By routine use of nasal endoscopes ENT surgeon are well familiar with the anatomy of lateral wall of Nose.

MATERIAL AND METHODS:

30 patients were presented to Ophthalmologist for complaint of epiphora and/or medial canthal swelling, 28 of them were females. All patients underwent detailed nasal examination with rigid nasal endoscope in OPD. Patients with deflected nasal septum, nasal adhesions and inflamed Ager Nasi cells were included in study. The cases with pre-saccal blockage were excluded.

All patients were operated under G/A at DHQ Teaching Hospital Sargodha and at Shaikh Zayed Hospital, Lahore. 30 minutes before the surgery bilateral nasal packing was performed which was impregnated with 4% xylcaine and 1:10000 adrenaline. After G/A induction, detailed examination of the nose was performed with 0 and then 30 degree nasal endoscopes. Lateral wall of nose on diseased side injected with 2% xylcaine with adrenaline in 1:200,000. Aim is to perform hydrostatic dissection and local vasoconstriction.

With the help of sickle knife, incision is given starting from anterior to axilla of middle turbinate in downward direction in the form of curve. With Frères elevator, mucosal flap elevated. Karrison bone punch is made to push on bone and let it enter in to thin bone overlying the sac area. Pieces of bone are removed bit by bit. The job of bone removal is performed from inferior to superior direction. While reaching at axilla of middle turbinate, there is hard bone of frontal process of maxilla, sometimes it is very difficult to remove with punch, chisel and hammer can be used for removal of hard piece of bone. Electric drill is another good option. After removal of bone, irrigation and suction is performed inside the nasal cavity and medial wall of sac is tried to visualized. Sac is confirmed by putting pressure on medial canthus and sac movements are observed. With sickle knife vertical incision is given lumen of sac visualized. Blunt probe is inserted inside the lumen and adhesions cleared if any. With the help of Blaksleys forceps, wall of sac and mucosal flap trimmed. Now the surgeon performs water irrigation in to canaliculated and free flow of water is seen inside the nasal cavity.

Clinical features of NLD obstruction may include chronic or intermittent tearing, debris on the eyelashes, increased tear meniscus, reflux of tears and mucoid discharge through the puncta with palpation of the lacrimal sac, and redness of the conjunctiva. Clinical features of dacryocystocele include a bluish swelling of the skin overlying the lacrimal sac and superior displacement of the medial canthal tendon. Acute dacryocystitis, manifest by erythema, swelling, warmth, and/or tenderness of the lacrimal sac, which can be managed in consultation with an ophthalmologist.

RESULTS

30 cases were collected and underwent endoscopic dacryocystorhinostomy, all of them had free flow of saline through newly built window. This was considered as successful criteria. Patient kept in follow up for one year and observed for epiphora and sac swelling. 8 patients had recurrence of symptoms in 6 months follow up. Endoscopic examination revealed either they were having adhesions or granulations inside the stoma. Out of these 8 patients 3 patients got their symptoms relieved by removal of adhesions or granulations under L/A.

<table>
<thead>
<tr>
<th>Complaints</th>
<th>No of cases</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epiphora</td>
<td>21</td>
<td>19</td>
</tr>
<tr>
<td>Acute infection</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Sac abscess</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

Success rate is 76%.

DISCUSSION

The lacrimal drainage system begins by forming at approximately 6 weeks of gestational age as a depression, teemed the lacrimal groove. A solid cord of ectoderm is eventually buried as the mesoderm develops and extends from the eyelid to Nose. Canalization of the cord begins at approximately 3.5 months of gestational age and is usually completed at or near the time of birth, with the lower level of the system being last to open. Anomalies may occur any where in the course of system.

Atresia of the nasolacrimal duct or dacryostenosis is the most common cause of epiphora in paediatric population. It is thought to result from failure of
canalization of the column of epithelial cells that form the nasolacrimal duct. The most common site of obstruction is at the mucosal entrance to the nose under the inferior turbinate. Probing of the nasolacrimal duct is the standard therapeutic procedure in the management of nasolacrimal duct obstruction, if it fails then further can be proceeded to invasive procedures. In eye clinics epiphora is a common complaint. Most of the Ophthalmologist refer such cases to ENT colleagues for nasal examination. Some Ophthalmologist try to perform syringing and passage of saline on irrigation is shared with ENT consultant. In present study, we collected 30 patients and all of them were females, ranging from 12 to 60 years. The success rate of 76% depends upon providing a wide intranasal stoma with removal of adequate bone around the stomal area. The complications like secondary canicular stenosis, sump syndrome, distal stenosis and adhesions between septum and lateral wall were not seen. Endoscopic dacryocystorhinostomy avoids external incision hence save the facial skin from scar. It preserves the pumping action of orbicularis oculi muscle. In our study we also found that 20% of patients needed concomitant nasal procedures. Although if there are reports of successful DCR with powered instruments and laser but in our study we performed all cases with conventional instruments without using laser.

CONCLUSION:

Endoscopic Dacryocystorhinostomy is good choice to avoid external facial scars in females. Other nasal pathologies are addressed simultaneously. Although it is having failure in reasonable percentage but with the help of powered instruments and LASER we can improve it further.

REFERENCES

Treatment of Macular Edema in Retinal Vein Occlusion: How Forward we are?

Prof. Marianne L. Shahsuvaryan*
Yerevan State Medical University, Yerevan, Armenia

ABSTRACT: Retinal Vein Occlusion (RVO) is the most common visually disabling disease affecting the retina after diabetic retinopathy. Although the disease entity has long been known, its management is still controversial. Macular edema is the main reason for decreased visual acuity in RVO. Recently the vitreous cavity has increasingly been used as a reservoir of drugs for the direct treatment of macular edema through intravitreal injection route. The most widely injected drugs so far has been triamcinolone acetonide and bevacizumab. The objective of this review is to evaluate new medical and surgical treatment modalities aimed at reducing macular edema due to central retinal vein occlusion (CRVO) and branch retinal vein occlusion (BRVO), including intraocular injections of steroids and anti-vascular endothelial growth factor agents, vitrectomy, sheathotomy, and to discuss controversies and future treatment options.

Keywords: retina, central retinal vein, branch retinal vein, occlusion, secondary macular edema, surgical treatment, medical treatment, intravitreal injections.

INTRODUCTION:
Retinal vein occlusion (RVO) is the most common visually disabling disease affecting the retina after diabetic retinopathy. Although it is more common in the middle-aged and elderly population, no age group is immune to it.

In spite of the fact that the clinical entity of RVO has been known since 1878, its management still remains highly controversial. The pathogenesis of RVO is multifactorial with both local factors and systemic diseases being etiologically important. Many case-control studies have examined the clinical features and risk factors in this disorder. Known risk factors for RVO include systemic vascular disease, hypertension, diabetes mellitus, hyperlipidemia and glaucoma. Hypercoagulable states are associated with RVO. These include primary hypercoagulable states with a defect in the physiological anticoagulant mechanism and secondary hypercoagulable states, which are conditions, associated with an increased risk of thrombosis. There are still gaps in understanding the aetiology and pathogenesis of circulatory disorders of the central retinal vein and its branches.

Although various new therapeutic approaches have been developed in the past few years, existing therapy forms are subject to controversy and available data to same extent inconsistent. Over the years, many treatments have been advocated enthusiastically and success has been claimed. Except for a few prospective studies, all the reports are based on retrospective collection of information or on limited personal experience. Most of the reported studies have a variety of limitations, which make it hard to evaluate the claimed benefits.

Macular edema is the main reason for decreased visual acuity in RVO. Macular edema is a common sight-threatening response of the retina. It involves the breakdown of the inner blood-retinal barrier and consists of an abnormal vascular permeability resulting in fluid accumulation and macular thickening, detectable by optical coherence tomography (OCT).

The objective of this review is to evaluate new medical and surgical treatment modalities aimed at reducing macular edema due to central retinal vein occlusion (CRVO) and branch retinal vein occlusion (BRVO), and to discuss controversies and future treatment options. The main treatments can be divided into three categories: medical, surgical and laser.

MATERIAL & METHODS

MEDICAL TREATMENT

i) Intravitreal Drug Administration:
Recently the vitreous cavity has increasingly been used as a reservoir of drugs for the direct treatment of macular edema through intravitreal injection route.

ii) Intravitreal tissue plasminogen activator:
In a retrospective review of 17 eyes with BRVO Murakami et al. treated subjects with the fibrinolytic agent intravitreal tissue plasminogen activator (tPA)
and claimed that visual acuity (VA) significantly improved and foveal thickness significantly decreased. They concluded that intravitreal tPA injection may be an effective treatment for resolving macular edema and improving the VA in BRVO. This report is based on retrospective collection of information and on limited personal experience.

iii) Intravitreal Corticosteroids

a) Triamcinolone Acetonide

The SCORE (Standard care vs. Corticosteroid for retinal vein occlusion) study, sponsored by the National Eye Institute (NEI) consists of 2 multi-center randomized, controlled clinical trials comparing the safety and efficacy of standard care with IVTA in either a 1 or 4 mg dose for vision loss associated with macular edema secondary to CRVO or BRVO\(^{11,12}.\) In the CRVO trial, standard care therapy is observation. Retreatments are considered for persistent or new macular edema at 4-month intervals.

The SCORE-CRVO study\(^{61}\) showed that both triamcinolone groups were superior to observation with respect to VA. The visual benefit of IVTA was demonstrated as early as 4 months and continued to 24 months; although there was less power at this point, the benefit appears to persist. However, in all 3 groups (1mg IVTA, 4mg IVTA or observation, there was a reduction of central retinal thickness from baseline to 24 months. Therefore, the visual benefit of IVTA may be due not only to macular edema decrease, but also to other effects, such as anti-inflammatory or neuroprotective effects. The study report 5 also evidenced the superior safety profile of the 1-mg dose compared with the 4 mg dose, particularly with respect to surgical complications. They stated that patients with non-ischaemic CRVO may respond more favorably than patients with ischaemic CRVO and further study with longer follow-up period is necessary.

In SCORE-BRVO\(^{12}\) IVTA injections was not found to be associated with improved VA outcomes compared with grid photocoagulation, being the standard care. The rates of adverse events were highest in the 4mg triamcinolone group. The rates of adverse events in the 1 mg TA group were similar, with respect to surgical intervention for cataract and glaucoma, to the laser group, but laser treatment excluded any possibility of injection related adverse events. The SCORE Study Investigative Group concluded that grid photocoagulation should remain the benchmark against which other treatments are compared in clinical trials for eyes with vision loss associated with macular edema secondary to BRVO.

b) Dexamethasone

The Ozurdex (Allergan Inc., Irvine, CA, USA) dexamethasone drug delivery system (DDS) was recently developed and approved by the FDA as a biodegradable intravitreal implant to provide sustained delivery of 0.7 mg dexamethasone for the treatment of macular edema associated with RVO\(^{13,14}.\)

Haller et al.\(^{15}\) concluded that for patients who have relatively short duration of macular edema, Ozurdex should be considered a viable treatment option. Increases in IOP were generally transient and similar following each treatment. Cataract adverse events occurred in 26% of patients treated with two injections and in 5% of patients who received no treatment over the 12-month study.

c) Posterior Sub-tenon injection of triamcinolone acetonide

Some authors\(^{15,16}\) have recently advocated the posterior sub-Tenon (PST) injection of 40 mg TA under topic anesthesia, based on claims that IOP elevation may be less common after PST injection than after intravitreal injection, however Iwao et al.\(^{66}\) have found that PST TA injection is associated with high rates of steroid-induced IOP elevation in eyes with previously normal IOP.

Lin et al.\(^{15}\), in a prospective study of 18 eyes with CRVO treated by three biweekly PST TA injections, claimed that this treatment is effective in reversing cystoid macular edema (CME) and improving VA in recent onset CRVO in the first 9 months before longstanding macular edema results in irreversible photoreceptor damage. No cataract progression or other complications were observed. They stated that patients with non-ischaemic CRVO may respond more favorably than patients with ischaemic CRVO and further study with longer follow-up period is necessary.

Recently Mizumo et al.\(^{17}\) in the experimental study have found that the pericellular injection of TA effectively decreased retinal thickness and inhibited leukocyte-endothelium interactions in the retina after ischemia. Down regulation of adhesion molecules of retinal vascular endothelium induced by TA may play a role in the course.

d) Anti-VEGF therapy

Application of vascular endothelial growth factor (VEGF) inhibitors represents a treatment option for macular edema secondary to RVO that targets the disease at the causal molecular level.

Over the past years, ophthalmologists have attempted to treat RVO-associated edema triggered by hypoxia-induced expression of VEGF with ranibizumab (Lucentis®), bevacizumab (Avastin®), and pegaptanib sodium (Macugen®).

a) Ranibizumab has received FDA approval for the treatment of macular edema due to both CRVO and BRVO, and it is the only available FDA-approved therapy. With ranibizumab, Pieramici et al.\(^{18}\) designed a study following the scheme of the PIER Study, i.e. the first 3 injections monthly and then after 6 and 9
months, if needed (persistent macular edema). They found that ranibizumab is generally well tolerated and may improve BCVA and decrease central retinal thickness in OCT. But the efficacy was lost after the loading phase, so an interval of 3 months between injections may be too long. In addition, Spaide et al. and Rouvas et al. demonstrated in two prospective studies that the patients with RVO have an improvement in VA, but with a mean of 7.4–8.5 injections in 1 year of follow-up.

Nowadays two phase III multicenter, prospective clinical trials are under way, assessing the safety, tolerability and efficacy of intravitreal ranibizumab injections in the treatment of macular edema secondary to BRVO and CRVO. They are called BRAVO (study of the efficacy and safety of ranibizumab injection compared with sham in patients with macular edema due to BRVO) and CRUISE (study of the efficacy and safety of ranibizumab injection compared with sham in patients with macular edema due to CRVO). During the first 6 months, the patients monthly received either 0.3 or 0.5 mg of ranibizumab or sham injection. During the second 6 month period, the patients were evaluated monthly and treated on an as-needed basis; meanwhile, patients in the sham group received 0.5 mg ranibizumab. In addition, in the BRAVO study, rescue laser therapy was performed if criteria were met. For the first 6 months, results are available. Regarding efficacy, at the primary endpoint (mean change from baseline BCVA at month 6), there is a rapid and sustained improvement in BCVA in patients with macular edema due to BRVO or CRVO. They show a statistically significant number of patients who gained macular edema due to BRVO or CRVO. They show a statistically significant number of patients who gained 15 letters from baseline at month 6, in the study group compared to the control group, as well as a change from baseline central foveal thickness over time to month 6. In the BRVO group, more patients in the sham group received rescue grid laser, compared with the 0.3 or 0.5 mg ranibizumab groups. Besides, intravitreal ranibizumab seems to have a safety profile consistent with previous phase III trials, and low rates of ocular and non-ocular safety events. Moreover, these two trials demonstrate that the duration of the disease does not matter for taking the decision of treating. Treated patients did always better than sham-treated patients. Therefore, treatment for RVO can also be delayed by 3 months. The latest results from open-label extension trial of the 12-month ranibizumab assessing long-term safety and efficacy in BRAVO and CRUISE trials evidenced that in patients who completed month 12, the mean number of injections (excluding month 12 injection) in the sham/0.5-, 0.3/0.5-, and 0.5-mg groups was 2.0, 2.4, and 2.1 (branch RVO) and 2.9, 3.8, and 3.5 (central RVO), respectively. The incidence of study eye ocular serious adverse events and systemic adverse events potentially related to systemic vascular endothelial growth factor inhibition across treatment arms was 2% to 9% and 1% to 6%, respectively. The mean change from baseline BCVA letter score at month 12 in branch RVO patients was 0.9 (sham/0.5 mg), 2.3 (0.3/0.5 mg), and 0.7 (0.5 mg), respectively. The mean change from baseline BCVA at month 12 in central RVO patients was 4.2 (sham/0.5 mg), 5.2 (0.3/0.5 mg), and 4.1 (0.5 mg), respectively. The authors concluded that no new safety events were identified with long-term use of ranibizumab; rates of systemic adverse events potentially related to treatment were consistent with prior ranibizumab trials. Reduced follow up and fewer ranibizumab injections in the second year of treatment were associated with a decline in vision in central RVO patients, but vision in branch RVO patients remained stable. Results suggest that during the second year of ranibizumab treatment of RVO patients, follow up and injections should be individualized and, on average, central RVO patients may require more frequent follow-up than every 3 months.

b) **Bevacizumab (Avastin®)**. Bevacizumab is a recombinant humanized monoclonal antibody directed against VEGF. There have been several studies with bevacizumab and RVO, retrospective or prospective, all showing improvements in VA and optical coherence tomography (OCT) outcomes, but also short-term efficacy and high recurrence rate. The dosage varies between 1 and 2.5 mg, there are no different outcomes. The Pan-American Collaborative Retina Study group concluded that intravitreal injections of bevacizumab at doses up to 2.5 mg were more effective in improving VA and reducing macular edema at 6 months (compared to 1.25 mg), but the study had no control group. By contrast, no statistically significant differences were found between the doses, when the group presented the results at 24 months. In addition, Ach et al. found that CRVO patients who benefit from therapy were significantly younger and had lower central retinal thickness at baseline, while BRVO patients showed no predictive factors for effectiveness of bevacizumab therapy.

Recently, Ghayoor et al. evaluated the effect of Avastin (mean 2.8 claimed that significant improvement in best corrected VA was observed at 6th week of follow-up. At 6th month more than 60% showed improvement in best corrected visual acuity, similarly 70% patients had complete resolution of macular edema. The authors concluded that anti-VEGF therapy should be further evaluated in large, prospective, controlled clinical studies.

Epstein et al. conducted the latest prospective double-masked clinical trial of 60 patients with macular
edema secondary to CRVO randomized 1:1 to receive intraocular injections of bevacizumab or sham injection every 6 weeks for 6 months. Results evidenced that the treatment improve VA and reduce macular edema significantly compared with sham.

c) Pegaptanib Sodium (Macugen®).

The pegaptanib sodium is a selective anti-VEGF and it is still not well studied in RVO. Bennet performed a pilot study where Macugen treatment achieved a decrease in macular thickness and an improvement in VA and retinal perfusion. But this study had enrolled only 7 patients with 6 months of follow-up and it had no control group. On the other hand, Wroblewski et al. conducted a study where subjects with BRVO were randomized 3:1 to intravitreal injections of pegaptanib 0.3 or 1 mg at baseline and at weeks 6 and 12 with subsequent injections at 6-week intervals at the discretion of the investigator until week 48. He also found improvements in VA and macular thickness in this study with a 54 week follow-up. Therefore, the authors consider that intravitreal pegaptanib offers a promising alternative for macular edema secondary to BRVO.

d) VEGF Trap

The VEGF trap is another novel anti-VEGF agent. It is essentially a small fully human, soluble VEGF receptor that acts as a decoy receptor binding free VEGF. The VEGF trap eye is currently under evaluation in two phase III studies on CRVO (GALILEO and COPERNICUS Studies) with 6-monthly injections of drug or sham-controlled injections. The latest six-months results of the phase III from COPERNICUS Study multicenter, randomized, prospective, controlled trial assessing the efficacy and safety of intravitreal injections of VEGF Trap-Eye 2 mg in eyes with macular edema secondary to central retinal vein occlusion (CRVO) randomized 3:2 to receive VEGF trap-eye 2 mg or sham injection monthly for 6 months evidenced that at week 24, 56.1% of VEGF trap-eye treated eyes gained 15 letters or more from baseline versus 12.3% of sham-treated eyes (P<0.001). The VEGF Trap-Eye treated eyes gained a mean of 17.3 letters versus sham-treated eyes, which lost 4.0 letters (P<0.001). Central retinal thickness decreased by 457.2 mm in eyes treated with VEGF Trap-Eye versus 144.8 mm in sham-treated eyes (P<0.001), and progression to any neovascularization occurred in 0 and 5 (6.8%) of eyes treated with VEGF Trap-Eye and sham-treated eyes, respectively (P=0.006). Conjunctival hemorrhage, reduced visual acuity, and eye pain were the most common adverse events. Serious ocular were reported by 3.5% of VEGF trap-eye patients and 13.5% of sham patients. Incidences of nonocular serious adverse events generally were well balanced between both groups.

The authors concluded that at 24 weeks, monthly intravitreal injection of VEGF Trap-Eye 2 mg in eyes with macular edema resulting from CRVO improved visual acuity and central retinal thickness, eliminated progression resulting from neovascularization, and was associated with a low rate of ocular adverse events related to treatment.

The general consensus is that the intravitreal injections turned out to be promising in recent clinical trials and appear to be an additional therapeutic option. But there are limits in efficacy, need for multiple injections, rebound effect of macular edema and non-responders. There are still many unclear points, such as: the correct time to start injections and the specific moment to finish them, the number of injections, the long-term efficacy and safety, ocular and systemic side effects.

The International Intravitreal Bevacizumab Safety Survey gathered adverse events from doctors around the world via the internet and showed all ocular and systemic side effects to be under 0.21% including corneal abrasion, lens injury, endophthalmitis, retinal detachment, uveitis, cataract progression, acute vision loss, central retinal artery occlusion, sub-retinal haemorrhage, retinal pigment epithelium tears, blood pressure elevation, transient ischaemic attack, cerebrovascular accident and death.

The latest study revealed that endophthalmitis following intravitreal injection is associated with an increased incidence of Streptococcus spp. infection, earlier presentation and poorer visual outcomes when compared with endophthalmitis following cataract surgery. While used intravitreally, the systemic absorption is minimal, however, a trend has been observed towards a higher risk of stroke among patients with a history of heart disease. In conclusion, patients should discuss the potential risks and benefits of intravitreal pharmacotherapy with their physicians before receiving treatment.

SURGICAL TREATMENT

i) Radial optic neurotomy (RON)

Radial optic neurotomy, a new surgical technique has been recently proposed for treating CRVO and hemicentral RVO. It is hypothesized that CRVO constitutes a neurovascular compartment syndrome at the site of the lamina cribrosa, which can be alleviated by performing a radial incision at the nasal part of the optic nerve head, relaxing the cribriform plate and the adjacent sclera.

Recently, Opremcak et al. claimed that surgical decompression of the vein in CRVO by making a radial cut from the vitreous side in the optic nerve head extending all the way down to the lamina cribrosa, adjacent sclera and cutting the arterial circle of Zinn...
and Haller by a procedure they called “radial optic neurotomy” (RON) is a technically feasible and safe procedure that was associated with anatomical resolution of CRVO in 95% patients and improved visual function in 71%. Some authors also have advocated RON for CRVO\textsuperscript{48,59,61-63,66,67} and hemicentral RVO\textsuperscript{65}, however Horio and Horiguchi\textsuperscript{19} in a study of 7 patients with CRVO underwent RON have found that VA was better than the preoperative VA by two or more lines in three out of seven eyes, and was worse in two eyes, macular edema was improved, but stated that they cannot exclude the possibility that the changes represent the natural course of this disease.

Garcia Arumi et al. comparing of outcome after RON in younger vs older patients concluded that functional results were better in younger patients although functional improvement remained limited in those with low baseline VA. Recently, Rizvi et al.\textsuperscript{67} presented an intervention case series of 11 patients with CRVO treated by RON. The authors concluded that a randomized study with a larger number of patients is necessary to establish the factors important for developing collateral circulation that allows for blood drainage beyond the occluded vessel.

Hayreh have studied the anatomy and blood supply of the optic nerve head and its ischaemic disorders in detail\textsuperscript{69} and have found that the claim made by some authors that RON is a safe procedure is totally unwarranted, for the following reasons: 1) RON is going to cut the arterial circle of Zinn and Haller, which is one of the sources of blood supply to optic nerve head. Therefore, this procedure is bound to cut off blood supply to the optic nerve head, resulting in acute ischemia of the optic nerve head and visual loss. 2) RON is also going to cut a large number of nerve fibers in the optic nerve head, and that is found to produce visual loss and visual field defects. 3) There is a risk of cutting or damaging the central retinal artery and/or central retinal vein during RON because the two structures lie in close apposition in the optic nerve head. Thus, Hayreh concluded that RON cannot be considered a safe procedure by any standard.

Visual field defects were associated with RON\textsuperscript{61,65,68}, Hasselbach et al.\textsuperscript{63} found various defects in 86.8% of all cases. Takaya et al.\textsuperscript{71} presented a case of arterial bleeding from the incision site during RON in patient with CRVO and following haemorrhagic retinal detachment and vitreous haemorrhage.

To avoid complications following a deeper incision in RON Wrede et al.\textsuperscript{44} have found that the development of a knife with a fixed penetration depth would be helpful. Vogler et al.\textsuperscript{72} examined histopathologic findings in a human eye after RON for ischaemic CRVO and enucleated due to neovascular glaucoma and concluded that they do not provide evidence for the postulated mechanism of action and it appears prudent to further evaluate this technique before its general implementation in the management of CRVO. In conclusion, there is not much scientifically valid evidence of the beneficial effects of this procedure.

\textbf{ii) Vitrectomy}

Hvarfner and Larsson\textsuperscript{73} evaluated the effect of vitrectomy in eyes with non-ischaemic macular edema secondary to hemi and CRVO and concluded that it has the potential to reduce macular edema and improve VA in the early postoperative phase but does not seem to improve the long term outcome of the disease. Furukawa et al.\textsuperscript{74} have found that vitrectomy with the creation of a posterior vitreous detachment also appears to be a possibly effective treatment in some eyes with CME associated with non-ischaemic CRVO.

Some authors have advocated vitrectomy with internal limited membrane (ILM) peeling for macular edema secondary for RVO\textsuperscript{75-77}, claiming rapidly reduction of macular edema with improvement in VA.

Recently, Mandelcorn et al.\textsuperscript{76} claimed enthusiastically that in CRVO and BRVO cases macular decompression by ILM peeling may reduce macular edema and haemorrhage and improve visual acuity by relieving elevated intra-retinal tissue pressure and facilitating egress of blood and extracellular fluid out of inner retinal layers into the vitrectomized vitreous cavity.

In conclusion, further randomized and controlled studies are needed to confirm these results and to compare them to the natural course of the disease.

\textbf{iii) Arteriovenous adventitial sheathotomy}

Most branch retinal vein occlusions occur at an arteriovenous crossing site\textsuperscript{79}. It has been proposed that conditions such as hypertension or arteriosclerosis may compress the lumen of the venule, which may in turn lead to occlusion, and that relieving the compression by surgical sheathotomy may improve the outcome of BRVO. The principle steps of this procedure are a pars plana vitrectomy, following which the overlying artery is separated from the vein by creating an incision in the adventitial sheath adjacent to the arterio-venous crossing and then separating the adhesions.

Although the study by Mason et al.\textsuperscript{79} reported a beneficial effect on VA in those patients undergoing surgery compared with those receiving laser or no treatment, the study was not randomized and was partly retrospective, introducing sources of potential bias. Feltgen et al.\textsuperscript{80} in the prospective study of 35 patients with BRVO have evaluated effect of arteriovenous dissection on VA and concluded that visual improvement was found irrespective of the successful dissection of vessels. The cataract formation rate and
additional surgery was a shortcoming of this procedure. Rodanant and Thonginsawan\textsuperscript{81} and Wrigstad and Algvere\textsuperscript{82} in a case reports have found that sheathotomy may improve vision and decrease macular edema in selected cases of BRVO. In conclusion, there is currently no evidence from randomized clinical trials supporting the routine use of adventitial sheathotomy to improve VA in eyes with BRVO.

**COMBINATION THERAPY**

i) **RON and intraocular TA**

Some authors\textsuperscript{83,84} have advocated RON with simultaneous, adjunctive intraocular TA for CRVO. Opremcak et al.\textsuperscript{84} claimed enthusiastically that clinical improvement was noted in 93% of patients following RON and intraocular TA, which paralleled outcomes following RON alone, but combined procedure was associated with a higher incidence of elevated IOP and endophthalmitis.

ii) **Vitrectomy and intraocular TA**

Vitrectomy and intraocular TA were also used in macular edema secondary to RVO\textsuperscript{75,84-86}. Nkeme et al., in a study of 4 patients with nonischaemic RVO and Tsujikawa et al.\textsuperscript{86} in a study of 17 patients with BRVO have found that an intraoperative injection of TA in combination with pars plana vitrectomy has the potential to facilitate the absorption of macular edema. Simultaneous peeling of ILM was done by some authors\textsuperscript{75,74}.

Yamashita et al.\textsuperscript{90} also have evaluated long-term IOP response after this combined procedure and stated that a dose-dependent IOP elevation was observed, starting from early postoperative days and returning to normal values after several months.

iii) **Vitrectomy and sheathotomy**

Mason et al.\textsuperscript{79} compared vitrectomy combined with adventitial sheathotomy with a concurrent control group in which patients with BRVO were treated with laser or no treatment. The surgical group also had a statistically significant increase in VA when compared with control patients, with an average increase of 4.55 lines compared with 1.55 lines in the control group. Sohn and Song\textsuperscript{89}, in a study of 22 patients with BRVO and recurrent macular edema, found visual improvement in 10 eyes (45%) and decrease of fovea thickness and concluded that vitrectomy with sheathotomy can be one treatment option for these patients. Kumagai et al.\textsuperscript{89} comparing the long-term effect of vitrectomy with or without sheathotomy for macular edema secondary to BRVO, have found that additional arteriovenous sheathotomy did not lead to a distinct functional benefit, but early surgical intervention may result in better visual outcomes.

iv) **Vitrectomy and endovascular lysis**

Feltgen et al.\textsuperscript{90}, in a prospective study of 13 patients with ischaemic CRVO performed endovascular lysis by injecting a fibrinolytic agent directly into a cannulated retinal vein after vitrectomy and have found that CRVO patients did not profit from this procedure and the number of postoperative complications is unacceptably high.

In conclusion, in spite of various claims made in various studies about the beneficial effect of surgery in macular edema secondary to RVO, there is little scientifically valid evidence of its effectiveness, since to date no randomized controlled trials on surgical procedures have been conducted and any evidence supporting these procedures has been based on clinical case series.

v) **Laser Treatment**

The Central Vein Occlusion Study\textsuperscript{81}, a large prospective randomized clinical trial, did not show statistically significant VA benefit from grid laser photocoagulation for macular edema. Two randomized clinical trials investigated the efficacy of grid macular laser treatment for macular edema secondary to RVO\textsuperscript{2,73}. The Branch Vein Occlusion Study (BVOS) Group have found that patients treated with grid laser gained an average of 1.33 lines at the third year study visit from baseline compared with 0.23 lines in the control group. The grid laser group had statistically significant improvements in VA with 65% treated versus 37% controls gaining 2 or more lines of vision over consecutive visits. Battaglia Parodi et al. in other randomized clinical study assessing the effect of grid macular laser photocoagulation on macular edema in BRVO have found that improvement in VA was related to natural history rather than laser photocoagulation in patients with very early (less than 15 days) onset of BRVO.

In conclusion, grid laser photocoagulation is not recommended for macular edema secondary to CRVO and is recommended as an effective treatment to reduce macular edema and to improve VA in BRVO with macular edema after 3 months of onset, allowing for any spontaneous resolution, reduction in haemorrhage, and VA of 20/40 or less.

**CONCLUSION:**

In conclusion, studies evaluating interventions for macular edema secondary to RVO have lacked sufficient sample size and power, are not controlled or lack an adequate control using placebo or best practice intervention, combine one interventional therapy with another, did not have insufficient follow-up times for long-term assessment of outcomes, or a combination thereof. Therefore, definitive conclusions cannot be reached. In spite of enthusiastic claims of success for various therapies, the reality is that the currently available treatments are associated with visual...
improvement in only a subset of patients and the approach to treatment of macular edema secondary to RVO is not evidence-based yet. The benefits and risks of therapy should be weighted in all treatment decisions. There is a need for large well-designed prospective randomized controlled trials with a long-term follow-up of new drugs taken in a non-invasive way.

REFERENCE:


of intravitreal bevacizumab (Avastin) for treatment of macular edema secondary to branch retinal vein occlusion: results from the Pan-American Collaborative Retina Study (PACORES) Group at 6 months of follow-up. Retina 2008;28:212–219.


52. Wells JA. The Paradigm Shifts in the Management of Retinal Vein Occlusion. Retinal physician, November 2011


69. Hayreh SS. The blood supply of the optic nerve head and the evaluation of it – myth and reality. Prog Retin Eye Res
Macular Edema Treatment in Retinal Vein Occlusion: How Forward we are?

INTRODUCTION

Glaucoma is characterized by progressive ganglion cell death, which clinically manifests as typical visual field (VF), optic nerve head (ONH) and retinal nerve fibre layer (RNFL) damage. As yet, the diagnosis and/or progression of glaucoma are established by analyzing these manifestations. As the visual field defects may appear later than the damage in the ONH and NFL damage, the focus is currently on scrutinizing the later two structures for the management of glaucoma. As a result, sophisticated devices have been developed to study these structures. However, these technologies are expensive and most eye departments, especially those in the developing countries, cannot afford to use them for documenting all the glaucoma cases. Simpler methods like determining the cup to disc ratio are too crude to be useful. A need therefore exists for a method to document the ONH changes which should be accurate, but simple and cost effective.

Spaeth and colleagues proposed an ONH grading system, the Disc Damage Likelihood Scale (DDLS), which takes into account the size of the optic disc and the narrowest neuro-retinal rim (NRR), thereby providing, not only a standardized and accurate method of ONH documentation, but also some information regarding the likelihood of glaucomatous damage. The system’s diagnostic power, reproducibility and ability to detect glaucoma progression, have been validated over time. A study was done to determine how the disc damage likelihood scale correlates with the visual field defects, regardless of the actual aetiology of the optic disc damage.

MATERIALS AND METHODS

In this observational case series, all the patients attending the Baqai University Hospital and its affiliated centres between August 2010 to February 2011, whose automated VF analysis results and stereo-photographs (SPs) of the optic discs were available, were included in the study. The patients with unreliable VF results (>20% fixation errors, >33% false-positives, and >33% false-negatives), and/or poor quality SPs, were excluded. As the correlation of the DDLS grade and visual field defects was to be studied without other influences, the individual eyes were used for computation of statistical correlation rather than the
patients. No attempt was made to classify the eyes as glaucomatous or non glaucomatous. (This is the topic of another ongoing study yet to be published). However, for the purpose of listing the frequency distribution, the diagnosis, age and sex were noted. All other variables were disregarded.

The procedure for determination of DDLS has been described previously. Briefly, the process includes determination of the ONH size using a slit lamp beam and a high plus lens e.g. 60 D, 78 D, or 90 D, and multiplying it with the multiplication factor (MF) of the lens used (e.g. the MF of Volk 90 D lens is 1.3), while the degree and extent of narrowest part of the NRR is estimated clinically, using the same equipment or a direct ophthalmoscope. The ratio between the narrowest part of the rim and the disc diameter in that meridian is then determined. If the NRR is absent at some place, its extent is determined in clock hours. The disc is then graded into 1 to 10, according to the rim / disc ratio or the extent of the absent NRR. For the discs smaller (<1.5 mm) or larger (>2.0 mm) then the average, the grade is increased or decreased by one respectively. The details of the grading system are given in table 1.

In this study the size of the disc was determined using a slit lamp with a Volk 90 D lens. However, instead of clinical estimation, SPs of the ONHs were used to determine the rim / disc ratio in order to maintain reproducibility, as has been done previously. Sequential digital SPs were obtained using Canon 605 fundus camera (Canon Inc., Tokyo, Japan), fitted with an Olympus E330 Digital SLR (Olympus Corp., Tokyo, Japan) camera body. The SPs were viewed using an on-screen stereo-viewer, and measurements done by means of a ruler. Visual fields testing was done using Humphrey (Carl Zeiss Meditec, Dublin, CA) 30-2 full threshold program, within a month of obtaining the SPs. Mean deviation (MD) was taken as the amount of field damage and used for statistical analysis.

The statistics software SPSS (IBM,) was used to determine the correlation between the DDLS grades and amount of VF damage by Pearson product-moment correlation coefficient, as this is known to be a linear correlation without outliers. Correlation was to be significant at the 0.01 level (2-tailed).

**RESULTS**

Altogether 42 eyes of 21 patients (15 males and 6 females) were included in the study.

The means (MD + / - SD) of 42 eyes for the DDLS grades and VF MD was, 5.6 +/- 2.2 (range from 1 to 9), and -6.5 DB +/- 4.7 (range 1 to 18) respectively.

There was a strong positive correlation between the grades of the DDLS and amount of visual field damage (r = 0.85) which was highly significant (<0.01)

An incidental finding was that two of the discs, which were definitely not glaucomatous, were graded as substantially damaged according to the DDLS. One was a case of tilted discs with minor VF defects (Figure 1), and the other was a myopic disc with negligible VF damage (Figure 2). Previous SPs of both the cases were available for three and four years respectively, and had shown no change.

**DISCUSSION**

This study is in agreement with the earlier studies in demonstrating the strong correlation between the DDLS and the VF defects. This fact could be useful for the screening of glaucoma, which is not satisfactory even in advanced countries. Clinical disc examination of the optic disc is a convenient, cost effective, and

<table>
<thead>
<tr>
<th>New DDLS</th>
<th>For small disc</th>
<th>For average size disc</th>
<th>For large disc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>&lt;1.50 mm</td>
<td>1.50–2.00 mm</td>
<td>&gt;2.00 mm</td>
</tr>
<tr>
<td>1</td>
<td>0.5 or more</td>
<td>0.4 or more</td>
<td>0.3 or more</td>
</tr>
<tr>
<td>2</td>
<td>0.4 to 0.49</td>
<td>0.3 to 0.39</td>
<td>0.2 to 0.29</td>
</tr>
<tr>
<td>3</td>
<td>0.3 to 0.39</td>
<td>0.2 to 0.29</td>
<td>0.1 to 0.19</td>
</tr>
<tr>
<td>4</td>
<td>0.2 to 0.29</td>
<td>0.1 to 0.19</td>
<td>less than 0.1</td>
</tr>
<tr>
<td>5</td>
<td>0.1 to 0.19</td>
<td>less than 0.1</td>
<td>0 for less 45°</td>
</tr>
<tr>
<td>6</td>
<td>less than 0.1</td>
<td>0 for less 45°</td>
<td>0 for 46° to 90°</td>
</tr>
<tr>
<td>7</td>
<td>0 for less 45°</td>
<td>0 for 46° to 90°</td>
<td>0 for 91° to 180°</td>
</tr>
<tr>
<td>8</td>
<td>0 for 46° to 90°</td>
<td>0 for 91° to 180°</td>
<td>0 for 181° to 270°</td>
</tr>
<tr>
<td>9</td>
<td>0 for 91° to 180°</td>
<td>0 for 181° to 270°</td>
<td>0 for more than 270°</td>
</tr>
<tr>
<td>10</td>
<td>0 for more than 180°</td>
<td>0 for more than 270°</td>
<td></td>
</tr>
</tbody>
</table>
potentially accurate method of glaucoma detection. However it can be quite inaccurate if only the cup to disc ratio is considered. Standardizing DDLS as a uniform protocol for disc examination may enable even the junior ophthalmologists to detect glaucoma in early stages.

This study is different from the previous studies on this topic in that the DDLS was correlated with the VF defects, irrespective of the VF defects being glaucomatous or not. This was useful in determining if the DDLS can give false positive results; a fact which can help in determining it’s role as a screening tool in future studies. Indeed, in this study, two cases which were definitely not glaucoma were classified as damaged, demonstrating the relatively low specificity of the DDLS. This observation stresses the necessity to thoroughly evaluate the patient, considering all aspects, before making a diagnosis of glaucoma. The DDLS may be more helpful as a screening tool rather than a diagnostic utility; the DDLS based abnormal cases detected by non-ophthalmologists or non-glaucoma specialists can be referred to a glaucoma specialist for further scrutiny.

One weakness of the study was the relatively small number of subjects. This is because of the fact that the availability of reliable visual fields test results was much less than the unreliable results and many eyes had to be excluded from the study. This is a common observation in our Country, especially among the less educated patients who generally visit the charity or public sector eye departments.

Another shortcoming of the study was that MD was used as a measure of visual field loss instead of more elaborate calculations. This was done to avoid complex computations, and due to the fact that the overall damage of VF, rather than localized VF defects, was to be correlated to the DDLS. MD has been used for this purpose in many good studies.9, 12

There were more males in the study then the females. Although not statistically analyzed, this was simply due to the fact that reliable results were available more for males then the females, and does not in any way reflect the prevalence of glaucomatous damage among the sexes.

CONCLUSION:
DDLS is significantly correlated to the visual field defects in a positive, linear manner. However, other evidence of glaucoma must be sought for before establishing the diagnosis

REFERENCES
7) Danesh-Meyer HV, Gaskin BJ, Jayusundera T, Donaldson M, Gamble GD. Comparison of disc damage likelihood scale, cup to disc ratio, and Heidelberg retina tomograph in the...
Correlation of Visual Field Damage & the Disc Damage likelihood Scale


INTRODUCTION

Endophthalmitis remains a serious complication after cataract surgery, although prophylactic measures introduced in recent years have reduced the number of patients with this complication.

Currently there are two streams of opinion towards endophthalmitis prophylaxis, the use of fourth-generation quinolones (gatifloxacin and moxifloxacin) topically,1–4 or the introduction of intracameral cephalosporins, the latter being cefuroxime (a second generation cephalosporin), which is the most widely used and accepted.5–10 However, our study group,11 as well as Garat et al.,2,13 prefers the use of cefazolin (a first generation cephalosporin). Having previously studied the bacteria that cause endophthalmitis in our environment most frequently, we prefer cefazolin because of its higher frequency of gram-positive bacteria in our medium, and because it best covers infections by such bacteria. Furthermore, cefazolin shows no corneal toxicity at doses of 1 mg or 2 mg; its toxicity was established when doses of 5 mg or more were injected. We consider the risk of an infection caused by a cefazolin-resistant bacterium low, based on the bacteria cultured since 1994 and their antibiogram. We consider there not to be any risk of coverage of gram-negative bacteria by cefazolin, and its incidence in endophthalmitis was low in our Health Care District.

Our two groups are included in the Barcelona Endophthalmitis Group (GEB), formed by 38 public and private Hospitals in Catalonia (Spain), who have been studying the epidemiological factors of postoperative endophtalmitis and assessing the prophylaxis and treatment of endophthalmitis in our country since 2000. This study will present the results obtained after seven years of using intracameral cefazolin after cataract surgery at doses of 1 mg in 0.1 ml solution.

MATERIAL & METHODS

Since 1996, there has been an ongoing registration of all postoperative endophthalmitis patients at Hospital St Joan (Table 1). All cases of postoperative endophthalmitis were studied in the epidemiological unit of the hospital in order to determine their origin.

A prospective observational study. The population comprised all patients submitted to uncombined cataract surgery in the period from January 1996 to December 2009. All cases of postoperative endophthalmitis were related. Only patients with phacoemulsification were included in the study in order...
to reduce any possible bias introduced by the technical cataract surgery. Technical surgery includes a sutureless, clear corneal incision of 3.2 mm using a venturi (Millenium, Bausch Lomb®) phaco unit.

For all patients included in our hospital, the prophylactic measures for reducing the bacterial flora of the conjunctiva since 1996 were:

- Topical 10% povidone-iodine in the skin of peri-orbital region
- Topical 5% povidone-iodine on the conjunctiva and eyelashes for a minimum of 1 minute
- Draping of the peri-orbital region and eyelashes
- Postoperative use of eye drops with tobramycin 3.00 mg/mL associated to dexametasone 1.00 mg/mL instilled every 4 hours (these eye drops were gradually tapered after 1 week), and diclofenac every 6 hours. These drops were continued at week 3, and the topical diclofenac was used for 1 month after surgery.

The patients were classified in two groups:
- Group 1 included patients operated on from January 1996 to December 2002 (11696 patients), during which time intracameral cefazolin was not used.
- Group 2 included patients operated on from January 2003 to December 2009 (13305 patients) when we used 1.00 mg/0.1 mL intracameral cefazolin was used at the end of cataract surgery.

### Antibiotic Selection

The choice of cefazolin as an intracameral antibiotic was based on bacterial and antibiogram studies in endophthalmitis cases since 1996 (Table 2), and the antibiogram (Table 3).

Table 3 was created from the analysis of an antibiogram of 14,626 cultures obtained from samples of patients with community- and hospital- acquired infections (urinary infections, pneumonia, sepsis, etc.), which occurred during 2002 in the population serviced.
by our Health Care District. In the table we presented only the results obtained with the bacteria cultured in endophthalmitis observed in our area, and compared with the prophylactic antibiotics most frequently used for endophthalmitis in Spain (cefazolin, cefuroxime, vancomycin, and levofloxacin). At this point we should point out that in our Hospital in cases of allergy to cephalosporines we used vancomycin.

The dose of cefazolin (1 mg/0.1 ml) was based on our calculations that this anterior chamber concentration of cefazolin exceeded the minimum inhibitory concentration (MIC) for susceptible bacteria.

### Inclusion Criteria

Patients in our dependent Health Care District who were submitted to cataract surgery by phacoemulsification by clear cornea incision.

### Exclusion Criteria

Patients admitted for extracapsular cataract surgery. Patients allergic to cephalosporins and to whom we gave intracameral vancomycin.

### Definition of Acute Postoperative Endophthalmitis

Following the criteria\(^{14}\) in the Endophthalmitis Vitrectomy Study (EVS), the ophthalmologist diagnosed presumed acute endophthalmitis. If a positive culture of a vitreous sample was obtained, we defined the case as a proven acute endophthalmitis. In all proven and unproven cases, the patients had swollen lids, pain and an opaque vitreous.

### Microbiological Method

Vitreous samples obtained by the ophthalmologist were immediately processed, then a Gram stain was carried out and the sample cultivated in petri dishes. Antibiogram susceptibility was measured according to the criteria laid down by the Spanish Committee for the Standardization of the Sensitivity and Resistance to Antimicrobials (MENSURA)\(^{15-17}\) which includes members of the Spanish Society of Chemotherapy and the Spanish Society for Infectious Diseases and Microbiology.\(^{15}\) This is a body with responsibilities similar to those of the National Committee for Clinical Laboratory Standards.\(^{18}\)

Statistical analyses for descriptive statistics were performed using SPSS statistical software (version 17.0). The data obtained was analysed with frequency and descriptive statistics. Values are expressed as mean ± SEM, and statistical significance was determined using the Student’s t-test for paired data.

### RESULTS

#### Demographic Results in the 2 Groups of Patients

Group 1. Formed by patients without intracameral instillation of cefazolin. This group included a total of 11,696 patients, with a median age of 69.8 ± 7.55 years (53–89 years); a total of 6785 (58.01%) were females.

Group 2. Formed by patients with intracameral instillation of cefazolin at doses of 1 mg/0.1 mL. This group included a total of 13,305 patients, with a median age of 66.17 ± 7.83 years (53–81 years); a total of 7717 (58.00%) were females. The difference between groups was not statistically significant in the Student’s t-test.

#### Endophthalmitis Cases

In Group 1 there were 76 postoperative endophthalmitis cases, at a median elapsed time of 5.37 ± 2.33 days after surgery. In 16 (69.77%) cases, cultures were positive for the following sub-classified gram-positive cultured bacteria: 9 cases (39.13%) of *Staphylococcus aureus*, 4 cases (17.39%) of *Staphylococcus epidermidis* and 2 cultures (8.70%) positive for *Streptococcus spp*. The gram-negative bacteria gave a culture positive for *Klebsiella pneumoniae* (4.35%).

Group 2, there were seven postoperative endophthalmitis cases, at a median elapsed time of 5.41 ± 2.29 days after surgery. The statistical study of differences in respect to first group were significant at p < 0.001, RR: 11.45 [95% CI 5.72–22.84].

The bacteria cultured were:

- The first case involved patients with diabetes

### Table 3

<table>
<thead>
<tr>
<th>Germen</th>
<th>Cefazolin</th>
<th>Cefuroxime</th>
<th>Levofloxacin</th>
<th>Vancomycin</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Staphylococcus Aureus</em></td>
<td>100% (≤2 &gt;4)*</td>
<td>96% (≤2 &gt;4)</td>
<td>65% (≤0.5 ≥8)</td>
<td>66% (≤4 ≥32)</td>
</tr>
<tr>
<td><em>Staphylococcus Aureus MARSA</em></td>
<td>54% (≤2 &gt;4)</td>
<td>48% (≤2 ≥4)</td>
<td>17.64% (≤0.5 ≥8)</td>
<td>99.02% (≤4 ≥32)</td>
</tr>
<tr>
<td><em>Staphylococcus Epidermidis</em></td>
<td>100% (≤2 &gt;4)</td>
<td>97% (≤2 ≥4)</td>
<td>27% (≤0.5 ≥8)</td>
<td>97% (≤4 ≥32)</td>
</tr>
<tr>
<td><em>Streptococcus Pneumoniae</em></td>
<td>96% (≤2 ≥8)</td>
<td>79.15% (≤0.12 ≥2)</td>
<td>89% (≤2 ≥8)</td>
<td>100% (≤1 ≥32)</td>
</tr>
</tbody>
</table>

### Gram negative

<table>
<thead>
<tr>
<th>Germen</th>
<th>Cefazolin</th>
<th>Cefuroxime</th>
<th>Levofloxacin</th>
<th>Vancomycin</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>E. Coli</em></td>
<td>85% (≤4 ≥32)</td>
<td>87% (≤4 ≥32)</td>
<td>71% (≤0.5 ≥8)</td>
<td>90% (≤4 ≥32)</td>
</tr>
<tr>
<td><em>Pseudomona Aeroginosa</em></td>
<td>18% (≤4 ≥32)</td>
<td>15% (≤4 ≥32)</td>
<td>65% (≤2 ≥8)</td>
<td>65% (≤4 ≥32)</td>
</tr>
<tr>
<td><em>Proteus Mirabilis</em></td>
<td>79% (≤4 ≥32)</td>
<td>82% (≤4 ≥32)</td>
<td>70% (≤0.5 ≥8)</td>
<td>100% (≤4 ≥32)</td>
</tr>
<tr>
<td><em>Klebsiella Pneumoniae</em></td>
<td>75% (≤4 ≥32)</td>
<td>79% (≤4 ≥32)</td>
<td>100% (≤0.5 ≥8)</td>
<td>95% (≤4 ≥32)</td>
</tr>
</tbody>
</table>
mellitus type II, treated with insulin for 30 years, with macro vascular disease with symptoms of intermittent claudication. The culture was positive for a Gram-negative bacterium (*Klebsiella pneumoniae*).

- The second case was a patient who lived alone and who had serious social problems; the patient also had domestic animals at home. The culture was positive for a Gram-positive anaerobic bacterium (*Corynebacterium*).

- The third case, positive for *Proteus mirabilis*, occurred in a 68-year-old woman with type II diabetes mellitus of long evolution (22 years), with poor glycaemic control and peripheral vascular macroangiopathy.

- The fourth case, positive for *Proteus mirabilis*, occurred in a 77-year-old man with type II diabetes mellitus and poor glycaemic control.

- The fifth case, positive for *Pseudomonas aeruginosa*, occurred in a 73-year-old man with viral C-hepatitis.

- Negative cultures: two cases of negative cultures (28.57%) were observed in this period of time. In the groups of patients that received intracameral cefazolin, there were no cases observed of toxic effect at the corneal or retina levels, nor was there any hypersensitivity reaction.

**Statistical Analysis**

The relative risk for presenting with endophthalmitis in Group 1 compared with Group 2 was 11.45 [95% CI 5.72–22.84, p < 0.001]. When limiting the analysis to proven cases (50 cases in Group 1, against 5 cases in Group 2), the estimators of the relative risk were 14.07 [95% CI 7.68 - 24.48, p < 0.001].

**Visual Acuity**

1. In Group 1 (period 1996–2002) 38 over 76 patients (50%) had a final visual acuity (VA) over 0.1 and six patients (7.9%) had VA > 0.4 on the Snellen charts. There were ten patients with no light perception (four cases with negative culture, one case produced by *Seratiamar censens*, and five cases of *Streptococcus pneumoniae*). *Staphilococcus epidermidis* in 18 cases caused a final VA between 0.1 and 0.4, and in 14 cases a final VA between light perception and 0.1; the *Staphilococcus aureus* predominantly produced a final VA between light perception and 0.1 (four cases) and only one case with final VA > 0.4 on the Snellen charts (Table 4).

2. In Group 2 (period 2003–2009) four patients had final VA of no light perception (two cases with gram-negative bacteria, one case with negative culture and one case produced by gram-positive corynebacterium). In the other three cases, the final VA was inferior to 0.1 on the Snellen charts (two cases with gram-negative bacteria and one with a negative culture) (Table 4).

**DISCUSSION**

In our health care district we had a high level of endophthalmitis. Previously, the intracameral use of antibiotics, as we point out in the present study in group 1, lead to the incidence of endophthalmitis at a rate of 0.649%. This value is higher than that reported in other countries,2,6,8,14 but the incidence in Spain was also higher than other study groups, Garcia-Saenz et al19 found an incidence of 0.59% (95% CI, 0.50%-0.70%) between January 1999 and September 2005, and Garat et al showed an incidence of 0.422% (95% CI 0.279–0.613) in their studies.12,13 Because our centre had an excessive number of endophthalmitis cases despite using all means of regular prophylaxis (a sterile ophthalmology operating room, povidone-iodine in skin (at 10%) and conjunctival sac (at 5%) with few surgical intraoperative complications etc.), we decided to use intracameral antibiotics after cataract surgery.

Peyman et al. published the first report of successful prophylactic bolus injections of antibiotics into the anterior chamber in 1977.20 Despite the efficacy of the injections, the technique later becomes forgotten about. It is well-established that the source of most infecting agents is the patients’ ocular flora; the most...
frequently reported being bacteria gram-positive, coagulase-negative, or positive staphylococcus.

Swedish physicians have pioneered the use of intracameral cefuroxime since 2002, with excellent outcomes in 400,000 surgical interventions. Montan et al. published the efficacy of cefuroxime 1 mg intracameral,5,6 a practice that has lowered the rate of postoperative endophthalmitis from 0.26% to 0.06%. The large, prospective, multi-centred study, the European Society of Cataract Refractive Surgeons (ESCRS) confirmed the Swedish experience, finding that an injection of cefuroxime at the end of the surgery reduced endophthalmitis rates to just 0.05%.8–10

We chose to use cefazolin, which is recommended by the Department of Microbiology and the Infectious Diseases Committee of our Hospital, rather than cefuroxime because it is a first generation cephalosporin and has a wide range of activity against gram-positive bacteria in our Health Care District, rather than a second-generation cephalosporin, such as cefuroxime. A study in our Health Care District by Vila-Corcoles et al.,21 showed an increased resistance of Streptococcus pneumoniae to cefuroxime but not to cefazolin.

It is interesting to observe in Table 3 that cefazolin and cefuroxime present a similar antibiotic resistance pattern, with regard to both gram-positive and gram-negative bacteria. Therefore, we still believe that cefazolin is a good option as a prophylaxis for endophthalmitis, and its substitution for cefuroxime is not important for reducing the number of cases of endophthalmitis. However, by using cefazolin, there is still a risk of infection by gram-negative bacteria, which is why the majority of proven cases of endophthalmitis in Group 2 (4/5 cases were gram-negative) were caused by this type of bacteria. This is clearly a limitation in the use of cefazolin as a prophylaxis for endophthalmitis.

The lack of availability of eye-drops of fourth generation quinolones in Spain is the most obvious reason for the preference for intracameral antibiotics in the prophylaxis of endophthalmitis. Since June 2010, a moxifloxacin eye-drop has been available in Spain, with more possibilities of prophylaxis.

Results show that final VA was worse in Group 2 than in group 1. The explanation for this can be found in the type of bacteria that cause endophthalmitis. We found Corynebacterium, Klebsiella pneumonia, Pseudomonas aeruginosa, and Proteus mirabilis in group 2. All these bacteria were poorly sensitive to cefazolin. Negative culture was observed in a 34.21% of cases in group 1 and 28.57% in Group 2, similar to other studies, such as the Endophthalmitis Vitrectomy Study (EVS), with values near to 30%.

**CONCLUSIONS**

Intracameral bolus injection of cefazolin in cataract surgery demonstrated prophylactic efficacy in diminishing the rate of postoperative endophthalmitis in our hospital, at two doses of 1 mg in 0.1 ml solution.

Furthermore, a close relationship between with the Department of Microbiology, and the Infectious Diseases Committee of our Hospital is essential for developing a proper antibiotic prophylaxis.

Further studies are needed with a larger number of patients in order to fully determine the effectiveness of cefazolin and its non-toxicity at corneal endothelium level.

**REFERENCES:**


Phacoemulsification: Effect of Intraocular Irrigating Solutions on the Corneal Endothelium

Mushtaq Ahmad FCPS\textsuperscript{1}, Yousaf Jamal Mahsood\textsuperscript{2}, Muhammad Naeem\textsuperscript{3}, Sofia Iqbal MRCOph. FRCS\textsuperscript{4}, Nazullah FCPS\textsuperscript{5}, Prof. Nasir Saeed FCPS\textsuperscript{6}

\textbf{ABSTRACT}

\textbf{Objective:} To compare corneal integrity after phacoemulsification with Balanced Salt Solution Plus (BSS Plus) versus Lactated Ringer’s (Ringer) solution.

\textbf{Material and Methods:} Sixty patients undergoing phacoemulsification were randomised to either BSS Plus (n=30) or Ringer (n=30) as the irrigating solution. Patients were examined at baseline and at 15 and 30 days postoperatively. Evaluations included specular microscopy to evaluate endothelial cell density (ECD) and endothelial cell size variability (CV).

\textbf{Results:} Groups were well balanced regarding baseline ECD and CV (p>0.05). There was no statistically significant difference between ECD reduction in group BSS Plus 15 ±2.0% and Ringer 11.1±1.9% (p<0.05) at day 30 or on any visit. There was no statistically significant difference between CV increase in group BSS Plus 20.0±3.0% and Ringer 27.2±4.0% (p<0.05) at day 60 or on any visit. Interestingly, there were statistically significant correlations between ECD loss and phacoemulsification time (p<0.0001) and ECD loss and irrigation solution volume (p<0.0001) in the Ringer group, but not in the BSS Plus group.

\textbf{Conclusions:} Ringer’s solution was similar to BSS Plus for corneal preservation in atraumatic cataract surgery. However, our study demonstrates that there is a trend towards lower postoperative endothelial cell density for surgeries with longer phacoemulsification time and higher irrigation volumes if Ringer is used.

\textbf{Keywords:} phacoemulsification, corneal integrity, irrigating solutions

\textbf{INTRODUCTION:}

The corneal endothelium consists of a monolayer of cells on the posterior corneal surface that has limited regenerating capability after injury. The normal thickness and transparency of the cornea are maintained by a barrier function and the active fluid pump of corneal endothelial cells.\textsuperscript{1} The natural loss of human endothelial cells is approximately 0.6\% each year.\textsuperscript{2} Intraocular manipulation, such as that during phacoemulsification cataract surgery, causes fluid and lens fragment turbulence that can lead to endothelial cell damage.\textsuperscript{3}

Solutions initially used for cataract surgery were salt solution, Ringer’s solution and plasma-lyte 148. Subsequently, in 1960, more physiological solutions with ionic composition, pH and osmolarity similar to aqueous humour were developed and received the name of balanced salt solution (BSS).\textsuperscript{4} In 1973, a third generation of irrigation solution, named BSS Plus, was developed after studies by Edelhauser and coauthors,\textsuperscript{5} who verified that the addition of glutathione, glucose and bicarbonate to the irrigation solution would contribute to endothelial cell function and survival in vitro. Further, some in vivo studies using different irrigating solutions show that postoperative corneal thickness and endothelial cell count do not depend on irrigation volume and time but rather depend on the solution’s chemical composition.\textsuperscript{6–11} In fact, studies show that enriched balanced salt solutions such as BSS Plus (glucose glutathione bicarbonate solution) provide characteristics similar to those of the aqueous humour to maintain constant intraocular conditions.\textsuperscript{8,12,13} However, dextrose bicarbonate Lactated Ringer’s solution for irrigation has been reported to be as effective as enriched BSS during cataract surgery,\textsuperscript{14} and some authors consider operating time and irrigation volume to be important clinical factors for endothelial cell loss during phacoemulsification cataract surgery.\textsuperscript{15,16}

Based on the above presented conflicting information and the necessity for optimising costs in cataract surgery, especially for very poor regions from developing countries, and considering that Lactated Ringer’s is 30 times cheaper than BSS Plus,\textsuperscript{17} we designed this prospective masked trial to investigate...
for differences in preservation of corneal integrity after phacoemulsification cataract surgery using two intraocular irrigating solutions.

**MATERIALS AND METHODS**

A randomized clinical trial was conducted at Ophthalmology Department Hayatabad Medical Complex, Peshawar from August 2011 to November 2011.

Participation in a prospective, double-masked trial was offered to all patients with age-related cataract scheduled to undergo phacoemulsification with intraocular lens (IOL) implantation.

**Exclusion criteria included:**

1. **Types of cataract other than age-related** (eg, secondary or congenital)
2. **Previous ocular surgery**
3. **Previous corneal disease**
4. **Anterior chamber cells or flare**
5. **Any condition that impeded corneal evaluation by specular microscopy and pachymetry or follow-up.** All patients underwent an initial screening visit which included a detailed ophthalmic evaluation with Snellen BCVA measurement, applanation tonometry measured with a Goldmann tonometer, biomicroscopy of the anterior segment, dilated biomicroscopic fundus examination and binocular indirect ophthalmoscopy.

Patients who met the eligibility criteria were informed verbally and in writing of the potential risks and benefits of the use of the two irrigation solutions, and those patients who agreed to participate signed a written informed consent form. For patients who accepted study participation, the screening visit was used as the baseline examination, which occurred 1-3 days before surgery. If both eyes were eligible for study participation, the eye with worse BCVA was included in the study.

The corneal endothelium was examined with a non-contact specular microscope (Topcon SP2000P). Three photographs were taken per eye at each examination, and the mean of measurements was calculated. With this semiautomatic method, the operator hand-digitised the centre of each cell (centre method). Corneal endothelial morphology was calculated from a cluster of 55 cells from each photo as described elsewhere. The following variables were measured: (1) central endothelial cell density (ECD) defined as the number of cells per mm²; (2) central endothelial cell size variability or the coefficient of variation (CV).

This variable is defined as SD/ICS (where SD is the standard deviation of the cell size, and ICS is the mean cell size) and is expressed as a percentage. After baseline evaluation, patients were randomised in groups of five. The technician was asked to pick up one of two identical opaque envelopes, one containing the designation for phacoemulsification surgery using BSS Plus irrigation solution (BSS Plus group; BSS Plus, Alcon, Fortworth, Texas) and the other containing the designation for phacoemulsification surgery using Lactated Ringer’s solution (Ringer group; Ringer Lactato, Baxter, São Paulo, Brazil).

The next five included patients were automatically assigned to the treatment group specified in the second envelope. The time of ultrasound use and its potency (kept at 60% for all cases), volume of irrigation solution used and operating time were noted for each surgery procedure, as well as intraoperative complications such as Descemet detachment, iris trauma and posterior capsule rupture. All surgeries were performed by the same physician (DRL) under sterile conditions. The physician was not masked and knew the type of irrigation solution that was being used for each patient. Postoperatively, 0.3% ciprofloxacin three times per day and prednisolone acetate 1% four times per day were used for 4 weeks. Patients were scheduled for follow-up examinations at postoperative days 1, 15 (±1) and 30 (±2).

At these visits, patients underwent complete ophthalmic examination using the same procedures as at baseline. All baseline and postoperative evaluations were performed by a masked ophthalmologist (MSAL) who was not aware of the irrigation solution used during surgery. Comparisons between groups at baseline (ie, patient age, surgery duration, etc) were performed with non-paired t tests. Cataract nucleus scores were compared with a contingency analysis followed by a Pearson ÷2 test. For data retrieved at postoperative days 1, 15 and 30 intra-individual differences from baseline were calculated, and a statistically significant effect was defined as a difference for zero for intra-individual mean differences. Statistical analyses have been performed using JMP 7.0.2 (SAS Institute 2007; SAS Institute, Cary, North Carolina) software.

Considering the mean and SD (16% and 4% respectively) for the intra-individual difference in endothelial cell density found in a previous study, we could estimate that, with a sample of 50 patients per group, the minimal detectable difference would be 2.4% (power=80%), which is

**RESULTS**

Ten patients (five from the BSS Plus group and five from the Ringer group) were excluded because they had two consecutive missed visits. There were no significant differences between groups with respect to patient’s age, gender, baseline visual acuity, intraocular pressure, cataract grading, time for ultrasound use and volume of irrigation solution employed (table 1).
The preoperative mean (±SEM) ECD was 2728.9±70.9 cells/mm² and 2836.6±50.3 cells/mm² in the BSS Plus and Ringer groups, respectively (p=0.1092). A significant reduction from baseline in ECD was observed at each postoperative study visit in both groups. There was no statistically significant difference in ECD reduction between BSS Plus and Ringer groups at any study visit (Table-2).

A statistically significant linear correlation was observed between ECD loss and phacoemulsification time for the Ringer group (p<0.0001) throughout the 30-day study period. Taking results from the last visit (30 days postoperatively), the coefficient of correlation (r²=0.313) demonstrates that the linear model explains only approximately one-third of the variation around the mean. Nevertheless, the observed significance probability (p=0.0001) can be considered as evidence of a regression effect. Thus, considering the model: ECD Change=a*USTime+b, the parameter found for the Ringer group at 30 days after surgery is: a=“6.3±1.3 (cells/mm²)/s, meaning that for each 1s of phacoemulsification time, ECD loss increases by approximately 6 cells/mm².

In contrast, there was no significant correlation between ECD loss and phacoemulsification time in the BSS Plus group at any study visit. For this group at day 30 after surgery, r² was 0.03 and p=0.2364, indicating that the linear model fits no better than the overall response mean. There is also a statistically significant correlation between ECD loss and the total volume of Ringer used. Linear model parameters for the Ringer group at 30 days postoperatively are a=“6.7±0.5 (cells/mm²)/ml, (r²=0.407; p<0.0001). Thus, for each 1ml of Ringer used, ECD loss increases approximately 7 cells/mm². In contrast, there was no significant correlation between BSS Plus used and ECD loss at any study period. For this group at day 30 after surgery, r² was 0.038 and p=0.1736, indicating that the linear model fits

### Table 1
Demographic and clinical characteristics

<table>
<thead>
<tr>
<th></th>
<th>Balanced Salt Solution Plus</th>
<th>Ringer</th>
<th>(p&gt;0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>63.0±1.6</td>
<td>65.3±1.7</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>34 females</td>
<td>36 females</td>
<td>(p&gt;0.05)</td>
</tr>
<tr>
<td>Visual acuity at baseline (logMAR)</td>
<td>0.52±0.02 (20/62)</td>
<td>0.51±0.03 (20/57)</td>
<td>(p&gt;0.05)</td>
</tr>
<tr>
<td>Visual acuity at postoperative day 60 visit (logMAR)</td>
<td>0.04±0.01 (20/22)</td>
<td>0.03±0.01 (20/21)</td>
<td>(p&gt;0.05)</td>
</tr>
<tr>
<td>Phacoemulsification time (s)</td>
<td>32.9±4.9</td>
<td>32.6±4.9</td>
<td>(p&gt;0.05)</td>
</tr>
<tr>
<td>Volume of irrigating solution employed (ml)</td>
<td>124.8±8.3</td>
<td>129.9±8.4</td>
<td>(p&gt;0.05)</td>
</tr>
<tr>
<td>Intraocular pressure at baseline (mmHg)</td>
<td>16±3</td>
<td>16±4</td>
<td>(p&gt;0.05)</td>
</tr>
</tbody>
</table>

* Values presented as mean±SEM.

### Table 2
Mean±SEM endothelial cell density and cell size coefficient of variability and the intraindividual differences during follow-up

<table>
<thead>
<tr>
<th></th>
<th>Balanced Salt Solution Plus</th>
<th>Ringer</th>
<th>Intraindividual difference (%)</th>
<th>Intraindividual difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Endothelial cell density</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>2836.6±50.3</td>
<td>2728.9±70.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2468.3±68.3</td>
<td>2438.6±67.5</td>
<td>12.7±2.1</td>
<td>10.3±1.5</td>
</tr>
<tr>
<td>15</td>
<td>2501.5±62.6</td>
<td>2344.3±71.6</td>
<td>11.3±2.1</td>
<td>13.5±2.0</td>
</tr>
<tr>
<td>30</td>
<td>2492.0±60.3</td>
<td>2357.0±76.8</td>
<td>11.7±1.9</td>
<td>13.0±2.3</td>
</tr>
<tr>
<td><strong>Cell size coefficient of variability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>42.3±1.2</td>
<td>41.6±1.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>51.6±1.6</td>
<td>50.4±1.4</td>
<td>24.7±3</td>
<td>24.1±3.2</td>
</tr>
<tr>
<td>15</td>
<td>56.8±1.4</td>
<td>60.9±2.0</td>
<td>39.1±5.0</td>
<td>51.8±6.1</td>
</tr>
<tr>
<td>30</td>
<td>52.7±1.2</td>
<td>53.3±1.2</td>
<td>29.2±4.9</td>
<td>32.5±3.7</td>
</tr>
</tbody>
</table>
Phacoemulsification: Effect of Intraocular Irrigating Solutions on the Corneal Endothelium

The preoperative mean CV was 42.3±1.2% and 41.6±1.4% in the BSS Plus and Ringer groups, respectively (p=0.6503). There was a significant increase in CV in both groups at 1, 15 and 30 days after surgery. There was no statistically significant difference in CV between the groups at any study visit. There was no statistically significant correlation between CV change and phacoemulsification time or total volume of irrigation volume used in either group. There were no cases of Descemet membrane detachment, iris trauma, posterior capsule rupture or endophthalmitis during the study.

**DISCUSSION**

The results of the current study show that BSS Plus is similar to Lactated Ringer’s with respect to the clinical parameters (ECD and CV) that reflect preservation of corneal integrity following phacoemulsification cataract surgery with posterior chamber IOL implantation. It is important to point out that this study included uncomplicated cases performed by an experienced surgeon, who performed all surgeries with less than 180s of phacoemulsification time (phacoemulsification power at 60%) and with less than 150ml for all surgeries. Kiss et al. and Puckett et al. reported similar endothelial preservation with the use of BSS Plus or Lactated Ringer’s as irrigating solutions for atraumatic cataract surgery by phacoemulsification and extracapsular extraction, respectively. However, the results of these latter two studies are in contrast to data from a study by Joussen et al., who reported that corneas irrigated with BSS Plus during phacoemulsification were less swollen than corneas irrigated with Ringer’s solution on the first postoperative day.

Another study, by Vasavada et al., also reported the same finding, although in this Indian study, standard BSS was used. On the other hand, the steepness of the endothelial cell density reduction slope in relation to phacoemulsification time and irrigation volume used in the Ringer group demonstrates the trend towards reduced endothelial cell density for surgeries with longer phacoemulsification time and higher volumes of irrigation; this is in contrast to the BSS Plus group, for which the endothelial cell density reduction slope is not so steep, and there is no significant correlation with phacoemulsification time and irrigation volume used. This is consistent with data obtained in studies from Edelhauser et al., Matsuda et al. and Yagoubi et al., which demonstrated that the corneal endothelium can be better preserved by using solutions with a composition similar to that of aqueous humour. In fact, BSS Plus and Lactated Ringer’s have common aqueous humour constituents: sodium chloride, potassium chloride, calcium chloride. However, just BSS Plus has magnesium, sodium phosphate, sodium bicarbonate, dextrose and glutathione, which are also present in aqueous humour.

The rationale for the above-mentioned composition differences that theoretically favour BSS Plus would be: magnesium is essential for the Mg-ATPase endothelial pump; the addition of dextrose would be justified as a natural energy source for endothelial cells, sodium phosphate and bicarbonate are physiological buffers found in aqueous humour, and glutathione is a peptide which is important as an antioxidant and as an agent maintaining the intercellular junctions. In addition, aqueous humour, BSS Plus and Lactated Ringer’s pH and osmolality are 7.38/304; 7.40/305 and 6.4/260, respectively.

Consequently, Lactated Ringer’s solution is hypotonic and slightly acidic when compared with BSS Plus, which seems to be more physiological, since it has pH and osmolality values closer to aqueous humour values. In summary, for uncomplicated phacoemulsification cataract surgeries, Ringer’s solution is associated with a corneal endothelial cell reduction similar to BSS Plus, if the surgeon uses limited phacoemulsification time and irrigation volume. Given the 30-fold higher cost of BSS Plus compared with Lactated Ringer’s solution, the findings of our study may have a substantial impact on the cost of providing cataract surgery for atraumatic cases. On the other hand, for cataract operations that may require a higher volume of irrigation solution or longer phacoemulsification time, such as dislocated lens, dense cataracts and inexperienced surgeons cases, BSS Plus may contribute to lower endothelial cell loss.

**CONCLUSIONS:**

Ringer’s solution was similar to BSS Plus for corneal preservation in atraumatic cataract surgery. However, our study demonstrates that there is a trend towards lower postoperative endothelial cell density for surgeries with longer phacoemulsification time and higher irrigation volumes if Ringer is used.

**REFERENCES**

ABSTRACT

Purpose: To compare the rates of significant post operative wound leak and anterior chamber (AC) reaction in patients undergoing phacoemulsification cataract surgery with and without hydrations of corneal incisions.

Material and Methods: All eyes scheduled to have phacoemulsification surgery by two surgeons were selected. The first group of eyes underwent phacoemulsification surgery with 3.25 mm superior and two side ports at right angle to the main clear corneal incision. The incisions were hydrated with 27 gage cannula. The second group of eyes underwent an identical surgery, but the incisions were not hydrated at the end of surgery. Patients were followed up at 24 hours, and 1 week and evaluated by slit lamp for wound leak (using Seidel’s Test), AC cells and flare.

Results: Twenty four eyes underwent surgery with ports hydrations and 25 eyes underwent no ports hydrations at the end of surgery. The mean age of patients in groups I and II were 61.2 years and 63.3 years, respectively. Following surgery, none of the patients in two groups showed wound leak at 1 day and 1 week. At the first post-op day, only 14.6% of eyes in group 1 showed AC reaction, compared to 32.0 % in group II (p = 0.04). At one week postop, 16.7% and 20.0% of eyes in Groups I and II showed AC reaction, respectively. However, the difference was not statistically significant (p = 0.67).

Conclusions: The incidence of postoperative wound leakage and anterior chamber reaction in patients undergoing phacoemulsification cataract surgery with and without corneal incisions hydrations are not different. Thus ports hydrations at the end of surgery offers no added advantages.

Keywords: Phacoemulsification, cataract, Anterior chamber reactions, Wound leakage
phacoemulsification cataract surgery with and without ports hydrations at the end of surgery.

MATERIALS AND METHODS

All eyes that were scheduled to have phacoemulsification surgery at Ophthalmology Department Hayatabad Medical Complex (HMC), Peshawar from December 2010 to December 2011 were included in the study. Eyes with very dark brown cataracts were excluded because of a likelihood of converting to ECCE or prolonged phacoemulsification time.

Eyes with phacoemulsification time greater than 1.5 minutes were also excluded. Post-operatively, eyes with corneal edema were excluded as this interfered with the evaluation of anterior chamber reaction. The first group of eyes underwent uncomplicated phacoemulsification surgery with 3.25 mm superior and two side ports at right angle to the main clear corneal incision. The incisions were hydrated using a 27 gage cannula.

The second group of eyes underwent an identical surgery, but the incisions were not hydrated. Patients were followed up at 24 hours, and 1 week and evaluated by slit lamp for the presence of wound leak (using Seidel’s test), and AC cells and flare.

A Seidel’s test includes application of a fluorescein strip with local anesthetic into the conjunctival sac and then examination of the wound using a cobalt blue filter. If fluid appears to flow from the wound, there’s a leak. Anterior chamber (AC) reaction was assessed using slit lamp to determine the number of cells and the amount of flare in the anterior chamber. AC reaction was called significant if the number of cells in one field, with any amount of flare, were > 10. Surgeons who operated, assessed the patients postoperatively and recorded the findings. The data were entered and analyzed using SPSS software (version 11.5; SPSS Inc., Chicago, USA).

Means (± SD) were calculated for continuous variables and frequencies and proportions for categorical variables. Chi-square test was used to compare the rates of wound leak and AC reaction in the two groups.

RESULTS

Twenty four eyes of 21 patients, 14 men and seven women, underwent surgery with ports hydrations and 25 eyes of 22 patients, 13 men and 10 women, underwent no ports hydrations after surgery. The mean ages of patients in groups I and II were 61.2 years and 63.3 years, respectively. Following surgery, none of the patients in two groups showed wound leak at 24 hours and the first week. In addition, at 24 hours only 14.6% of eyes in group I showed AC reaction, compared to 32.0% in group II (p = 0.04). At one week post-op, 16.7% and 20.0% of eyes in Groups I and II showed AC reaction, respectively. However, the difference was not statistically significant (p = 0.67).

DISCUSSION

To the best of our knowledge, this is the first study in Pakistan to compare the rates of postoperative wound leak and anterior chamber reaction in patients undergoing phacoemulsification cataract surgery with and without ports hydrations after surgery. We found that there were no statistically significant differences in the rates of postoperative wound leak and anterior chamber reaction in the two groups at 24 hours and one week. Logically wound hydration seal the eye and reduce the chances of wound leak and most of the surgeons prefer to hydrate the incision after phacoemulsification for their own satisfaction although our study showed no added advantage of this practice.

Comparison with other studies

An extensive review of national and international literature revealed there were no studies that directly compared the rates of postoperative wound leak and anterior chamber reaction in the two groups we studied. However, there were several studies that compared postoperative astigmatism between sutured and unsutured phaco surgery. We plan to address these in our future studies.

Our study had the following limitations:

First, the sample size was small, especially for the assessment of wound leak which is a relatively rare outcome. Second, participants were not assigned to the two interventions randomly. Randomization eliminates selection biases.

We conclude that the rates of postoperative wound leak and anterior chamber reaction in phacoemulsification are not different in both groups. Thus ports hydrations at the end of surgery offers no added advantages.

REFERENCE

ABSTRACT

Objectives: To compare the safety and efficacy of phacoemulsification versus small incision cataract surgery (SICS) in mature cataract.

Material and methods: A prospective randomized controlled trial was carried out involving 79 and 71 patients with mature senile cataract selected for phacoemulsification and SICS respectively. All patients underwent slit lamp examination. Phaco-suitable mature senile cataracts were included for this study. Study variables included surgeon’s time, intraoperative/postoperative complications, postoperative uncorrected visual acuity and surgery-induced astigmatism on the first postoperative day. Mean values with standard deviations were calculated. P value of less than 0.05 was considered significant.

Results: There was no difference between the groups in terms of gender, age and pre-operative visual acuity (p = 0.09). In phacoemulsification group (n=79) more than three quarters and in SICS group (n=71) more than two thirds of the patients had good visual outcome (6/6-6/18) on first postoperative day p=0.065. Poor outcome (<6/60) was recorded in 1% (phacoemulsification group) and 3% (small incision cataract surgery group). Mean visual acuity was 0.53 ± 0.27 in phacoemulsification group and 0.47 ± 0.24 in SICS group. Mean surgery time was significantly shorter in SICS group (p=0.003). Data were computed and analyzed using the SPSS software program vs 10. The p value of < 0.05 was considered significant.

Conclusion: Performing SICS is significantly cheaper, faster and is a suitable alternative option for the treatment of immature senile cataracts. Although the complication rate is high in group B but there is no significant difference in visual outcome on the first postoperative day between Phaco and SICS techniques.

Keywords: phacoemulsification, small incision cataract surgery (SICS)

INTRODUCTION

Several worldwide studies suggest that the prevalence of blindness is approximately 11%1 in cataract surgery. Review of these studies shows that cataract is the main cause of blindness, as some studies have reported about 79% of bilateral blindness is due to cataract.2 Insufficient financial resources, inaccessibility and lack of awareness about existing eye care facilities are some of the barriers underprivileged people face in utilizing available eye care services in poor countries.3 Phacoemulsification is the preferred technique for cataract surgery in developed countries, but large-scale implementation in developing countries may prove to be a challenge.4 An alternative surgical technique, manual sutureless small incision cataract surgery, has been increasing in popularity, as the technique has been shown to yield similar surgical outcomes as phacoemulsification.5 Several comparable studies have shown similar visual outcome of the two surgical techniques (Ruit et al 2007; Schwab, 2007; Gogate et al 2007; Spencer, 2006) but none of those previous studies had compared the surgical procedures on phaco mature cataracts.6,7,8,9

This prospective randomized controlled trial was done to compare the efficacy of these two methods of cataract extraction on phaco mature cataract in developing countries.

MATERIALS AND METHODS

A randomized clinical trial was conducted at Ophthalmology Department Hayatabad Medical Complex, Peshawar from August 2011 to November 2011. All patients underwent slit lamp examination. Phaco-suitable mature senile cataracts were included for this study. Mature cataract was defined as total lens opacity. All other types of cataracts were excluded from this study. An informed consent was obtained from all the patients before including them in the study. Ethical clearance was obtained from the Institutional Research Committee. The patients with mature senile cataract were divided into two groups before receiving retrobulbar anaesthesia. Randomization was done with the help of random number tables. All patients were operated by a single surgeon well experienced in...
performing cataract surgery with both techniques for more than ten years.

All cases were operated and examined in the postoperative period by a single surgeon. A manual (Topcon) keratometer was used for the purpose of keratometry and a A-Scan ultrasound (Sonomed) for the purpose of axial length measurement. The power of the intra-ocular lens was calculated with the modified SRK II formula. After pupil dilatation with tropicamide and phenylephrine eye drops, a retrobulbar injection was given in sitting position and the patient requested to press the eye ball with the hand over a piece of a cotton gauge to soften the eyeball. Preoperative povidone-iodine 5 % solution was used for disinfection of the periocular skin area. All the surgeries were done via the superior approach. Three incisions made in phaco patients (3.2mm superior and two side ports). A phacoemulsification machine (Universal-II) with tubings, hand pieces and Phaco tips, irrigation and aspiration cannulas was used for performing phacoemulsification surgery in this study. The Acrylic hydrophilic foldable lens with a 6 mm optic was implanted in the bag.

The SICS was performed using the tunnel incision 2mm from the limbus and 7 mm enlarged. In all SICS cases, a large capsulorrhexis was made before nucleus delivery to ensure the placement of the intraocular lens in the bag. The rigid poly- methylmethacrylate intraocular lens with a 6 mm optic was implanted in the bag. The surgical time was measured from the preparation of the sclera-corneal incision to the application of the eye pad.

Study variables included surgeon’s time, intraoperative/ postoperative complications, postoperative uncorrected visual acuity and surgery-induced astigmatism on the first postoperative day. Postoperative uncorrected visual acuity was taken with a Snellen chart at a 6 meter distance and was converted into decimals.

RESULTS

Total of 150 patients included in the study, 79 were operated with the phacoemulsification technique (Group A) and 71 were operated with the SICS technique (Group B).

Baseline characteristics were similar in both groups as shown in table 1.

Mean intraocular lens power was similar in both groups, phaco group: 22.2 ± 1.8 D and SICS group: 22.02 ± 1.31 D. In group A, one patient had zonular dialysis during hydro-dissection procedure. In group B, two patients had posterior capsule rupture (PCR) with vitreous loss. One patient underwent anterior vitrectomy and PCIOL was placed in the ciliary sulcus. The other patient, who had a nucleus drop, was referred to the Retina Unit of our hospital. Dropped nucleus was removed and PCIOL was implanted in ciliary sulcus by the vitreo-retina surgeon.

Mean time spent by the surgeon per surgery was 11 minutes in group A and 8 minute 18 seconds in group B. In group A, 56.2 % patients and in group B 19.9 % had surgery time of more than 9 minutes (p value < 0.003).

<table>
<thead>
<tr>
<th>Table 1 Baseline characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>Age (Mean± SD)</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>VA (HM orworse)</td>
</tr>
<tr>
<td>Mean VA (remaining patients)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2 Intra-operative findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parameters</td>
</tr>
<tr>
<td>Mean IOL power</td>
</tr>
<tr>
<td>Intra-operative complications</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Mean surgerytime &gt; 9 min</td>
</tr>
</tbody>
</table>

Ophthalmology Update Vol. 10. No. 3, July-September 2012 247
Postoperatively, uncorrected visual acuity was measured on the first postoperative day immediately after removal of the eye pad. In group A, 90% more than two third and in group B 75% nearly two thirds of patients had good visual outcome (6/6-6/18).

Mean visual acuity was 0.53 ± 0.27 D in group A and 0.47 ± 0.24 in group B. Poor outcome (unaided visual acuity <6/60) was noticed in 1% patients from group A and in 3% patients from group B.

Postoperatively, four patients had corneal edema in group A and three patients in group B. One patient had increased anterior chamber reactions due to postoperative uveitis and eight patients had hyphema in group B (Table 4). All patients with corneal edema responded to treatment with antibiotic and steroid (Tobramycine and Dexamethasone) containing eye drops and all the patients with hyphema had spontaneous resolution with in a two days. Corneal astigmatism are more in group B as compared to group A. All the patients were discharged on the third post operative day.

**DISCUSSION**

In this randomized clinical trial only mature cataracts were included, so the outcomes cannot be generalized for all types of cataract. Operated patients were advised to apply antibiotic and steroid containing (Tobramycine and Dexamethasone) eye drops regularly on a tapering regime for six weeks. It is a common tendency that though we advise our patients to review after six weeks. All surgeries were performed by a single surgeon (SKS), who is experienced in both the techniques. After the phacoemulsification procedure a 6 mm optic hydrophilic foldable lens was implanted in the bag and after the fish hook SICS surgery a 6 mm optic PMMA lens was implanted in the bag. Usually in SICS, the internal opening of the sclero-corneal wound is larger than the outer opening. On the first postoperative day, more than three quarters of all the patients in group A and more than two thirds of the patients in group B had a good visual outcome.

Mean visual outcome and mean induced keratometric astigmatism were comparable in both groups on the first post operative day. A frown shaped temporal incision of SICS with phaco resulted in almost similar visual outcome with equal amount of postoperative astigmatism.

Mean surgery time was 10 minutes in group A and 8 minutes and 18 seconds in group B. Mean surgery time of more than 9 minutes was observed in 85% of patients in group A and 11% of patients in group B (P value <0.003). Shorter in toto nucleus extraction time compared to phacoemulsification of nucleus, faster epinucleus removal and faster cortex aspiration by simcoe cannula compared to irrigation and aspiration cannula resulted in faster surgery by the SICS method. Complications like hyphema and against the rule astigmatism are more frequently observed in group B.

Though the cost difference between the phaco and SICS with rigid lens is very low (Gogate et al, 2007) in high volume set up, consumable cost of phaco surgery with a rigid PMMA lens is higher due to increased use of viscoelastics and irrigating solution. A hospital based study done by Hennig et al (2007) in similar setting at Sagarmatha Choudhary Eye Hospital, Nepal showed

---

**Table 3 Visual outcome on the first postoperative day**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Phacoemulsification</th>
<th>SICS</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Group A)n=79</td>
<td>(Group B)n=71</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good (6/6-6/18)</td>
<td>90.7%</td>
<td>75%</td>
<td>0.0655</td>
</tr>
<tr>
<td>Borderline (6/24-6/60)</td>
<td>26%</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Poor (&lt;6/60)</td>
<td>1%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Mean visual outcome</td>
<td>0.53 ± 0.27</td>
<td>0.47 ± 0.24</td>
<td></td>
</tr>
</tbody>
</table>

**Table 4 Postoperative findings on the first post-operative day**

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group A</th>
<th>SICS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postoperativecomplications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corneal edema</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>AC reaction</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Hyphema</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Mean induced Kastigmatism ( diopter)</td>
<td>0.12 (SD 0.82)</td>
<td>0.81(SD 0.84)</td>
</tr>
</tbody>
</table>
a consumable cost difference of USD 0.50 between SICS and phaco with rigid lens. The fixed cost associated with the establishment of a phaco set-up is much higher compared to SICS. The cost of the phaco machine used in this study was Euro 20,000. The depreciation of the phaco machine and the running cost associated with the consumables and tips make phaco surgery expensive as compared to SICS.

Phacoemulsification has a long learning curve, requires expensive equipments, has a high consumable cost and needs expensive foldable lenses to maximize the benefit associated with the small incision (Thomas, 2009). Despite these facts, there is a growing demand for phaco surgery in the developing world and many patients are willing to pay more for it (Thomas et al, 2008). To meet the demand and to make it affordable to the people of all socioeconomic levels, phacoemulsification is being performed with implantation of foldable and rigid IOLs as well in the developing countries.

In the high volume set-up of the BEH where a single surgeon operates on two tables, six surgical sets of instruments, hand pieces, phaco tips, sleeves and irrigation-aspiration cannulas are required to perform phacoemulsification faster. The cost associated with phaco hand pieces, phaco tips, sleeves, irrigation and aspiration cannulas are high and increase the fixed cost and consumable cost associated with phacoemulsification. Reusable tubings, cassettes, phaco tips and hand pieces can help to lower the cost of phacoemulsification surgery. There are certain guidelines given by the company about the maximum number of autoclaving cycles for the tubings, tips and hand pieces. Often these accessories are autoclaved and reused many more times than recommended (Thomas, 2008). Only in a very few ophthalmic theatres in developing countries do they change phaco hand pieces, phaco tips, sleeves and tubings for each surgery (Thomas, 2009). Various practices like changing only the tips and sleeves between surgery and dipping phaco tips and cannulas in antiseptic solution after each surgery are common practices in developing countries to cut down the cost. But none of the above-mentioned procedures meet the recommended sterilization standards and therefore, should be avoided (Thomas, 2009). Easily available, inexpensive surgical instruments allow surgeons to follow standard recommended procedures of sterilization for SICS whereas the same is not true for phacoemulsification. Although there is hyphema and against the rule astigmatism in significant number of patients in group B but this study clearly shows that there is no additional visual and surgical benefit on the first postoperative day with phaco technique with foldable IOLs as compared to SICS with rigid IOLs.

CONCLUSION
Performing SICS is significantly cheaper, faster and is a suitable alternative option for the treatment of immature senile cataracts. Although the complication rate is high in group B but there is no significant difference in visual outcome on the first postoperative day between phaco and SICS techniques.

REFERENCES:
Comparision Between Topical Anesthesia alone vs Topical with Intracameral Anesthesia in Phacoemulsification

Muhammad Naeem¹, Mushtaq Ahmad FCPS², Yousaf Jamal Mehsood³
Hina Mehwish Khan⁴, Mohammad Naeem Khan FCPS⁵
Ophthalmology Department, Hayatabad Medical Complex, Peshawar

ABSTRACT
Purpose: To compare and determine patients and surgeon's comfort and satisfaction in Phacoemulsification under topical anesthesia with proparacaine hydrochloride 0.5% versus topical with intracameral xylocaine 2% (preservative free).

Material and Methods: The study was conducted in the department of Ophthalmology Hayatabad Medical Complex, Peshawar from May 2010 to June 2011. 96 patients of cataract divided into two groups, A and B each containing 48 patients were included in this study. Phacoemulsification was performed on group A under topical anesthesia with proparacaine hydrochloride 0.5% and on group B under topical anesthesia along with intracameral xylocaine 1%. All the patients in both groups were operated by the same surgeon. The surgeon and patients satisfaction score was entered in a standardized performa.

Results: 43 patients (89.58%) in group A, felt no pain while 5 patients (10.41%) felt pain up to the extent that 0.5 cc of 2% lignocaine was needed to inject in the anterior chamber and then the procedure of phacoemulsification was completed comfortably and pain free in one patient (2.08%) in group A, the nucleus dropped into the vitreous and was referred to vitreoretinal surgeon for further management. The mean phaco time was 2.2 minutes while mean operation time was 22 minutes. In group B, the patients were operated after infiltration of 0.5 cc 2% lignocaine injection in the anterior chamber. All patients operated under topical with intracameral were pain free and remained comfortable during surgery except in two cases in group A, who felt pain during implanting folding lens. The mean phaco time was 2.1 minutes and mean operation time was 22.0 minutes. The extension of CCC was seen in 5 patients (10.41%) in group A and 2 patients (4.16%) in group B. The posterior capsule rent was seen in 2 patients (4.16%) in A group and in 2 patients (4.16%) in group B.

Conclusion: The intracameral injection of 2% lignocaine into the anterior chamber is superior to topical anesthesia alone with proparacaine hydrochloride during phacoemulsification in ensuring patient's and surgeon's comfort. None of the patients in any group showed the complications as sometimes seen in periocular or retrobulbar anesthesia.

INTRODUCTION
Cataract blindness has been recognized for many centuries with potential surgical intervention varying from couching, extra capsular by needle pricking first ECCE, than intra capsular cataract extraction, with the introduction of cryo-extraction, this became most popular method. These obtained limited success due to the complications like vitreous prolapse, retinal detachment, macular edema, aphakic glaucoma¹.

Early surgeons, performing couching had no idea of pushing something behind the pupil was the human lens. In 16th century Atoine Jan and Michel Pierre identified from autopsy specimen that the cataract was truly the crystalline lens itself².

The written proof of couching came from Susruta an Indian surgeon³. Daviel performed extracapsular extraction from inferior limbus in sitting position⁴. Pierre Francos shifted incision to the upper limbus while sitting on head side of patient. The pharmacological mydriasis and planned iridectomy was introduced by Carl Himly⁵.

The next breakthrough came in intracapsular surgery with the development of chemical zonulysis using an enzyme ?-chymotrysin⁶. Aphakic correction with contact lens started from 1940. Harold Ridley implanted first synthetic lens on November 29, 1949⁷. First feeling of intact supports for IOL was urged by Cornelius Binkhorst. Kelman introduced his phacoemulsifier in 1967 but many intracapsular surgeons were not convinced⁸. After that Robert Sinskey and John Sheets were more popular in small incision ultrasonic surgery⁹. Howard Gimbel introduced capsulorhexis first time¹⁰. Small incision closing sutures were introduced by John Shepherd and...
later by Howard Fine\textsuperscript{11}.

Kelman performed phacoemulsification into anterior chamber and D. Calvard, Kratz.,T performed phacoemulsification into the papillary plane\textsuperscript{12}. Endocapsular phacoemulsification was introduced by Shepard\textsuperscript{13}. Several studies have demonstrated that topical anesthesia provides satisfactory analgesia, comparable with regional blocks (retrobulbar, peribulbar and sub-tenon, anesthesia)\textsuperscript{24}. This study was conducted to assess and compare the advantages of topical with intracameral anesthesia over topical anesthesia alone in phacoemulsification surgery.

MATERIALS AND METHODS

The ninety six patients having cataract were divided into two groups A and B each having 48 patients. The age of patients ranged between 50 to 70 years. Both male and female patients with anterior, posterior, nuclear, cortical or grade 1 to 3 cataract were included in the study.

Following patients were excluded from the study;

- Having history of trauma and ocular surgery
- Having corneal opacity
- Un-cooperative patients
- Claustrophobic patients

Pre-operative ocular and systemic assessments along with routine investigations were carried out. All the surgeries were done by the same doctor. The preoperative medicines included, 1 tab. diamox, 1 tab. Neo-k, 1 tab. valium 5 mg, 1 tab. levoflaxacine and these were given an hour before starting surgery to each patient. Every patient’s pupil was dilated with eye drops of Alcaine, Mydracyl and Isonephrine, half an hour before start of surgery. A written informed consent was obtained from each patient on the day of surgery. The outcome measures and criteria consisted of;

1. **Patient satisfaction**;
   a. Very happy
   b. Happy
   c. Angry

2. **Ease of surgery**
   a. Phaco time
   b. Operative time
   c. Conversion to ECCE

3. **Complications**
   a. Extension of CCC
   b. Posterior capsule rent
   c. Vitreous loss and nucleus drop

The group A patients were operated under topical anesthesia (proparacaine hydrochloride 0.5%, Alcaine) instilled 6 times with interval of 5 minutes between each drop, after dilating the pupil before start of surgery. Patients were instructed to keep their eyes closed after instilling drops. The patients were instructed to lie supine on operating table with opened eyes while at the same time keeping their eyes stable. At operating table no topical, intracameral or subconjunctival anesthesia was given. One limbal 3.2 mm phaco port and two side ports about 0.8 mm were fashioned. The CCC was done with cystitome after filling anterior chamber with methyl cellulose. Hydro dissection and hydro delineation were done properly and then phaco started with observation of good phaco techniques and tips. Total phaco and surgery completion time, complications if any and satisfaction score was noted and recorded in the performa.

The patients in group B were prepared in the same manner as above except in addition a 0.5 cc 2% lignocaine was injected intracameraly. No other type of analgesia was given. Then phaco time, total operation time, complications and satisfaction points were recorded in the performa.

RESULTS

There were 48 patients in group A. The age of the patients was between 50 to 70 years (detail is shown in the table). Out of 48 in group A only 5 patients (10.41%) felt pain so severe that they required injection of 0.5 cc of 2% lignocaine intracameraly and then the procedure was carried out. The extension of ccc was seen in 5 patients (10.41%) out of total 48 patients while posterior capsule rent was seen in 2 patients (4.16%) this complication was managed with anterior vitrectomy and implantation of 6.5 mm IOL in the sulcus and incision was closed with 3 interrupted 10/0 sutures. In one patient nucleus dropped in the vitreous and was referred to vitreoretinal surgeon for further management. The average phaco time was 2.2 minutes while total operative time was 22 minutes. In group B there were 48 patients and all of them were given 0.5 cc injection of lignocaine intracameraly. None of the patients felt remarkable pain. The extension of ccc was seen in 2 cases (4.16%) while posterior capsule rent was seen in 2 patients (4.16%) that was managed with vitrectomy and 6.5 mm IOL in the sulcus and the closure of incision was done with 3 interrupted 10.0 stitches. No nucleus was dropped in the vitreous. The average phaco time 2 minutes and total operative time was 22 minutes.

<p>| Age and Sex determination |</p>
<table>
<thead>
<tr>
<th>Group</th>
<th>Age range</th>
<th>Age n (%)</th>
<th>Sex n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>50-60</td>
<td>23 (47.91)</td>
<td>35 (72.91)</td>
</tr>
<tr>
<td>61-70</td>
<td>25 (52.08)</td>
<td>13 (27.08)</td>
<td></td>
</tr>
<tr>
<td>Group B</td>
<td>50-60</td>
<td>22 (45.83)</td>
<td>28 (58.33)</td>
</tr>
<tr>
<td>61-70</td>
<td>26 (54.16)</td>
<td>20 (41.66)</td>
<td></td>
</tr>
</tbody>
</table>
Satisfaction Score

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Topical Group</th>
<th>Intracameral Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean phaco time</td>
<td>2.2 MIN</td>
<td>2.1 MIN</td>
</tr>
<tr>
<td>Mean operating time</td>
<td>22.0 MIN</td>
<td>22.0 MIN</td>
</tr>
<tr>
<td>Pain score</td>
<td>11.11%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Extension of CCC</td>
<td>10.41%</td>
<td>4.16%</td>
</tr>
<tr>
<td>Posterior cap. Rent</td>
<td>4.16%</td>
<td>4.16%</td>
</tr>
<tr>
<td>Nucleus drop</td>
<td>2.08%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Foldable IOL</td>
<td>74.77%</td>
<td>88.89%</td>
</tr>
<tr>
<td>Rigid IOL</td>
<td>20.00%</td>
<td>11.11%</td>
</tr>
</tbody>
</table>

**DISCUSSION**

Cataract is most common form of treatable blindness. The most effective treatment modality now is extracapsular cataract extraction with IOL implantation. The phacoemulsification is the best option among small incision extracapsular cataract extraction and then foldable IOL implantation. There are different procedures to attain akinesia and analgesia e.g General and Local anesthesia (topical, subconjunctival, subtenon, facial, peribulbar, retrobulbar etc). The general anesthesia needs a long list of investigations for patient’s fitness and at the same time expert anesthetist is required. The general anesthesia may cause more complications in old age in contrast to local anesthesia. The periocular anesthesia, whether retrobulbar or peribulbar carries with it the risk of globe perforation and retrobulbar hemorrhage. There are other available reports about the complications of peribulbar anesthesia as optic nerve transaction and brain stem anesthesia. An other alarming complication noted was diplopia. The conversion from peribulbar to topical anesthesia created a lot of questions and reservations in the mind of surgeons due to lack of akinesia. It is very difficult to do phacoemulsification on a patient who is hard of hearing. Therefore we also excluded the patients who were hard of hearing especially from our topical group A. In one study an author mentioned Phacoemulsification on a patient who was hard of hearing.

All the patients disliked peribulbar anesthesia due to needle puncture or pain. But all the patients were happy with intracameral or topical anesthesia. Some surgeons found patients had pain and stress in the topical and peribulbar anesthesia. Our phaco time and operation time was comparable to another study. In another study it was concluded that both the topical and intracameral anesthesias were well accepted methods of providing local anesthesia for small incision self-sealing phacoemulsification cataract surgery. The topical anesthesia was less invasive and quicker to administer. But all the acceptance lied on the patient’s comfort during the procedure.

The topical anesthesia was compared with intracameral anesthesia in a study and the surgeon needed augmentation of topical anesthesia with intracameral injection of 2% lignocaine. Fichen has investigated the blood pressure, pulse rate and respiratory rate of patients during surgery under topical anesthesia and has found no major changes in these parameters. Lignocaine 2% jelly has been used for providing topical anesthesia in phacoemulsification in various studies.

**CONCLUSION:**

We concluded the following facts;

1. Is safe and time saving.
2. It is convincing and patients showed good compliance.
3. Lack of akinesia was controlled by patient cooperation and phaco technique.
4. IOP remained the same.
5. Phaco time and operation time was same as in subconjunctival group.
6. It caused no postoperative redness.

**REFERENCES**

4. Daviel J. Surune nouvella method de querirla cataract par extraction ducrystalline. mem Acad R Chir pasis 2; 337; 1753.
11. Fine IH. Infinity suture in Koch pc. Davisan JA (eds), Text


Effect of Ophthalmic Visco-elastic Device on Corneal Endothelial Cell Count after Phacoemulsification

Yousaf Jamal Mahsood¹, Mushtaq Ahmad FCPS², Muhammad Naeem³

ABSTRACT

Objective: To compare the effect of cohesive and dispersive ophthalmic viscoelastic devices (OVDs) on corneal endothelium cell count after in-the-bag phacoemulsification with implantation of a foldable posterior chamber intraocular lens (IOL).

Materials and Methods: This study was conducted at department of ophthalmology, Hayatabad Medical Complex, Peshawar from 1st May 2010 to 31st April 2011. It was a prospective single-masked randomized study and included 50 eyes of 50 cataract patients. Two groups were compared each consisting of 25 patients, with dispersive sodium hyaluronate (dispersive-NaHa) used in one group while cohesive sodium hyaluronate (cohesive-NaHa) in other group. The corneal response to surgery was evaluated by measuring the endothelial cell loss. Data were recorded preoperatively and 2 months postoperatively.

Results: Preoperatively, no significant difference was observed in cell count between the groups. Postoperatively, both the groups had a significant decrease in cell count, but the decrease was significantly less in the dispersive-NaHa group (6.97%) than cohesive-NaHa group (18.46%).

Conclusions: Choosing a dispersive OVD during the phaco procedure may allow better protection of the endothelial cells while suppressing the formation of free radicals. This may be the reason for the superior protective effect on the corneal endothelial cells of dispersive-NaHa compared with cohesive-NaHa.

Keywords: Ophthalmic viscoelastic devices, phacoemulsification, corneal endothelial cell.

INTRODUCTION:

The development of new surgical phacoemulsification techniques aims at restoring visual acuity (VA) with a faster return to normal social life and work. Advancements in the technique and instrumentation like small-incision phaco procedures have minimized postoperative astigmatism and have reduced the incidence of postoperative endophthalmitis. However, corneal edema can lead to compromised VA in these patients because of a decrease in endothelial pump function. Different factors have been reported to cause endothelial cell damage during phacoemulsification like: phacoemulsification technique,¹ hardness of the nucleus,² incision size and design,³ amount of total ultrasonic energy,¹⁴ the composition of the irrigation fluids,⁵ and formation of free radicals.⁶ To decrease postoperative corneal endothelial cell loss, different OVDs have been tried to facilitate surgical maneuvers, maintain space during surgery, and protect the endothelial cells. Researchers have provided enough evidence of endothelial cell protection during phacoemulsification in humans.⁷ The critical endothelial cell density is estimated to be 600–800 cells/mm². If the number of cells decrease below this level, corneal edema appears.

Adult human corneal endothelium behaves as a non-replicative tissue and throughout life there is a natural decrease in endothelial cell density, from 4000 cells/mm² in childhood to 2500 cells/mm² in people aged 80 years and over.⁹ Increased age and ocular traumas such as cataract surgery cause the endothelial cell area to become less uniform.⁹ The corneal endothelium acts as a barrier between the anterior chamber and the corneal stroma. If this barrier function is damaged during cataract surgery, swelling of the cornea will occur. An increase in central corneal thickness in the first postoperative week, measured by pachymetry, may be a useful clinical predictor of long-term endothelial cell loss,⁹ although the correlation between corneal thickness and endothelial cell count is not quite clear.¹¹

The aim of our study was to evaluate the efficacy of dispersive-NaHa and cohesive-NaHa in protecting the corneal endothelium during in-the-bag phacoemulsification with implantation of a foldable
acrylic lens. Cohesive-NaHa was used as the reference gold standard.

MATERIALS AND METHODS:

We designed a clinical prospective, randomized study including 50 eyes of 50 consecutive patients scheduled to undergo cataract surgery at department of ophthalmology, Hayatabad Medical Complex, Peshawar from 1st May 2010 to 1st April 2011. The study protocol was approved by the local ethical committee. All patients gave full informed consent. The 50 patients were randomly assigned into two groups based on the OVDs used: dispersive-NaHa or cohesive-NaHa. The two viscoelastics differ from each other in molecular weight, concentration, viscosity, pseudoplasticity, cohesiveness and coatability. The rheological and clinical features of the two OVDs are presented in Table 1.

Exclusion criteria were corneal dystrophies, traumatic or old infected corneal scars or previous intraocular surgery, history of intraocular inflammation, diabetes, preoperative pupil dilatation <5 mm, age less than 45 years, preoperative endothelial cell count <2000 cells/mm² and surgical complications that may lead to excessive compromise of corneal endothelium. Preoperatively, all patients’ best corrected visual acuity (BCVA) and intraocular pressure (IOP) were measured followed by detailed slit lamp examination and dilated fundus examination. The endothelial cell parameters including cell density was recorded using a non-contact specular microscope. Specular microscopy was repeated 2 months postoperatively.

All the surgeries were carried out by one surgeon following a standardized procedure: sterile draping with Povidine-iodine (PVD-iodine) 5%; peribulbar anesthesia; a 3.2-mm, self-sealing, superior, clear corneal incision; followed by one of the two OVDs; capsulorhexis with rhexis forceps; phaco stop and chop removal of the nucleus; cortical clean-up; implantation of a foldable acrylic lens using an injector system, and aspiration of the OVD. At the end of the operation all patients received a subconjunctival injection of 1cc dexamethasone followed by steroid-antibiotic combination ointment in conjunctival sac. No sutures were applied.

The surgeon used same phaco machine, phaco machine parameters and standard phaco tips in all cases. The patients were dismissed from our department on 1st postoperative day. Postoperatively, steroid-antibiotic combination eye drops were used 4 times a day. The two observer who performed the pre- and postoperative measurements was unaware aware of the OVD used.

Statistical analysis:

Statistical analysis was carried out by using SPSS software version 17. Tests for difference between the groups in demographic and clinical characteristics were carried out using chi-square tests for categorical variables and one-way analysis of variance (anova) tables for continuous variables. If differences were observed using anova, least significant difference tests were performed between all pairs of groups. Snellen’s VA was converted to logMAR for statistical purposes. A p-value of less than 0.05 was considered significant. For the power calculation a clinical important change in cell count was defined as a loss of one standard deviation (300 cells/mm²).

RESULTS:

Fifty patients were enrolled but three patients couldn’t come for follow-up due to personal reasons. The remainder 47 patients (23 patients in dispersive-NaHa and 24 patients in cohesive-NaHa groups) came for last follow-up. Baseline preoperative data is given in Table 2. There were no statistically significant differences between the two groups regarding their age, gender, visual acuity or IOP (Table 2). No significant difference was observed preoperatively between two groups (Table 3).

Postoperatively, both groups had a significant decrease in endothelial cells (Table 3). The mean endothelial cell loss was 190 cells/mm² (7.39%) in the
Effect of Ophthalmic Visco-elastic Device on Corneal Endothelial Cell Count after Phacoemulsification

**Table 3**  
Preoperative and postoperative endothelial cell count by group

<table>
<thead>
<tr>
<th></th>
<th>Dispersive-NaHa</th>
<th>Cohesive-NaHa</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Preoperative</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cells/mm² (SD)</td>
<td>2570 (290)</td>
<td>2698 (376)</td>
<td>0.30*</td>
</tr>
<tr>
<td><strong>Postoperative</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cells/mm² (SD)</td>
<td>2380 (410)</td>
<td>2168 (589)</td>
<td>0.35*</td>
</tr>
<tr>
<td>Mean cell loss</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cells/mm² (%)</td>
<td>190 (7.39)</td>
<td>530 (19.6)</td>
<td>0.04*</td>
</tr>
</tbody>
</table>

*anova and least significant difference as post hoc test.

dispersive-NaHa group, and 530 cells/mm² (19.6%) in the cohesive-NaHa group. The dispersive-NaHa group had a significantly lower rate of cell loss than the other group (anova, p = 0.04). There was an equal increase in VA. Postoperative IOP did not differ significantly from preoperative IOP within any of the groups or between the two groups.

**DISCUSSION:**

In our study, we investigated the effect of phacoemulsification on the corneal endothelium with implantation of a posterior foldable acrylic lens using two different OVDs. Preoperatively, demographic as well as endothelial cell parameters were similar in the two groups, indicating that no sampling bias was present. Loss of endothelial cells is compensated by cellular enlargement, cell gliding, rearrangement and cell coalescence. Postoperatively, both groups had a significant decrease in cell density, but the cell loss was significantly lower in the dispersive-NaHa group than in the other group. Several factors may explain this observation.

Ophthalmic viscoelastic devices (OVDs) have been shown to decrease endothelial cell damage during phacoemulsification by facilitating the surgical maneuvers, maintaining space and protecting the endothelial cells during surgery. The visco-elastics vary in their properties (Table 1). However, in clinical life it is more convenient to divide OVDs into two main groups of cohesive and dispersive OVDs according to their behavior during surgery. A cohesive hyaluronate OVD with high molecular weight contains long polysaccharide chains with glycosides connections, which gives it higher viscosity, pseudoplasticity and cohesiveness. Dispersive OVDs are better able to coat and protect the corneal endothelium. This ability is convenient during surgery, but it is more difficult to remove dispersive OVDs from the anterior chamber at the end of the operation. The complete removal of these OVDs may prolong aspiration/irrigation time and be responsible for increased endothelial cell loss. This has been demonstrated in another study using the Miyake video technique. Less cell loss was observed with dispersive-NaHa. This may be explained by the ability of dispersive-NaHa to reduce formation of free radicals. Phacoemulsification produces free hydroxyl radicals and reports suggest that these are destructive to corneal endothelial cells. The amount of free radicals is proportional to phaco time. Hylanuronate OVDs have been shown to suppress the formation of free radicals and exert anti-inflammatory properties. It has been demonstrated that dispersive hyaluronate OVDs suppress free radicals better than cohesive hylanuronate OVDs. Others have shown that cohesive hylanuronate OVDs suppress the formation of free radicals significantly more than methylcellulose.

**RESULTS**

Similar to ours have been published for the dispersive which reported that there was significantly better endothelial protection was observed using dispersive OVD as compared to a cohesive OVD. A new group of OVDs, the viscoadapatives, behave differently from both the cohesive and the dispersive OVDs because they are able to change from being highly viscous cohesive to fracturable pseudo-dispersive according to the flow rate. It has been suggested that these new viscoadapatives may offer better protection of endothelial cells because they are well retained during lower flow rates, and are easily evacuated under higher flow at the conclusion of the operation. Viscoadapatives OVDs have been compared with the dispersive OVDs and seem to offer comparable protection to endothelial cells.

In summary, a dispersive-NaHa OVD which is well retained in the anterior chamber during the phacoemulsification procedure, and thus offers mechanical protection to endothelial cells while suppressing the formation of free radicals. These abilities may explain the better protection provided by dispersive-NaHa compared to cohesive-NaHa. Our
results encourage further investigations of the protective characteristics of dispersive-NaHa and similar dispersive, low molecular, hyaluronate OVDs.

REFERENCES


INTRODUCTION

The term exophthalmos has been derived from Greek, literally meaning with prominent eyes. It refers to the protrusion of one or both eyes. It is often used interchangeably with the term proptosis although some reserve the term exophthalmos for endocrine-related protruding eyeball and proptosis for other causes. Exophthalmos is a clinical sign of orbital disease and may be accompanied by other signs. The orbital disease may be isolated (e.g. orbital varices) or may be a manifestation of a more proximal problem (e.g. carotid-cavernous fistula) or systemic disease (e.g. Graves’ disease). The evaluation of proptosis include a detailed clinical history, ocular examination, laboratory investigations and imaging studies. As far as the radiological investigations are concerned, findings on plain radiographs and ultrasonography are not pathognomonic of most of the orbital disease process though some help can be obtained in characterization of lesion in certain cases. Advent of MRI land CT has revolutionized the diagnostic imaging of orbit and its contents. MRI with its superb soft tissue contrast and multiplanar ability provides excellent rendering of orbital anatomy but is limited by lack of wider availability and high cost. On the other hand easy availability and operability, good maintenance and speed makes CT scan an affordable diagnostic tool in orbital diseases under existing circumstances and present set up.

MATERIAL AND METHODS

26 patients of various age groups and both sexes with unilateral or bilateral exophthalmos were the subjects for the study. Before commencing for CT examination, all the preceding history, clinical, laboratory data were recorded. A CT scanner (SIEMENS SOMATOM AR.T) was used for the study. The technique was to obtain a lateral scannogram with the patient supine and contiguous axial sections with slice thickness of 3 mm and interslice gap of 3 mm were obtained. Coronal 3-5 mm sections were obtained as and when required with the patient in prone position. The scans were obtained both prior to and after administration of non ionic intravenous contrast. All patients with globe protrusion >21mm anterior to the interzygomatic line on axial scans at the level of lens were evaluated. CT findings were correlated with final diagnosis based on clinical, laboratory findings, operative findings, histopathological study or response to treatment.

RESULTS

The patients included were from 2 to 80 yrs. of age. The majority of patients (22%) were between 31-40 yrs. of age. man/woman ratio was 1.08:1. The most common lesion causing exophthalmos were tumours (46%) and infections (28%) followed by inflammation (18%), trauma (6%) and vascular (2%). CT scan findings in relation with the age of the patient, the clinical picture and laboratory investigations were able to give a correct diagnosis in 82% patients.

Conclusion: CT scan can be considered as a cost effective, non invasive, reliable diagnostic tool for evaluation of exophthalmos.

Keywords: CT scan, exophthalmos

ABSTRACT

Objectives: To analyze the diagnostic role of CT scan in evaluation of orbital masses

Material and Methods: 26 patients presenting with proptosis were evaluated by CT scan. Role of CT was evaluated in defining the cause of exophthalmos and the nature and extent of the lesions causing exophthalmos.

Results: The most common lesion causing exophthalmos were tumours (46%) and infections (28%) followed by inflammation (18%), trauma (6%) and vascular (2%). CT scan findings in relation with the age of the patient, the clinical picture and laboratory investigations were able to give a correct diagnosis in 82% patients.

Conclusion: CT scan can be considered as a cost effective, non invasive, reliable diagnostic tool for evaluation of exophthalmos.

Keywords: CT scan, exophthalmos

INTRODUCTION

The term exophthalmos has been derived from Greek, literally meaning with prominent eyes. It refers to the protrusion of one or both eyes. It is often used interchangeably with the term proptosis although some reserve the term exophthalmos for endocrine-related protruding eyeball and proptosis for other causes. Exophthalmos is a clinical sign of orbital disease and may be accompanied by other signs. The orbital disease may be isolated (e.g. orbital varices) or may be a manifestation of a more proximal problem (e.g. carotid-cavernous fistula) or systemic disease (e.g. Graves’ disease). The evaluation of proptosis include a detailed clinical history, ocular examination, laboratory investigations and imaging studies. As far as the radiological investigations are concerned, findings on plain radiographs and ultrasonography are not pathognomonic of most of the orbital disease process though some help can be obtained in characterization of lesion in certain cases. Advent of MRI and CT has revolutionized the diagnostic imaging of orbit and its contents. MRI with its superb soft tissue contrast and multiplanar ability provides excellent rendering of orbital anatomy but is limited by lack of wider availability and high cost. On the other hand easy availability and operability, good maintenance and speed makes CT scan an affordable diagnostic tool in orbital diseases under existing circumstances and present set up.

MATERIAL AND METHODS

26 patients of various age groups and both sexes with unilateral or bilateral exophthalmos were the subjects for the study. Before commencing for CT examination, all the preceding history, clinical, laboratory data were recorded. A CT scanner (SIEMENS SOMATOM AR.T) was used for the study. The technique was to obtain a lateral scannogram with the patient supine and contiguous axial sections with slice thickness of 3 mm and interslice gap of 3 mm were obtained. Coronal 3-5 mm sections were obtained as and when required with the patient in prone position. The scans were obtained both prior to and after administration of non ionic intravenous contrast. All patients with globe protrusion >21 mm anterior to the interzygomatic line on axial scans at the level of lens were evaluated. CT findings were correlated with final diagnosis based on clinical, laboratory findings, operative findings, histopathological study or response to treatment.

RESULTS

The patients included were from 2 to 80 yrs. of age. The majority of patients (22%) were between 31-40 yrs. of age. man/woman ratio was 1.08:1. The most common lesion causing exophthalmos were tumours and infections. Various lesions causing exophthalmos are grouped in the table.

Tumours

Lymphomas were the most common orbital masses followed by rhabdomyosarcomas. The second common tumours were metastatic malignancies from breast and lung. Sarcomas were the least common tumours.

INFECTIONS

Pyogenic infections were the commonest lesions followed by fungal infections. Infections in immune compromised patients were common.

INFLAMMATORY LESIONS

Inflammatory lesions such as granulomatous disease and idiopathic/extrinsic orbital inflammatory syndrome were the commonest.

TRAUMATIC LESIONS

Traumatic lesions such as orbital blowout fractures were the commonest lesions in this group.

VASCULAR ANOMALIES

Vascular anomalies such as cavernous haemangiomas and carotid-cavernous fistulae were the commonest lesions.
tumours. In all two patients, lymphoma appeared as homogenously enhancing soft tissue masses in extraconal space with involvement of intraconal space in two patients. Extraocular muscles were involved in all patients and optic nerve involvement was seen in one patient. Eyeball was normal and displaced in all patients. Bone erosion was seen in one patient. Two patients of retinoblastoma revealed homogenously enhancing masses involving whole of the eyeball. Calcification was seen in both patients while thickening of the optic nerve with extension up to optic chiasma was seen in one patient.

Two patients of rhabdomyosarcoma presented as homogenously enhancing extraconal masses with involvement of extraocular muscles in both patients. Epidural extension was seen in one patient. Two patients of malignant melanoma appeared as large heterogeneously enhancing mass infiltrating all extraocular muscles and the eyeball. In one patient, dermoid appeared as hypodense non-enhancing extraconal mass with fat density with scalloping of the lateral orbital wall.

Three patients in our study presenting with exophthalmos were proved to be metastases in the orbit. One of the patients presenting with extraconal masses in superolateral quadrants in bilateral orbits was proved to be a case of neuroblastoma on abdomen CT. One patient presenting with extraconal mass in the right orbit was shown to have a swelling in the left leg which was proved to be Ewings sarcoma. One patient was a follow up case of Ca breast and was shown to have metastatic extraconal mass in the left orbit.

### Infections

Amongst seven patients of orbital cellulitis in our study, subperiosteal involvement was the most common seen in four patients with preseptal extension seen in all showing increased density of the soft tissues. Formation of subperiosteal abscess with medial enhancing rim was seen in two patients. Diffuse orbital involvement was seen in two patients with increased density of soft tissues in both intraconal and extraconal spaces. Involvement of the eyeball with uveoscleral thickening was seen in four patients. Concurrent involvement of the eyeball with uveoscleral thickening was seen in four patients. Concurrent involvement of the eyeball with uveoscleral thickening was seen in four patients.

### Cases of Exophthalmos

<table>
<thead>
<tr>
<th>Conditions</th>
<th>No of Patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumours</td>
<td>13</td>
<td>50</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>2</td>
<td>7.69</td>
</tr>
<tr>
<td>Metastases</td>
<td>3</td>
<td>11.53</td>
</tr>
<tr>
<td>Retinoblastoma</td>
<td>2</td>
<td>7.69</td>
</tr>
<tr>
<td>Rhabdomyosarcoma</td>
<td>2</td>
<td>7.69</td>
</tr>
<tr>
<td>Leukemia</td>
<td>1</td>
<td>3.84</td>
</tr>
<tr>
<td>Malignant melanoma</td>
<td>2</td>
<td>7.69</td>
</tr>
<tr>
<td>Meningioma</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hemangioma</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dermoid</td>
<td>1</td>
<td>3.84</td>
</tr>
<tr>
<td>Infections</td>
<td>7</td>
<td>26.92</td>
</tr>
<tr>
<td>Orbital cellulitis</td>
<td>4</td>
<td>15.38</td>
</tr>
<tr>
<td>Paranasalsinusmucoceles</td>
<td>3</td>
<td>11.53</td>
</tr>
<tr>
<td>Inflammations</td>
<td>3</td>
<td>11.53</td>
</tr>
<tr>
<td>Graves ophthalmopathy</td>
<td>2</td>
<td>7.69</td>
</tr>
<tr>
<td>Pseudotumours</td>
<td>1</td>
<td>3.84</td>
</tr>
<tr>
<td>Trauma</td>
<td>2</td>
<td>7.69</td>
</tr>
<tr>
<td>Vascular</td>
<td>1</td>
<td>3.84</td>
</tr>
</tbody>
</table>

**Fig. 1**

**Fig. 2**
ethmoid sinusitis was seen in seven patients and maxillary sinusitis in one patient. One patient presented with soft tissue density in peripheral orbital space with mass in the nasal cavity and ethmoid sinuses with erosion of the medial orbital wall which was proved to be mucormycosison histopathology.

Amongst three patients of mucoceles of paranasal sinuses invading the orbit, involvement of frontal sinus was most common followed by fronto-ethmoidal involvement. All patients had a non enhancing extraconal cystic mass in superomedial quadrant of the orbit with evidence of expansion of the bone in all and erosion of bone in two patients. Optic nerve compression was seen in one patient.

**Inflammation**

Amongst three patients of Grave’s disease, bilateral involvement was seen in two patients and unilateral involvement in one. Extraocular muscle enlargement was seen in all patients with multiple muscle involvement being more common than single muscle involvement. Inferior rectus muscle was most commonly enlarged followed by medial rectus and superior rectus. In inflammatory pseudotumor of the orbit, unilateral involvement was seen. Muscle enlargement was diffuse involving the tendinous insertions. Soft tissue infiltration of orbital fat was also seen. Optic nerve was infiltrated. Eyeball was involved in a patient showing uveoscleral thickening with enhancement.

**Trauma**

Two patients of orbital trauma had intracranial hemorrhage (retrobulbar and preseptal). Fracture of the bony orbit was seen in both of the patients with evidence of haemorrhage in paranosal sinuses. There was extradural haematoma in temporal lobe in one patient.

**Vascular**

In our study there was one patient of carotid cavernous fistula presenting as pulsatile exophthalmos after trauma. CT findings included proptosis, asymmetry and distension of affected cavernous sinus and congestion and asymmetrical dilatation of superior ophthalmic vein.

**DISCUSSION**

The most common lesion causing proptosis in our study were tumours (46%). Our findings correlated well with the findings of Masud MZ et al (2006) who described neoplasms (33%) as the most common causes of proptosis in their study. Lymphomas were the most common orbital tumours in our study. Margo CE et al (1998) reported orbital lymphoma to be the most malignant orbital tumours. The most common paraorbital tumor invading the orbit in our study was maxillary carcinoma similar to that described by Johnson LN et al (1984). Out of 23 patients of tumours CT diagnosis correlated with the histopathological diagnosis in 18 patients (78.26%). In a study by Usha et al (2005) there was 56.6% correlation between the CT diagnosis and histopathological diagnosis in case of neoplasms (Conference proceedings: All Indian ophthalmological society: 2005).

Infectious pathology accounted for 28% patients of exophthalmos in our study while in study by Masud MZ et al (2006) infections accounted for 20% patients of exophthalmos. CT provided an accurate diagnosis in 88.8% patients of orbital cellulitis in our study. Clary RA et al (1992) analysed the accuracy of CT in orbital cellulitis in children and showed correlation between radiological and operative findings in 84.21% cases.

Graves disease accounted for 10% patients of exophthalmos in our study compared to the study by M K Narula et al (1994) where Graves disease accounted for 6% patients of exophthalmos. Inferior rectus muscle was most commonly enlarged followed by medial rectus and superior rectus. In inflammatory pseudotumor of the orbit, unilateral involvement was seen. Muscle enlargement was diffuse involving the tendinous insertions. Soft tissue infiltration of orbital fat was also seen. Optic nerve was infiltrated. Eyeball was involved in a patient showing uveoscleral thickening with enhancement.

Pseudotumor accounted for 8% patients of exophthalmos in our study compared to the study by M K Narula et al (1994) where pseudotumor accounted for 11% patients of exophthalmos. Correct diagnosis of pseudotumour was made in 50% patients in our study in view of the non specific radiological findings as stated by Alfred L Weber et al (1999).

Pseudotumor accounted for 8% patients of exophthalmos in our study compared to the study by M K Narula et al (1994) where pseudotumor accounted for 11% patients of exophthalmos. Correct diagnosis of pseudotumour was made in 50% patients in our study in view of the non specific radiological findings as stated by Alfred L Weber et al (1999). Trauma was the cause in 6% patients of proptosis in the present study. Our results are similar to the study done by Masud MZ et al (2006) where trauma was the cause of exophthalmos in 5% patients. In our study vascular lesions were the least common accounting for 2% patients of while in a study by Masud MZ et al (2006)
37% cases of proptosis were caused by vascular lesions.

In the present study overall CT diagnosis was found to be correct in 41 patients (82%). Our results are similar to the study of Zahir Shah Mahsud et al (2004). In their study the diagnostic accuracy of CT scan in evaluation of proptosis was 80%. CT scan is highly useful in describing the precise location and extent of the lesion and is fairly accurate in lesion characterization. In view of non specific findings in cases of orbital tumours and pseudotumours, an evaluation of clinical and laboratory data is essential to arrive at a precise diagnosis.

CONCLUSION

CT is useful to characterize: the precise location of the lesion - the intraconal space (including muscles & Optic nerve), the extraconal space (associated or not to an extra orbital lesion), or the eyeball; the features of the lesion (density, calcification, enhancement.). These findings are helpful to generate a differential diagnosis. CT is also useful to demonstrate the precise extension of the orbital lesion, the involvement of adjacent paranasal sinuses and nasal cavity, the evidence of bone erosion and intracranial extension which helps in pre-treatment evaluation and post treatment follow up. To conclude CT scan can be considered as a cost effective, non-invasive, reliable diagnostic tool for evaluation of orbital masses.

REFERENCES

1. Mercandetti M; Exophthalmos, eMedicine, Feb 2010
11. Zahir Shah Mahsud, SurayaBano, Diagnostic role of CT scan in proptosis in pediatric age group. JPMA 2004; 18: 3: 439-446
External Dacryocystorhinostomy with & without Intraoperative Mitomycin-C Application in Adults

Asif Iqbal¹, Omer Khan²

ABSTRACT

Objective: To compare the results of external dacryocystorhinostomy with and without intraoperative mitomycin-C application in adults.

Material and Methods: This was hospital based prospective randomized controlled study. 60 consecutive eyes of the patients above 20 years of age, diagnosed with uncomplicated nasolacrimal duct obstruction or chronic dacryocystitis(CDC). The patients were randomly divided by simple random technique into two equal groups; a conventional dacryocystorhinostomy (DCR) group and an external dacryocystorhinostomy with mitomycin-C (DCR with MMC) group, in which mitomycin-C (MMC) was used during surgery. The surgical procedures in both groups were exactly the same, except that in DCR with MMC group, a piece of neurosurgical cottonoid soaked with 0.2 mg/ml MMC was applied to the osteotomy site for 10 minutes. The patients were followed for 6 months. The results of surgeries were evaluated by asking patients about conditions of tearing improvement, irrigation and height of tear meniscus.

Results: 60 eyes were included in this study. 10 patients (16.7%) were male and 50 patients (83.3%) were female. In 56.7% right side was involved and in 43.3% left side was involved. In DCR with MMC group, 26 cases (86.7%) showed complete improvement, 3 cases (10%) showed partial improvement while 1 case (3.3%) showed no improvement of symptoms. In conventional group, 23 cases (76.7%) showed complete improvement, 1 case (3.3%) partial improvement and 6 cases (20%) showed no improvement. The difference between two groups was significant. The tear meniscus in DCR with MMC group was normal in 28 cases (93.3%), moderate in 1 case (3.3%) and high in 1 case (3.3%). In conventional group, tear meniscus was normal in 24 cases (80%), moderate in 2 cases (6.7%) and high in 4 cases (13.3%). The difference between two groups was statistically significant. Irrigation (syringing test) in DCR with MMC group showed patent pathway in 29 cases (96.7%) and pathway obstruction in 1 case (3.3%). In conventional group, irrigation showed patent pathway in 24 cases (80%) and pathway obstruction in 6 cases (20%). The difference between two groups was statistically significant. Complications like nasal bleeding was observed on 1st post operative day in 2 cases in DCR with MMC group, while one case in same group showed delayed wound healing at 10th post operative day.

Conclusion: Intraoperative MMC is effective in increasing the success rate and a safe adjunct to achieve good results of Ext-DCR surgery.

Key words: External dacryocystorhinostomy(Ext-DCR), Mitomycin-C (MMC), Nasolacrimal duct obstruction, Chronic dacryocystitis(CDC)

INTRODUCTION:

Epiphora and acute or chronic dacryocystitis are the most common symptoms of acquired nasolacrimal duct obstruction. Epiphora due to nasolacrimal duct obstruction is a common ophthalmological problem and accounts for approximately 3% of all ophthalmologic clinic visits¹. Acquired nasolacrimal duct obstruction is a common disorder that occurs more frequently in females than in males ². In Pakistan the disease more commonly occurs in adult females. DCR allows fistulization of lacrimal sac into nasal cavity, bypassing the blocked nasolacrimal duct. Previous studies show the success rate for this procedure is about 90%⁴. Toti(1904, Italy) first described the technique of external DCR⁵. Dupy-Dutemps and Baerrget (1921, France) described the modern external flap DCR technique⁶. Over the years the external dacryocystorhinostomy (Ext-DCR) has underwent many modifications for a better surgical outcome without altering its basic concept.

The two most frequent causes of DCR failure are obstruction of common canaliculus and fibrous closure of the osteotomy site ⁷. Most Ophthalmic surgeons now think that the success rate of Ext-DCR may be increased by intraoperative use of anti-proliferative agents to inhibit the fibrous tissue growth and scarring over the anastomosed flaps and osteotomy site ⁸. Mitomycin-C (MMC) is useful in DCR because it reduces the scarring process and prevents the occlusion of osteotomy site due to fibrosis. Intraoperative MMC has been used by Liao in 2000, You in 2001, Roozitalab in 2004 and Akhund in 2005 and reported the success rate of 97.5%, 100%, 90.5% and 99% respectively ⁹. MMC is isolated from Streptomyces caesipitosus, is an

¹. Medical Officer; Ophthalmology Department, District Head Quarter Hospital, Swabi, (KPK) ². Senior Registrar, Khyber Institute of Ophthalmic Medical Sciences, Hayatabad Medical Complex, Peshawar.

Correspondence: Dr. Omer Khan Orakzai, House No: 279, Street 10, Sector E-2, Phase-1, Hayatabad, Peshawar. Cell: 0333-911-6370. E.Mail- dicasif@yahoo.com.

Received, Jan’2012  Accepted: May’2012
antineoplastic antibiotic that acts by the inhibition of DNA synthesis, RNA and cellular proteins. It decreases collagen synthesis in fibroblasts by inhibiting the synthesis of RNA dependent DNA, thus inhibiting fibrous tissue growth and scarring. MMC has widely been used in pterygium excision and trabeculectomy with favorable results. The objective of the study was to evaluate the success rate of intraoperative mitomycin-C in external DCR.

MATERIAL AND METHOD:
This was a prospective randomized control study which was undertaken at Ophthalmology Department District Head Quarter Hospital, Swabi (KPK) from February 2010 to September 2011. There were sixty consecutive patients from 20-60 years of age with chronic dacryocystitis with or without lacrimal sac fistula, primary acquired nasolacrimal duct obstruction and mucocele of lacrimal sac were included. Young patients (<20 years), patients with canicular obstruction (common or individual), previously failed DCR and patients with associated nasal pathology were excluded from the study.

Patients fulfilling the criteria were included in the study. An informed consent was taken from all patients included in study. Patients were then randomly divided into two groups. A specific proforma was designed with detailed record of all the parameters of the disease including detailed history, complete clinical examination (ocular, nasal, systemic), laboratory and radiological investigations. Nasal examination was done in ENT department of DHQ Swabi.

Surgery was performed by single surgeon and under local anaesthesia. All patients underwent standard Ext-DCR. Technique for the two procedures was essentially the same, except that a neurosurgical cottonoid was placed under the osteotomy site for 10 minutes in Ext-DCR with MMC group. Incision site was infiltrated with 2% xylocain with adrenaline 1:100,000 injections. Nasal packing was done with gauze soaked in xylocain 4% and adrenaline (1:1000). A vertically straight bone deep incision was given about 8 mm medial to the medial canthus. Bone was exposed by blunt dissection of the orbicularis muscle, medial palpebral ligament and peristeum was divided and sac exposed. Osteotomy was made using bone nibbler. Lacrimal sac was exposed and an anterior and posterior lacrimal sac flaps were made. Posterior flap was excised but the anterior flap was secured by anastomosed anterior flaps and osteotomy site with the long thread passing out through the nostril. The anterior nasal and lacrimal sac flaps were sutured with 3-4 interrupted 6/0 vicryl sutures. After 10 minutes at the conclusion of surgery, the cotton swab was removed transnasally by pulling out the long thread from the nostril. The orbicularis oculi and the skin were closed in separate layers. Wound was then closed in layers. Antibiotic ointment was then applied over the wound as well as to external ocular surface and firm pressure pad applied to the eye for 24 hours.

Most of the patients were discharged on the first postoperative day. Two patients had significant postoperative bleeding, were managed promptly and discharged after 48 hours. After discharge each patient was reviewed on the 10th postoperative day, at 3 months and finally at 6 months following the surgery. Skin stitches were removed on tenth postoperative day. At each visit patients were evaluated for relief of symptoms and any complications they might have developed. The outcome of surgery was measured according to the symptomatic relief, regurgitation test, irrigation in selected cases, height of tear meniscus. The height of tear meniscus was measured with fluorescein stain under cobalt blue light at slit lamp for each patient and graded it as normal tear meniscus (<0.1 mm), moderate tear meniscus (0.1-0.2 mm) and high tear meniscus (>0.2 mm). Record of each visit was made to the data collection proforma.

RESULTS:
There were 60 patients included in this study; 30 in DCR with MMC group and 30 in conventional group. Age range was from 20-60 years. There was no significant difference in age between the two groups (p>0.1). 10 patients were male (16.7%) and 50 patients were female (83.3%). The male to female ratio was 1:5. In 34 cases (56.7%) right side was involved in 26 cases (43.3%) left side was involved. All cases were done under local anaesthesia. Most common presenting complaint was watering in 49 cases (81.7%), followed by recurrent infection in 7 cases (11.7%) and swelling along medial canthus in 4 cases (6.7%). The patients were followed for six months. In DCR with MMC group, 26 cases (86.7%) showed complete improvement, 3 cases (10%) showed partial improvement while 1 case (3.3%) showed no improvement of symptoms. In conventional group, 23 cases (76.7%) showed complete improvement, 1 case (3.3%) partial improvement and 6 cases (20%) showed no improvement in symptoms after six months.

As far as objective symptoms were concerned, the tear meniscus in DCR with MMC group was normal in 28 cases (93.3%), moderate in 1 case (3.3%) and high in 1 case (3.3%). In conventional group, tear meniscus was normal in 24 cases (80%), moderate in 2 cases (6.7%) and...
high in 4 cases (13.3%) after 6 months follow up, the difference between two groups is statistically significant.

Irrigation (syringing test), in DCR with MMC group showed patent pathway in 29 cases (96.7%) and pathway obstruction in 1 case (3.3%), whereas in conventional group, irrigation showed patent pathway in 24 cases (80%) while pathway obstruction in 6 cases (20%).

During the follow up period, complications like nasal bleeding was observed on 1st post-operative day in 2 cases in DCR with MMC group, while one case in same group showed delayed wound healing at 10th post-operative day. The delayed wound healing was due to accidental contact of MMC soaked sponge to edges of skin wound. In all patients the wound healed completely leaving a barely visible scar at 3 months follow up. The final success rate in DCR with MMC group was 96.7% compared to 80% in conventional group. There was significant difference in success of two groups. P value was 0.045 (p<0.05).

**DISCUSSION:**

External DCR is a highly successful procedure in managing epiphora due to nasolacrimal duct obstruction. The reported success rate varies between 85% to 99%. Traditional DCR has its own limitations with reported failure rates of 0 to 18%. To overcome this, different modifications have occurred in this technique from time to time. Failure is generally defined as persistent tearing with the inability to irrigate the lacrimal drainage system. McPherson and Egelston noted dense scar tissue obstructing the osteotomy site. Pico found occluding membrane obstructing the new drainage channels. On histopathology, the granulation tissue formed the occluding membrane. Granulation tissue obstructing the distal part of common canaliculus and osteotomy scarring was also reported by Allen and Berliner.

The above literature review shows that fibrous tissue growth, scarring and granulation tissue formation during the healing process results in the stenosis or complete obstruction of osteotomy site, leading to surgical failure. This implies that the success rate can be increased by reducing fibrous proliferation at the osteotomy site of anastomosed flaps.

Mitomycin-C (MMC) is an antineoplastic antibiotic, isolated from *Streptomyces caespiitosus*; it inhibits the synthesis of DNA, cellular RNA and proteins in rapidly growing cells. It has the ability to suppress the vascular growth and fibrosis significantly, hence can reduce possibility of stenosis of newly created osteotomy in DCR.

To suppress the fibrous proliferation, MMC 0.2mg/ml was used in this study at the osteotomy site and anastomosed flaps. Theoretically, this modification should reduce fibrous tissue growth and scarring at the osteotomy site as well as around the opening of common canaliculus. Ugurbas et al concluded that MMC application can result in a decrease in density and cellularity of mucosa and enhance the success of DCR surgery. Similarly Yeatts and Neves also recommended that adjunctive use of MMC may increase the success rate of repeat DCR. In our study, 0.2mg/ml MMC was applied to osteotomy site for 10 minutes. The drug was applied without intubation with the success rate of 96.7%.

In this study, nasolacrimal duct obstruction was most commonly noted in middle age females, more comparable with the studies of Lee-wing, Ashenhurst.
and Baig et al. The nasolacrimal duct and lacrimal fossa forms greater angle on the right side than on left side.

In our study 34 cases (56.7%) had unilateral involvement of right side. Most common presenting complaint was epiphora in 49 cases (81.7%). This compares well with Baber et al.

In this study, epiphora completely improved in 26 cases (86.7%), partial improvement in 3 cases (10%) while no improvement in 1 case (3.3%) in DCR with MMC group. In conventional group, 23 cases (76.7%) showed complete improvement, 1 case (3.3%) partial improvement and 6 cases (20%) showed no improvement in epiphora. There was a significant difference between the two groups according to symptoms reported by patients.

The height of the tear meniscus was also measured and compared between two groups. In DCR with MMC group height of the tear meniscus was normal in 28 cases (93.3%), moderate in 1 case (3.3%) and high in 1 case (3.3%). In conventional group, tear meniscus was normal in 24 cases (80%), moderate in 2 cases (6.7%) and high in 4 cases (13.3%) after 6 months follow up. The difference between two groups is statistically significant.

Patency of lacrimal drainage system showed that in DCR with MMC group 29 cases (96.7%) had patent pathway in and 1 case (3.3%) had pathway obstruction. In conventional group, irrigation showed patent pathway in 24 cases (80%) and pathway obstruction in 6 cases (20%). The patency rate of lacrimal drainage system was 96.7% in DCR with MMC group compared to 80% in conventional group. The difference between the success rate of two procedures was statistically significant.

In this study, no significant complication was noted due to MMC. Two cases showed nasal bleeding in early post-operative period in DCR with MMC group. While one case showed delayed wound healing at the 10th post-operative day. Kao et al. pointed out various possible complications due to intraoperative use of MMC. You et al. and Yeatts et al. reported no complications due to MMC application in Ext-DCR.

CONCLUSION:

Dacryocystitis and nasolacrimal duct obstruction is primarily a disease of middle age females. Right side is more commonly involved. Intraoperative MMC in Ext-DCR is safe and effective adjunct that helps to achieve good results of DCR surgery. This modification significantly improves the success rate over traditional DCR. It is cheap and less time consuming procedure having minimal complications.

REFERENCES:

Evisceration: Frequency, Indications and Clinical Correlation in a Tertiary Care Hospital

Nuzhat Rahil1, Rahil Aumir Malik2, Shams Ul Haq3
Lady Reading Hospital, Peshawar (KPK)

ABSTRACT
Purpose: To analyze the frequency, clinical indications and clinical correlation for evisceration in patients at a tertiary care centre in KPK.
Materials and Methods: It was a retrospective hospital-based case series study of all the patients who underwent evisceration at Lady Reading Hospital, PGMI Peshawar from April 2010 till April 2011. The parameters evaluated were the age and sex distribution, The clinical features and the indications for evisceration, the etiological factors responsible for evisceration were determined on the basis of history, clinical examination and investigations as determined from previous records. An attempt was made to classify eyes to the original underlying disorder that led to the need for evisceration.
Results: Total number of eyes which were eviscerated was 49 in one year. Males outnumbered females in a ratio of 1.9:1 (32 males and 17 females). The most common age group affected was between 51 to 60 years and the second one was above 60 years. Panophthalmitis was the major clinical indication in 24 patients and in these patients, post cataract endophthalmitis was responsible for 18 cases. Old neglected perforated corneal opacities, keratitis and descematoceles were the indication of evisceration in 14 cases. Post trauma evisceration was carried out in 11 patients. Clinico-pathological correlation was 100% in cases with definite clinical diagnosis of post operative and post traumatic endophthalmitis.
Conclusion: Panophthalmitis, old neglected corneal opacities and severe ocular injuries were the major indications of evisceration in our tertiary care hospital.

INTRODUCTION
Evisceration is a standard surgical treatment modality for many end-stage eye diseases. Indications for evisceration vary with changing trends in disease management. Von Graefe first advocated the use of evisceration in the presence of severe endophthalmitis as a means of preventing intracranial spread of infection1,2. Over the years, indications for evisceration have expanded to include both infectious and noninfectious intraocular inflammation resulting in total loss of vision with no potential for any useful vision, end-stage glaucoma, and post traumatic severe ocular injuries. With the advent of modern technology and rapid access to modern eye care in the developed countries, many eyes with endophthalmitis, glaucoma, and severe ocular trauma are being saved without the need for evisceration or enucleation. However, in developing countries, because of the delay in access to modern health care and appropriate diagnostic and therapeutic intervention, many eyes lose visual potential. Eventually, many of these patients present with end-stage diseases; therefore, evisceration or enucleation may be the only available option. The purpose of this study was to determine the underlying ocular conditions leading to evisceration in a major tertiary eye care center in Khyber Pakhtoonkhawa and to correlate it clinically.

MATERIAL AND METHODS
Clinical records of all the patients who underwent evisceration from April 2010 till April 2011 at Lady Reading Hospital, PGMI, Peshawar, a tertiary center for referral of the patients were retrospectively reviewed. Information regarding patient history, duration of disease, diagnosis, investigation, any prior treatment were evaluated. Additional information for previous trauma, the objects causing trauma, earlier treatment, length of time before seeking medical help, history of any prior surgery, the place of surgery and any complication during surgery and presence of systemic disease was obtained. For the purpose of data collection, indications were assigned on the basis of the most recent clinical diagnosis. Results of diagnostic investigation, such as ultrasonography (U/S) or computed tomography (CT), anterior chamber tap and vitreous tap or biopsy were collected where available. Indications for evisceration for each operated eye were obtained. The predisposing causes for the final diagnosis were categorized as panophthalmitis, severely traumatized eye, cosmetically disfigured eyes with corneal perforation, postsurgical, and others. All patients were further categorized by age and divided
Evisceration: Frequency, Indications and Clinical Correlation in a Tertiary Care Hospital

into seven groups of 10 years each. Mean and standard deviation was calculated for quantitative variable like age. Chi square test was applied to find the correlation of diagnoses and indication. P value < 0.05 was considered as significant value.

RESULTS

The total admission in one year (April 2010 to April 2011) in our eye unit was 2446. Out of these 49 patients between the age of 0 and 70 years and above were operated for evisceration in one year. These patients were included in the study. Male constituted 32 (63.5%) and females 17 (34.6%) in number. Out of these 49 cases, 6 (12.24%) patients were in the age group 0 to 10 years. Age group 11 to 20 years had no patient while 4 (8.16%) patients were in age group of 21 to 30 years and in the age group 31 to 40 years 3 patients (6.12%) underwent evisceration, 41 to 50 years age group included 6 (12.2%) patients. The most common group admitted was between 51 to 60 years included 19 (38.77%); the other group of 60 years and above included 11 (22.48%).

Panophthalmitis was the major etiology for evisceration of 24 (48.97%) eyes. Post cataract surgery panophthalmitis was responsible in 18 eyes to be eviscerated because of trauma included 6 patients of the total. Trauma from bomb blast injuries, FAI, stones and sticks as well as road traffic accidents and penetrating sharp objects, mostly in young males, were responsible for devastating ocular injuries and subsequently had eviscerations in 11 (22.44%) patients. The number of evisceration done for old corneal opacities with spontaneous perforation were in 10 eyes (20.40%). These opacities were years old and some were since childhood. The other common indication for evisceration was keratitis. These keratitis led to endophthalmitis and 4 (8.16%) had perforated corneal ulcer. These perforation led to uveal prolapse and were unable to be treated conservatively, and as a last resort evisceration was done. The indications for evisceration is shown in the table.

<table>
<thead>
<tr>
<th>Indication for Evisceration</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Operative Panophthalmitis</td>
<td>36.73%</td>
</tr>
<tr>
<td>Post traumatic Panophthalmitis</td>
<td>12.24%</td>
</tr>
<tr>
<td>Trauma</td>
<td>22.04%</td>
</tr>
<tr>
<td>Perforated corneal opacities</td>
<td>20.40%</td>
</tr>
<tr>
<td>Keratitis</td>
<td>8.16%</td>
</tr>
</tbody>
</table>

DISCUSSION

Evisceration although a surgical procedure which mostly cannot be justified and explained to the patients and in our opinion the indication for evisceration are mostly unexplainable to the patients. The need of this study was to find out the commonest indication for evisceration in tertiary set up and why with all the available sources we had to opt for this surgery. In our study the number of the male patients were more than the female. As in other case series, there was predominance of males undergoing evisceration. Predominance of males undergoing enucleation has also been reported in previous studies. This may be related to males being more prone to trauma because of their high-risk professions and outdoor activities.

The commonest age group affected was above 50 years and the reason was that most of the patient had panophthalmitis after age related cataract surgery. Panophthalmitis and untreatable endophthalmitis followed by unsightly eyes emerged as the major reasons for patients presenting for evisceration in the present study. Blind painful eyes occurred primarily due to endophthalmitis post operatively and post trauma, ocular injury, neglected corneal ulcers and opacities. Panophthalmitis was responsible for evisceration in 24 (48.97%) patients in our study. In the literature, depending on the geographic location, endophthalmitis has been reported to be the cause for evisceration in 23.3%-78.6% of cases. Classically, the clearest indication for an evisceration has been in cases of virulent endophthalmitis, to reduce the risk of the infection spreading via the optic nerve sheath.

The number of endophthalmitis cases have been on the decline lately in developing countries. For example, a recent study from India reported a significant decrease in eviscerations due to endophthalmitis from 91.2% during the first 5-year period (1990–1994) to 50% during the second 5-year period (1996–2000). The authors’ rationale for this decline was improvement in ophthalmic care, introduction of newer antibiotics, availability of better trained health care professionals, and better access to health care. The data presented in our study has been collected from a tertiary eye care center where the cases referred to us were at the end stage of the disease process. That is why the results of our study regarding post operative and post trauma do not correlate with the rest of international studies. The reason is that we receive cases from all over the province and we mostly receive those cases which were operated in less equipped, and by less trained professionals.

The other bigger issue is trauma, which is much more common as compared to other studies and this include trauma due to war on terror as well. Trauma from bomb blast injuries, FAI, stones and sticks as well as road traffic accidents and penetrating sharp objects, mostly in young males, was responsible for devastating ocular injuries and subsequent eviscerations in 16 (32.65%) patients of cases in our study. This was similar
to the results previously reported by other observers in India, Ireland, and Sweden.\textsuperscript{2,4,5} Panophthalmitis was the most common indication for evisceration (78.6\%) followed by irreparable globe injury (21.3\%), by a study done Dada et al\textsuperscript{2}. In a study done by Limbu et al the indications for evisceration included ruptured eyeball, Panophthalmitis, and painful blind eyes\textsuperscript{8}.

In our study 4 (8.40\%) of the eyes were eviscerated because they had perforating keratitis. In study done by Constantinou et al, corneal ulcers that result in the loss of eye in elderly population are frequently associated with glaucoma and persistent epithelial defects. The majority of these cases have non-healing microbial keratitis caused by Pseudomonas aeruginosa\textsuperscript{9}. The indications for evisceration or enucleation were extensive non-healing microbial keratitis (22/47) and corneal perforation secondary to microbial keratitis (17/47)\textsuperscript{9}.

One of the major indications for evisceration was old perforated corneal scars and opacities. It is in correlation with other international studies\textsuperscript{6,7,9,10}. Most of these patient had these corneal opacities since ages and a trivial trauma leads for the indication of evisceration.

**CONCLUSION & RECOMMENDATIONS.**

Panophthalmitis, old neglected corneal opacities, and severe ocular injury are the major indications of evisceration in our tertiary care hospital.

Public education, health safety regulations, implementation of safe working and living environments, along with early diagnosis of the eye diseases and timely intervention by well trained health care workers, may prevent loss of vision. It is expected that with improvement in eye care, the advent of modern surgical techniques, and the use of newer antibiotics, many of these eyes can be saved from evisceration or enucleation in the future.

**REFERENCES**

Optic Neuritis in Children

Zakir Hussain FCPS, Dr. Sanaullah Jan FCPS, FRCS, Afzal Qader FCPS, Mohammad Sabir FCPS, Samina Karim FCPS
Ophthalmology Dept., Khyber Institute of Ophthalmic Medical Sciences, Hayatabad Medical Complex, Peshawar.

ABSTRACT
Objectives: To study the clinical characteristics of optic neuritis in children.
Place and duration of study: The study was carried out at Department of Clinical Ophthalmology, Khyber Institute of Ophthalmic Medical Sciences (KIOMS), Postgraduate Medical Institute (PGMI), Hayatabad Medical Complex (HMC), Peshawar from November 1st, 2007 to March 31st, 2011.
Patients and Methods: A retrospective review of the medical charts of 18 patients who were diagnosed with optic neuritis before age 10 was conducted in this study. Data were collected on the demographics, clinical features, use of intravenous corticosteroids, neuroimaging, and diagnosis of multiple sclerosis.
Results: Eighteen patients were identified with optic neuritis, 13 of whom were girls (72.2%) and the remaining 5, boys. Mean age at diagnosis was 7.2 ± 1.5 years (range, 4 to 10 years). Eleven patients were diagnosed with bilateral diseases (61.1%). All patients (100%) exhibited visual acuity worse than 6/60. However, 14 patients (77.7%) recovered to a visual acuity level better than 6/12. Fifteen patients received the corticosteroid treatment. Disc swelling was observed in 75.8% of eyes (25 eyes). The mean follow-up period was 24.9 ± 22.3 months (range, 6 to 69 months). During that time, 3 patients developed multiple sclerosis.
Conclusions: In children with optic neuritis, it was found that there was a profound decrease in initial visual acuity and rapid recovery of visual acuity. Corticosteroid treatment resulted in a beneficial effect on visual outcomes, but had no effect on the risk of multiple sclerosis.
Key words: Optic neuritis, Multiple sclerosis.

INTRODUCTION
Optic neuritis (ON) is an acute inflammatory condition affecting the optic nerve. The most common cause of ON is demyelination of the optic nerve (either idiopathic or due to multiple sclerosis), although there are other possible etiologies, including parasitic infections, infections and vasculitides.1 Attack of optic neuritis in childhood are usually bilateral.2 Childhood optic neuritis is a rare condition that differs from adult-onset optic neuritis in some clinical aspects. It is widely accepted that in children, attacks of optic neuritis usually occur following a febrile illness, tend to affect both eyes, are frequently associated with swollen discs, improve rapidly, and have a low conversion rate to multiple sclerosis (MS).3,5 The relationship between optic neuritis and multiple sclerosis (MS) has been well-established, and several articles have noted a lower incidence of MS in children with optic neuritis.4,6-12 Since there have been no studies of childhood optic neuritis comparable to the Optic Neuritis Treatment Trial (ONTT), a multi-center, randomized, placebo-controlled trial for adult optic neuritis, the previous results regarding childhood optic neuritis cannot be viewed as complete or definitive.

In previous studies on childhood optic neuritis, the study populations were heterogeneous in nature, owing to the broad age distributions of the subject children. Some previous reports have suggested that hormonal effects and puberty affected the clinical manifestations of the condition.5,7-13 Working from this perspective, several authors have focused on pre-pubertal patients, however, the number of study patients was small.13,14

In this study, we describe the clinical characteristics of optic neuritis in young children who were diagnosed before the age of 13.

MATERIAL AND METHODS
Our study reviewed patients younger than 13 years of age that visited the Eye unit of Hayatabad Medical Complex, Peshawar and were diagnosed with optic neuritis between November 1st, 2007 and March 31st, 2011. Optic neuritis was diagnosed on the basis of the following clinical symptoms and signs: acute loss of visual acuity or visual field lasting 8 days or less,
relative afferent pupillary defect, and abnormal color vision. Additionally, bilateral disease was defined as a loss of vision in the other eye occurring within two weeks after the initial attack. The following data were recorded: demographics (age at diagnosis, sex), clinical profiles (laterality, initial visual acuity, worst visual acuity, final visual acuity, duration between initial symptom and recovery), ophthalmologic characteristics (disc swelling, results of color vision test and visual field test), presumed or definite viral infection or vaccination preceding visual loss, findings in brain magnetic resonance images (MRI), development of MS, and the use of steroid treatment. We considered 6/12 as functionally good visual acuity, and the duration of visual recovery to 6/12 was checked. We used SPSS ver. 17.0 for the analysis, and regarded the result as statistically significant when the \( p \)-value was less than 0.05.

RESULTS:

We identified 18 patients, 13 of whom were girls (72.2%) and the remaining 5, boys. Mean age at diagnosis was 7.2 ± 1.5 years (range, 4 to 10 years). Eleven patients were diagnosed with bilateral diseases (61.1%). All patients (100%) exhibited visual acuity worse than 6/60. However, 14 patients (77.7%) recovered to a visual acuity level better than 6/12. The duration between the worst visual acuity and 6/12 was 2.50 ± 2.90 months (6 days to 8 months). Four patients showed no recovery of visual acuity, 3 (16.6%) patients showed bilateral disease, and 3 patients did not receive corticosteroid treatment.

We administered a regimen of 10 to 30 milligrams of methylprednisolone per kilogram per day. Fifteen patients received this treatment. Based on previous reports of corticosteroid treatment favorable visual outcomes in childhood optic neuritis, we recommended the treatment to every parent. However, 3 patients refused the therapy and underwent a follow-up. Compared to the non-treated subjects, patients who received intravenous corticosteroid treatment resulted in better visual outcomes \( p = 0.043 \). Disc swelling was observed in 75.8% of eyes (25 eyes). Color vision tests were done on 10 eligible patients. Color vision defect was present in all the 10 patients. Goldmann perimetry was done with the same 10 patients. Four of the patients experienced central and paracentral scotomas, 4 patients had diffuse decreased central sensitivity, 1 patient showed a paracentral island, and the other patient reported no generalized depression. Six patients reported suffering from febrile disease before the onset of acute visual loss, and 2 patients had received the vaccine for measles, mumps, and rubella prior to the attack.

With the exception of 2 patients, all children had a baseline brain MRI. MRI abnormalities are shown in Table II. Six of the patients showed no abnormalities. Three patients showed optic nerve enhancement and 4 patients had high signal lesions in the white matter. On the MRI of the other 3 patients, both high signals in the optic nerve and white matter lesions in the brain were observed.

The mean follow-up period was 24.9 ± 22.3 months (range, 6 to 69 months). During that time, 3 patients developed multiple sclerosis. Two of the patients were female, and one did not initially receive intravenous corticosteroid treatment for optic neuritis.

<table>
<thead>
<tr>
<th>Table I</th>
<th>Gender distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Number of cases (%)</td>
</tr>
<tr>
<td>Male</td>
<td>5 (27.77%)</td>
</tr>
<tr>
<td>Female</td>
<td>13 (72.23%)</td>
</tr>
<tr>
<td>Total</td>
<td>18 (100%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table II</th>
<th>MRI abnormalities (n=16)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRI Abnormalities</td>
<td>Number of cases</td>
</tr>
<tr>
<td>No abnormalities</td>
<td>6</td>
</tr>
<tr>
<td>Optic nerve enhancement</td>
<td>3</td>
</tr>
<tr>
<td>High signal lesion in white matter</td>
<td>4</td>
</tr>
<tr>
<td>Optic nerve enhancement + high signa</td>
<td>3</td>
</tr>
<tr>
<td>Lesion in white matter</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
</tr>
</tbody>
</table>

DISCUSSION:

Attacks of optic neuritis in childhood are usually bilateral and often associated with a febrile illness. Visual symptoms tend to improve rapidly, especially with steroid therapy, and visual acuities are often normal within 4-6 weeks of onset.\(^{15,16}\) The frequency of multiple sclerosis after optic neuritis in childhood appears to be low.\(^{2,3}\) According to the ONTT, female predominance was observed in adulthood optic neuritis, that is, 77% of the enrolled patients were female.\(^{17}\) With regards to its dominance in childhood, there has been some controversy regarding a female predilection for the condition, and the ratio of females to males affected was 2:3 to 4.\(^{2,7,8,18}\) Some authors reported that no sex preponderance, but the female-to-male ratio increased to 2:1 after puberty.\(^{5,7,13}\) In a previous study conducted in Thailand, the proportions of females were 59% and 71% of patients with optic neuritis age under 10 and between 10 and 12,
respectively. However, in our study, a female predominance was detected with 72.2% of the patients being female.

Childhood optic neuritis was considered to be bilateral in nature. Contrary to the inclusion criteria of the ONTT, which covers only patients with unilateral visual acuity loss, some authors have recruited children with bilateral optic neuritis, while other authors did not attempt to exclusively include bilateral diseases, but exclusively reported cases in which the conditions were bilateral. There were 11 cases of bilateral disease among our 18 patients, which was consistent with previous articles where bilateral disease was reported in the range of 42% to 87%.

Initial profound visual loss occurred more commonly in children than adults. The authors reported that 84% to 100% of childhood patients experienced visual acuity of 20/200 or worse upon presentation. According to the ONTT, initial visual acuity was better than 20/200 in 64.1% of the 454 patients. In our study, all patients (100%) exhibited visual acuity worse than 6/60. Despite severe visual loss at the initial phase, visual prognosis was good to excellent in the childhood optic neuritis patients. Previous articles reported that 53% to 92% of patients recovered visual acuity better than 20/40. The ONTT provided long-term follow-up results of visual prognosis: 72% of the affected eyes had a visual acuity of 20/20 or better, and 66% of patients had a visual acuity of 20/20 or better in both eyes at 15-years’ follow-up. In this study, 14 patients (77.7%) recovered to a visual acuity level better than 6/12, while 4 patients exhibited no recovery of their visual acuity. The duration between the worst visual acuity and 6/12 was 2.50 ± 2.90 months (6 days to 8 months).

This study was not a controlled study, and the number of study patients was small. However, we were able to identify significant beneficial effects of intravenous corticosteroid therapy on the visual outcomes. We employed the regimen of 10 to 30 milligrams of methylprednisolone per kilogram per day, which was consistent with previous articles that reported satisfactory visual outcomes with corticosteroid therapy. Of course, there have also been reports showing no correlation between the use of steroids and the final visual outcomes, making the decision of corticosteroid treatment on young children difficult and controversial. However, it is both logical and ethical to treat optic neuritis patients with corticosteroids when taking the suspected autoimmune mechanism underlying the pathogenesis of optic neuritis into account.

Many reports have focused on the association between optic neuritis and MS. According to the ONTT, the aggregate cumulative probabilities of developing MS were 30%, 38%, and 50% with 5-year, 10-year, and 15-year follow-ups, respectively. In a study of childhood optic neuritis, Lucchinetti et al. estimated the risk of MS to be 13%, 19%, 22%, and 26% after 10, 20, 30, and 40 years from the onset of optic neuritis. In another case series, the risk of developing MS was estimated to be 8% to 50%. In our study, during the mean follow-up period of 24.9 ± 22.3 months (range, 6 to 69 months), 3 patients (16.6%) were diagnosed with MS. After the ONTT reports, it became commonly accepted that steroid therapy did not alter the visual outcomes or the risk of MS in adults. In addition, we find no significance in corticosteroids preventing MS. Only the presence of MRI lesions, the most important risk factor in the ONTT, affected the risk of MS. In our study, only patients who showed abnormalities in the baseline MRI developed MS. This finding was comparable to the findings of the ONTT, which reported the risk of MS after 15 years increasing 25% to 72% in cases where the baseline MRI showed one or more lesions, and the findings of the study on patients younger than 18 years of age.

This study has the same disadvantage as other studies concerning childhood optic neuritis: the study population is too small to fully analyze the prognosis depending on the treatment and risk factors of multiple sclerosis. The prevalence of optic neuritis in children is known to be less than in adults, and thus the possibility of studying large population of patients is considered fairly low. Nevertheless, we found that steroid treatment exerted a significant effect on visual outcomes, and the presence of MRI lesions had a statistically significant effect on the risk of MS. This study recruited a large number of patients who were younger than 10 years when diagnosed with optic neuritis, and thus created a distinction between our results and the previous articles. Previous reports regarding childhood optic neuritis that studied such a broad age group or such a small study population exhibited insignificant results. In this study, we demonstrated the clinical characteristics of optic neuritis in young children. In particular, the patients in this age group tended to be female, have bilateral disease, and despite initial deep visual loss, recovered their visual acuity within a few months. Corticosteroid treatment appeared to exert a helpful effect on the visual outcomes, and in cases involving MRI lesions at baseline, the risk of developing MS tended to be higher.

CONCLUSION:

In children with optic neuritis, it was found that there was a profound decrease in initial visual acuity and rapid recovery of visual acuity. Corticosteroid treatment resulted in a beneficial effect on visual
outcomes, but had no effect on the risk of multiple sclerosis.

REFERENCES:

Phacoemulsification with Topical Anaesthesia Vs Peribulbar Anaesthesia*

Zaman Shah¹, Sadia Sethi², Saber Mohammad³, Mohammad Rafiq Afridi⁴
Shafqatullah Khan Marwat⁵

Abstract: Objective: To investigate the level of pain perceived by patients undergoing phacoemulsification under topical anaesthesia, in comparison with peribulbar technique.

Material and methods: This study was conducted in the department of ophthalmology Khyber Teaching Hospital Peshawar from 1st June 2011 to 30th December 2011. 62 consecutive patients undergoing phacoemulsification under local anaesthesia were established. The study was done in two groups, group 1 consist of 31 patients (11 male, 20 female) were operated on topical anaesthesia. Group 2 consist of 31 patients (15 male, 16 female) underwent phako surgery using peribulbar injection.

Results: The study groups showed the distribution of pain score at the time of induction, per-operative and postoperative. On induction score ranged from 0-3 for group 1 and 0-10 for group 2. Per operative pain score was 0-3 in both groups. Post operative pain ranged from 0-3 for group 1 and 0-5 for group 2.

Conclusion: Phacoemulsification with topical anaesthesia is quite successful with minimum or no pain during procedure and this avoid the dreadful complications of peribulbar/retrobulbar injection.

INTRODUCTION

Although phacoemulsification with only topical anaesthesia is possible, the level of any discomfort perceived by the patients is unknown. Topical anaesthesia eliminates any risk of inadvertent ocular or orbital injury. With the advent of phacoemulsification, cataract surgery using only topical anaesthesia has become a reality¹. This form of anaesthesia has several advantages over regional infiltrative techniques such as peribulbar, retrobulbar and sub-tennon injection, the foremost of which is the abolition of any risk of inadvertent injury to the globe or orbital contents². The drops are instilled just a few minutes before surgery and anaesthesia is sufficient to perform phacoemulsification through a sclera or corneal pockets without a superior rectus sutures, typically with a single dose.

In topical anaesthesia, patients’ education and cooperation is needed because ocular motility and surgeon’s tension are all there. As iris is one of the most sensitive structures, inadvertent touching of the iris will result in to severe pain. Pupil should be widely dilated before proceeding the surgical procedure. In miosed pupil the surgery is not only difficult but frequent touching of the iris with chopper and grasping of the iris into the phako probe is common. One should not carry out phako surgery on long standing dilated pupil because the pupil may get constrict during the procedure.

MATERIAL AND METHODS

This study was conducted in the department of Ophthalmology Khyber Teaching Hospital Peshawar from 1st June 2011 to 30 December 2011. 62 consecutive patients underwent phacoemulsification under local anaesthesia. Group 1 consist of 31 patients (11 male, 20 female) were operated on topical anaesthesia. Group 2 consist of 31 patients (15 male, 16 female) underwent phako surgery using peribulbar injection.

In group 1 topical anaesthesia was administered in the form of proparacaine eye drop instilled to the superior conjunctival fornix once the patient was positioned on the operating table. The patient was asked to report when the stinging sensation subsided. In group 2 peribulbar anaesthesia consisted of xylocain 2% with adrenaline. This was divided in to two injections, half was injected inferior temporally and half superiorly.
The group 1 patients were directed to focus on a particular point on the roof without moving their eyes. Pain assessment was carried out on return to the ward by the same member of the nursing staff, who had not met any of the patients before. The patients were asked to grade the pain felt on the standardized 10 cm visual analogue scale, 0 representing no pain felt at all, 10 representing the most severe pain (fig 1). All the patients were asked to grade pain perceived at three stages of procedure, at induction of anaesthesia, topical/peribulbar, per operative and one hour post operatively at the time of assessment in the ward. Any analgesia given was also recorded. Additionally the surgeon was asked to report any pain encountered during the procedure in both groups. The pain scores for each group were compared.

**RESULTS:**

The group 1 consist of 31 patients (11, 35.48% male) and 20 (64.51% female) with age range 40-75 years, mean age 57.5 years. The group 2 comprise of...
31 patients, 15(48.38%) male, 16(51.61%) female, age range 30-80 years and mean age 55 years.

A fig 2 shows the distribution of pain scores at the time of induction. Score ranges from 0-3 for group 1 and 0-10 for group 2. There was a significant difference between the pain perceived with instillation of drops and that with peribulbar injection. Per operative pain score was shown in fig 3, score ranged from 0-3 in both groups and most of the score in each group representing slight pain or less. Fig 4 showed the pain scores post operatively, score ranged from 0-3 for group 1 and 0-5 for group 2. The median scores were 0 for the group 1 and 1 for group 2 and most of the scores in each group again represented slight pain or less. Only 2 patients needed analgesia in group 1 and 05 patients in group 2 in the ward.

DISCUSSION:

Topical anaesthesia in the form 5% cocaine was described as pre-eminently useful for cataract extraction by Knapp in 1884(3). He reported that pain was felt only when iris was grasped to perform an iredeectomy. Nucleus extraction is likely to produce pain due to stretching of iris, particularly when dilatation is poor. By fragmenting the nucleus in situ, phacoemulsification obviates the need to touch the iris during cataract extraction, provided the pupil is well dilated. During the introduction of phako probe at the start of surgery the patients may feel slight pain due to iris stretching and deepening of the anterior chamber.

Cataract surgery under topical anaesthesia requires full co-operation of the patient during the procedure, to prevent undesirable movement of the globe and this requires particular effort by the surgeon to win the patient’s confidence. A detail discussion is needed to explain the procedure to the patient and even multiple visits may be arranged to get the patient confidence. Superior rectus suture may be omitted in most of the cases which may well contribute to lower incidence of post operative diplopia and ptosis. The patient needs to be asked to try to keep the eye particularly still for a moment to perform capsullorhexis and at the time of intra ocular lens implantation. The globe is adequately fixated by phacoemulsification probe and chopper during the procedure. The ideal anaesthetic technique should produce an adequate level of analgesia for the proposed surgical procedure, inflict the minimum pain or toxicity on the patient top work easily, whilst both the peribulbar and retrobulbar techniques are effective. There is a small risk of globe perforation (0.006%) retrobulbar hemorrhage (0.072%) and damage to extra ocular muscles with these. A subdural injection may also occur with retrobulbar injection which may result in brain stem anaesthesia or death. Optic atrophy and central retinal vein and artery occlusion have also been reported. Most of the risks are eliminated by the use of a subtennon injection as described by Stevens.

Topical anaesthesia is rapid and straight forward to perform, it is also likely to be more acceptable to patients and large proportion of whom are afraid of needle. There is no risk of damage to the globe or orbital contents and therefore topical anaesthesia is strongly indicated in the presence of large staphylomatus globe with synechiae especially associated with bleeding tendency. The absence of akinesia, whilst increasing the technical difficulty for the surgeon, also avoid any transient post operative diplopia experience by the patient. Diplopia may still occur if the cataract has impaired the patient’s fusion. The mydriasis and cycloplegia are now limiting factors on immediate post operative vision. Finally the cost of topical anaesthetic agent like proparacaine is less than lignocaine and bupivicain mixture.

A reasonable degree of experience is required to perform phacoemulsification under topical anaesthesia. It will be very difficult to convert it to traditional extra capsular cataract extraction once you get any problem in the procedure. The capsullorhexis has to be performed reasonably quick to minimize the risk of unfavorable effect of patient movement, as this is the first step for successful phacoemulsification. One must avoid touching the unanaesthetized iris with any instruments so that to minimize the per operative miosis. In my study all those patients operated on topical anaesthesia did not require any pad for covering the eye and the post-operative medications including topical steroid and antibiotic started and these patients have good visual acuity just post operatively and regarding the pain most of the patients said at the end of procedure that they had enjoyed the surgical procedure. To abolish the effect of mydriatics, I usually inject intracameral miochol at the end of surgery on all group 1 patients so that to have a good vision just post operatively.

CONCLUSION:

The study is concluded with the remarks that phacoemulsification with topical anaesthesia is quite successful with minimum or no pain during the procedure and slight pain afterward, which avoids the dreadful complications of peribulbar or retrobulbar injection. The best line of anaesthesia recommended in this study for cataract surgery is topical anaesthesia.

REFERENCES:
Ratio between Refractive Error & Strabismus among its different Types in Children attending Eye Department Khyber Teaching Hospital, Peshawar*

Ayat Shah1, Sadia SethiFCPS2, Zaman ShahFCPS3, Saber MohammadFCPS4
Department of Ophthalmology, Khyber Teaching Hospital, Peshawar

ABSTRACT:
Objectives: The objectives of the study were to find out the ratio between refractive error and strabismus and among different types of refractive errors in children up to 16 years age.

Material and Methods: This study was conducted in the Department of Ophthalmology, Khyber Teaching Hospital Peshawar from 1st Jan 2011 to 31st Dec 2011. All patients of refractive error and strabismus under 16 years visiting Out Patient Department Khyber Teaching Hospital were examined. A total of 1535 patients were included in the study, fulfilling the inclusion criteria. All the patients were examined according to the protocol.

Results: A total of 1535 patients of refractive error and squint below 16 years were examined. Out of these patients 860 (56.03%) were of refractive error, 588 (38.31%) patients were of squint and 87 (5.67%) patients were excluded from study. Among these refractive error 860 patients, 396 (46.05%) were astigmatism, 176 (20.46%) patients were myopic, 149 (17.32%) patients were hypermetropic, 58 (6.74%) patients were aphakic, 57 (6.63%) patients had nystagmus and 24 (2.79%) patients were anisometropic amblyopic. In squint patients out of 588, 205 (34.86%) were Accommodative esotropia, 125 (21.26%) patients were of exotropia, 107 (18.20%) patients were of infantile esotropia, 73 (12.41%) patients were of strabismic amblyopia, 33 (5.61%) patients were of pseudo-squint, 23 (3.9%) patients were of exophoria, 22 (3.74%) patients were of paralytic squint. Total amblyopic patients were 97 (6.32%). Local patients of Peshawar were 1012 (65.93%) and non local patients were 523 (34.07%). Out of total patients 59 (3.84%) from Khyber Agency, 46 (3.0%) patients were from Afghanistan. A total 808 (52.64%) patients were male, 727 (47.36%) patients were female.

Conclusion: The study shows that the ratio of refractive error was greater than strabismus. In refractive error the ratio of astigmatism was higher than other types of refractive error. Myopia, hypermetropia, aphakia, nystagmus and anisometropia have descending ratio respectively. In squint the ratio of esotropia were greater than exotropia. Accommodative esotropia have high ratio in all types of strabismus. Infantile esotropia, exotropia, pseudo squint, exophoria, paralytic squint have descending ratio respectively. The ratio of local patients was greater than non local. The ratio of male was greater than female.

Key Words: Astigmatism, Myopia, Hypermetropia, Esotropia, Exotropia, Exophoria, Amblyopia.

INTRODUCTION:
Vision 2020 declared by WHO as the “right to sight” and global initiative to eliminate the five major ocular causes of avoidable blindness by the year 2020 known as vision 2020. These are cataract, trachoma, onchocerciasis, vitamin -A deficiency and refractive error1. Refractive error in Pakistan is 11.4% according to the national survey conducted in 1987-1990 and found that the refractive error was the largest cause of avoidable blindness2. Refractive error which account mostly for low vision and visual handicap was the largest cause of preventable blindness in Pakistan1.

Strabismus is the misalignment of visual axis of one or both eyes. Convergent squint is the most common form of strabismus constituting ½ to ⅔ of all misaligned eyes4. Strabismus is a common disorder that affects 3% to 5% of children5. The overall estimated prevalence of strabismus in Pakistan is 5.4%. In Ireland, it was found that esotropia was five times more than exotropia7. Accommodative esotropia is the most common type of comitant convergent squint about 36.5%8.

MATERIAL AND METHODS:
This study was conducted in the department of Ophthalmology Khyber Teaching Hospital Peshawar from 1st Jan 2011 to 31st Dec 2011. The study includes 1535 patients of refractive errors and strabismus under 16 years, all the patients were examined in detail. To estimate the ratio of refractive error and strabismus and ratio among its different types under the age of 16 years
attending Eye OPD at Khyber Teaching Hospital Peshawar were included in study. Patients with mental disorder, trauma, macular disorder, corneal opacity and above than 16 years were excluded from the study.

RESULTS:

In this study total patients of refractive error and squint below 16 years examined in Eye OPD Khyber Teaching Hospital Peshawar were 1535. Out of those patients 860 (56.03%) were of refractive error, 588(38.31%) patients were of squint and 87(5.67%) patients were in excluded criteria.

Among these refractive error 860 patients, 396(46.05%) were astigmatism, 176(20.46%) patients were myopic, 149(17.32%) patients were hypermetropic, 58(6.74%) patients were aphakic, 57(6.63%) patients were of nystagmus and 24(2.79%) patients were anisometropic amblyopic.

In squint patients out of 588, 372(63.27%) patients were of convergent strabismus and 158(26.87%) patients were of divergent strabismus. 205(34.86%) were accommodative esotropia, 125(21.26%) patients were of exotropia, 107(18.20%) patients were of infantile esotropia, 73(12.41%) patients were of strabismic ambylopia, 33(5.61%) patients were of pseudo squint, 23(3.9%) patients were of exophoria, 22(3.74%) patients were of paralytic squint.

Total amblyopic patients were 97(6.32%). Total local patients of Peshawar were 1012(65.93%) and non local patients were 523(34.07%). Out of total patients 59(3.84%) from Khyber Agency, 46(3.0%) patients were from Afghanistan, 23(1.50%) patients were from Sawabi, 16(1.04%) patients were from Swat, 62(4.04%) patients were from Charsada, 59(3.84%) patients were from Khyber Agency, 26(1.69%) patients were from Karak, 23(1.50%) patients were from Bannu, 19(1.24%) patients were from Lakimarwat, 17(1.11%) patients were from Shabqadar, 17(1.11%) patients were from...
Nowshera and a little number from other areas like Waziristan, Dara, Malakand, Chitral etc. A total 808(52.64%) patients were male, 727(47.36%) patients were female.

**DISCUSSION:**

In our study 860 patients (children) were of refractive error (56.03%), 588 patients were having strabismus (38.31%) and 87 patients were of other condition which causes refractive error and squint like Trauma etc (5.66%). Out of 1535 patients, 808 Patients were male (52.64%) and 727 patients were female (47.36%).

In refractive error the ratio of Astigmatism was greater 396(46.05%) followed by myopia 176(20.46%), hypermetropia 149(17.32%), aphakia 58(6.74%), nystagmus 57(6.63%) and anisometropic amblyopia 24(2.79%). In squint patients the ratio of accommodative esotropia was greater 205(34.86%) followed by infantile esotropia 107(18.20%), exotropia 125(21.28%), strabismic amblyopia 73(12.43%), pseudo squint 33(5.61%), exophoria 23(3.9%), paralytic squint 23(3.74%).

Total amblyopic patients were 97(6.32%). Comitant esotropia was found in 372(63.27%) patients and comitant exotropia was found in 158(26.87%) patients. Refractive errors are among the leading causes of visual impairment worldwide and are responsible for high rates of low vision and blindness in certain areas.

According to the study done in Khyber Teaching Hospital Peshawar the prevalence of astigmatism was 46.6%, myopia 28.6%, hypermetropia 25%, according to another study done among school going children in Dezful, Iran revealed overall rate of myopia in students up to 15 years 3.4%, hypermetropia 16.6% and astigmatism 18.7%.

In our study anisometriopic amblyopia was found 2.79% (24.75%) and strabismus amblyopia was found 6.32% (75.25%). While according the study done in Khyber Teaching Hospital Peshawar anisometropia was found 21%, combined amblyopia 16%, ametropic amblyopia 6% and stimulus deprivation amblyopia 2%.

Strabismus is a significant cause of ocular morbidity leading to amblyopia and psychosocial distress. According to our study esotropia was found 63.27% and exotropia 26.87% in all types of strabismus which has no big different with another study done in HMC Peshawar.

According to the study done in Department of Ophthalmology Hayatabad Medical Complex Peshawar, esotropia was found 74.35% and exotropia 25.64% in children. In a population base study Wood Ruff on 961 children with amblyopia in United Kingdom, found that 57% of amblyopia was due to strabismus. While according to our study 75.25% amblyopia was due to strabismus.

**CONCLUSION:**

Our study showed that the ratio of refractive error was greater than strabismus in children. Astigmatism was found the most common type of refractive error which is greater more than twice times of myopia and hypermetropia. Accommodative esotropia was approximately twice times of infantile esotropia and exotropia. Esotropia was greater in proportion than exotropia. The ratio of male patients was greater than female. Local patients were approximately twice times of non local patients.

**REFERENCES:**

INTRODUCTION

Trabeculectomy, since its introduction in 1968, has become the gold standard surgical procedure for progressive open angle glaucoma. Trabeculectomy is the most common operative procedure for the treatment of medically uncontrolled glaucoma and is a better option than medical treatment in many cases. Trabeculectomy lowers intraocular pressure by creation of a new channel for aqueous outflow between the anterior chamber and sub-tenon space. Recently surgery for glaucoma is being performed at early stages of the disease when the vision is still fairly good. Many patients report subjective changes in vision following trabeculectomy.

Two types of astigmatic changes are usually found following trabeculectomy. Majority of patients shows vertical steepening and ‘with the rule’ astigmatism, while some patients shows vertical flattening and ‘against the rule’ astigmatism. Corneal astigmatism also occur after trabeculectomy and combined operation with various surgical techniques. The surgically induced astigmatism is more in the early post operative period and it decreases with the passage of time. The astigmatism usually corrects within the initial period of three months postoperatively. Small flap trabeculectomy produces smaller changes in corneal curvature that resolve sooner than previous reports of larger flap technique. Various explanations have been given regarding the effect of trabeculectomy on corneal curvatures.

1. The more posterior placement of the incision in trabeculectomy may also explain the observed behavior as the size and location of the incision have a profound impact on the postoperative visual results.

2. Another explanation is that in trabeculectomy, when a piece of tissue is removed from under the scleral flap and the flap then sutured back, the flap approaches corneal edge of the trabeculectomy opening to the scleral edge and also allows the unsupported corneal edge of the opening to sink slightly. Both of these mechanisms would have the effect of shortening the vertical corneal radius of curvature. A few months onwards the tension in the sclera sutures may start to weaken and allow the free corneal edge of the sclerostomy opening to resume its preoperative position.

3. The cause of induced astigmatism may be related to the use of cautery during surgery, producing a contraction of the sclera in the meridian of surgery and leading to the ‘with the rule’ astigmatism. When the surgery is augmented with topical application of anti-metabolite which have antifibroblastic activity, this will have less astigmatism as noted by Honj YJ.
and Zarnowski T.  

MATERIAL AND METHODS

The study was conducted in the Department of Ophthalmology, Khyber Teaching Hospital Peshawar, Pakistan. It was spanned over one year duration starting from August 2009 to September 2010. It was a prospective and comparative study. The patients admitted for primary trabeculectomy to the eye department was included in this study. The pre and post-operative assessment of the patient regarding the type of Glaucoma, intra ocular pressure, and manual keratometry readings were recorded. Shin Nippon manual Keratometer was used.

The surgery was performed with local anesthesia. In all the patients a limbal based conjunctival flap was raised and reflected forward. A square partial-thickness scleral flap (approximately 4 x 4 mm) was dissected towards the limbus, and a wedge of trabecular tissue (1x2 mm) was excised from beneath this. A peripheral iridectomy was performed, and the scleral flap was secured back with two 10/0 nylon sutures at the corners. The conjunctiva was also closed with interrupted 10/0 suture. All post operative keratometry readings were compared with that of the pre-operative readings. Special proforma was made for information of the patients. Informed consent was taken from each patient included in this study.

The inclusion criteria were:
1. Adult patient’s age 17 years and above.
2. All patients with diagnosis of primary open angle glaucoma, uncontrolled with maximal medical therapy and needing filtration surgery.

The exclusion criteria were:
1. Congenital /juvenile glaucoma.
2. Previous intraocular surgeries.
4. All types of lens induced and neovascular glaucoma.
5. Patients who were not willing to give consent of being included into this study.
6. Patients with no follow up.

The patients were followed 15 days after the operation so that the operative inflammation is reduced.

RESULTS

Total 33 eyes of the 23 patients with trabeculectomy were studied. 52% patients were male and 48% were female. Ten patients were having bilateral operations, the rest were having surgery on one eye only. Patient’s demography given in Table I. Out of these 33 cases 24 (73%) eyes were having vertical steepening with the rule astigmatism and the 9 (27%) were having vertical flattening against the rule astigmatism. In the early post operative days the difference was more between the preoperative and postoperative keratometries and the average vertical steepening was 2.25D and flattening was 2.50D. Results are assessed on Statistical Package for Social Studies (SPSS) version 10. P-value in group I (vertical steepening) is 0.000 which is highly significant as it is less than 0.05 and in group II P value is 0.02 which is also significant. Details are given in Table II and III.

<table>
<thead>
<tr>
<th>No of patients</th>
<th>%age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (years (SD) 52 ± 017 yrsMale</td>
<td>12</td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
</tr>
<tr>
<td>Unilateral</td>
<td>13</td>
</tr>
<tr>
<td>Bilateral</td>
<td>10</td>
</tr>
</tbody>
</table>

Table II

<table>
<thead>
<tr>
<th>Stage</th>
<th>Diopters</th>
<th>Mean ± S.D</th>
<th>P – Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-operative</td>
<td>43.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-operative</td>
<td>45.772.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table III

<table>
<thead>
<tr>
<th>Stage</th>
<th>Diopters</th>
<th>Mean ± S.D</th>
<th>P – Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-operative</td>
<td>44.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-operative</td>
<td>41.95</td>
<td>2.50</td>
<td>0.020</td>
</tr>
</tbody>
</table>

DISCUSSION

In our study total 33 cases were included. 72% eyes were having vertical steepening i.e. with the rule astigmatism and the 28% were having vertical flattening i.e. against the rule astigmatism. Our observations closely correlate with the Hugkulstone who in 1991 found similar changes in the vertical corneal radius of curvature following trabeculectomy in 10 patients. Rosen also found that five of eight (62.5%) eyes developed 1.50 to 2.50 diopters of steepening in the 90-degree meridian following trabeculectomy. A study done by Cunliffe IA also discovered that the change in vertical corneal curvature after trabeculectomy is consistent with the with-the-rule change in corneal astigmatism. Claridge in 1995 suggested that there appear to be two broad patterns of topographic variation following trabeculectomy, the most common being a postoperative steepening of the corneal curvature though a smaller number of patients developed a superior corneal flattening.

Liu found that trabeculectomy may cause certain
with-the-rule corneal astigmatism which in most of the cases may decrease as time passes by. Dietze\textsuperscript{7} concluded that by 12 weeks after trabeculectomy, visual acuity returned to preoperative levels in all patients and the corneal topographic changes returned to within 1 diopter of preoperative values in 12 of 13 (92\%) patients. In 2005 S K Law\textsuperscript{6} observed that there is with the rule corneal astigmatism, after trabeculectomy. Our observations are also supported by another study recently conducted by Mehmooda Ashai\textsuperscript{5} in 2007 in Srinagar India. They have observed 87\% with the rule astigmatism and 13\% against the rule.

CONCLUSION

Surgically induced astigmatism is becoming an important issue because it delays visual rehabilitation and exerts a negative effect on the final visual outcome. Hence the effect of the procedure should be explained to the patient before the operation.

REFERENCES:

9. Cunliffe IA , Dalping RB , West J , Longstaff S . A prospective study examining the changes in factors that affect visual acuity following trabeculectomy. Eye 1992 ; 6(Pt 6) : 618-22.
To determine the Diagnostic use of B-Scan in the detection of Vitreoretinal Pathologies in patients with poor Posterior Segment View

Afzal Qadir FCPS¹, Umer Khan FCPS², Zakir Hussain FCPS³
Department of Ophthalmology, Hayatabad Medical Complex, Peshawar (KPK)

ABSTRACT
Objectives: To determine the diagnostic use of B-Scan in the detection of vitreoretinal pathologies in patients with poor posterior segment view.

Material and Methods: The study was conducted in the Department of ophthalmology Hayatabad Medical Complex Peshawar from September 2011 to February 2012. In this study evaluation of over a period of six months, 240 eyes of 240 patients with vitreous opacities and poor retinal visualization were investigated with B-Scan ultrasound. Patients were selected from the retina clinic of the Department of Ophthalmology. The B-Scan machine used was US Scan- 3300

Results: Total 240 scans performed, RR/D 117 eyes, TR/D 8, 91 had vitreous hemorrhage, 22 had endophthalmitis, IOFB in 21 eyes, intraocular tumor in 8 eyes, PVD in 5 eyes, Asteroid hylosis in 5 eyes. Dropped nucleus in 1 eye. Draped IOL in 1 patient, and choroidal detachment 2 eyes. Seven patients had traumatic scleral perforation. Six Patients were diagnosed as cases of PHPV.

Conclusion: B-scan ultrasound is a very useful diagnostic tool in detection and evaluation of vitreo-retinal pathologies in patients with opacities in the vitreous cavity.

Key words: B Scan, Vitreoretinal pathologies.

INTRODUCTION
Ultrasound is an acoustic wave that consists of an oscillation of particles within a medium. Ultrasound was first used in ophthalmology in 1956 by American ophthalmologists Mundt and Hughes.¹ They used A-scan mode to evaluate an intraocular tumor. B-scan was introduced in ophthalmic practice by Baum and Greenwood in 1958.² Both A-scan and B-scan techniques are important for the diagnosis of intraocular diseases. B (Brightness) mode is useful for a better demonstration of the shape and topographic relationship of lesions in the posterior segment.³ B-scan provides cross sectional display of diseased tissues and is valuable in detecting unsuspected posterior segment diseases.⁴ The frequency used in the diagnostic ophthalmic ultrasound for posterior segment is 8-10 MHz. Over the last 30 years ultrasonography has greatly advanced and this has enabled us to study posterior segment of the eye in the presence of opaque media.⁵ The purpose of this study is to evaluate the nature of intraocular pathologies detected by ultrasound examination in patients with vitreous opacity.

MATERIAL AND METHODS
Over a period of six months (September 2011 to February 2012), 240 eyes of 240 patients were selected from the retina clinic of the Department of Ophthalmology at the Hayatabad Medical Complex Peshawar. There was poor visualization of fundus using slit lamp and indirect ophthalmoscope in all the patients due to vitreous opacities. B-scan ultrasound was advised for the evaluation of vitreous opacities and to detect any underlying posterior segment pathology. Patients were explained about the procedure. Topical anaesthetic eye drop was used to achieve ocular surface anesthesia. The B-Scan machine used was US Scan- 3300 (NIDEK). Hydroxypropyl methyl cellulose was used as the coupling material. Patient was kept in supine or seated in comfortable position and the patient was so adjusted that the examiner could see the eye under evaluation and the monitor at the same time. Basic screening was performed initially at high gain (i.e. 80 dB) setting followed by examination under lower sensitivity. Kinetic echography was done by keeping the probe still and asking the patient to move the eyes in different gazes to determine the after movements of membranous structures. Any solid lesion detected was evaluated topographically. Quantitative echography was performed to determine the internal reflectivity of a solid lesion. The clinical and ultrasound findings were recorded in proforma.
RESULTS:
In this study 66 patients (66 eyes) with rhegmatogenous retinal detachment, with vitreous opacities and poor retinal visualization were investigated with B-Scan ultrasound. There were 48 male (72%) and 18 female (30%) patients. Age range was 36–65 (mean 48 years). Eight eyes of eight patients had tractional retinal detachment. Vitreous opacification was due to vitreous hemorrhage in 71 (29.58%) eyes, of 71 patients. Intraocular inflammation (uveitis) in 8 (3.33%) eyes and 22 (9.166%) had diagnosed as endophthalmitis. Dense asteroid hyalosis in 5 (2.08%) eyes. Intraocular foreign bodies were observed in 21 eyes of 21 (8.75%) patients. (Table 1) Posterior vitreous detachment (PVD) in 5 (2.08%) eyes, intraocular tumor in 8 eyes. One eye was observed dropped nucleus; one eye had dropped IOL in vitreous, while 2 eyes had choroidal detachment. 7 patients had traumatic scleral perforation. 6 patients were diagnosed as retinoblastoma. Six Patients were diagnosed as cases of PHPV, Staphyloma, disc coloboma and choroidal thickness were observed one in each case. (Table 2)

DISCUSSION:
Ophthalmic ultrasound has become an indispensable diagnostic tool that has increased our ability to detect and differentiate many ocular and orbital diseases. Echography is indicated whenever opacification of ocular media does not allow the examiner to peep into the posterior segment and the latter is kept in the dark about the possibility of various pathologies. If the surgeon knows about these pathologies preoperatively, he can modify his plan of surgery and can also take

Table I

<table>
<thead>
<tr>
<th>Cases of intraocular inflammation Pathology</th>
<th>No of Eyes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endophthalmitis</td>
<td>22</td>
</tr>
<tr>
<td>IOFB</td>
<td>21</td>
</tr>
<tr>
<td>Uveitis</td>
<td>08</td>
</tr>
<tr>
<td>Dropped nucleus</td>
<td>01</td>
</tr>
<tr>
<td>Choroidal detachment</td>
<td>02</td>
</tr>
<tr>
<td>Traumatic scleral perforation</td>
<td>07</td>
</tr>
<tr>
<td>Total</td>
<td>61</td>
</tr>
</tbody>
</table>

IOFB; IOFB: Intraocular Foreign Bodies

Table II

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No of Eyes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posterior Vitreous Detachment</td>
<td>05</td>
</tr>
<tr>
<td>Rhegmatogenous Retinal Detachment</td>
<td>66</td>
</tr>
<tr>
<td>Tractional Retinal Detachment</td>
<td>08</td>
</tr>
<tr>
<td>Vitreous Hemorrhage only</td>
<td>71</td>
</tr>
<tr>
<td>Intra Ocular Tumor</td>
<td>08</td>
</tr>
<tr>
<td>Persistent hyperplastic primary vitreous</td>
<td>06</td>
</tr>
<tr>
<td>Asteroid hyalosis</td>
<td>05</td>
</tr>
<tr>
<td>Retinoblastoma</td>
<td>06</td>
</tr>
<tr>
<td>Staphyloma</td>
<td>01</td>
</tr>
<tr>
<td>Disc Coloboma</td>
<td>01</td>
</tr>
<tr>
<td>Choroidal thickness</td>
<td>01</td>
</tr>
<tr>
<td>Dropped IOL in vitreous</td>
<td>01</td>
</tr>
<tr>
<td>Total</td>
<td>179</td>
</tr>
</tbody>
</table>

IOL; Intraocular Lens
measure to combat various predictable complications. In this study, 240 eyes of 240 patients with vitreous opacities were examined. In all the cases, vitreous opacities were dense enough to preclude adequate assessment of retina and any underlying pathology.

Vitreous opacification was because of vitreous hemorrhage in 91 eyes, intraocular inflammation in 8 eyes and asteroid hyalosis in five eyes. 22 eyes were diagnosed as endophthalmitis in which 14 were postoperative endophthalmitis and eight were post traumatic endophthalmitis. The distinction between the opacities was clinical as well as echographic. Fresh vitreous hemorrhage appears as dots and short lines on B-scan. The more dense the hemorrhage, the more opacities are seen on B-scan. Organized blood produces larger membranous surfaces on B-scan. Inflammatory cells in vitreous give similar echogenic appearance as fresh vitreous hemorrhage; however, certain feature on B-scan can help differentiate posterior vitreous detachment (PVD) is more extensive in vitreous hemorrhage; inflammatory cells are evenly distributed while vitreous hemorrhage settles inferiorly due to gravity.

In asteroid hyalosis, calcium soaps produce bright echoes on B-scan with clear vitreous gel located between asteroid opacities and retina. Out of 91 eyes with vitreous hemorrhage, 4 eyes showed associated posterior segment pathologies rhegmatogenous RD was detected. It produces a bright continuous folded membrane that inserts into optic disc and/or ora serrata. In contrast PVD produces a smooth membrane that shows low reflectivity as compared to RD. And nine eyes had IOFB with vitreous hemorrhage. Kinetic echography is helpful in differentiating these 2 conditions; in PVD there is very fluid undulating after movement on B-scan, whereas RD exhibits a more tethered and restricted after movement. However there are situations in which the acoustic behavior of PVD is similar to RRD and the distinction may be quite challenging. Peripheral retinal tear was detected with B-scan in 2 eyes; this appears on B-scan as a retinal flap; with a PVD or vitreous strand attached to it. Eight eyes with tractional RD and vitreous hemorrhage were examined. The causes of TRD in our patients were advanced diabetic eye disease in 4 eyes, penetrating ocular trauma in 3 eyes and in 1 eye due to inflammatory processes. Both tent like and table top configurations were observed on B-scan. Whereas tent like TRD is produced by a point like adherence, the table top detachment is the result of a broader vitreoretinal adherence. A thorough echographic examination is very helpful before vitrectomy in eyes with TRD; it demonstrates the safest region to break the posterior hyaloid, allows the surgeon to anticipate areas of vitreoretinal traction and provide reasonable assessment of expected visual prognosis.

In our study, 23 patients had penetrating ocular trauma with vitreous hemorrhage and 16 retained intraocular foreign body. Standardized echography is invaluable in precise localization of IOFB and to determine the extent of intraocular damage, even when a foreign body (FB) has been previously localized with CT scan. Typical metallic FB produces a very bright signal on B-scan that persists at low sensitivity; also there is marked shadowing of ocular and orbital structures just posterior to it. One patient had severe blunt trauma and presented with hemorrhagic chemosis and dense vitreous hemorrhage. B-scan showed RD and features suggestive of posterior scleral rupture i.e. irregular scleral contour and low reflectivity in the area of rupture along with vitreous incarceration and episcleral hemorrhage. Eight patients with intraocular tumor were scanned; the features were consistent with choroidal melanoma in 1 patient i.e. mushroom shape growth showing acoustic hollowness, choroidal excavation and orbital shadowing. Six patients had retinoblastoma, and one patient was referred for fine needle biopsy and for metastatic workup. Endophthalmitis was diagnosed in 22 patients; 14 of these were postoperative eyes, 8 had traumatic endophthalmitis, with corneal ulcer/abscess in anterior chamber full of hypopion.

Ultrasound is useful to determine the severity and extent of inflammation in clinically suspected cases of endophthalmitis. When the presence of infection is questionable from clinical appearance, B-scan may help to differentiate whether the vitreous opacities are
secondary to inflammation or to vitreous hemorrhage, as already discussed. One postoperative patient showed vitreous opacities and membranes along with a dropped nucleus that appeared as an oval spherical mass adhered to the retina or floating in the vitreous cavity. Two postoperative patients with history of choroidal detachment during surgery, large dome shaped membranes, extending from the periphery to the posterior pole along with echogenic shadows of fresh and clotted blood in the supra-choroidal space. Echography is useful in following the course of hemorrhagic choroidal detachment and in determining the appropriate time for drainage.

CONCLUSION:

B-scan ultrasound is very important for demonstrating the nature and extent of abnormalities in eyes with vitreous opacification. It is also useful for monitoring progression of retinal diseases. In eyes with vitreous haze that are being considered for vitrectomy, ultrasonic evaluation helps to diagnose the underlying pathology, to determine the timing of surgery, in optimal placement of vitrectomy instruments and to predict the visual outcome.

REFERENCES:

5. Zafar D, Sajad AM, Qadeer A. Role of B-Scan ultrasonography for posterior segment lesions. JLMHS 2008; 07: 7-12.
Frequency of Hepatitis B & C in patients Undergoing Ocular Surgeries in Bannu District (KPK)

Sanaullah FCPS, MPH1, Saber Mohammad, FCPS2 Nazullah Khan, FCPS3 Awalia Jan FCPS4, Waseem ullah Memon, MCPS, MPH5, Mir Attaullah DCP6

ABSTRACT
Objectives: To know the frequency of Hepatitis B and C viral infection in the patients undergoing different ocular surgeries in district Bannu.
MATERIAL & METHODS
Study design: It was a retrospective study.
SETTING:
Duration of study: It was one year study conducted from March 2011 to March 2012.
Sample size: Sample size was 500 patients.
Results: Five hundred patients were operated for different ocular surgeries at district Bannu. Mean age of the patients was 60 years. 234 (46.8%) were male and 266 (53.2%) were female. Out of them 7 (1.4%) were male and 5 (1.0%) were female positive for HBS antibodies, while HCV antibodies were found in 2 (0.4%) male patients and 6 (1.2%) female patients.
Conclusion: The prevalence rate of Hepatitis B and C antibody in district Bannu is alarming sign not only for the general population but also for the general health care personals. Steps needs to be taken to stop this preventable diseases.

INTRODUCTION
Viral hepatitis also called infectious hepatitis—an inflammation of the liver caused by virus and is a major health problem affecting approximately two billion people worldwide. The hepatitis B virus (HBV) has infected more than 2 billions people and 350 million people are carrier of the virus. Approximately one million people die from hepatitis B, makes it one of the cause of morbidity and mortality1. Hepatitis C virus (HCV) infection is increasing even more rapidly and has occurred in endemic situation in most part of the world, with a prevalence of about 3% world wide.2 Hepatitis C virus infection progresses slowly and carries high risk of chronic liver disease (70-80%) and later liver malignancy.3 The prevalence of hepatitis B and C is also increasing in our country.4 Surgeons and paramedical staff have a high occupational risk of acquiring HBS and HCV from infected patients.5 Due to this occupational risk of disease, we want to carried out and evaluate the presence of HBC and HCV infection in patients underwent cataract surgeries in different operation theatre in Bannu district.

MATERIALS AND METHODS:
The observational study was carried out at district Bannu from March 2011 to March 2012. During this period 500 patients undergoing eye surgery were evaluated for hepatitis B and C antibody. After taking history, examination and investigations patients were screened for HBS and HCV with chromatography (kit) method. The details were recorded on proforma and data was compiled and analyzed for age and sex mean values. Special emphases were put on age, sex, and occupation. All patients of either sex who were operated as elective cases were included in the study.

RESULTS:
In this study, 500 patients who underwent eye surgery at district Bannu were screened for HBS and HCV. There were 234 (46.8%) male and 266 (53.2%) female patients shown in Fig: 1. Mean age of the patients was 60 years. The range of age was 40 to 80 years shown in (Table 1). Total 20 patients were found positive for HBS and HCV. Amongst them 12 were positive for hepatitis B (2.4%) and 8 for hepatitis C (1.6%) shown in Fig 2. Hepatitis B was found in 07 (1.4%) male and 05 (1.0%) female patients. Hepatitis C was predominant in females 6 (1.2%) while it was found in 2 (0.4%) male patients. Both hepatitis B and C were found in 20 (4%) patients. Amongst them 9 (45%) were male and 11 (55%) were females shown in Fig: 3.
DISCUSSION:

The incident of hepatitis B and C has achieved endemic situation in many countries of the world, especially in underdeveloped countries. Pakistan is of no exception, as the disease has been recorded to an alarming level in most parts of the countries especially rural areas, as can be seen from table 1 and 2. In Pakistan a large proportion of the population is already infected with hepatitis B and C with the prevalence of 10% for hepatitis B and 4-7% for hepatitis C. In certain parts especially in the rural areas the percentage of infected individuals is significantly higher than the above quoted figures 6,7. The transmission of virus is through the blood and secretions. Most common source of spread of these infections is through the use of unsterilized syringes or instrument especially dental instruments or unchecked blood transfusion. Other factors involved in the spread of infections are persons who have their arm-pits or face shaved by street barber or those involved in sexual abuse8,9,10.

In this study 2.4% patients had hepatitis B and 1.6% patients had hepatitis C. According to Cloud Hay and his colleagues11 the prevalence of hepatitis C was 11.26% which is higher than our study. Ali and his associates reported 5.1% patients suffering from hepatitis C in their study at Gadap area. The carrier state of HBS Ag is around 10% in different segments of Pakistani people7 which is higher than our study. Study done by Shiekh and his colleagues13 carrier state of HBS Ag was found to be 2.8%. Wies and his co-workers14 reported 35% cases of HCV and 4% cases of HBV in their study of patients operated at John Hopkins. Our study showed that the prevalence of hepatitis is quite low as compared to other studies carried out abroad.

CONCLUSION:

With such a rate of HBV and HCV as reported in our study suggests screening of all the patients who are selected for surgery. At the same time the print and electronic media is required to aware the public about the methods of the spread of the disease to prevent further transmission. It is the prime duty of doctors and paramedical staff to counsel the patients and use ethical practice.

REFERENCES:
4. Khohkar N, Gill ML, Malik GL. General seroprevalence of
hepatitis B and C infections in the populations and surgeons Pak, 2004; 14:534.
ABSTRACT
Objective: To measure the rise of intraocular pressure immediate after Nd: YAG laser in posterior capsulotomy in pseudophakic patients.

Material and method: A total number of 100 patients referred to the laser room of department of ophthalmology, Lady Reading Hospital, Peshawar fulfilling the inclusion and exclusion criteria were included in this study. With Nd: YAG laser about 4mm hole was created in the posterior capsule. Intraocular pressure was measured before and after laser with non-contact air puff tonometer.

Results: Out of 100 patients 69 (69%) were male and 31 (31%) were females. Their mean age was (52 years) ranging from 5 years to 70 years. Sixty three patients had normal or low intraocular pressure, 24% patients had rise of 2 – 3 mm Hg in intraocular pressure. While 13 patients had a significantly raised intraocular pressure of more than 5 mm Hg one hour after YAG laser capsulotomy. The rise in intraocular pressure was noticed in patients after Nd: YAG laser capsulotomy.

Conclusion: IOP rise was noticed, immediately after Nd: YAG laser capsulotomy. Hence it is advisable to start pressure lowering drugs before capsulotomy.

INTRODUCTION
Posterior capsule opacification is the commonest complication of cataract surgery with an incidence of between 10% to 50% by two years postoperatively. It causes reduction in visual acuity and contrast sensitivity by obstructing the view or by scattering the light that is perceived by the patient as glare. Interest has been shown to prevent this visually disabling complication by introducing intraocular lenses of different material and different design or surgical procedure. Daniel Aron Rosa first described the procedure of Nd: YAG laser capsulotomy. Nd: YAG laser is a photodisruptive laser, producing extreme amount of heat of about 10,000 Celsius along with an acoustic shock wave at the site being focused on. It disrupts the tissue and the property is used in ophthalmology to perform YAG laser capsulotomy peripheral iridotomy in glaucoma and to cut vitreous bands.

Standard treatment for posterior capsule opacification consist of opening the posterior capsule using a Neodymium Yttrium-Aluminium-Garnet laser (Nd:YAG laser). Nd: YAG laser is widely available for posterior capsulotomy, and although complications such as transient rise in intraocular pressure, uveitis, retinal detachment, and cystoid macular oedema, intraocular lens damage and IOL subluxation has been reported. The purpose of this study was to record any rise of intraocular pressure immediate after YAG laser capsulotomy.

MATERIAL AND METHODS
This prospective study was conducted in department of ophthalmology PGMI, Lady Reading Hospital Peshawar, Khyber institute of Ophthalmic Medical Sciences from January 2011 to June 2011 one hundred pseudophakic patients with posterior capsularopacification referred from consultant OPD for Nd: YAG laser capsulotomy were included in this study. Patients having other ocular diseases like glaucoma, inflammatory diseases, and who had undergone pars planavitrectomy were excluded from this study.Before capsulotomy all patient had a thorough ophthalmic examination including best corrected visual acuity, slit lamp examination, gonioscopy, and intraocular pressure with non-contact air puff tonometer, the pupil was dilated with 1% tropicamide eye drops. A minimum energy of 3.4mj/shot was used to create a 3 – 4 mm hole in the posterior capsule.

The intraocular pressure was measured 1 hour after laser. A rise in intraocular pressure of more than 5mm Hg post laser capsulotomy was recorded asas having raised intraocular pressure.
RESULT
Out of 100 patients 69 (69%) were male and 31 (31%) were females. Their mean age was (52 years) ranging from 5 years to 70 years. Sixty three patients have normal or low intraocular pressure, 24% patients had rise of 2 – 3 mm Hg in intraocular pressure. While 13 patients had a significantly raised intraocular pressure of more than 5 mm Hg one hour after YAG laser capsulotomy.

DISCUSSION
Cataract is the most common cause of blindness worldwide, posterior capsularopacification (PCO) or secondary cataract is an extremely common cause as well. Opacification of the posterior capsule is the common time related complication of extra-capsular cataract extraction more frequently in children and younger adults. In Pakistan it is possible for about 36% of patients. Posterior capsularopacification has not only medical but social and economic implication over the life of the patients’ family and society as a whole. The incidence of posterior capsularopacification (PCO) has been reported different in different studies. Apple DJ has noted the incidence of PCO up to 50% by the two years postoperatively. While other authors have reported the incidence of PCO up to 43% in five years duration after extra-capsular extraction, due to such high incidence of PCO after cataract surgery different modalities and techniques have been developed and adopted to alter the incidence of the disease (sequaely).

Capsular opacification started from continued viability of lens epithelial cells remaining after removal of the nucleus and cortex. With the recognition of the role of lens epithelial cells in PCO, a wide verity of technique have also been directed to remove residual cell during surgery. The fact that none of these techniques has been utilized as a routine surgical procedure reflect the difficulty in totally removing all lens epithelial cells. As a result of clinical failure of both lens epithelial cells removal and pharmacological intervention to reduce PCO. Emphasis has been shifted towards IOL, its material and design, as a practical solution. Recent work worldwide strongly suggests that lens implant design rather than lens material maybe the more important factor in the prevention of PCO. A recent systematic study review based onCochrane methodology including 26 randomized controlled trials with a follow up of at least 12 months showed that the PCO score was significantly lower with sharp-edged IOL but did not different with 1 piece open lope IOLs.

Neodymium YAG laser has become popular non-invasive technique of creating posterior capsulotomy in both pseudophakic and aphakic eyes with posterior capsularopacification. Nowadays PCO is treated with Nd: YAG laser which is safe and effective as out-patient department procedure. Although Nd: YAG laser capsulotomy is a widespread and popular approach for the treatment of posterior capsule opacification, some complication have been reported such as increase intraocular pressure (IOP), hyphaema, cystoid macular edema, retinal detachment, endophthalmitis, anterior vitreous opacification, posterior sub-laxation of IOL, IOL pitting. A transient rise in IOP after Nd; YAG laser capsulotomy has been well documented.

Although this IOP elevation, which characteristically reaches a peak within the first three postoperative hours, usually resolves without squery, it may lead to visual field loss and or loss of central vision particularly in the eyes with pre-existing glaucomatous damage. In our study of 100 patients we included the rise in intraocular pressure one hour after Nd: YAG laser capsulotomy in eyes free from other pathologies. Among them 69% were male and 31% female while similar study by Rafiq et al 80% of the patient were male and 20% patient were female. While IOP is higher 13% in my study as compare to Richter et al. While IOP is higher 13% in my study as compare to Richter et al.

CONCLUSION:
IOP rise was noticed, immediately after Nd: YAG laser capsulotomy. Hence it is advisable to start pressure lowering drugs before capsulotomy.

REFERENCES
2) Tan CH, Spalton DJ, Arden GB. Comparison of methods to


INTRODUCTION:

Congenital cataract is the most common cause of treatable childhood blindness accounting for 5% to 20% of blindness in children worldwide. The prevalence of blindness from cataract is higher, about 1 to 4 per 10,000 children in developing countries. In the developed world, most of the causes of bilateral congenital cataract is idiopathic and about one third of cases are hereditary, without any systemic diseases. Rare causes of childhood cataracts are metabolic disorders such as galactosemia and hypocalcemia.

Unilateral congenital cataract is generally not associated with systemic disease and is rarely inherited. Rubella virus infection (TORCHES infection) occurring in pregnant women during the first trimester of pregnancy may often result in the development of congenital rubella syndrome of the newborn producing one or more severe congenital defects like congenital cataract and commonly associated with mental retardation. Pediatric cataract is always a challenge for the ophthalmologist. It is not only the surgical management of the cataract but also the post op visual rehabilitation, which is an even bigger challenge. In recent years, lot of advances have been made in the management of pediatric cataracts in terms of surgical methods employed as well as the various means to treat aphakia especially with intraocular lenses. In spite of this, the long term safety of intraocular lenses especially in a child less than one year of age is still uncertain. However these advancements have made it possible to tackle the problem of congenital cataract in a smooth way. In addition to the small size of the child’s eye, decreased scleral rigidity and increased tissue reactivity leading to excessive postoperative inflammation and capsular opacification make pediatric IOL implantation particularly challenging.

MATERIALS AND METHODS:

65 cases of congenital cataract were included in...
this retrospective study. Both the sexes were included between the ages of one month to 11 years. Preoperatively, a detailed history including family history, past visual status and trauma were taken. The workup included thorough systemic and local examination, visual acuity with or without best correction (when possible) was recorded. A complete slit lamp examination or examination under anesthesia (EUA) of the anterior and posterior segment was performed where possible. Posterior segment was assessed by direct and indirect ophthalmoscopy and ultrasonography. All patients gave informed consent. Surgery was performed under general anesthesia. Pupils were dilated with 1% cyclopentolate and 2.5% phenylephrine eye drops preoperatively. All the patients undergoing lens aspiration without IOL implantation had a peripheral iridectomy. Vitrectomy was done in the cases with posterior capsule rupturing and vitreous loss.

RESULTS:

65 patients could be identified from the case notes, and the total number of eyes enrolled in this study was 119 eyes. The number of patients between the age of 2-11 months were 23 (35.38%), 12 were male and 11 were female given in (Figure No, 1) while between 1-11 years, total number of patients were 42 (64.61%), 26 were male and 16 were female. (Figure No, 2). The number of unilateral case were 11(17.8%) in which 7 were male and 4 were female and the number of bilateral cases were 54(83.0%) in which 31 were male and 23 were female shown in (Figure No, 3). In the surgical management, 37 (56.9%) eyes under-went simple lens aspiration with spectacles correction and 27 (42.2%) patients were implanted intraocular lens (IOL) and one patient refused any surgical intervention shown in (Figure No, 4). Post op visual rehabilitation included 37(56.9%) eyes treated with spectacles while 27(42.2%) eyes were treated with intraocular lenses implantation (Figure No, 5).

DISCUSSION:

There are an estimated 200,000 children blind from cataract worldwide; 20,000 to 40,000 children with congenital cataracts are born each year. In the developing world there is a need to improve early detection and referral services and to establish centers with expertise in the assessment, surgical treatment,
and long term management of the child with cataract. If we compare the etiology of cataracts between industrialized and developing countries, there is no difference of etiology in case of bilateral cataracts. However in case of unilateral cataracts, it is mainly idiopathic in industrialized countries whereas in developing countries trauma is the leading cause of unilateral cataracts. In our study, 23 patients were between the age of 2-11 months and 42 patients were between 1-11 years of age. In 23 patients of age 2-11 months, 12 were male and 11 were female. In 42 patients of age 1-11 years, 26 were male and 16 were female. In our study, the number of bilateral and unilateral cataract were 54 (83%) and 11 (17.8%) respectively, which is similar to the study conducted by Ondracek O and Lokaj M. in 2003 in which 55 were bilateral and 53 were unilateral in 108 patients.

In our study, the maximum number of cases were developmental 37 (56.9%) followed congenital 28 (43.07%) which is similar, studied by Iqbal Z et al. in which 60.30% were developmental and 13.70% were congenital in 110 cases of pediatric cataracts. A child born with cataracts has to fight both aphakia as well as amblyopia. Timing is very crucial for the management of paediatric cataract.

In our study the protocol was to implant IOL at the age of 2 years or above which is different from studied by Sidky M.A et al in which they implanted IOL under 2 years of age. Congenital cataract management depend on the density of lens opacity and must be removed as early as possible in order to develop binocular vision. It is now about four decades when Scheie first introduced the surgical method of lens aspiration. It is still performed nowadays, however newer surgical techniques are practiced especially to retard the most dreaded post-op complication of posterior capsule opacification in children. Some of these techniques with posterior continued curvilinear capsulorhexis (PCCC), with or without anterior vitrectomy.

In our study 37 (56.9%) children eyes underwent plain lens aspiration with peripheral iridectomy, 27 (42.2%) underwent lens aspiration with IOL implantation while 01 (1.53%) patient refused surgery. For the post-op visual rehabilitation, basically the ophthalmologist has to choose between spectacles, contact lenses and IOL’s. Spectacles are usually used for bilateral aphakia. In case of IOL, a lot of work is being done especially in terms of material, which in turn hinders the process of PCO. IOL implantation in an infant’s eye is further confounded by the rapid growth of the eye during the first two years of life. To avoid the complication of induced myopia in children which might warrant an IOL exchange in adult life, it is better to under correct a child younger than 2 years by 20% while children between 2 and 8 years of age should be under corrected by 10%.

Out of the 65 patient’s eyes, 37 (56.9%) were treated with spectacles, 27 (42.2%) had IOL’s implantation while none of them were given contact lens. Once the ophthalmologist had treated the cataract and rehabilitated the child in terms of vision, he still has to overcome the obstacles of post-op complications which range from posterior capsule opacification (PCO), papillary membrane, aphakic glaucoma, strabismus, uveitis, IOL decentration, retinal detachment, and cystoid macular oedema. As this was a retrospective study we had not followed the patients for the complications.

CONCLUSION:

Early detection and surgical treatment followed by visual rehabilitation is very important to prevent amblyopia. Congenital cataract is the most treatable cause of childhood blindness. The importance of regular follow-ups must be stressed, with assessment and treatment of posterior capsule opacification, glaucoma, refractive errors and amblyopia undertaken if good visual outcome is to be achieved.

REFERENCES

20. Francois J. Late result of congenital cataract surgery, Ophthalmology 1979; 86:1586.
Postoperative Wound Leakage in Sutured & Sutureless Corneal Incisions after Phacoemulsification and Rigid IOL Implantation*

Sohail Zia FCPS¹, Yasir Iqbal FCPS²

ABSTRACT

Background: Phacoemulsification is the gold standard cataract surgery these days. Foldable IOL is an expensive option in our settings. Rigid IOL can be implanted after extending the incision. The purpose of this study is to compare the rate of wound leakage in two groups who underwent phacoemulsification with rigid IOL, sutured and unsutured corneal incision. The study would be important in decision making regarding the safety of the two techniques.

Material and Methods: It was a non-randomized clinical intervention study conducted from January 2011 to December 2011 in REDO Eye Hospital, Rawalpindi. 75 patients in group A underwent phacoemulsification with sutured corneal incision and 75 patients in group B underwent phacoemulsification with sutureless corneal incision. Rigid IOL was implanted in all cases. Rate of wound leakage was noted in both groups at 24 hours and one week postoperatively.

Results: Only one case in group B showed wound leakage at 24 hours postoperatively. No case of wound leakage was seen in group A. Difference was statistically insignificant.

Conclusion: Both sutured and sutureless corneal incisions after phacoemulsification with rigid IOL implantation are safe techniques regarding wound leakage. Sutureless corneal incision is less time consuming and cost effective. Sutured corneal incision provides no additional benefit.

INTRODUCTION

Cataract is the world leading cause of avoidable blindness affecting about 20 million people worldwide¹. In Pakistan 52% of total blindness is due to cataract². Cataract surgery is the leading ocular surgery performed these days³.

Many techniques are employed for cataract surgery including conventional extracapsular cataract extraction and phacoemulsification⁴. Phacoemulsification is the gold standard treatment and is almost universally used today⁵. Phacoemulsification provides minimal post operative complications and swift visual rehabilitation⁶. These advantages are mainly due to small incision usually about 3.2 mm.

In developed countries phacoemulsification is followed by foldable Intra Ocular Lens (IOL) but in developing countries like ours foldable IOL is not a common practice in public sector due its high cost⁷. Therefore rigid PMMA IOL is implanted after enlarging the initial incision to 5.5mm. Wound closure either by simple hydration of incision or by applying a suture has been reported in studies⁸⁹. The purpose of applying suture is to prevent wound leak leakage which can lead to endophthalmitis and other serious complications⁸. In this study we report the findings of rate of post operative wound leaks in patients undergoing phacoemulsification with rigid PMMA IOL with suture and sutureless wound closure.

MATERIAL AND METHODS

This clinical interventional study with convenience (non-probability) sampling was conducted at Redo Eye Hospital, Rawalpindi from Jan 2011 to Dec 2011. The patients were first allotted the hospital registration number before proceeding for examination. Complete eye examination was performed including Snellen’s best corrected visual acuity, intraocular pressure measurement by Goldmann’s applanation tonometry, slit-lamp biomicroscopy, indirect ophthalmoscopy and biometry for IOL power calculation.

The study procedure and its aim were explained to all the patients before beginning the treatment and they had to sign an informed written consent form. 75 patients were selected for study in each group. Eyes with senile uncomplicated cataracts were selected. Dark brown cataracts were excluded because of a likelihood of converting to ECCE or prolonged phacoemulsification time. All eyes underwent uncomplicated phacoemulsification surgery with 3.25 mm superior corneal incision. After completion of phacoemulsification, incision was enlarged to 5.5 mm and a 5.5mm rigid PMMA IOL was implanted in the capsular bag. Wound closure in Group A was done with...
a single 10/0 monofilament nylon suture and in Group B without suture with stromal hydration only.

Patients were followed up at 24 hours and 1 week postoperatively. Seidel’s test was performed at slit lamp for the presence of wound leakage. Seidel’s test includes application of a sterilized fluorescein strip moistened with topical anesthetic into the conjunctival sac and then examination of the wound using a cobalt blue filter. If fluid appears to flow from the wound, that indicates wound leakage.

The data were entered and analyzed using SPSS software version 13. The quantitative variables like age, was also presented as mean and standard deviation. Chi-square test was used to compare the rates of wound leak. A $p$ value of $\leq 0.005$ was taken as significant.

**RESULTS**

The study was completed in one year. Total of 150 patients, 34 (45%) male and female 41(54%) underwent surgery with sutured corneal incision (group A) and 39(52%) men and 36(48%) female underwent surgery without suture in (group B). Mean ages of patients were 61.2 years and 63.3 years in groups A and B, respectively. Following surgery, none of the patients in group A showed wound leakage at 24 hours and 1 week whereas only one case in group B showed leakage at 24 hours which was a sutured on the same day. Statistical test was applied. However, the difference was not statistically significant ($p = 0.65$).

**DISCUSSION**

After thorough literature review we conclude that this is the first study in Pakistan to compare the rates of postoperative wound leakage in patients undergoing phacoemulsification cataract surgery with sutured and sutureless corneal incisions, with rigid PMMA IOL. We found that there were no statistically significant differences in the rates of postoperative wound leakage in the two groups at 24 hours and one week. A study has been conducted by Chaudhary TA which compares the rate of wound leakage after phacoemulsification with foldable IOL. Another study done by Iftikhar S. Kiani SA, showed wound leakage in two cases of phacoemulsification with implantation of rigid 6mm IOL without sutures. Our results are comparable with results shown in above mentioned studies.

As foldable IOL are expensive option in our settings, our study may have significant implications. For example, sutureless surgery is less time-consuming and cost effective. Surgically induced astigmatism, which increased with suture can be avoided, providing better and early uncorrected visual rehabilitation.

**CONCLUSION**

Despite of small sample size and non-randomization we conclude that our results are encouraging for opting sutureless surgery as sutured surgery gives no additional benefit. Multicenter studies with larger sample size are recommended.

**REFERENCES**

Is Glaucoma a Neurodegenerative Disease?
Could it be a mechanical problem and not a neurodegenerative disease?

Syed S. Hasnain M.D.
General Ophthalmologist, California & Abbas S. Hasnain

Unlikely, it is widely published that glaucoma may be a neurodegenerative disease such as Alzheimer’s, Parkinson’s, and ALS\(^1\)\(^-\)\(^2\). The reason, glaucoma is considered a neurodegenerative disease is due to unexplained death of neurons in the lateral geniculate nucleus (LGN) and of the neurons in the visual cortex occurring concurrently with the death of the retinal ganglion cells (RGCs). Based upon the forthcoming arguments, this article will attempt to demonstrate glaucoma not to be a disease with such neuro-degenerative pathophysiology.

It is an established fact in glaucoma, that the arcuate and peripheral vision fibers are selectively destroyed first, whereas the central vision fibers remain until the end-stage of the disease. In other words, the RCGs are being destroyed in a specific sequence and in an orderly fashion in glaucoma.

On the other hand, in neurodegenerative diseases like Parkinson’s, Alzheimer’s or ALS, the degeneration of the neurons occurs randomly and haphazardly—not following any specific sequence as occurring in glaucoma. If glaucoma is a neurodegenerative disease, we face another dilemma: why, in glaucoma, does neurodegeneration always start precisely first with those RGCs which serve the peripheral vision and not occur randomly? The random destruction of the neurons is characteristic of a neurodegenerative disease, as a result the course of such a disease varies in each individual. Therefore, this distinction alone should keep glaucoma distanced from the group of neurodegenerative diseases.

I would like to mention briefly about history of term ‘cupping’ of the optic disc which seems to be the core problem in glaucoma. The term cupping was given by Heinrich Muller in 1856 and endorsed by the majority of the ophthalmologists of the time. It was believed that the optic disc was being cupped or excavated by the direct mechanical pressure of high IOP. However, there was one dissenter. In 1864, Dr. Dixon disagreed that cupping was caused by direct effect of raised IOP. He argued that if the mechanical force of high IOP was strong enough to cause cupping of the disc, then the same force should have also displaced the lens and iris forward as well. But his opinion was turned down by another prominent ophthalmologist, Sir William Bowman, and since then the term cupping has become synonymous with glaucoma. One hundred years later (1960s), we introduced the term ‘cup-to-disc ratio’ which gave further credence to cupping theory.

I believe the term cupping was mistakenly given 150 years ago which has misguided and put us on a wrong path. We are deeply indoctrinated with the ‘cupping disc’ paradigm and unless we replace it, we may never discover the true pathogenesis of glaucoma. If cupping is indeed occurring, then I salute those who gave us this term by using their rudimentary ophthalmoscope (without electricity/battery) in the early stages of ophthalmology.

Returning to the subject of Neuro-degeneration: why are the RGCs and neurons of the LGN being destroyed simultaneously in glaucoma? In order to answer this question, we have to first replace the present cupping disc paradigm of glaucoma with a ‘sinking disc’ paradigm. The phenomenon of cupping implies that the problem starts from the center of the optic disc and extends peripherally. As we know, the central vision fibers originate closer to the disc and lie superficial (closer to vitreous) and exit from the central part of the disc. In contrast, the peripheral vision fibers originate from the distant retina or farther from the optic disc and lie deeper (closer to sclera) and exit closer to
the edge of the scleral opening. If cupping was occurring, then the central vision fibers should be destroyed first, and peripheral vision fibers last, but the opposite is occurring in glaucoma.

Now the further question arises as to why the peripheral fibers being destroyed first in glaucoma. To answer this, I hypothesize that the optic disc may be sinking \(^3, 4\), not cupping in glaucoma. Due to sinking of the disc, the prelaminar nerve fibers, prior to their entry in the lamina, are being stretched as one end is attached to the RGC and the other end anchored in the sinking optic disc and thus ultimately severed against the scleral edge. Since the peripheral nerve fibers lie deeper and exit closer to the scleral edge, the peripheral fibers would be the first to be affected and severed whereas the central fibers later if sinking of the disc is occurring. This is exactly what is revealed by glaucomatous visual fields. Furthermore, severing of the axons would result in retrograde degeneration of the RGC and Wallerian degeneration of the distal axon leading to the death of the neurons of the LGN. Wallerian degeneration may explain the death of the neurons in the LGN and also in the visual cortex. Sinking of the disc would become self-propagated due to progressive severance of 360 degrees of nerve fibers which also provide anchorage to the disc as roots do to a tree. The process of sinking disc would continue until all the nerve fibers are cut against the scleral edge.

\textit{Since I have proposed that nerve fibers are being severed, not atrophied in glaucoma: Do we have any evidence for it?} Before we discuss this issue I would like to define the atrophy of an organ. Atrophy is defined as an abnormal decrease in size or mass of a developed organ or a tissue due to disease. Atrophic organs though shrunk in mass are normally visible and don’t disappear unless the involved tissue is very small and has atrophied to microscopic level. On the other hand, severance is simply the cutting of an organ or tissue leading to its immediate total disappearance. An example would be whether the leg is atrophied due to stroke or severed (amputated) due to gangrene. It will be important to keep this distinction in mind for ensuing discussion whether the nerve fibers are being atrophied or severed in glaucoma.

Returning to the evidence for severing of the nerve fiber: Although we may never see the actual process of severing of the nerve fibers, we may conclude this by deductive reasoning of the events taking place in glaucomatous disc. The continuous severing of the nerve fibers is supported by the phenomenon of progressive thinning of the RNFL as observed on optical coherence tomography (OCT). The end-stage histology of glaucomatous disc resembles an empty bean-pot. In studying the histology of the bean-pot; its opening appears to be that of scleral opening; its dilated belly is formed by dura mater and its base composed of necrotic tissue. Interestingly, the bean-pot appears quite huge compared to the size of original disc. Is this large bean-pot really a deeply cupped disc (lamina)? Is the lamina so distensible that its excavation has assumed the shape of a large bean-pot? If so, then the lamina should be forming the walls of the bean-pot, if not, then where did the lamina and atrophied nerve fibers disappear? Why don’t we see atrophied nerve fibers in bean-pot as we see in the histology of optic atrophy such as due to multiple sclerosis? I believe the bean-pot is not a deeply cupped disc. The empty bean-pot appears to be the left over area which once housed the disc. Most likely, the lamina is lying at the bottom after all the nerve fibers have been cut and disappeared. Thus, the end-stage glaucomatous disc resembling a bean-pot can only be explained by severance, not due to atrophy of the nerve fibers.

In studying the optic atrophy caused by multiple sclerosis or other conditions, the atrophic discs in these conditions are flat (non-excavated). There is neither sloping/kinking of the blood vessels at the disc margin nor excavation of the disc indicating that flat atrophic discs are not associated with sinking. Since these discs are not sinking, there is no severing of the nerve fibers and thus no excavation is occurring in these conditions. The histology of the flat disc atrophy reveals shrunken and collapsed nerve fibers, but no empty bean-pot as in glaucoma. Therefore, histologically, flat disc atrophy and glaucomatous disc are distinctly different. In conclusion, the nerve fibers are being atrophied in flat disc atrophy whereas the nerve fibers are severed in glaucomatous disc.

\textit{Regarding arcuate field defects: How is it possible} that raised IOP or neurodegeneration or any other pathology would cause the degeneration only of the superior and inferior arcuate fibers or their RGCs solely, leaving others unscathed in the early stages of glaucoma? The severing, not atrophy, of the nerve fibers may explain the sharply defined arcuate field defects occurring in the early stages of glaucoma. Due to inherent temporal tilt of the optic disc, the entire group of temporal fibers (macular, sup., and inf. arcuate) are being stretched and severed. However, the superior and inferior arcuate fibers being fewer in number compared to the macular fibers will be depleted earlier, resulting in arcuate field defects/ring scotoma. The wedge shaped defects in retina which sometime we see in glaucoma patients are empty spaces created by the severance and thus disappearance of the arcuate nerve fibers, not due to their atrophy. We do not observe such empty gaps in flat disc atrophy conditions such as due to multiple sclerosis and other conditions.
The vertical enlargement of the physiological cup may be due to severance and depletion of the sup. and inf. arcuate fibers which occurs in early stages of glaucoma. The enlarged vertical cup/disc ratio may not be a risk factor but may be representing cases in which glaucoma has already been initiated. Otherwise, how do we explain that vertical, and not the horizontal cup/disc ratio, is a risk factor for glaucoma? Severing of the macular fibers occurring concurrently with sup. and inf. arcuate fibers from the very early stages of glaucoma may explain the thinning of the macular ganglion cell complex as observed on OCT. There are two events which appear to be taking place in glaucoma. First, the sinking of the disc, second, the severing of the nerve fibers as a result of sinking disc, the severance of the nerve fibers and excavation of the disc are unique features of glaucoma. In view of the above rationale, chronic glaucoma may not be an optic disc neuropathy but an optic disc axotomy.

So, do we have any scientific evidence of the Sinking Disc? I believe we do.

First, the photographs of the glaucomatous optic discs vividly reveal sloping and kinking of the blood vessels at the disc margin prior to any change in the contour of the physiological cup. This suggests that the optic disc may be sinking, not cupping in glaucoma. The physiological cup may not be truly enlarging, but instead, disintegrating due to severance of the nerve fibers. Second, the new enhanced imaging technique of the optic disc (EDI-SD-OCT) has enabled us to visualize the deeper structures in the scleral canal well beyond the entire width of the lamina cribrosa which was previously not possible with standard SD-OCT. Therefore, EDI technique has opened a new chapter and provided us with very valuable information of the glaucomatous disc. EDI of the glaucomatous optic disc in vivo has shown the posterior migration of the lamina cribrosa from the very early stages of glaucoma as far back as pia mater or in other words total sliding outward of the lamina from the scleral opening. This is very significant discovery as it suggests that lamina (optic disc) is detachable from the scleral wall and is able to slide posteriorly (sink) in the scleral canal. If the lamina is detachable from the scleral wall, then how can a loose and rigid lamina cribrosa also become cupped at the same time? EDI findings support the phenomenon of sinking, not cupping of the disc. If true, then chronic glaucoma may be a mechanical problem, a herniation of the disc, not a neurodegenerative disease.

REFERENCES:
4. Hasnain SS. Scleral edge, not optic disc or retina is the primary site of injury in chronic glaucoma. Medical Hypothesis 2006; 67(6);1320-1325
Glaucoma may Involve the entire Visual Pathway, not just the Eye

Elma Chang, MD, & Jeffrey Goldberg, MD, PhD,  
Bascom Palmer Eye Institute  
University of Miami Miller School of Medicine, Florida USA.  
Prof. Robert Weinreb, MD,  
Chairman, Department of Ophthalmology  
Director, Shiley Eye Center, University of California, San Diego, USA.  
Syed S. Hasnain M.D.  
General Ophthalmologist, California, USA  
Edited by: Dr. Rashad Qamar Bahawalpur (on line)

Glaucoma, long held to be a disease primarily of elevated intraocular pressure, in reality may be a disease primarily of neuro-degeneration. In an article published online February 18 in Ophthalmology, Elma Chang, present a view of glaucoma focused on the degeneration of retinal ganglion cells (RGCs) and their axons in the optic nerve, with an eye toward potential neuroprotective, neuroregenerative, and neuro-enhancing strategies.

**Dr. Elma Chang**

All glaucoma treatments to date have been aimed at lowering the risk factor of elevated intraocular pressure, which works well in most patients, especially when the diagnosis is made early in the disease. However, Dr. Goldberg expressed “Fundamentally, the disease isn’t the pressure. It’s the susceptibility to the pressure, and that’s what we don’t understand.” For example, one patient may get into trouble at a given pressure, but another will not. “With progress in understanding that, we can bring what we’ve learned into new treatments that have nothing to do with the pressure, but have something to do with the underlying susceptibility,” Dr. Goldberg predicted.

There are myriad pathophysiologic mechanisms to explore, including glutamate excitotoxicity, reactive oxygen species, vascular effects and ischemia, defective axonal transport, glial dysfunction, loss of neurotrophic factors, cell survival, and apoptotic mechanisms. Unraveling these intertwined factors may lead to therapies that provide neuroprotection, neuro-enhancement (improved functioning of neurons), and even neuroregeneration.

**Mechanisms of Retinal Ganglion Cells (RGC) Damage and Death:**

In addition to the observable structural damage at the optic nerve head, glaucoma leads to changes in the central visual pathway from the retina to the brain’s lateral geniculate nucleus and the visual cortex. The primary lesion is found in the axons in the optic nerve. “It may then activate additional degeneration processes in the retina and in the brain, but the progression of the disease has to be happening in the optic nerve head,” Dr. Goldberg explained. Therefore, the spread of RGC damage does not propagate in the retina, but occurs according to the distribution of RGC axons in the optic nerve. Adjacent RGC cell bodies in the retina may thus have different fates.

The authors discussed several mechanisms by which RGC cells may die in glaucoma. For example, acute and chronic ischemia from vasospasm, defective vascular regulation, or microvascular compression at the lamina cribrosa may limit perfusion of the optic nerve head, resulting in metabolic imbalances and oxidative stress. Treatments including antioxidants and anti-vasospastic drugs such as calcium channel blockers have been studied.

Another possibility is that excite-toxicity from compounds such as glutamate released from dying cells may activate N-methyl-D-aspartate (NMDA)-sensitive glutamate channels, causing deleterious rises in intracellular calcium as well as other harmful pathways in adjacent neurons or other functionally supportive cells. Wherever the harm occurs, bystander RGCs ultimately take the hit.

Finally, increased intraocular pressure that is mechanically deforming the optic nerve head or causing metabolic disruptions may lead to defective axonal transport. “Axonal cargoes” normally shuttle up and down the axon. These include neurotrophic survival...
factors and growth signals, such as brain-derived neurotrophic factor. RGCs may also become less responsive to these signals once they are injured, and endoplasmic reticulum stress may occur from abnormally folded proteins resulting from other metabolic defects. Whatever the pathophysiologic insults to the RGCs, their final common pathway is apoptosis: programmed cell death with degradation of intracellular components and eventual phagocytic clean-up. Better understanding of these processes may therefore lead to anti-apoptotic therapies “independent of what the initiating factors are,” Dr. Goldberg predicted.

**Pressure to find Treatments not focused on Pressure:**

**Dr. Jeffrey Goldberg**

Dr. Goldberg said he is focusing on translating knowledge into new treatment approaches “that don’t have anything to do with pressure but, rather,...with keeping the cells in the eye and optic nerve functioning at full capacity and giving them a boost and protecting them from dying.” In this regard, treatments can generally be considered neuroprotective, neuroregenerative, and neuro-enhancing.

During development, the retina and optic nerve are an outgrowth of the brain, so these organs share many properties with the rest of the central nervous system, such as a lack of a regenerative response under normal circumstances. “We know fundamentally that [glaucoma is] a neurodegeneration like the rest of the neurodegenerative diseases. It stretches across multiple parts of the brain,” Dr. Goldberg said. Therefore, many approaches currently used in other neurodegenerative conditions may also have potential in glaucoma.

Neuroprotection focuses on preventing the death of neurons and maintaining their function. One example is the use of *memantine*, which is approved for the treatment of the symptoms of Alzheimer’s disease. Memantine is an NMDA antagonist and blocks glutamate excitotoxicity, and animal models have shown that it protects against RGC loss. In a clinical trial in glaucoma, however, it failed to meet its primary efficacy endpoint, the authors note. Other approaches have targeted alpha-adrenergic receptors, inhibition of nitric oxide synthesis, immune modulation, and the use of traditional neurotrophic factors. Various methods of the inhibition of caspases, enzymes that mediate apoptosis, are in clinical trials.

Another potential therapy, optic nerve axon regeneration, aims at remediating long-standing insults to the nerve. Glial cells release molecules that stop RGC axons from growing, and inhibiting these signals is one approach to regeneration. Targeted gene therapy, including modulating transcription factors, is another. Many growth control pathways are potential targets for modulation by genetic, immune, small molecule, and electrical means. Small surgical manipulations may stimulate the release of prosurvival and progrowth factors. Coaxing stem cells to differentiate into RGCs and make proper connections may be a long way off, but in the nearer term, they may hold promise as sources of beneficial chemical mediators.

Neuroenhancement may be a more realistic goal in the short run compared with neuro-regeneration. Neuroenhancement in glaucoma refers to short-term improvements in RGC function, similar to the effects of acetyl cholinesterase inhibitors and memantine in Alzheimer’s disease. Somewhere between cell injury and cell death, there may be opportunity to improve cell function. Electrophysiologic testing has already shown reversible dysfunction after acute lowering of intraocular pressure in glaucoma, especially early in the disease.

Beyond pressure-lowering treatments, neurotrophic factors may improve RGC function. Small molecules involved in the production of membrane lipids have shown some positive effects. Electrical stimulation may be another way to protect RGCs and enhance their function. The RGCs die if their electrical activity is blocked with tetrodotoxin, but electrical activity enhances RGC survival both in vitro and in vivo. A contact lens electrode has promoted RGC survival after optic nerve injury in an animal model.

**The Barrier for Testing**

A large remaining challenge is how to test new therapies. At this time, the second endpoints that the US Food and Drug Administration will accept for glaucoma therapy trials are the lowering of intraocular pressure and visual field testing. “Glaucoma tends to be a slow neurodegeneration,” Dr. Goldberg noted, and half of RGCs may be lost before there are changes in visual field testing, which is a relatively insensitive endpoint.

Therefore, a major area of research is finding and defining other biomarkers of disease progression “to give us outcomes that can be measured in a shorter term, and allow these trials to proceed in a more realistic and affordable fashion,” he said. Some possibilities are physiologic measures such as pattern electroretinograms and structural measurement techniques such as retinal stereo photography, confocal scanning laser tomography, scanning laser polarimetry, and optical coherence tomography. These modalities are all more objective than visual field testing, but even with them, it may take years to confirm the efficacy of candidate neuroprotective drugs.
Showing neuroenhancement may be something less of a challenge. “If we have a drug that acutely improves visual function, which never happens in the natural course of glaucoma, it might be something that we could measure very quickly and easily in patients, which would facilitate bringing treatments to clinical use”.

Given the time frame and the barriers to clinical testing, the great variety of possible pathophysiologic mechanisms, and the wide array of potential targets and means of hitting them, Dr. Goldberg says there is still a message of hope in viewing glaucoma as a susceptibility of RGCs to neurodegeneration. “We’re going to wait to see when the dust settles which if any of these new approaches ends up working and really helping patients”. “But we’re starting to realize some of the hope that a better understanding of the disease can lead us to new therapies.”

Prof. Robert Weinreb.

He extended the discussion beyond RGCs, saying that the damage seen in glaucoma reaches into the visual pathways of the brain — a subject that he has been investigating for 15 years. “the axons are dying, then it’s likely that the cells that they connect to might also be deprived of electrical and chemical signals and would not be healthy”. His research in non human primates found loss of neurons in the visual pathway in the brainstem and in the visual cortex.

“This could potentially be a problem with neuroprotection, too”. “It could potentially be another barrier because you might protect the retinal ganglion cells, but if the neurodegenerative process has already been ongoing, by protecting the ganglion cells or even regrowing the ganglion cells you might not be affecting the relay neurons, the neurons that are within the central visual pathways.” He cautioned that this line of reasoning is still speculative, but that it brings up an issue of whether one could restore vision with an eye drop or an intravitreal injection if there is secondary neurodegeneration that is already occurring in the visual pathways. “Is it possible you might need a pill that influences the neurons in the eye, as well as in the entire visual pathway?” he asked.

Going even further, Dr. Weinreb stated that glaucoma is not just a disease of the eye but also of the central nervous system. With 60 to 80 million patients worldwide, “you can make the case that it’s probably the most prevalent neurodegenerative disease of all,” he said, and although elevated intraocular pressure may lead to glaucoma, “It’s entirely plausible to me that there’s a subset of glaucomas where the initiation might be somewhere else in the visual pathway,” which is a controversial and speculative point, he admitted.

He lauded Dr. Goldberg for talking about glaucoma as a collection of conditions, rather than a single disease or phenotype, “but it appears to be a large group of different conditions with a final common pathway that has a phenotype with characteristic changes” in the optic nerve and the visual field.

Whereas Dr. Goldberg pinpointed the RGCs as a central target in glaucoma, Dr. Weinreb said surrounding cell types, such as astrocytes and retinal amacrine cells, also probably have a role, “and there are people who have hypothesized that the primary damage might be to those cells, and then the retinal ganglion cell is a bystander that gets injured in the course of the primary cell getting injured.”

Dr. S.S. Hasnain

Researchers have been speculating about glaucoma, being a neurodegenerative disease for a long time and some have even suggested that glaucoma starts in the midbrain. In my humble opinion we have failed in understanding glaucoma because we are deeply embedded in wrong paradigm of “cupping disc” which was mistakenly given 150 years ago. The term “cupping” was given by Heinrich Muller in 1856 (Duke-Elder) and since then the term cupping has become synonymous with glaucoma. I believe, unless we abandon the ‘cupping disc’ paradigm we may never discover the true pathogenesis of glaucoma. If ‘cupping’ is indeed taking place, then I salute those who gave us the term ‘cupping’ by using their rudimentary ophthalmoscope devoid of electricity in the early stages of ophthalmology.

Interestingly, even though the researchers are talking about true pathogenesis of glaucoma being a neurodegenerative disease, they still don’t seem to abandon the terms “cupping” and cup/disc ratio. In my response in the article “Is glaucoma a neurodegenerative disease” you may agree with my hypothesis that chronic glaucoma may not be an optic disc neuropathy but an optic disc axotomy with a strong scientific evidence of sinking disc, thus discovering the true pathogenesis and correct treatment of glaucoma.
**Letter to the Editor**

Dear Prof. Durrani,

With great interest I have read the latest issue of Ophthalmology Update covering a wide spectrum of topics, including central serious chorio-retinopathy, clinical usage of Povidone-iodine. I personally use 1.25% solution for Bacterial Keratitis. I am very impressed by your hard work as an Editor-in-Chief to keep the high level of publications, and really the contents of Journal entirely reflects its name. I am very impressed by your Editorial on the Over-indulgence of Computer. You have highlighted extremely updated topic. I agree with you entirely.

You have also highlighted the cutting edge of modern reality and evidenced the current problem. One more time reading your journal confirms my feeling when I have acquainted with it that the contents of journal entirely reflects the largest scope of problems. I imagine your hard and fruitful work to keep this high level.

Thank you very much for your kind words and presentation of my work to the readers. Hoping that my second paper also meets your requirements.

May I take this opportunity of wishing you all the very best and prosperity in all spheres of your activity including exciting scientific journal under your Editorship.

I have just finished my second paper and as I promised I am sending it to you hoping that it meets your requirements, reflecting the cutting edge achievements in ophthalmology, that is why my new paper contains the latest findings on the matter. Wising you further fruitful work, prosperity and all the very best, with warmest regards.

Prof. Marianne Shahsuvrayan  
MD, Ph.D, D.Sc  
Professor of Ophthalmology  
Republic of Armenia

---

**Dear Prof. Durrani**

I really appreciate the new crisp Ophthalmology Update copy, handed over to me by a drug company (Jan-March’2012 issue). I had seen previous issues and have always appreciated. I have now, seen this new type of format of big size for the first time. The articles which I saw are of really good quality. I pay my heartiest congratulations to you and your team especially Dr. Jahanzeb Durrani for this achievement. I fully understand the amount of hard work it needs to keep up the standard. Also I must update about myself. As you know CPSP introduced its second fellowship in Vitreo-retinal surgery and I am the first candidate to pass this fellowship in VR in December 2011. It was a really hard task. Allah, The Beneficial helped me to pass this. I thank you for sharing the scientific material with the Ophthalmic community by publishing this journal.

Dr. Kashif Iqbal, FCPS FRCS.(Ed)  
Fellowship in Vitreoretinal Ophthalmology (CPSP)  
Consultant Ophthalmologist LRBT Lahore

---

**Dear Dr. Kahif Iqbal!**

Please accept heartiest congratulations on successfully completing the Fellowship in Vitreo-retinal surgery. We do not have many V-R surgeons in the country and it is highly creditable of you to be the one to qualify the examination with flying colors. It certainly speaks volumes of your professional dedication. May Allah bless you enough strength and vigor to continue serving the profession and ameliorating the ailing humanity to your best. Amin! The management of Ophthalmology Update especially Dr. Jahanzeb joins me in congratulating you on your creditable achievement……. Chief Editor)

---
To

Prof. Dr. Nadeem Qureshi, FCPS
Head of Vitreo-Retinal Unit,
Al-Shifa Trust Eye Hospital,
RAWALPINDI

CONGRATULATIONS

My Dear Prof. Nadeem,

Please accept heartiest congratulations from the management and editorial staff of Ophthalmology Update on the award of a highest and prestigious scientific award of gold medal by the Ophthalmological Society of Pakistan, as an outstanding Vitreo-Retinal Surgeon. You have, indeed, a brilliant record of academic eminence in the pursuit of knowledge in your field which speaks volumes of your dedication and devotion to achieve professional excellence and a prestigious place in the comity of venerated academicians.

May Allah bless you enough strength and vigor to continue serving the profession and ameliorating the sufferings of ailing humanity to your best. Amin! wishes the happiest moments in future life.

Prof. Dr. M. Yasin Khan Durrani
Editor in Chief

More on Line
Read the latest research in Ophthalmology at the following website,
www.ophthalmologyupdate.com

Carrot — A Sight Booster?

Zainab Inam, Nowshera (KPK)

According to popular wisdom Carrot has long been used for its efficacy in improving eye sight, but scientifically speaking is it really a sight booster or just a lore?

Carrot is found in Pakistan in fantastic colors of pinkish red, purple and yellowish pink (popularly known as ‘Cheeni Gajar’ China Carrot) used in popular Chinese dishes and Pakistani cuisine- a most delicious biryani. Carrot belongs to the family of Umbelliferae with coriander, parsley and cumin as its members. The vegetable has long been touted for its efficacy in improving eye sight, but is it really a sight booster as popular wisdom asserts and believed by different systems of practicing medicine. The purported link between carrot and markedly acute vision, is it a matter of scientific wisdom or mere a lore?

Carrot contains 87% of water and it is rich in fiber, which protects against the cancer of colon. It has high content of luxuriously rich beta-carotene, Vitamin-B, calcium, iron and vitamin-C. It is also very effective in the fight against cardiovascular diseases, cataract and macular degeneration. It promotes skin complexion and maintains its elasticity by elimination pimples. Hippocrates described the use of carrot seeds as an oral contraceptive. Quite interestingly, the anti-laxative property of carrots has also helped Greek soldiers survived the prolonged hide out inside the Trojan horse. Henry Ford convinced that it held the secret of longevity.

Because it contains more sugar than any other vegetable, carrots have been used in sweet cakes ‘the Passion Cake’ popularly known as Gajar ka halwa, which has now become a standard dessert in winter so much so people in California hold exclusive February Festival and relish by promoting the consumption of carrots. The extract of purple carrot, popularly known a kalonji is used over this sub-continent as a carminative against digestive ailments. Interestingly, in 2010, a $25 million marketing campaign was launched to promote baby-cut carrots as an alternative to junk foods.

During the worldwar II, soldiers were chanting ‘a carrot a day keeps the black out at bay’. Walt Disney in his famous movie ‘Dr. Carrot’ people were lure into belief that the carrot roots helped British Pilots develop the ‘cat eyes’ required to see Nazi bombers attacking at night, a bit more vision-related cachet. Even more amusingly, carrots can not only be eaten, but also be played. Thanks to Flutenveg, a group of talented Australian individuals who make musical instruments out of carrots and thus promote health dietary habits. Making carrots all the more distinct is the latest endeavor of the astronauts who promised to make the ability to grow the vitamin-A rich carrots in space in order to incorporate natural antioxidants into their diet to combat the effects of radiation. Moreover, scientists now believe that bio-fuels, harnessed from the carrots will be able to supplement our energy demands when the oil runs out.

(Note: Zainab Inam is a matric student, daughter of a noted ophthalmologist Dr. Inamul Haq Khan from Nowshera. She is a versatile writer on various subjects. We have requested her to feature vision-related articles for the interest of our readers…… Editor)