Tackling ROP
The KIDROP-experience shows that tele-ophthalmology is a cost effective possibility to spread ROP-screening programmes into the rural areas of India.

Therapies for AMD
Numerous new medical therapies for wet age-related macular degeneration are under investigation. This is one of the most rapidly evolving fields in ophthalmology.

Tears and Bubbles
Femtosecond laser flap complications are very rare and often linked to the surgical technique. Usually they can be handled without consequences for the patient.

Dealing with Small Pupils
Mechanical Stretch, Iris Hooks, Malyugin Ring

SUNDERLAND – The definition of a small pupil depends on the degree of experience of the surgeon, and also on the degree of surgical difficulty expected to be encountered.

An experienced surgeon may be happy to operate with a 3-4 mm pupil in a straightforward case, but may be unhappy with a 4.5 mm pupil if dealing with a rock hard cataract. The problems caused by a small pupil are not confined to difficulties removing the nucleus without damaging the iris margin. A smaller pupil allows less light to enter the eye, and so the red reflex may be poorer with smaller pupils and the threshold for use of a capsule staining dye is therefore lowered.

Sunderland – The definition of a small pupil depends on the degree of experience of the surgeon, and also on the degree of surgical difficulty expected to be encountered.

Dealing with Small Pupils
Mechanical Stretch, Iris Hooks, Malyugin Ring

SUNDERLAND – The definition of a small pupil depends on the degree of experience of the surgeon, and also on the degree of surgical difficulty expected to be encountered.

Mechanical Stretch, Iris Hooks, Malyugin Ring

Small pupils may be due to posterior synchia from previous inflammation or previous miotic use (frequently now but was common in the past). The condition may in other cases be due to some other concurrent disease/medication e.g. pseudoexfoliation, tamsulosin use, or it may simply be a small pupil.

Always check to see if there are posterior synchiae and carefully break these (including at mid-stroma if patient has been on long term miotic).

Simple mechanical pupil stretch with 2 instruments can be effective in many cases (figure 1). It is important to stretch by taking the instruments almost into the angle. One problem is that the pupil may then re-constrict or wave in the breeze because of multiple sphenicter rupture.

Experience with IFS from tamsulosin has shown the value of intra-camerai alpha agonists either at the outset or during surgery. We favour phenylephrine diluted in BSS (others advocate epinephrine). The contents of 1 minium of 2.5% phenylephrine (Bausch & Lomb) added to 1-2 mL of BSS injected into the AC can give added dilatation, and certainly diminishes or prevents re-construction and also prevents iris prolapse.

In all cases consider reducing your fluidics parameters. A high aspiration flow rate increases the risk that you will aspirate the pupil margin in small pupil cases. A high vacuum then makes it much more likely that you will damage the iris tissue if you do catch it, and this can cause problems for the surgery and problems for the patient afterwards.

For some cases it is desirable to mechanically dilate and then in some way to fix the pupil. We initially learned from vitreo-retinal surgeons to use Iris hooks. If you use Iris hooks ensure that your incisions in the cornea to place the hooks are very peripheral (there should be bleeding at each incision) and horizontal (figure 2). This ensures that you are pulling the pupil margin peripherally rather than upwards.

Some hooks come in packs of 5 – the 5th one is meant as a ‘spare’ in case you drop one. However, you can also plan to use 5. When using 4 make a ‘diamond’ pattern rather than a ‘square’ – in other words one hook should be placed under the incision so that you get maximum retraction where you are entering the eye with the phaco tip (figure 3). Try to space the incisions/hooks as symmetrically as possible.

continued on page 2
More recently a very simple but ingenious device from Russia (Malysyin ring) has become very popular. Personally I find this easier to use than hooks – although it is not without its difficulties. In all cases where the pupil has been stretched consider using additional anti-inflammatory medication post operatively to reduce the chances of uveitis/irisitis.

Further Notes on the Particular Problems of IFIS
At the turn of the year 2004/05 we became aware of a ‘new’ phenomenon – the intra-operative floppy iris syndrome (IFIS). While the exact mechanism underlying this problem is still uncertain, we do know that it is relatively common. The biggest risk factor for IFIS is the current or previous use of the drug tamsulosin. 1-2% of the cataract surgery population falls into this category. Although some surgeons have been concerned about patients taking other α1a blockers, the risk of experiencing IFIS in patients with tamsulosin is 40 times that in patients using other blockers.

These are not simply patients with small pupils. The iris butterfly is quite specific, and some simple measures good for ‘normal’ small pupils such as pupil stretching are positively contraindicated in IFIS patients.

Our Experience of IFIS
Experienced surgeons of 30 consecutive eyes in late 2005/early 2006 in patients taking Tamsulosin:
50% of patients will dilate well, but 50% of these will subsequently constrict during surgery
35% will be completely dilated
15% will be poorly dilated
Markwijk et al JCRS 32:1611-14 2006

Thursday 16 February
13.00 – 14.30 hrs
Hall 10
Session: CAT - Detour: roadblocks to routine phaco

Frankfurt – Endothelial cell loss or intra-gratious cataract discourages many surgeons from using phakic lenses. New, modern PIOL may offer new solutions to their concerns.

Trials comparing corneal refractive surgery with phakic intraocular lenses (PIOL) reveal the superiority of the latter in terms of quality of vision, while other parameters like stability, safety and efficacy in the development of different PIOLs, are still under investigation. Some show the use of iris hooks. New, modern PIOL may offer these outcomes to their questions.

The most dreaded complication of posterior chamber PIOL isastigmatism cataract. Induced by contact between the PIOLand the natural lens due to insufficient vaulting and/or modified aqueous humour fluidics. Schmitz et al. show a nearly linear and continuous decrease in the distance of the ICL V4 (STAAR) and the natural lens in 44 patients. From 444,218 μm directly after surgery the distance decreases to 184,159 μm after 74.1±33.1 months. The resulting clinical significant anterior subcapsular cataract rate in their retrospective study was 28% after 44 months. 17% of the patients underwent explantation of the PIOL follow- ing cataract surgery. Inadequate clear- ance between the natural lens and the PIOL was a significant predictor for anterior subcapsular cataract forma- tion. The latest design evaluation of the ICL provides a central hole in the optic to prevent pupillary blocking and to enhance the aqueous humour fluidics in the gap between the ICL and the lens to reduce cataract formation. Figure 1, figure 2. Eshrig et al. show very good short-term visual results, compara- ble to other phakic lenses, proving the optical practicality of the central hole. Secure supported lens. Although this is a very promising implant, longer follow up is needed to evaluate the cataract rate and long term vaulting stability. In opposite to this very new posterior chamber PIOL, the long-term results of today’s most commonly used anterior chamber iris-fixated PIOL (Artisan, Ophthec, figure 2) are well known. The visual outcomes are excellent, even in toxic patients. Sizing of the implants is, contrary to the posterior chamber or angle-supported anterior chamber IOL, not an issue.

The weak point of iris-fixated PIOL is the endothelial cell loss numbers show mean rates of up to a maximum of 14.05% after 5 years. Outliers, how- ever, also need to be taken into consideration.

The history of anterior chamber angle-supported PIOL is mainly a history of failures. Even though visual results have been very good, severe endothelial cell losses, pupil ovdalizations, synchiae and inflammations have led to the withdrawal of almost every implant.16 The latest development in this field is the Cachet PIOL (Alcon, figure 3), a single-piece, foldable soft acrylic IOL. Visual results are very good, as published three-year FDA trial data by Knecht et al.20 showed. For example: UDVA was 0.20 or better in 101 (97.7%) and 0.31 or bet- ter in 48 (46.2%) of patients. The residual refractive error was within ±0.50 D of target in 82 patients (98%). Apart from that, all other known severe complications from angle-supported anterior chamber lenses have been rare. No pupil ovdalization, pupillary blockage, or retinal de-tachment was observed after three years.17 Looking particularly at the endothelial cell loss data leaves refractive surgeon optimistic. The annualized per- centage loss central and peripheral endothelial cell density from 6 months to 3 years was 0.41% and 1.11%, respectively.21 The natural endothelial cell loss adults is about 0.3 to 0.6%. Both, visual acuity and endothelial cell loss numbers, remain stable when looking at the, yet unpublished, 5-year follow up. However, longer follow up is required as well, to evaluate the long-term safety.

The Ideal Phakic Lens
The PIOL industry has to fulfill different requirements: Lenses should be foldable to allow for astigmatism-neutral implantation and thus predict- able refractive outcome. Lens design, positioning and material should not induce any short- or long-term intraocular damage; endothelial cell loss and cataract formation are espe- cially an issue here. If lenses fulfill these needs, there is no reason, why PIOL should not be used as an equal procedure next to laser refractive sur- gery. Eventually PIOL have one major advantage compared to eximer laser surgery: their reversibility.

Thursday 16 February
16.30 – 18.00 hrs
Hall 10
Session: CAT - Hot topics in cataract surgery

Authors: Oliver K. Klaproth, Thomas Kohner
Corresponding Author: Thomas Kohner, Department of Ophthalmology Goethe University Frankfurt am Main Germany
E-mail: kohner@em.uni-frankfurt.de

Current Status of Phakic IOLs
Doubts are Justified – but New Lenses Arouse Expectations

References
The KIDROP Experience in India
TacklingROP in Middle-Income Countries with Cost-Effective Tele-Ophthalmology

BANGALORE – The need for telemedicine in Retinopathy of Prematurity (ROP) in middle-income countries like India is born out of the skewed demand and supply problem plaguing ROP management, the largest cause of infant blindness worldwide.

Of the 27 million live births annually in India, about 8.8% are born below 2000 grams and are at risk of ROP. However, a majority of these infants are born in rural areas and remain unscreened. With less than 500 retinal surgeons and 20 infants born out of the skewed demand and supply in retinopathy of prematurity (ROP) in middle-income countries like India is of growing concern.

Asia’s First Tele-ROP Screening Programme

In 2008 we started Asia’s first tele-ROP screening programme in Southern India to cover unscreened rural neonatal care centers in the state of Karnataka. Under this KIDROP (Karnataka Internet Assisted Diagnosis of ROP) programme, technicians were trained to image, interpret, store and transmit images to be viewed on the smart phone or the PC using the low cost Automated Binary Optimization (ABO) compression technology (patented). Images were also graded by these technicians and validated against binocular indirect ophthalmoscopy by the ROP expert.

The KIDROP programme currently serves 51 neonatal intensive care units (NICU) in rural and semi-urban regions and runs on a non-profit grant by the Institute. 18 of these centers are in a remote zone 50 kilometers away and are co-managed in a public private partnership (PPP) with the State Government. In this PPP the Government has granted USD 0.52 million (2009-2012) to set up two zones that cover six districts each. Our contribution will include free training, image reading and treatment. The government will provide for the equipment, its maintenance and staff.

In conclusion, tele-ROP is a viable model in middle-income countries. The cost utility analysis comparing the KIDROP model with other alternate strategies indicates that the KIDROP model, which uses a single Retcam shuttle to service a zone of roughly 300-400 kilometers radius in six districts using non-physicians (trained technicians) is the most cost-effective method of providing the standard of care in ROP screening in centers which are rural or peripheral with limited access to health care given the economic strata making travel costs with the family a heavy burden on their resources.

The fact that repeated visits are needed before discharge from the screening programme, further adds to problem of travelling which compounds the costs for the family. Poor compliance to complete the screening meant higher risk of blindness. The multiple Retcam stra-tegy had the best coverage, since most parents in rural areas were daily wage workers and belonged to the lower economic strata making travel costs with the family a heavy burden on their resources.

The KIDROP programme can be indirectly measured by evaluating the blindness prevention quotient in financial equivalent. Thus far 512 children have received vision restoring laser treatment. The return on investment in the national perspective may be calculated as follows: Each of these 512 infants will survive to an average of 65 years (average life expectancy) and earn approximately USD 900 per annum (per capita income). This is a federal saving of over USD 25 million! All this for an investment of less than USD 250,000 ! The social returns are, of course, priceless.

A Viable Model

In conclusion, tele-ROP is a viable model in middle-income countries. The cost utility analysis comparing the KIDROP model with other alternate strategies indicates that the KIDROP model, which uses a single Retcam shuttle to service a zone of roughly 300-400 kilometers radius in six districts using non-physicians (trained technicians) is the most cost-effective method of providing the standard of care in ROP screening in centers which are rural or peripheral with limited access to health care given the economic strata making travel costs with the family a heavy burden on their resources.

The fact that repeated visits are needed before discharge from the screening programme, further adds to problem of travelling which compounds the costs for the family. Poor compliance to complete the screening meant higher risk of blindness. The multiple Retcam stra-tegy had the best coverage, since most parents in rural areas were daily wage workers and belonged to the lower economic strata making travel costs with the family a heavy burden on their resources.

The fact that repeated visits are needed before discharge from the screening programme, further adds to problem of travelling which compounds the costs for the family. Poor compliance to complete the screening meant higher risk of blindness. The multiple Retcam stra-tegy had the best coverage, since most parents in rural areas were daily wage workers and belonged to the lower economic strata making travel costs with the family a heavy burden on their resources.

The fact that repeated visits are needed before discharge from the screening programme, further adds to problem of travelling which compounds the costs for the family. Poor compliance to complete the screening meant higher risk of blindness. The multiple Retcam stra-tegy had the best coverage, since most parents in rural areas were daily wage workers and belonged to the lower economic strata making travel costs with the family a heavy burden on their resources.
Théodore Remi

The early oculist known by name should be Iby in Egypt. He must have lived between 275 B.C. and 225 B.C. His grave was found close to the pyramids of the kings Cheops, Chephren and Mykerinos. The inscriptions on his grave name him “the doctor of the pharaoh, guardian of the royal intes- tines-exit and oculist of the palace”. So here we find a very early speciali-
sation in medicine and just in opth-
alatomy, because Iby was men-
tioned as an oculist!

About 2000 BC we find a statement in the book of laws of Hammurabi about the therapy of eye-diseases in Babylonia and Assyria. The medical rules start with penalties for ophthal-
mological mistakes by oculists. This is a proof for the high standard of opth-
alatomy in this area and these times. The 20 m long “Papyrus Ebers” was written about 1550 BC and includes therapeutic suggestions for about 30 eye-diseases. The earliest oculist known by name should be Iby in Egypt. He must have lived between 275 B.C. and 225 B.C. His grave was found close to the pyramids of the kings Cheops, Chephren and Mykerinos. The inscriptions on his grave name him “the doctor of the pharaoh, guardian of the royal intestines-exit and oculist of the palace”. So here we find a very early specialisation in medicine and just in ophthalmology, because Iby was mentioned as an oculist!

About 2000 BC we find a statement in the book of laws of Hammurabi about the therapy of eye-diseases in Babylonia and Assyria. The medical rules start with penalties for ophthalmological mistakes by oculists. This is a proof for the high standard of ophthalmology in this area and these times. The 20 m long “Papyrus Ebers” was written about 1550 BC and includes therapeutic suggestions for about 30 eye-diseases.

Famous Names in Arabian Ophthalmology

Amar Aparwai

The earliest oculist known by name should be Iby in Egypt. He must have lived between 275 B.C. and 225 B.C. His grave was found close to the pyramids of the kings Cheops, Chephren and Mykerinos. The inscriptions on his grave name him “the doctor of the pharaoh, guardian of the royal intestines-exit and oculist of the palace”. So here we find a very early specialisation in medicine and just in ophthalmology, because Iby was mentioned as an oculist!

About 2000 BC we find a statement in the book of laws of Hammurabi about the therapy of eye-diseases in Babylonia and Assyria. The medical rules start with penalties for ophthalmological mistakes by oculists. This is a proof for the high standard of ophthalmology in this area and these times. The 20 m long “Papyrus Ebers” was written about 1550 BC and includes therapeutic suggestions for about 30 eye-diseases.

Famous Names in Arabian Ophthalmology

Amar Aparwai

The earliest oculist known by name should be Iby in Egypt. He must have lived between 275 B.C. and 225 B.C. His grave was found close to the pyramids of the kings Cheops, Chephren and Mykerinos. The inscriptions on his grave name him “the doctor of the pharaoh, guardian of the royal intestines-exit and oculist of the palace”. So here we find a very early specialisation in medicine and just in ophthalmology, because Iby was mentioned as an oculist!

About 2000 BC we find a statement in the book of laws of Hammurabi about the therapy of eye-diseases in Babylonia and Assyria. The medical rules start with penalties for ophthalmological mistakes by oculists. This is a proof for the high standard of ophthalmology in this area and these times. The 20 m long “Papyrus Ebers” was written about 1550 BC and includes therapeutic suggestions for about 30 eye-diseases.

Famous Names in Arabian Ophthalmology

Amar Aparwai

The earliest oculist known by name should be Iby in Egypt. He must have lived between 275 B.C. and 225 B.C. His grave was found close to the pyramids of the kings Cheops, Chephren and Mykerinos. The inscriptions on his grave name him “the doctor of the pharaoh, guardian of the royal intestines-exit and oculist of the palace”. So here we find a very early specialisation in medicine and just in ophthalmology, because Iby was mentioned as an oculist!

About 2000 BC we find a statement in the book of laws of Hammurabi about the therapy of eye-diseases in Babylonia and Assyria. The medical rules start with penalties for ophthalmological mistakes by oculists. This is a proof for the high standard of ophthalmology in this area and these times. The 20 m long “Papyrus Ebers” was written about 1550 BC and includes therapeutic suggestions for about 30 eye-diseases.
Searching for the Best Treatment Strategy

Is there still a Role for the Laser in the Treatment of Macular Edema?

LIMA - Diabetic macular edema is a leading cause of blindness among working people in the world. Laser treatment was the only effective treatment that we had two decades ago to prevent further loss of vision due to macular edema. Now we have intravitreal injections and some oral drugs that could help us dealing with this important cause of blindness.

We know that triamcinolone and anti-VEGF injections can effectively reduce macular thickness, and in some cases help to improve vision. But to have to inject an eye several times to achieve a steady result is neither desirable to the patient nor to the physician. That is why other forms of treatment with or without laser photocoagulation are currently under investigation.

The Early Treatment Diabetic Retinopathy Study group (ETDRS) demonstrates that focal/grid laser photocoagulation reduced the risk of moderate loss of vision in patients with clinically significant macular edema (CSME) by 50% (from 24% to 12%) during the period of three years. On the other hand an improvement of the visual acuity (VA) was observed in less than 3% of cases, based on a gain of 15 letters after three years, 17% of the patients showed any improvement in vision. The characteristics of the participants in the ETDRS could limit the benefit obtained, because an important proportion of patients enrolled in the ETDRS had a basal VA of at least 20/40, so it was very difficult to reach an improvement of three lines. Among those participants that could improve three lines or more, 40% obtained it.

The Diabetic Retinopathy Clinical Research network (DRCRnet) compared intravitreal triamcinolone with the focal/grid laser treatment. Three years after the start of studies the group that had been treated with the laser had a mean improvement of five letters versus zero letters in the triamcinolone group. More patients in the triamcinolone group suffered from cataract and ocular hypertension than in the laser group.

In about 50% of the patients treated with laser the retinal central thickness remained unchanged. About 20% showed the worst visual acuity at the beginning of the study.

Anti-VEGF drugs (ranibizumab and bevacizumab) have demonstrated their effectiveness in reducing retinal central thickness and improving visual acuity in patients with macular edema secondary to diabetes. Investigators from the DRCRnet group conducted a study comparing ranibizumab with previous laser versus ranibizumab with differed laser. After one year follow-up in both groups the visual acuity improved compared to patients treated with laser alone. The difference between combined treatment (ranibizumab plus laser) versus laser treatment alone after one year amounted to nine letters. The results after two and three years of follow-up are necessary to estimate the real benefit of combined treatment. We still need to keep looking for the best strategy to deal with macular edema in order to maintain and to improve visual outcomes in diabetic patients: anti-VEGF injections followed by focal/grid laser photocoagulation, triamcinolone injection followed by focal/grid photocoagulation, or photocoagulation alone.

But the laser is, in these days, one of the most important tools that ophthalmologist have to control macular edema.

Sat, 18 February 10.30 – 12.00 hrs
Hall 8
Session: RET - Macular edema
Author: Dr. José A. Roca
Clinica Ricardo Palma
Av. Javier Prado Este 1066
San Isidro
Lima 2, Peru
Tel: +511(0)224-2224
E-Mail: jaroca62@yahoo.com
A Giant Stride in Optimizing the Refractive Outcome

Combining Multifocal and Toric IOLs

AHMEDABAD – Many patients have a significant unilateral or bilateral astigmatism. To provide an optimal refractive outcome after cataract surgery, multifocal IOLs alone are not enough. Multifocal IOLs have steadily gained popularity among patients since they provide a greater degree of spectacle independence for activities at different distances following cataract surgery. However, as has been reported, presence of astigmatism of 1D or more would significantly degrade the visual performance of a multifocal IOL. To manage the co-existent astigmatism, an additional intervention like LASIK and limbal relaxing incisions (LRI) would be required. But each procedure has its own limitation that is likely to make the outcome less predictable and satisfactory. In a survey of our own practice we found a high prevalence of significant corneal astigmatism (>1D) similar to what has been reported in literature. We found that nearly 40% of our patients with cataract also had significant unilateral or bilateral astigmatism and hence it was not possible to provide an optimal refractive outcome with multifocal IOL implantation alone.

Customized Refractive Outcome

In other words, significant corneal astigmatism was perhaps the most common hurdle to multifocal IOL practice. The ideal solution would have been to combine the concept of multifocality and toricity in a single IOL. The new Multifocal Toric IOL has answered the need of the hour and promises to provide a customized refractive outcome by integrating the management of corneal astigmatism during cataract surgery itself. While the Multifocal Toric IOL offers to be a safe and effective option for those of our patients who are motivated to reach a greater degree of freedom from spectacles but have a significant astigmatism, the success of this IOL hugely depends on the platform that we provide for it. Hence, raising the bar of precision at every step of cataract management cannot be emphasized enough.

Understanding Astigmatism

The due diligence at our end begins with the fundamental understanding of astigmatism and all its relevant components, like estimation of its magnitude and axis, choosing the appropriate type (regular astigmatism) and knowing our own surgically induced astigmatism. Since we are now aiming at a consistently predictable refractive outcome, our need for precision demands employing instrumentation that yields accurate estimation of the corneal astigmatism as well as a precise biometry evaluation. Ensuring negligible spherical equivalence, by using appropriate IOL calculation formula, is more important now than ever before. The next step towards a successful outcome would be to ensure an optimal surgical result by using appropriate ophthalmic viscosurgical device (OVDs) and an appropriate surgical technique. Appropriate size and centricity of the anterior capsulorhexis has become a requirement, in order to provide an adequate capsular ‘wrap’ all around the optic, which would help to maintain the effective lens position (ELP). Finally the precise placement of the toricity of the IOL on the intended axis, is of paramount importance (figure 1).

Our experience of Multifocal Toric IOL implantation has been with the ReSTOR Toric IOL (Alcon Laboratories, Fort Worth, Texas). This single piece hydrophobic acrylic IOL has an aspheric apodized diffractive configuration on its anterior surface and toricity on its posterior surface. Of the 61 eyes (50 patients) that have received the ReSTOR Toric IOL in our practice, nearly as many patients had bilateral astigmatism as unilateral. The magnitude of astigmatism was in the range of 1 to 1.25D in 50% of the eyes. A significantly large number of patients, who opted for this IOL, had a moderate to high myopia. This gave us an insight into the preference pattern of our patients. It would seem that the myopes, who are blessed with good unaided near vision, are motivated to retain that ability even after cataract surgery. The postoperative visual performance, assessed at 1 month, was definitely encouraging. Unaided distance visual acuity was found to be 20/30 or more in 85% of the eyes. Unaided near visual acuity of N/8 or more, was seen in all the eyes with a fairly good reading range of 25 to 40cm. Residual refractive astigmatism was found to be 1D or less in all the eyes. Recently, Visser et al (JCRS, November 2011) have reported the visual outcomes following AT Lisa Toric IOL (n= 45 eyes), which is a plate haptic multifocal toric IOL. They have reported residual refractive astigmatism of 1D or less in approximately 90% of the eyes. In a questionnaire designed to find out if they could perform various routine activities at distance, intermediate and near, we found that all the 50 patients reported spectacle independence in their everyday life, following ReSTOR Toric IOL implantation.

Attention to Detail

At this juncture, it would be fair to say that the ReSTOR Toric IOL offers a promising opportunity to optimize the refractive outcome in those patients who have cataract with significant corneal astigmatism. Incorporating this IOL into our practice would practically need no additional learning curve if one is familiar with multifocal and toric IOL implantation. Successful performance of this multifocal toric IOL largely hinges on our attention to detail and a diligent effort to ensure as much precision as is possible, at every step of cataract management.

**Better Classification**

HOUSTON – Tumours of the lacrimal gland are rare but an important cause of ocular morbidity and cancer-related mortality.

In this section the multi-disciplinary management of epithelial tumours of the lacrimal gland will be discussed with a view to better classification of tumours based on size and AJCC criteria. In addition, tumours of the lacrimal drainage apparatus and their multi-disciplinary management using globe preserving surgery followed by radiation therapy will be discussed through illustrative case presentations.

**Arabian Night**

The Cultural Event at the Emirates Palace

ABU DHABI [Gl] – The venue for the cultural night on 17 February reminds of the Arab heritage, with the giant hookahs and traditional Arabian elements, the big buildings of the golden age of the Orient. Located on 1.3 km of private beach the hotel is surrounded by 85 hectares of beautiful gardens. It has its own luxury shopping mall, a marina and a helipad. 2000 employees from 56 countries work at the Emirates Palace.

The building was designed by the renowned architect John Elliot KIBA. It is owned by the Abu Dhabi government and is managed by the Kempinski Group. The cost to build the hotel that opened in November 2005 were 11.02 billion AED (United Arab Emirates dirham, 1 AED = 0.2722 USD). The 114 domes are decorated with gold leaf. Many of the suites are furnished in gold and marble. The six Rulers’ Suites in the topmost floor are reserved for Emirati royalty and dignitaries.

**Arabian Night**

The Cultural Event at the Emirates Palace

**Figure 1**: Intraoperative toric axis alignment of ReSTOR Toric IOL.

**Figure 2**: ReSTOR Toric IOL - 1 month postoperatively.
The End Game for Blinding Trachoma
Where do we Stand as far as Global Elimination of Trachoma is Concerned, and how are we Going to Close the Gap?

GEORGIA – Blinding trachoma, one of the oldest known infectious eye diseases, may be facing its end game.

The world’s leading cause of preventable blindness, trachoma, brings extraordinary human suffering and economic devastation to tens of millions of people, mostly women and children in poorer countries. Yet as a result of development and targeted interventions it is now limited to an estimated 59 countries, often affecting the poorest populations.

New Global Strategic Plan
A new global strategic plan — 2020 INSight — created by an international coalition of partners, lays out specific actions to take and milestones to meet that can lead to elimination of blinding trachoma by the year 2020. At this year’s World Ophthalmology Congress in Abu Dhabi, there is no better time to focus on what is needed to achieve the ambition of eliminating the disease by 2020.

8 Million People Suffer from Trachomatous Trichiasis
An estimated 320 million people live in areas where they can be exposed to trachoma, a Neglected Tropical Disease (NTD). Repeated infections with Chlamydia trachomatis of the conjunctiva and scarring lead to entropion causing trichiasis. This extremely painful condition ultimately leads to corneal opacity and blindness.

Trachoma blinds one person every 15 minutes and makes one person experience severe sight loss every four minutes. Over 8 million people are suffering from trachomatous trichiasis (TT) the final, painful stage of this eye disease and require surgical lid rotation to prevent them from going blind. However, studies have shown high levels of recurrence after trichiasis surgery. Reasons for this are poor technique and quality of surgery. With a major backlog of TT surgeries even after prevention and treatment targets have been met, ophthalmologists could play a critical role in this area by providing training and supervision for those performing TT surgeries.

SAFE Strategy
Our goal to eliminate blinding trachoma in less than nine years is, indeed, ambitious, but it is also achievable. The primary reason for hope is the World Health Organization (WHO)-endorsed SAFE strategy. SAFE brings Surgery, Antibiotics, Facial cleanliness and Environmental improvement to the poorest communities where trachoma is most likely to be found. To implement SAFE, national governments and non-governmental organizations around the world have a role to play.

Surgery for entropion eyelids
Antibiotics: Pfizer-donated Zithromax® to treat and prevent active infection
Facial cleanliness to prevent disease transmission
Environmental change to increase access to water and sanitation

Congress in Abu Dhabi, there is no better time to focus on what is needed to reach this ambitious goal: country leadership, international coordination, strategic planning, and adequate funding. Ophthalmologists around the world have a role to play.

One of Five Priority Diseases for VISION 2020

Those of us involved in the fight against trachoma are hopeful. Trachoma was named as one of five priority diseases for the VISION 2020 “The Right to Sight” global initiative for the elimination of avoidable blindness launched by WHO and the International Trachoma Initiative. Even though the disease doesn’t stand a chance.

We hope that those of you gathered for this year’s World Ophthalmology Congress in Abu Dhabi will join us in this fight to end blinding trachoma. We invite you to contact us to learn more about the need for training and supervision for TT surgeries and about the part you can play.

References:

1. 2020 INSight can be found at http://www.trachomacoalition.org/node/713
Water-Drinking Test
Revival of an Abandoned Diagnostic Tool

References
7. Hatanaka M, Grigera DE, Barbosa WL et al. An eight-week, multicentric, randomized, interventional, open-label, phase 4, parallel comparison of the efficacy and tolerability of latanoprost versus timolol maleate 0.5%/dorzolamide 2% versus timolol maleate 0.5%/brimonidine tartrate 0.2% versus fixed combination of timolol maleate 0.5%/dorzolamide 2% in patients with elevated intraocular pressure. J Glaucoma 2010;19(6):331-335.

New Therapies for Wet AMD

Water-Drinking Test

T he water-drinking test was first described by Schmidt as a diagnostic tool for glaucoma1. However, it has been later abandoned due to its poor diagnostic accuracy2,3.

Growing Interest

Recently this test was revived with a new purpose. Studies have shown that the water-drinking test may be used as a surrogate for detecting patients who have IOP spikes not identified during office hours.4 The water-drinking test also has been used to evaluate the effect of treatment on reducing IOP peak and fluctuation, both with ocular hypertensive medication5 and in the presence of visual field progression15-17.

There has been a growing interest in the water-drinking test among ophthalmologists. This test has been cited a mean of 10.26 times in the last 10 years and has been the title of three editorials in peer-review journals5,9,11.

In addition, there are numerous treatments under investigation. Those approaches can be grouped according to the therapeutic target:

1. VEGF Cascade

Multiple molecular interactions finally result in the production of vascular endothelial growth factor (VEGF). A key step in the VEGF production involves a molecule known as mTOR (mammalian target of rapamycin). A protein kinase that regulates cell proliferation, motility, survival and pro-angiogenesis. Inhibition of certain transcription factors, including hypoxia-inducible factor 1 (HIF1α), which activates genes, including those that produce VEGF.

KRP001 (RED01) is a gene that displays a hypoxia-dependent regulation in cells of neoplastic origin. It promotes VEGF production through the mTOR/HIF1α pathway. KRP001 displays a significant antitumor/antiangiogenic activity that is coupled with a decrease in vascular endothelial growth factor (VEGF) production and a reduction in the thickness of AMD patients has been investigated. Also, KRP001 inhibits angiogenesis.

VEGF expression is mediated by tyrosine kinase (tk). Thus, inhibiting tk-inhibitors should be also efficient in counteraction VEGF-initiated effects in the tissue.

Further, there are several approaches under investigation to target the VEGF directly and/or its integrins in general.

2. VEGF Receptor

Following production VEGF binds to its receptors. By doing so the molecule initiates a series of events which are mediated by extracellular receptor and present in the neovascular growth factor receptor 1 and 2 with human immunoglobulin Fc.

Furthermore, there are several approaches under investigation to target the VEGF directly and/or its integrins in general.

3. VEGF Effects

Following production VEGF binds to its receptors. By doing so the molecule initiates a series of events which are mediated by extracellular receptor and present in the neovascular growth factor receptor 1 and 2 with human immunoglobulin Fc.

Furthermore, there are several approaches under investigation to target the VEGF directly and/or its integrins in general.

Rapidly Evolving Field

Thus, antagonization of those mole- cules should exert an antiangiogenic effect.

Sphingosine-1-phosphate (S1P) is a bioactive lipid molecule that stimulates endothelial cell proliferation, pro- liferation, and survival in vitro, and tumor angiogenesis in vivo. Against, targeting this molecule should reduce proliferative activity.

PFD-4 (Potentia Pharmaceuticals, Inc.) a small molecule derivative of Compstatin is directed against complement factor C3. POT-4 is a cyclic 13 amino acid peptide, which interferes with the cleavage of the C3, the component all 3 path- ways of complement activation con- verge on. It is the first complement inhibitor studied in patients with AMD. POT-4 has completed phase 1 and demonstrated an excellent safety profile. A unique feature of POT-4 is that it persists as a long-lasting gel depot after intravit- real injection. The study demonstrated that significant levels of drug are maintained in the vitreous cavity for up to 6 months following a single injection. A phase 2 study is currently under way.

GeneNtech/Roche is working on anti-factor D (F1D-4514S) that inhibits the C3 and C5 alternative pathway convertases. Phase 1 studies have been successfully completed. Furthermore, the following inhibitors are being studied: Eciluzumab/Solliris (Alexion) and ARC1905, an anti-C5 aminopeptidase (Ophthotech).

In summary, the inflammatory cas- cade plays a significant role in this disease entity. Therefore, targeting this part of the pathway could be a very effective approach in the future of wet AMD treatments.

5. Viritreoretinal Traction

This part of the disease entity has been underestimated so far. The elimination of vitreoretinal traction by means of surgery or with a vitreolytic agent therefore can be reasonable when traction contributes significantly to the disease process. In those subjects who are not responding adequately to anti-VEGF the vitreous body should be investigated in detail. A prospec- tive trial to investigate this approach is pending.

Frl 17 February 13.30 – 15.00 hrs
Capital City 13 Session: PMH - Drugs for posterior segment disease

Author: Prof. Dr. Albert J. Augustin Städtische Klinik Karlsruhe Mailto: Vortrag 76133 Karlsruhe Germany Tel: +49 (0)721-974-7140 Fax: +49 (0)721-974-8000 E-mail: albertjaugustin@gmail.com
HEIDELBERG – Early experience with a new femtosecond laser platform proved to be promising and safe for the use in patients with pre-existing conditions such as black/brown cataracts or pseudoexfoliation syndrome. The new VIC TUS femtosecond laser platform (Bausch + Lomb/Technolas Perfect Vision) is a versatile system which provides refractive, therapeutic and cataract applications. The laser features real-time OCT and also employs a curved patient interface, which is used in combination with the intelligent pressure sensors to minimize corneal application and corneal folds. CE Mark approval for the femtosecond laser platform was recently obtained in early December 2011.

Initially laboratory studies on pig and human cadaver eyes were conducted at the University of Heidelberg. These studies measured the maximum applicable stretch force of the capsular bag, found that the femtosecond laser capsulotomy with either the femtosecond laser or with the manual technique in freshly enucleated eyes. Results for the capsular bag stretch force required to rupture divided by the circumference of the capsula immediately before rupture. The study found that 113±12 micro Newtons (mN) in force were necessary to rupture the capsular bag in the femtosecond laser group compared to 73±22 mN in the manual group. This difference was statistically significant. Stretching ratio measurements were also calculated where the stretching ratio is defined as the circumference of the intact-shaped anterior capsula immediately before rupture divided by the unstrained diameter. Results found a higher stretching ratio using the femtosecond laser procedure of 1.67±0.08, compared to 1.36±0.05 using the manual technique.

In the clinical setting, a preliminary evaluation of the femtosecond laser cataract surgery procedure on the VIC TUS platform at Heidelberg University assessed the safety and efficacy of performing the anterior capsulotomy and lens fragmentation in cataract patients with pre-existing conditions. Patients with pre-existing conditions such as black/brown cataracts, pseudoexfoliation syndrome (PES), amblyopia or atrophy were selected to undergo the femtosecond laser cataract surgery procedure in this single surgeon, single centre evaluation. Following the anterior capsulotomy and lens fragmentation using the VIC TUS femtosecond laser platform, phacoemulsification and intracocular lens implantation has been performed using standard manual techniques. Measured outcomes included safety, efficacy, precision and centration of the capsulotomy, use of different lens fragmentation patterns and ease of use of this new femtosecond laser procedure.

To date, 9 eyes (8 patients) have undergone the femtosecond laser cataract surgery procedure. The procedure has been safely performed in all cases, providing good visual outcomes. Docking of the curved interface is straightforward and the graphic user interface (Figure) incorporating the OCT allows easy procedural planning as well as monitoring. The anterior capsulotomies created have been well centred and accurate.

The first patient to undergo a femtosecond laser anterior capsulotomy in Germany was a 66 year old female with a black cataract (OS) and PEX, in May 2011. The surgery was uneventful. Pre-operatively, the patient could only see hand movements, had UDVA of 0.02 and CDVA of -5.0/0.0 = 0.05. At 3 weeks post-operatively, the patients visual acuity had improved to an UDVA (OS) of 0.8 and CDVA of 0.75/180 = 1.0. Lens fragmentation has been performed on all cataract grades. Different lens fragmentation patterns such as radial cuts, ring cuts or combinations of both have been applied. In our first case where both the anterior capsulotomy and the lens fragmentation were carried out with femtosecond cataract surgery, a 65 year old male presented with cortical nuclear cataracts (OU) and amблиопия (OS). With the first eye (OS), the procedure was performed under general anaesthetic, whilst the procedure was performed under topical anaesthesia with the fellow eye (OD). A cross pattern/radial cuts were applied for lens fragmentation. The bilateral implantation of posterior chamber toric IOLs occurred without complications. The patients visual acuity improved from pre-operative CDVA OD 1.25/1.25/177 = 0.5 and CDVA OS of +4.75 = 0.25 to postoperative UDVA OD of 0.8 and UDVA OS 0.32.

In summary, early experience using the femtosecond laser cataract surgery technique indicates it is a very promising procedure which can be safely and effectively used in patients with pre-existing conditions. Further eva-

TARGETING HIGH-RISK GROUPS

BEIJING – The World Health Organization ranks glaucoma as the second most common cause of blindness after cataract, and the most common cause of irreversible blindness globally.

The World Health Organization estimates that glaucoma affects 60 million people worldwide now and will affect 111 million people by 2030. Of these, 17 million are expected to develop open-angle glaucoma.

In the Netherlands or the United Kingdom, the prevalence of glaucoma is 0.3% of the age 40 years and over. 2.5% of the population (aged 40 years or above), and 20% (glaucoma patients' siblings). In the Netherlands, prevalence of glaucoma was 1.97%, 17.39%, and 50% respectively in all three populations, the PPV was increased to 1.97%, 17.39%, and 50% respectively. In order to increase the PPV of a screening test, a higher prevalence of disease is desirable. So, we can “increase” the presumed prevalence of glaucoma and precursor states by targeting high-risk groups such as the elderly, persons with family history of glaucoma.

Sat, 18 February 13.30 – 15.00 hrs Hall 10 Session: I wERF – Emerging Techniques in Refractive Surgery

Author: Prof. Dr. Gerd U. Auffarth
Dept. of Ophthalmology, Univ. of Heidelberg
Im Neuenheimer Feld 400
69120 Heidelberg, Germany
E-Mail: Gerd_Auffarth@med.uni-heidelberg.de

A Promising Innovation for Complicated Cases

Experience with the VIC TUS Femtosecond Laser Cataract Surgery Procedure

HEIDELBERG – Early experience with a new femtosecond laser platform proved to be promising and safe for the use in patients with pre-existing conditions such as black/brown cataracts or pseudoexfoliation syndrome.

The new VIC TUS femtosecond laser platform (Bausch + Lomb/Technolas Perfect Vision) is a versatile system which provides refractive, therapeutic and cataract applications. The laser features real-time OCT and also employs a curved patient interface, which is used in combination with the intelligent pressure sensors to minimize corneal application and corneal folds. CE Mark approval for the femtosecond laser platform was recently obtained in early December 2011.

Initially laboratory studies on pig and human cadaver eyes were conducted at the University of Heidelberg. These studies measured the maximum applicable stretch force of the capsular bag, found that the femtosecond laser capsulotomy with either the femtosecond laser or with the manual technique in freshly enucleated eyes. Results for the capsular bag stretch force required to rupture divided by the circumference of the capsula immediately before rupture. The study found that 113±12 micro Newtons (mN) in force were necessary to rupture the capsular bag in the femtosecond laser group compared to 73±22 mN in the manual group. This difference was statistically significant. Stretching ratio measurements were also calculated where the stretching ratio is defined as the circumference of the intact-shaped anterior capsula immediately before rupture divided by the unstrained diameter. Results found a higher stretching ratio using the femtosecond laser procedure of 1.67±0.08, compared to 1.36±0.05 using the manual technique.

In the clinical setting, a preliminary evaluation of the femtosecond laser cataract surgery procedure on the VIC TUS platform at Heidelberg University assessed the safety and efficacy of performing the anterior capsulotomy and lens fragmentation in cataract patients with pre-existing conditions. Patients with pre-existing conditions such as black/brown cataracts, pseudoexfoliation syndrome (PES), amblyopia or atrophy were selected to undergo the femtosecond laser cataract surgery procedure in this single surgeon, single centre evaluation. Following the anterior capsulotomy and lens fragmentation using the VIC TUS femtosecond laser platform, phacoemulsification and intracocular lens implantation has been performed using standard manual techniques. Measured outcomes included safety, efficacy, precision and centration of the capsulotomy, use of different lens fragmentation patterns and ease of use of this new femtosecond laser procedure.

To date, 9 eyes (8 patients) have undergone the femtosecond laser cataract surgery procedure. The procedure has been safely performed in all cases, providing good visual outcomes. Docking of the curved interface is straightforward and the graphic user interface (Figure) incorporating the OCT allows easy procedural planning as well as monitoring. The anterior capsulotomies created have been well centred and accurate.

The first patient to undergo a femtosecond laser anterior capsulotomy in Germany was a 66 year old female with a black cataract (OS) and PEX, in May 2011. The surgery was uneventful. Pre-operatively, the patient could only see hand movements, had UDVA of 0.02 and CDVA of -5.0/0.0 = 0.05. At 3 weeks post-operatively, the patients visual acuity had improved to an UDVA (OS) of 0.8 and CDVA of 0.75/180 = 1.0. Lens fragmentation has been performed on all cataract grades. Different lens fragmentation patterns such as radial cuts, ring cuts or combinations of both have been applied. In our first case where both the anterior capsulotomy and the lens fragmentation were carried out with femtosecond cataract surgery, a 65 year old male presented with cortical nuclear cataracts (OU) and amблиопия (OS). With the first eye (OS), the procedure was performed under general anaesthetic, whilst the procedure was performed under topical anaesthesia with the fellow eye (OD). A cross pattern/radial cuts were applied for lens fragmentation. The bilateral implantation of posterior chamber toric IOLs occurred without complications. The patients visual acuity improved from pre-operative CDVA OD 1.25/1.25/177 = 0.5 and CDVA OS of +4.75 = 0.25 to postoperative UDVA OD of 0.8 and UDVA OS 0.32.

In summary, early experience using the femtosecond laser cataract surgery technique indicates it is a very promising procedure which can be safely and effectively used in patients with pre-existing conditions. Further evaluations are on-going to obtain further data on visual outcomes, use of different lens fragmentation patterns and the incorporation of this technique into routine practice.
The Experience of Jordan Eye Bank

Successful Donation Programmes Count on the Help of Religious Leaders

AMMAN - Jordan Eye Bank (JEB) was established in 1994 as a national, non-profit institution devoted to the restoration of sight. It is based at Jordan University Hospital in Amman and funded by four sectors: Ministry of Health, The University of Jordan, Royal Medical Services and Jordan University of Science and Technology. It is run by a committee of five ophthalmologists representing those sectors as well as the private sector.

The main Goals and Objectives of JEB are:

- to organize and provide basic structure for corneal transplantation in Jordan,
- to spread the awareness of the importance and need for local corneal donation and
- to provide corneas for patients in need via local donation or importation from international eye banks supported by JEB.

JEB supplies trephines, solution to preserve corneas free of charge to all public hospitals and provides corneal grafts to more than 1000 patients in all health sectors.

It is worth mentioning here that Jordan is a small developing country with a population size of about six million. In Jordan, 94% of the people are Moslems and 6% are Christians.

As for after death, the principles of inheritance hierarchy if his identity is approved of his kin according to Islamic Shari'a permit benefiting from his lifetime to donate the organs mentioned, or to donate one of them voluntarily and at his own will, or the approval of his kin according to inheritance hierarchy if his identity is known and his family and relatives are known.

A high likelihood of success of the transplant operation based on the opinion of specialized physicians.

4. Total inability of treatment in the absence of organ transplant.

From 1979 till 1991 we were not able to extract local corneas. From 1992 till the end of 2011, more than 2800 local corneal transplants were performed in Jordan according to JEB records. We attribute this to the clear statement in 1988 by the religious authorities permitting corneal donation.

From 1992 till 2006 the average number of local donation was 95 corneas/year. The average of local donation became 280 corneas/year over the past five years. This was achieved with the help of different institutions, the media, JEB Friend Society and campaigns held by local radio stations.

JEB started implementing its new role since 1 August 2003 by importing corneas for all the health sectors in Jordan. In order to control the quality and cost of imported corneas, the Cabinet made a decision allowing only Jordan Eye Bank to import corneas, along with controlling the quality of local donation. The imported corneas exclusively come from: Tissue Banks International (TBI), North Carolina Eye Banks, Heartland Lions Eye Banks, International Sight Registration (ISR) and Midwest Eye Banks.

The recipient has to pay for the shipment and cost of tests ran on the imported corneas, as, on the other hand, local corneas are provided to recipients free of charge.

Cornea importation has decreased. As an example:

- here are some figures for the years and number of corneas imported:
  - 2005: 440 corneas
  - 2007: 378 corneas
  - 2008: 285 corneas
  - 2010: 276 corneas
  - 2011: 221 corneas

This decrease in importation goes back to the fact that we have been extracting more local corneas and we had a large number of keratocoonic patients whom we could recently treat with intrestomal corneal rings instead of corneal grafting.

**JEB – a Look into the Future**, in order to be accepted as a member of the International Federation of Eye Banks, JEB is moving few steps towards its target, such as: setting new regulations under the umbrella of Ministry Of Health, having specular microscope and corneal topographer (Pentacam HR), appointing and training staff and interchanging experience. JEB had a good experience with Midwest Eye Banks which has brought great benefits. During 2011, two short visits by an active team from Midwest Eye Banks were made to JEB to explore its current situation and to give advice on eye banking.

The visits were very fruitful. Midwest Eye Banks thankfully donated a new specular microscope and provided the required training to our bank technicians. A mutual agreement was signed to revise JEB polices and its medical standards and to provide JEB a technical support in order to make it a model in the area.

**Conclusion**

As a conclusion, JEB with all the efforts made by people with a vision of how the world could be a better place has crossed a long way to becoming one of the most important Eye Banks in the Middle East.

Needless to say, that with the help of donors, we will keep making a difference and giving hope to all in need.

Two things about eye banking do remain the same: the smile recipients have when their sight is restored and their gratitude to the generous donors who made it possible.

Friday, 17 February

15.30 – 17.00 hrs

Hall 1

Session: COB - Eye banking

**Author:** Muawysh Al Botour

**Director, Jordan Eye Bank**

E-Mail: botour@yahoo.com

---

**Most Useful for Non-Invasive Examinations**

**Corneal Imaging using Three-Dimensional Anterior Segment OCT**

**OSAKA - The OCT technology will play an increasingly important role as non-invasive and quantitative modality for examining the anterior segment of the eye.**

S

ince optical coherence tomography (OCT) was introduced as a non-contact imaging method that provides detailed cross-sectional images of internal structures of the tissues, OCT has been attracting a great deal of attention in the field of Ophthalmology. It caused a paradigm shift in diagnosing and treating retinal diseases.

The first report of OCT imaging of the cornea and the anterior segment of the eye was published in 1994. The time-domain OCT at 1,310 nm (Visante, Carl Zeiss Meditec, Inc., Dublin, CA) has become commercially available for cross-sectional images of the cornea, anatomic structures of the iridocorneal angle, and anterior chamber biometry. The anterior segment of the eye can be visualized and quantified non-invasively in the clinic. Anterior segment OCT (AS-OCT) is now frequently used not only for diagnosing the pathology of the anterior segment, but also for planning and evaluating anterior segment surgery such as DSAEK and DALK. The resolution in vertical direction is 18 μm and the speed of the A-scan is 2000 scans per second with the 1,310 nm time-domain OCT.

On the other hand, higher resolution (5 μm) and faster speed of the A-scan (26000 scans per second) can be obtained with the 840 nm spectral domain OCT (RTVue-100, Optovue Inc., Fremont, CA). Bowman’s layer can be identified as the parallel lines, and the thickness profile of epithelial layer and stromal layer of the cornea can be analyzed separately with SD-OCT, although it is difficult to obtain images clear enough to separate the epithelial layer from the stroma in a normal cornea with TD-OCT. The details of bullous keratopathy (Figure 1) or epithelial ingrowth under the LASIK flap was clearly shown by the high-resolution images with high magnification using SD-OCT.

The introduction of the 1310nm swept-source OCT, that is categorized as another type of Fourier-domain OCT, empowered us to reconstruct the 3D images of the anterior segment of the eye more precisely. For example, the SS-1000 (Tocey Corporation, JAPAN) has a vertical resolution of 10 μm with 30,000 A-scans per second for 18mm diameter.

We had the chance to develop an OCT-based corneal topographer with the SS-1000 to solve problems of currently available corneal topographers. Figure 2 shows the example how to compare topographic findings among a Placido-based corneal topographer (TMS-4N, Tomey), a Scheimpflug-based corneal topographer (Pentacam HR, Oculeus), and a OCT-based corneal topographer (SS-1000, Tomey). In this eye with mild keratoconus, one can find all the anterior axial power maps revealed similar inferior steepening. Also, elevation maps of the anterior and posterior corneal surfaces and the pachymetry map resemble each other between Pentacam and SS-1000.

The Placido-based topographer uses mire images produced by the reflex in pre-corneal tear film and it is difficult for the videokeratoscope to digitize heavily distorted mire images in eyes with severe irregular astigma.

---

continued on page 11
TUBINGEN – Adequate and in-time vision rehabilitation has a positive effect on secondary depression due to AMD.

We included patients suffering from AMD in both high and best corrected visual acuity not better than 0.2 to make sure that reading was not possible anymore without low vision aids. None of the patients had undergone visual rehabilitation before. We recruited patients into two study arms: a rehabilitation group, which was provided with low vision aids at the first assessment, and a control group which was provided with 3 months later at second assessment. All patients underwent clinical ophthalmological examination and psychological testing at first and second assessment. We measured reading speed of patients in the rehabilitation group at both assessments, of control group only at second assessment because the control group did not get rehabilitation before and therefore could not read at first assessment. Psychological testing was executed via Geriatric Depression Scale, German version of CES-D-Scale (ADSL: general depression scale), Mini-Mental State Examination, Dementia Detection Test and Quality of Life was determined by National Eye Institute Visual Function Questionnaire (NEI-VFQ).  

We included 22 patients, who were randomly assigned: 11 were recruited for the rehabilitation group and 11 as controls. Average age was 79 (range 68–85) years. At first assessment there was no statistically significant difference between the two groups regarding age, gender, education, cognitive status, depression and quality of life. Best corrected visual acuity did not change in the three months interval.

Reading speed in the rehabilitation group, as expected, improved in a clinically relevant manner from 44 words per minute up to 59 words per minute. Because of the small number of patients included, this difference did not become statistically significant.

In terms of the psychological testing we observed changes from visit one until visit two in three test items:

<table>
<thead>
<tr>
<th>p</th>
<th>0.039</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st visit</td>
<td>12</td>
</tr>
<tr>
<td>2nd visit</td>
<td>10</td>
</tr>
<tr>
<td>Control</td>
<td>13</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>8</td>
</tr>
</tbody>
</table>

As always, there is no simple answer to this question, otherwise there would be no point in writing an article or giving a presentation on this topic! To start, let us remember that the astigmatism to be corrected is corneal...

Toric Multifocal IOLs or Bioptics?  

The Correlation of Astigmatism in Cataract and Refractive Surgery

MANNHEIM – The correlation of corneal astigmatism is a significant issue in cataract and refractive surgery.  

Multifocal IOLs are designed to replace glasses. This is achieved by a perfect refractive outcome, which means that astigmatism is at a minimum. To achieve good vision at distance and near, the refractive error must be within +/-0.5 D, both for sphere and cylinder. Multifocal IOLs are thus much less tolerant to residual astigmatism than monofocal IOLs, which means that any astigmatism existing preoperatively is induced by the surgery must be addressed more precisely than in a monofocal IOL. As about 60-70% of eyes present with cataract astigmatism of more than 0.5 D before surgery, the correction of astigmatism is a significant issue both in cataract and refractive surgery.

Which Technique is Preferable?  

Corneal astigmatism can be corrected using corneal incisions, corneal laser refractive surgery such as PKRLASEK or LASIK, and toric IOLs. Toric multifocal IOLs are now available from a number of companies including Alcon, Zeiss, and others. The question raised here is: Which technique is preferable? Shall we use a toric multifocal IOL or shall we combine laser refractive surgery and implantation of a multifocal IOL, a technique named “biotics”? Shall we use other options such as corneal incisions?

Danger of Image Distortion  

As always, there is no simple answer to this question, otherwise there would be no point in writing an article or giving a presentation on this topic! To start, let us remember that the astigmatism to be corrected is corneal...

Early Visual Rehabilitation Prevents Depression  

Results of a Randomized and Controlled Pilot Study in Patients with AMD

We hypothesize that adequate and in-time vision rehabilitation has a positive effect on secondary depression due to AMD.

We included 22 patients, who were randomly assigned: 11 were recruited for the rehabilitation group and 11 as controls. Average age was 79 (range 68–85) years. At first assessment there was no statistically significant difference between the two groups regarding age, gender, education, cognitive status, depression and quality of life. Best corrected visual acuity did not change in the three months interval.

Reading speed in the rehabilitation group, as expected, improved in a clinically relevant manner from 44 words per minute up to 59 words per minute. Because of the small number of patients included, this difference did not become statistically significant.

In terms of the psychological testing we observed changes from visit one until visit two in three test items:

<table>
<thead>
<tr>
<th>p</th>
<th>0.039</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st visit</td>
<td>12</td>
</tr>
<tr>
<td>2nd visit</td>
<td>10</td>
</tr>
<tr>
<td>Control</td>
<td>13</td>
</tr>
<tr>
<td>Rehabilitation</td>
<td>8</td>
</tr>
</tbody>
</table>

As always, there is no simple answer to this question, otherwise there would be no point in writing an article or giving a presentation on this topic! To start, let us remember that the astigmatism to be corrected is corneal...

Possible Side Effects  

First, there are the side-effects of laser refractive surgery, namely dry eye syndrome in LASIK and haze in surface ablation. Second, performing laser refractive surgery requires another surgical procedure, in addition to the IOL implantation. The patient has to come again, and there are the general risks of surgery. Thus, from an overall perspective, a toric...
Use of the Femtosecond Laser

My current approach is a combination of the above and yet another technique. I implemented laser refractive surgery with an intracorneal femtosecond laser in July 2011. I use the Alcon LenSx femtosecond laser, which enables me to perform corneal incisions both for entry into the eye and for astigmatism correction, capsulorhexis, and lens fragmentation and liquefication. If the suction is lost during the last second of the side cut, I always position my main incision on the steep axis of the cornea (or at 12 o’clock, if there is no astigmatism present). I combine this main incision with an arcuate incision on the opposing half-meridian, or I use two arcuate incisions in addition to the main incision, if I place the main incision away from the steep meridian. The use of the femtosecond laser in lens surgery therefore enables me to correct corneal astigmatism by performing arcuate corneal incisions at the time of lens surgery. I use this approach routinely in eyes with corneal astigmatism of less than 2 D.

Corneal astigmatism of 2 D or more can still be corrected on the cornea using arcuate incisions alone, but the incisions will induce a significant amount of corneal irregularity as they are typically performed at a radius of 4.5 mm (9 mm diameter), or even less, and therefore not too far away from the center of the cornea. Because of this irregularity, I prefer to split the correction of corneal astigmatism of 2 D or more between corneal arcuate incisions and a toric multifocal IOL. For example, if corneal astigmatism of 3 D is present, I will implant a toric multifocal IOL, which corrects 1.5 D of astigmatism at the corneal plane, and I will use arcuate laser incisions to correct the remaining 1.5 D of corneal astigmatism. This approach minimizes optical side effects and maximizes predictability of refractive outcomes.

What about biopsies? Is there still a place for laser refractive corneal surgery in combination with IOL implantation? I believe there is, although I do not longer use biopsies as a pre-planned procedure if a toric multifocal IOL is available. In my opinion, biopsies are therefore indicated whenever a toric multifocal IOL is not available for the attempted correction, or in all cases of re-treatments due to unexpected refractive outcome. The predictability of IOL calculation formulas is far from 100%, the outcome of arcuate incisions varies considerably, and toric IOLs can, as of today, not be implanted “on axis” in all eyes. This results in a certain number of “not perfect” refractive outcomes, which need to be addressed. A corneal arcuate incision can, of course, be repeated and enlarged, and a misaligned toric IOL can be rotated. Adding or enlarging an arcuate corneal incision, however, is not very predictable, and re-aligning a toric IOL requires another intracorneal procedure. Therefore I prefer to use laser refractive corneal incisions. In such cases, I typically will perform LASIK with a femtosecond laser. I always place my arcuate incisions at a radius of 4.5 mm (9 mm diameter), which leaves space for an 8.5-mm flap, which is my preferred choice. I prefer LASIK, but this is a personal choice. PK/LEASK work just as well and will give the same results.

Conclusion

In summary, biopsies are the better choice from a purely optical perspective, as corneal astigmatism is corrected at the corneal plane. However, toric multifocal IOLs are the preferred option, because they require one surgical procedure only in most eyes and still provide an excellent refractive outcome. Toric multifocal IOLs may be combined with corneal relaxing incisions (e.g., laser refractive lens surgery with a femtosecond laser) to minimize optical side effects and maximize refractive outcome.

Thu, 16 February
13.00 – 14.30 hrs
Hall 1
Session: Presbyopia correction: where are we?

Author: Michael C. Knorz
Consultant, Ophthalmology
Medical Faculty Mannheim
Heidelberg University
Mannheim, Germany
E-Mail: michael.knorz@med.uni-mannheim.de

Dr. Knorz is a consultant to Alcon LenSx, Ft. Worth, TX, USA

Management of Complicated Femtosecond Laser Flaps

Problems often Linked to the Surgical Technique

T he most crucial step in LASIK is the creation of the corneal flap, as anything less than a perfect flap jeopardizes the success of the operation. Although the microkeratome has long been used successfully for flap creation, recently, the femtosecond laser has found extensive use in the creation of corneal flaps. It has excellent results with the microkeratome in our clinic, we initially felt that we did not need the femtosecond laser. However, a few weeks after the installation of the femtosecond laser we were so pleased with its results that we immediately chose the femtosecond laser. The femtosecond laser has been so successful that we have not seen any.

Suction Loss

This is an occasional complication where the suction ring loses vacuum during the flap creation. Tight orbits, lid squeezing and faulty positioning are the main causes. If suction loss happens during the raster phase, we reapply a different suction ring and the same procedure is repeated. If the suction is lost during the side cut we repeat the side cut only by reducing the diameter by 0.2 mm, using a new corner with a different suction ring. Sometimes the suction is lost during the last second of the side cut. In this case we do not repeat the side cut, because in our experience, the side cut is almost always sufficient to achieve suction in spite of severe attempts. In these cases, I performed the cut by increasing the pressure and manually holding the suction ring without any complications.

Gas Bubbles

The most common problem is the gas bubble layer which interferes with the laser track. In these cases, it is best to wait until the bubble layer diminishes to a level which does not interfere with the excimer laser auto-tracking. Gentle massage of the corneal surface with a spatula may shorten the time by helping the absorption of the bubbles. Sometimes the gas bubbles find their way into the anterior chamber by dissecting the cornea and trabecular meshwork. These bubbles, because of the supine position of the patient interfere with the patient fixation and the laser auto-tracking. In such cases simple dilatation of the pupil usually solves the problem with the auto-tracking, or one can wait a few hours or ask the patient to come the next day.

Vertical gas breakthrough may happen in corneas with scars that caused a physical defect on the Bow- man’s membrane. During the femtosecond raster phase, this can be recognized as a black spot. We avoid lifting such a flap with this problem. The best method of avoid vertical gas breakthrough is to make the flap thicker. If the scar is not recognized before the flap is lifted causing a button hole, after the excimer laser, the flap is repositioned and carefully dried then a contact lens is applied. We have had several such cases without any negative consequences.

Flap tears

The most serious complication associated with the femtosecond laser flaps is cutting the flap with the spatula. This is usually a surgeon-related complication. To prevent this one should check the tip of the spatula carefully before applying the suction. In such a case, I leave a thin island of unseparated flap near the hinge tear and separate the rest of the flap to prevent extension of the hinge tear. I separate this island after complete separation of the flap then place the hinge and dry the edges. If the hinge is totally torn, the flap is separated in such a way that a hinge is left at 180 degrees from the original hinge.

Incomplete Side Cut

The reason for this complication is the uneven cone position in the suction ring, causing uneven application during the procedure. The surgeon can notice this during the laser application or later at the excimer laser while lifting the flap. In our practice, if the partial cut is less than 4 degrees, we do not attempt a second side cut, even if we see it during the flap creation. Instead, we dissect the flap from where the side cut is proper and then carefully lift the uncut portion with the aid of a McPherson forceps. This is not as difficult as it sounds because there usually is a partial side cut. Although the relatively irregular edges increase the risk of epithelial ingrowth, we have not seen any.

Decentered flap

Extreme attention should be paid to center the flap on the cornea. Marking the center of the cornea before applying the suction ring helps to better centration, however it is possible to achieve perfect centration without marking.

Since the femtosecond corneal flaps are usually over 9mm, only extreme decentration can be clinically significant.

IZMIR – The femtosecond laser has documented advantages in creating the corneal flap. Complications are rare and not as devastating as some of the microkerato- me-associated complications.

Previous Penetrating Keratoplasty and RK

It is possible to make femtosecond laser (flaps larger or smaller than the graft in corneas with previous penetrating keratoplasty. Lifting the flap in cases where the flap is larger than the graft and in corneas with RK is the most difficult part because the graft interface or RK incision may separate. One should dissect the flap very carefully in order to preserve the integrity of the cornea. If vertical break- through happens at the site of RK cuts, lifting the flap is not recommended because of the risk of a button hole.

Unfittable Flap and Nondissected Islands

This is a rare complication where the interface is insufficiently dissected and therefore difficult to separate. It may be possible to separate the flap using a little more force during the lifting. Using too much force should be avoided for fear of damaging the flap. In such cases it is advisable to postpone the surgery to a later date and attempt again with the femtosecond laser or the microkeratome.

Conclusion

The complications of femtosecond laser flaps are rare and they usually can be handled by the surgeon without further complications for the patient. These complications are not related to the femtosecond laser instrument but to the surgeon. The application of good surgical technique usually prevents such complications.