8th Congress of the European Glaucoma Society

Berlin, Germany, 1st – 6th June 2008

Lectures
Report on WGA consensus topics: diagnosis, surgery, intraocular pressure, angle closure, screening, reporting

WGA CONSENSUS SESSION
E. Greve
World Glaucoma Association, Graveland, The Netherlands

Extensive review of the 2008 5th WGA Consensus on Screening for Glaucoma & updates of the Consensus reports on: Structure and Function in Glaucoma Management, Surgery Open Angle Glaucoma (OAG), Angle Closure Glaucoma (ACG), Intraocular Pressure, Screening OAG and ACG.

The unique Consensus program of the World Glaucoma Association has now covered five topics of the planned list that includes virtually every important topic of glaucoma. All consensus reports are the result of months long discussions by over 100 glaucoma experts from all over the world. The reports have passed through all the worlds glaucoma societies for additional input. Each consensus report has been or will be published in a separate book. Each consensus report will be regularly updated. Summary reports can be found at www.worldglaucoma.org (tab: The WGA Consensus).

The World Glaucoma Association is actively promoting the promulgation of the consensus outcomes a.o. through consensus sessions at meetings of member Glaucoma Societies.

WGA-AWARD CEREMONY 2008
E. Greve
World Glaucoma Association, Graveland, The Netherlands

During the WGA-Award ceremony 2008 (with an attractive audiovisual introduction) the two best publications from the glaucoma literature of 2007 will be awarded. The WGA-Award is an unique and prestigious award for the glaucoma specialty since 1999. There will be three two award categories per year for the purpose of stimulating creativity and originality and rewarding daring and breakthrough research in the field of glaucoma, to help protect the research time of junior researchers for the benefit of glaucoma patients. 1. "The Classic" for long-term impact 2. "The Present" for present impact 3. "The Promise" for potential future impact. The nomination process consists of two phases. The first phase involves over 70 worldwide experts who and together with the regional glaucoma societies will result in choose a top-ten of nominated papers (there is no other global research award that is supported by the worlds glaucoma societies). The second phase comprises the choice by a selection committee which, from these 10 nominated papers, the selection committee it selects the two winning papers. The WGA-Awards "The Classic" and "The Present" consists of a USD 25.000, a crystal bowl and a diploma. Up to two papers can be selected for these awards. "The Promise" consists of a crystal bowl and a diploma. The number of papers selected for "The Promise" may vary. The awards haves been made possible by an unrestricted educational grant from Pfizer to the WGA.

WGA-Award winners 1999-2006
1999 (London) Francesca Cordeiro & Peng Khaw; Ronald Harwerth
2000 (Seoul) Paul Palmberg & Doug Gaasterland; Harry Quigley
2001 (Orlando) Michal Schwartz; Crawford, Yeni Yucel, Robert N. Weinreb
2003 (Florence) Elke Lutjen Drecoll & Paul Kaufman; Paul Mitchell
2004 (Vienna) Aiko Iwase; Claude Burgoyne
2005 (Chennai) Simon John; Hiroshi Sakai
2006 (Singapore) Terete Borras; Neeru Gupta & Yeni Yucel

Main Session 1

NEW UNDERSTANDING IN GLAUCOMA: NEURONAL MECHANISMS AND PROCESSES

1.1 MORPHOLOGIC CHANGES IN GLAUCOMA EYES
E. Tamm
Institute of Human Anatomy & Embryology, University of Regensburg, Regensburg, Germany

Extracellular matrix changes in glaucoma eyes. Intraocular pressure, the most critical risk factor for primary open-angle glaucoma (POAG), is generated in the trabecular meshwork outflow pathways which provide resistance to aqueous humor (AH) outflow. The resistance is increased in POAG, and changes in the quality and amount of the extracellular matrix (ECM) in the juxtanacanlicular region (JCT) of the trabecular meshwork appear to be causatively involved. The ECM changes are very likely under control of transforming growth factor-ß2 (TGF-ß2), which is found at high concentrations in the AH of patients with POAG. Additional factors are thrombospondin-1, which activates TGF-ß2 in vivo, and connective tissue growth factor, which is an important downstream mediator of the effects of TGF-ß2 on TM ECM turnover. In contrast, bone morphogenetic protein-7 (BMP-7) strongly antagonizes fibrogenic actions of TGF-ß2 on human TM cells. Growth factors control the homeostatic balance of ECM turnover in the normal TM, a process that appears to fail in the TM of patients with POAG.

1.2 NEURAL NETWORKS
J. Morgan
School of Optometry and Vision Sciences, Cardiff University, Wales, United Kingdom

Retinal ganglion cell death is the key pathological event in glaucoma that underlies loss of visual field. Recent work has now revealed that retinal ganglion cells undergo changes in both structure and function prior to cell death generating large populations of “sick” cells. These cells demonstrate pruning and shrinkage of the dendritic tree with a reduction in cell soma volume. Studies in other neural systems suggest that it may be possible to reverse these changes with return in neural function. Strategies for the in vivo detection of these cells and the recovery of neural integrity will be discussed.

1.3 IMAGING APOPTOSIS IN VIVO
F. Cordeiro
Head Glaucoma & Retinal Neurodegeneration Research Group, UCL Institute of Ophthalmology, London, United Kingdom; Hon Consultant Western Eye Hospital, London, United Kingdom

Recent developments in imaging technologies offer great potential for the assessment of RGC disorders, with particular
relevance to glaucoma. In particular advances in this field have allowed unprecedented access to the retinal layers. Most promising technologies use the established confocal scanning laser ophthalmoscope (cSLO) combined with other methodologies to improve RGC visualization. Direct assessment and the successful evaluation of healthy RGCs has been possible in transgenic and disease models. Ideally, methodologies enabling the visualization of healthy and “sick” RGCs would provide a comprehensive assessment of glaucomatous changes and disease states.

DARC (Detection of Apoptosing Retinal Cells) is a recently devised, non-invasive real-time imaging technique using cSLO to visualise single RGC apoptosis in vivo. This allows longitudinal study of disease processes, which has not previously been possible. Using DARC, we recently showed evidence that implicates these same mechanisms in the blinding disease glaucoma with Alzheimer’s. The Alzheimer protein Aβ we showed to be closely associated with the development of RGC apoptosis in glaucomatous neurodegeneration.

Results of RGC imaging and DARC studies to date and future implications of these technologies will be discussed.

1.4 STEM CELLS AND RETINAL GANGLION CELL REPAIR

K. Martin
Cambridge University Centre for Brain Repair and Addenbrooke’s Hospital, Cambridge, United Kingdom

Stem cell transplantation could theoretically be beneficial in glaucoma either by replacing retinal ganglion cells (RGC) lost to the disease or by a neuroprotective effect of transplanted cells on surviving RGC. As re-establishing functional connections between transplanted cells and the appropriate target fields in the brain presents formidable challenges, demonstration of a neuroprotective effect of transplanted cells may be a more realistic initial goal. Such a protective effect would require transplanted cells to survive, function and presumably integrate within the host retina without compromising its function. Several promising candidate cell types for transplantation exist, including adult retina-derived cells and mesenchymal stem cells. These cells can survive and differentiate in animal models of glaucoma, and modulation of the host environment seems to facilitate integration.

Successful stem cell transplantation for glaucoma will require control of the survival, migration, differentiation and integration of transplanted cells. The mechanisms involved in these processes are gradually being elucidated and their modulation can be explored in retinal explant cultures with the most promising approaches then taken forward into animal models of glaucoma. Replacement of RGC is the long-term goal, but in the short term it is important to establish if cellular transplantation therapy has neuroprotective potential without unacceptable side effects.

1.5 IMMUNOLOGIC ASPECTS OF GLAUCOMA

F.H. Grus
Department of Ophthalmology, University of Augenklinik, Mainz, Germany

Although an elevated intraocular pressure represents the main risk factor, it cannot explain the glaucoma disease in all patients. Previous studies could provide hints for an involvement of autoantibodies in the pathogenesis of the disease. In several studies we could demonstrate consistent up- and down-regulations of immune reactivities against ocular antigens in glaucoma patients. These are furthermore consistent between different study populations e.g. from the U.S. and Germany. These findings could lead to a better understanding of the pathomechanisms involved in glaucoma, but could also lead to new innovative ways of early detection of the disease.

1.6 GLAUCOMA DAMAGE AT THE LGN LEVEL

N. Gupta
Department of Ophthalmology & Vision Sciences, University of Toronto, Toronto, Canada

In glaucoma, the pathological correlate of vision loss is accepted as loss of retinal ganglion cells (RGCs). The degeneration of RGCs and their axons in glaucoma extends into the brain to target neurons of the lateral geniculate nucleus (LGN). In the LGN, there is evidence that all 3 major vision channels, namely the magnocellular, parvocellular and koniocellular pathways are injured in the primate model of glaucoma. Ex-vivo and in vivo human studies of the LGN in glaucoma will be discussed and point to the LGN as integral in considering human glaucomatous neural degeneration and disease progression.

Main Session 2

HEALTH ECONOMICS

2.1 INTRODUCTION: WHY DO WE NEED TO CONSIDER COSTS IN GLAUCOMA CARE?

A. Tuulonen
Department of Ophthalmology, University of Oulu, Finland

Today, it is not anymore enough that an intervention is effective, it should also be cost-effective. All new interventions (diagnostic devices, controlled trials, comparative studies either medical or surgical) should have a health economic assessment. The symposium will survey why we need to consider costs in glaucoma care. By definition, every cost-effective intervention is also clinically effective. In addition to critical evaluation of clinical literature, clinicians and researchers have to gain education and understanding on health economics. The symposium draws an overview of health economics and its methodology as well our challenges in combining it with glaucoma care and research. The methodology will be discussed in more detail during the afternoon course after the symposium.

2.2 OVERVIEW OF HEALTH ECONOMICS (MAIN PRINCIPLES): WHAT ARE THE METHODS TO EVALUATE COST-EFFECTIVENESS OF GLAUCOMA CARE

R.A. Hernandez
Health Economics Research Unit, University of Aberdeen, Aberdeen, Scotland

This presentation will start with the underlying economic principles in economic evaluation: scarce resources and opportunity costs. Secondly, the different types of economic evaluation will be explained. Next, it will focus on modelling based economic evaluations and when to use them. It will briefly address different types of models. Finally, it will discuss how to present and read results.
2.4 EVIDENCE BASED HEALTH ECONOMICS (WHAT DO WE CURRENTLY KNOW). WHAT IS CURRENT STAGE OF EVIDENCE BASED HEALTH ECONOMICS IN GLAUCOMA CARE?
J. Burr
HSRU University of Aberdeen, Aberdeen, Scotland, United Kingdom

Current evidence on the cost effectiveness of interventions for the detection and management of glaucoma will be described. In addition, the results of a systematic review of the impact of glaucoma on patient reported health status will be presented.

2.5 THE PROBLEMS IN HEALTH ECONOMIC STUDIES (RE: CURRENT CLINICAL AND COST DATA). WHAT KIND OF INFORMATION DO WE NEED FOR ECONOMIC EVALUATION?
A. Azuara-Blanco
Department of Ophthalmology, University of Aberdeen, Scotland, United Kingdom

There are several types of economic analysis, which would obviously influence the type of data needed. In cost-effectiveness analysis, for example, we would try to answer what is the most cost-effective method to prevent significant loss in quality of life due to glaucomatous loss of visual function. Data needed to answer such question would include the natural history of glaucoma, the effect of the intervention on disease progression, cost and potential harms of the intervention(s), and the impact of glaucoma on quality of life. Practical examples in the context of interventions for glaucoma will be provided.

Main Session 3
DETECTING GLAUCOMA DAMAGE WITH OPHTHALMOSCOPY, IMAGING AND PERIMETRY

3.1 HOW TO DETECT GLAUCOMA WITHOUT STRANGE INSTRUMENTS - CLINICAL ANALYSIS OF THE OPTIC NERVE HEAD
Y. Lachkar
L’Institut du Glaucome, Hospital St. Joseph, Paris, France

Stereoscopic examination of the optic disk is an essential part of good clinical practice. Dilatation of the pupil is preferable (having verified the irido-corneal angle) in order to achieve a good stereoscopic view, although this may not be absolutely necessary for the seasoned observer.
Cupping is the characteristic sign of injury to the disc in glaucoma, providing that it is progressive. However it may be accompanied by other visible signs such as peripapillary atrophy, the appearance of a disk haemorrhage or exclusion of a circumlinear vessel. Numerous studies have confirmed the presence of disk haemorrhages to be a major prognostic indicator for progression of glaucoma.
In order to recognise the pathological qualities of a cupped disk, a finding mainly confined to glaucoma, it is necessary to first recognise the wide variations in the normal disk. No two optic disks are identical, as are no two ocular fundi, to such an extent that the use of fundus photography has been proposed as an alternative to finger printing for personal identification. Bearing in mind the wide interindividual variations in disk and physiological cup sizes, the absolute value of the C/D ratio has no diagnostic significance. A C/D ratio of 0.3 in a small disk may be pathological and of 0.8 in a large disk may be physiological. The diameter of the optic disk can in fact be accurately measured at most slit lights, whether the examination technique is indirect with a Volk-type lens or by direct observation with a contact lens.

3.3 ARE THERE DIFFERENCES BETWEEN TYPES OF PERIMETRY TO DETECT EARLY GLAUCOMATOUS FIELD DEFECTS?
A. Azuara-Blanco
Department of Ophthalmology, University of Aberdeen, Scotland, United Kingdom

The current gold standard to detect glaucomatous visual field loss is the white-on-white perimetry. Fast strategies (e.g., SITA, TOP) have gained wide acceptance among clinicians. There are other types of perimetry that have been proposed as potentially useful to detect visual field abnormalities (e.g., FDT, SWAP). In this lecture we will review how the different types of perimetry work, their diagnostic performance, practical issues such as time of examination, and whether selective perimetry or early diagnosis have any advantage in the management of glaucoma.

3.5 HALF OF ALL GLAUCOMA PATIENTS ARE UNDETECTED - WHAT CAN WE DO?
T. Zeyen
Middelheim Hospital, Antwerp, Belgium

Glaucoma is the leading cause of preventable blindness and half of all glaucoma patients are undetected. Is there an appropriate screening test? Optimal screening test criteria are unknown and there is no single test or group of tests that is the best. Advanced glaucoma can be diagnosed more easily and at lower cost than early disease. The sensitivity and specificity of all diagnostic tests for population based screening are unknown since most have been tested on selected groups, not on populations. Screening tests for case finding are probably the most cost-effective, provided they have a high sensitivity.

Main Session 4
FOLLOWING GLAUCOMA WITH IMAGING AND PERIMETRY

4.3 HOW TO ASSESS GLAUCOMA RATE-OF-PROGRESSION WITH PERIMETRY
B. Bengtsson
Department of Ophthalmology, Lund University, Malmö University Hospital, Malmö, Sweden

Rate of progression is very important for the management of glaucoma patients. In perimetry it is usually assessed by regression analysis of the mean deviation (MD) value over time. A new visual field index (VFI) has been designed for calculation of perimetric rate of progression. The new index is presented
Main Session 5

SURGERY 1

5.1 GLAUCOMA SURGERY SUCCESS DEFINITION
T. Shaarawy
Department of Ophthalmology, Geneva University Hospitals, Switzerland

This talk will present recently developed guidelines on design and reporting glaucoma surgical trials. This will include guidelines on methodology, success definitions, definitions of complications, Ethical and economical considerations and statistical analysis.

5.2 THE EFFORTS TOWARDS SAFER TRABECULECTOMY
T. Zeyen
Middelheim Hospital, Antwerp, Belgium

Trabeculectomy is the most widely used filtration surgery. Technical modifications to make trabeculectomy safer and more efficient include: handling correctly antimetabolites, using a combination of adjustable and releasable sutures, maintaining the anterior chamber well formed throughout surgery, closing the conjunctiva watertight, and postoperative management of the failing filter.

5.4 GLAUCOMA SURGERY WOUND HEALING RESEARCH - WHICH TRACK TO FOLLOW IN THE FUTURE?
G. Schlu¨nck
University Eye Hospital, Wurzburg, Germany

Postoperative scarring remains a major obstacle to success in filtering glaucoma surgery and additional means to modulate wound healing are desirable. Recent clinical trials may have raised some reservations concerning the targeting of TGF-beta. However, failed filtering blebs show enhanced expression of TGF-beta receptors and extensive TGF-beta-induced extracellular matrix alterations which further support the notion of TGF-beta as a distinct mediator of filtering bleb scarring in vivo. At the same time, biomechanical cues and cell-matrix interactions emerge from studies of basic cell biology as additional determinants of scarring responses and may afford new approaches to wound healing modulation.

5.5 FUNCTIONAL MORPHOLOGY OF THE LIMBAL REGION AND ITS RELATION TO GLAUCOMA SURGERY
E. Lütjen-Drecoll
Department of Anatomy, University of Erlangen-Nürnberg, Germany

The limbal region contains the sulcus sclerae and the trabecular meshwork, which are especially rich in elastic fibers. The elastic fibers of the uvea finally insert either into the scleral spur, trabecular meshwork or peripheral cornea anteriorly and Bruch’s membrane and optic nerve posteriorly. In non-human primates disinsertion of the anterior insertion of the elastic fibers leads to posterior movement of the ciliary muscle and influences accommodation. Schlemm’s canal drains aqueous humor into 25-30 collector channels which are then drained into the episcleral veins. This draining system is located directly adjacent to the cornea without active pumping cells between the two connective tissue layers. On the other hand the basal limbal cells contain enzymes which seem to be involved in dehydration of the connective tissue of the limbal region. In the limbal sclera and the episclera the arteries and veins are intensely innervated and the veins are surrounded by a thick muscle layer. In human eyes there are not only arteriovenous anastomoses in the episclera but also anastomoses between arterioles and collector channels. In about 20% of the eyes investigated these anastomoses are present directly at the outer wall of Schlemm’s canal as connections between the so-called Friedenwald arteries and collector channels. Location of these arteries has implications for the outcome of glaucoma surgery. If only the avascular trabecular meshwork is cut, only little or no scarring is observed and the holes stay open. If a vessel at the outer wall is opened there is scarring of the wound region with occlusion of Schlemm’s canal.

Main Session 6

SURGERY 2

6.1 OUTCOMES OF PRESENT ESTABLISHED SURGICAL TECHNIQUES. WHAT DO YOU NEED TO BE BETTER THAN TRABECEULECTOMY
K. Barton
Moorfields Eye Hospital, London, United Kingdom

Trabeculectomy is only moderately successful, visual recovery is slow and complication rates are less than ideal. Despite these disadvantages, an explosion in new medications, the evolution of non-penetrating surgery as a safer alternative, and a renewed interest in aqueous shunt implantation, trabeculectomy remains the gold standard IOP-lowering procedure in many countries. Why has trabeculectomy survived? Safe IOP-lowering surgery demands a careful balance between a higher success rate with a greater risk of complications on the one hand, and a safer less successful procedure on the other. In this talk, the speaker will discuss the ideal filtration procedure and whether it will ever be possible to achieve this ideal.

6.2.1 TRABECTOME
D. Minckler
Professor of Ophthalmology and Pathology UC Irvine, Irvine, California, USA

Purpose: To update a retrospective case series including 688 trabectome-only, 7 trabectome-other, and 320 trabectome-phacoemulsification procedures. Methods: Electro-ablation of 90-120° of nasal meshwork via a temporal corneal approach under gonioscopic control. Outcomes include intraocular pressures (IOP), medications, and complications. Kaplan-Meier curves provide success/failure estimates. Results: Among trabectome-only cases, mean preoperative
IOP of 25.3 ± 7.7 mmHg < to 16.8 ± 4.1 mmHg (n = 46), (39% <). Reflux-bleeding occurred in 78.5%. No prolonged hypotony, choroidal effusion, choroidal hemorrhage or infections occurred. 16% had IOP elevation day one (IOP > 21). Failure led to trabeculectomy in 7.3% (n = 50) and shunt installation in 1.6% (n = 11). Medications < from 2.95 to 1.2 by 24 months. Cumulative success among 81 cases with > 1-year follow-up (IOP < 21 or > 20% below baseline) was 57.9%. Success among 500 trabeculectomy-only cases with > two weeks follow-up, no repeat surgery, IOP < 21 with & without medications was 55% at 48 months (n = 15). 78/688 (11.3%) had prior failed trabeculectomy & 231/688 (34%) had undergone prior ALT or SLT. Among combined phaco-trabeculectomy cases base-line IOP of 20 ± 6.4 mmHg decreased at 12 months to 15.4 (16%) mmHg (n = 35) and medications < from 2.65 to 1.49. Success (< in IOP > 20%, < in medications, no additional surgery) was 78% at 6 months and 64% at 12 months. Conclusions: Trabectome offers an effective minimally invasive method of improving IOP control in open-angle glaucomas including previously operated eyes at increased risk for surgical failure.

6.2.2
GLAUKOS
T.S. Dietlein
Department of Ophthalmology, University of Cologne, Cologne, Germany

The intracanalicular microshunts (I-stent or Eyepass, Glaukos) are designed to create a microbypass between the anterior chamber and Schlemm’s canal. The angled non-ferromagnetic, implant-grade titanium i-stent is inserted into the trabecular meshwork by an ab-interno approach using a small clear cornea incision. The Eyepass double tube made of silicone (6 mm in length) is implanted by an ab-externo approach after identifying Schlemm’s canal. First clinical pilot studies have demonstrated the pressure-reducing potential of this surgical concept. However, as yet clinical data on both micro shunts are extremely limited making a reliable evaluation difficult.

6.2.4
SOLX M.
M. Nardi
Department of Neurosciences-Ophthalmology, University of Pisa, Pisa, Italy

Alternatives to trabeculectomy: internal shunts. Filtrating procedures are actually the gold standard for surgical treatment of glaucoma: in this type of surgery, the subconjunctival space is the target for diverting aqueous humor and the formation of a functioning bleb is necessary for the success of the procedure. Problems with filtrating procedures (unpredictable wound healing, need of antifibrotic agents, failures, bleb rupture, blebitis, endophthalmitis) are common and are mainly linked to the bleb. Aiming at a blebless surgery the suprachoroidal space is an attractive alternative to subconjunctival filtration, because hydrostatic pressure in the suprachoroidal space is lower than IOP. The Gold Micro-Shunt (Solv), which received CE mark in 2005, is a 24 karat gold sheet 5.2 mm long with multiple channels to allow aqueous flow through the shunt; they are implanted with a simple procedure through a sclera approach with the tip in the anterior chamber and the tail in the suprachoroidal space. From January 2007, 48 shunts where implanted at the Eye Clinic of the University of Pisa, mainly in refractory glaucomas, with an high percentage of success and a reduced number and seriousness of complications.

6.2.5
NON-PENETRATING GLAUCOMA SURGERY: UPDATE
Y. Lachkar
L’Institut du Glaucome, Hospital St. Joseph, Paris, France

The main goal in glaucoma surgery is to achieve a low intraocular pressure with a low complication rate. A balance between the complication profile and the need of a “tailor made target IOP” is to be considered when selecting a procedure for glaucoma surgery. Non penetrating glaucoma surgery provides an alternative surgical approach to trabeculectomy for lowering IOP. Deep sclerectomy and viscoscanalostomy were developed 2 decades ago to decrease the rate of complications of glaucoma surgery. These techniques are more challenging and take longer to perform. Short term complications may be fewer and less severe because sudden decompression of the eyeball is avoided. However, the IOP level obtained long term may not be as low as with trabeculectomy. Careful post-operative monitoring is crucial to achieve an acceptable success rate. Post-operative Nd Yag laser gonipuncture is an integral part of these non-penetrating procedures. When antimetabolites are used long term complications (such as transconjunctival oozing) may be less frequent with deep sclerectomy than with trabeculectomy.

6.4
PEDIATRIC GLAUCOMA SURGERY – A CHALLENGING FIELD OF GLAUCOMA SURGERY
F. Grehn
Department of Ophthalmology, Würzburg, Germany

Congenital glaucoma and secondary paediatric glaucomas are among the most challenging procedures to be performed in glaucoma surgery. Delicate structures and long life expectancy of these babies, and amblyopia are three characteristic features that differ from adult glaucoma surgery and have to be also addressed scientifically. The results of the two Würzburg retrospective studies on trabeculoromy and goniotomy will be presented and discussed. Although trabeculotomy and goniotomy are appropriate procedures with a acceptable high success rate in congenital glaucoma, newer approaches of trabecular surgery were not yet introduced or adequately investigated. For secondary pediatric glaucoma, particularly aphakic glaucoma after early cataract surgery, conventional procedures have much lower long term success rates and scarring is often a long term problem, resulting in multiple repeated cycloablative interventions or tube surgery.

Main Session 7
ANGLE CLOSURE

7.2
IMAGING IN ANGLE-CLOSURE
T. Aung
Singapore National Eye Centre, National University of Singapore, Singapore

Objective: To review recent advances in imaging for angle closure. Methods: Several new instruments have been introduced for angle imaging. Ultrasound biomicroscopy and anterior segment optical coherence tomograph (AS-OCT) are new non-contact instruments that rapidly obtain high-resolution images of the angle and allow qualitative and quantitative angle analysis. This talk provides an overview of the use of imaging instruments in angle imaging.
Results: Instruments such as AS-OCT provides a simple, user friendly and objective method of assessing the drainage angle that is well tolerated by the patient. The quality of the images allows a dynamic cross-sectional view of the angle, which is very helpful in determining mechanisms and appropriate management of patients with angle closure.

Conclusions: Several promising new tools for angle imaging have been introduced.

7.4 LASER IRIDOPLASTY

P. RojanaPongpun
Department of Ophthalmology, Faculty of Medicine, Chulalongkorn University, Bangkok, Thailand

Argon laser peripheral iridoplasty (ALPI) creates contracting burns placed at the iris periphery in order to pull the iris root away from the angle. It is effective in acute primary angle closure, and pure plateau iris by eliminating appositional angle closure, but has no proven efficacy for CACG. Additionally, it has been used to temporary relieve appositional angle closure secondary to lens-related mechanism, and to widen the angle prior to argon laser trabeculoplasty. However, it will not break permanent synechiae. So, if there is residual appositional closure after LPI, ALPI should be performed in an early stage before extensive PAS develops.

References


7.5 MEDICAL MANAGEMENT

T. Aung
Singapore National Eye Centre, National University of Singapore, Singapore

Objective: To review recent advances in medical management for angle closure.

Methods: Several randomized controlled trials for the medical management of angle closure have recently been completed. This talk provides an overview of the use of various medications for angle closure.

Results: Recent studies have shown that prostaglandin analogues are efficacious in reducing intraocular pressure in patients with angle closure glaucoma. Such new information on medical therapy has allowed us to choose the most appropriate management of patients with angle closure.

Conclusions: Therapeutic options for the medical treatment for angle closure have increased recently leading to improved care for patients with this condition.

7.6 SURGERY (SURGICAL IRIDECTOMY, LENS EXTRACTION, TRABECULECTOMY)

J. Thygesen
Copenhagen University Glaucoma Clinic, Denmark

All patients presenting with acute angle closure should be treated immediately with systemic and topical medications to lower the IOP, followed by laser iridotomy for the affected and fellow eyes. However, some patients who present with acute angle closure can take longer to respond to medical treatment and may especially with plateau iris configuration require additional interventions such as argon laser peripheral iridoplasty to break the acute attack iridotomy.

When faced with a patient presenting with acute symptomatic primary angle closure it is difficult to make judgments on how much the lens is contributing to the disease. Assessment of the contribution of lens opacity to poor visual acuity is complicated by the presence of corneal oedema and it is often difficult to obtain a clear gonioscopic view of the angle. The role of lens extraction in this form of the disease is still unclear and there is currently little in the way of evidence to guide us. For a patient who has residual appositional angle closure following iridotomy and coexisting lens opacity, it is reasonable to have a low threshold for doing cataract surgery at the earliest sign of visual symptoms.

Difficulties arise when dealing with cases in which the lens appears to be making a significant contribution to the residual angle closure but there is no significant cataract and visual acuity is good. Does this situation justify a clear lens extraction and can prophylactic surgery prevent future development of PACG in these cases? Some studies suggest that cataract surgery may be as effective as filtering surgery in controlling IOP in PACG cases. In cases in which there is early optic disc cupping and mild visual field loss, lens extraction alone may be enough to achieve adequate IOP control; whereas eyes with advanced glaucomatous optic neuropathy are more likely to have poor residual trabecular meshwork function as a result of PAS or non-synechial damage. In such cases phacotrabeculectomy may be necessary to achieve the degree of IOP control required to prevent progression of glaucomatous optic neuropathy.

Surgical trials are underway to examine the role of cataract/lens extraction in post-acute primary angle closure. This technique has the potential to prevent recurrence of the condition and progression to chronic angle closure glaucoma. With existing and upcoming new data on managing acute primary angle closure, it is hopeful that a more optimal treatment algorithm will be established soon.

Main Session 8

SECONDARY GLAUCOMA: XGF AND PSG

8.1 GENETICS OF EXFOLIATION SYNDROME & EXFOLIATION GLAUCOMA.

GENE SEARCH LANDS A BIG HIT

F. Jonasson, deCode Genetics Study Group, Reykjavik Eye Study Group

Ophthalmology, Landspitali University Hospital, Reykjavik, Iceland; Faculty of Medicine, University of Iceland, Reykjavik, Iceland

Aim: To summarize the recent discovery of the genetic basis for exfoliation syndrome and possible clinical implications.

Methods: A recent study that identified the genetic etiology of exfoliation syndrome will be discussed as well as later replications. This landmark study used a whole genome-scan much like a case control study, to compare sequence variants in persons with and persons without exfoliation glaucoma.

Results: Combined the high risk single nucleotide polymor-
phisms (SNPs) were present in 99% of the Icelandic and Swedish exfoliation glaucoma cohorts. Person homozygous for both the highest risk haplotypes were 700 times more likely than those with the low risk variant to have exfoliation glaucoma. This may in near future lead to genetic testing of persons who have family members with exfoliation glaucoma and may lead to targeting of family members with the high risk haplotype in the glaucoma clinic.

Conclusion: This remarkable finding will provide the basis for better insight in the pathophysiology of exfoliation syndrome and probably provide insight into the development of new not intraocular pressure lowering medication for exfoliation glaucoma.

8.2
BASIC SCIENCE OF EXFOLIATION SYNDROME AND EXFOLIATIVE GLAUCOMA
U. Schlötzer-Schrehardt
Department of Ophthalmology, University of Erlangen-Nürnberg, Erlangen, Germany

Exfoliative glaucoma (XFG) is the most common and most important secondary open-angle glaucoma comprising the majority of glaucoma in some countries. The underlying disorder, exfoliation syndrome (XFS), is a generalized disease of the extracellular matrix characterized by the progressive, stable deposition of abnormal fibrillar aggregates in various intra- and extraocular tissues. Active involvement of trabecular meshwork cells in this fibrotic process involving the local production of exfoliative material in the juxtaocular area may be the primary cause of outflow resistance and chronic pressure elevation in XFS patients. Molecular biologic and biochemical data support the pathogenetic concept of XFS as a type of stress-induced elastosis, associated with the excessive production and abnormal aggregation of elastic fiber components. Both genetic and environmental factors have been implicated in the pathogenesis of XFS. Recently, a strong genetic risk factor for XFS/XFG, i.e. polymorphisms in the lysyl oxidase-like 1 (LOXL1) gene has been identified. LOXL1, a member of the lysyl oxidase family of enzymes, which are essential for the formation, stabilization, and maintenance of elastic fibers, has been shown to play a role in XFS material accumulation and in concomitant elastotic processes in intra- and extraocular tissues of XFS patients. In addition, TGF-β1, increased oxidative and cellular stress, a dysbalance of proteolytic enzymes and their inhibitors, low grade inflammatory processes, and impaired cellular protection mechanisms appear to be key factors in pathogenesis.

8.3
CLINICAL SIGNS OF EXFOLIATION SYNDROME AND EXFOLIATIVE GLAUCOMA
G. Holló
1st Department of Ophthalmology, Semmelweis University, Budapest, Hungary

Aims: To summarise the clinical characteristics of exfoliation (pseudoexfoliation) syndrome and exfoliative (plesudoeoxfoliative) glaucoma.

Methods: Clinical and literature based review.

Results: Exfoliation syndrome is a frequent disease worldwide with several clinically significant consequences. It is well known that due to zonular damage the risk for complication in intraocular surgery, especially in cataract surgery is significantly increased in exfoliation. Exfoliative glaucoma develops from exfoliative syndrome. This glaucoma is not only the most frequent type of the secondary open-angle glaucomas, but also associated with elevated intraocular pressure, unusually high intraocular pressure fluctuation, severe visual field damage and relatively poor intraocular pressure decrease under conventional glaucoma medication. Both exfoliation syndrome and exfoliative glaucoma are associated with systemic alterations and diseases. The association between systemic vascular diseases and exfoliation is well explained by the results of those recent human studies in which systemic vascular pathophysiology was investigated. In exfoliation syndrome and glaucoma both microvascular and macrovascular perfusion is damaged, and the damage increases along the duration of exfoliation.

Conclusion: All the above results are of clinical importance, thus all ophthalmologist need comprehensive information in the field.

8.5
CATARACT SURGERY IN EXFOLIATIVE GLAUCOMA
M. Teus
Department of Ophthalmology, University Hospital Alcala de Henares, Madrid, Spain

The coexistence of cataract an glaucoma is very common in exfoliative (PEX) eyes. In these eyes, cataract surgery is usually more difficult than in non PEX eyes, due to the poor midriasis and weak zonula that theses eyes usually have. The clues for the correct diagnosis and management of these potential difficulties will be discussed, and also some videos showing our preferred surgical technique in these eyes will be shown.

8.6
PIGMENT DISPERSION SYNDROME AND PIGMENTARY GLAUCOMA
M. Irkec
Department of Ophthalmology, Hacettepe University Faculty of Medicine, Ankara, Turkey

The Pigment dispersion syndrome (PDS) and the pigmentary glaucoma (PG) are characterized by almost always bilateral mid-peripheral loss of pigment from the posterior surface of the iris. Dispersed pigment is deposited on intraocular structures such as the corneal endothelium (Krukenberg spindle), anterior surface of the iris stroma, anterior and posterior lens surface at the zonular attachments, and typically the trabecular meshwork. Pigmentary glaucoma (and PDS) is more common in men than women and young myopic men 20 – 45 years of age typically affected Krukenberg spindle, iris transillumination defects, trabecular pigmentation, elevated IOP with wide fluctuations are findings that aid in clinical diagnosis. Recently, there has been interest in the genetics of PDS and PG. Treatment comprises both medical and laser/surgical modalities.