Cutting-edge concepts in refractive surgery, ranging from presbyopia correction to innovations in laser refractive surgery and beyond, were addressed in the Monday morning session “The Upcoming Technology Revolution in Refractive Surgery.”

Guy Kezirian, MD, Scottsdale, Arizona, U.S., first brought up the various sociologic factors related to refractive surgery.

“It’s time for us as a profession to consider the sociology of what we do,” Dr. Kezirian said, adding that there are a broad range of things impacted by refractive surgery, such as psychology, education, lifestyle, fitness, and safety.

From a psychological standpoint, Dr. Kezirian said the profession hasn’t really acknowledged the psychological impact of refractive surgery on adolescents. He discussed the results of a study that found kids who wore glasses, on average, had lower self-esteem, were lonelier, experienced more criticism, had a higher weight, felt more fear, and had stressful events related to being lost without their glasses. For this group, Dr. Kezirian said refractive surgery can offer hope, with glasses and contact lenses being a bridge to get eyes to maturity before they can be fixed with refractive surgery.

There are occupational hazards that result from wearing glasses and contact lenses. In some fields, due to these hazards, Dr. Kezirian said refractive surgery has become a common procedure, but “we haven’t evenly penetrated all fields and it’s time to do that.”

Transitioning to DMEK

Monday morning session highlighted transitioning to Descemet membrane endothelial keratoplasty (DMEK) and explored different DMEK techniques. Presentations touched on using OCT in DMEK surgery, experience with eye bank-prepared tissue for DMEK, difficulties with transition to DMEK, experience with tissue injectors, and reDMEK.

Josep Torras, MD, Barcelona, Spain, presented first at the session, discussing his experience with eye bank-prepared tissue for DMEK, particularly highlighting experience with the Barcelona Tissue Bank (BTB).

He started by comparing how tissue is delivered from the eye bank for both Descemet’s stripping automated endothelial keratoplasty (DSAEK) and DMEK.

He then discussed experience so far doing pre-dissected DMEK surgery at his surgery center, starting in January 2017. Over the first year, Dr. Torras said the surgery breakdown was about one-third DMEK, one-third DSAEK, and one-third penetrating keratoplasty (PK). However, he noted that during the first 4 months of 2018, they have had a trend toward DMEK, completing 21 cases, compared to five DSAEK.

Overall, he has been happy with his DMEK experience because, out of 52 cases performed so far in 2017–2018, 46 have achieved a clear cornea at 1-month postop. There were six primary failures, he said, but four were seen at the time of surgery, and 16 cases (31%) had to be rebubbled.

He also explained the steps he takes when doing DMEK surgery, showing surgical video. Overall, Dr. Torras said that he finds eye bank-prepared tissue easy to prepare, mark, and load. He has also had good experience with tissue quality.

Sara Martin, MD, Barcelona, Spain, discussed the use of OCT in DMEK, particularly highlighting intraoperative OCT (iOCT). She first said that DMEK is challenging because of delicate graft, deficient visibility in some steps, and a longer learning curve. iOCT, she said, can be particularly useful for complex cases, and it can be helpful relating to descemetorhexis, graft orientation, graft unfolding, and graft adhesion.
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There are also safety implications inherent with glasses and contact lens wear. Glasses can be lost or forgotten, which is dangerous in an emergency situation. Contact lenses require proper care and without it can result in infections and corneal ulcers. There are also issues with glare at night.

Then, there’s the cost/economics related to the lifetime of glasses or contact lens wear, which is more expensive in total when compared with the one-time cost of refractive surgery. Dr. Kezirian highlighted on an illustrative slide.

While there are efforts to provide refractive correction via glasses to those in developing countries, Dr. Kezirian said he thinks refractive surgery should be delivered as primary care on a global scale. Glasses, again, can be lost, broken, and are difficult to deploy in certain areas.

“Much of the world skipped telephone lines and went straight to cell phones. … I think we will skip telephone lines and went straight to deploy in certain areas. Can be lost, broken, and are difficult to get it correctly oriented. Dr. Martin said it offers full vision at a range of distances, provides a balanced distribution of light for better contrast sensitivity, and causes virtually no glare or halo.”

In terms of what’s new or coming down the pike in refractive surgery, Dr. Felipe Vejarano, MD, Popayan, Colombia, presented about pharmacologic preoperative treatment, specifically with a drop that he created called FOV Tears. The compound has been tested in a non-controlled prospective study, showing safety and efficacy of improved both farsighted (0.5–1 D) and near (2–3 D) vision, especially with continued use; a controlled study is planned.

With the increase in myopia on a global scale as a result of environmental factors, Dr. Kezirian said there is a place for myopia control, through things like schools making an effort to get students outside, campaigns to reduce near screen time, and more.

“Refractive errors can be corrected across the span of a lifetime,” Dr. Kezirian said, adding, however, that less 4% of the world’s population has ever seen refractive surgery. “Right now, vision correction is still back in the early 20th century. We have to bring it forward to the 21st century,” he emphasized later.

In terms of what’s new or coming down the pike in refractive surgery, Dr. Felipe Vejarano, MD, Popayan, Colombia, presented about pharmacologic preoperative treatment, specifically with a drop that he created called FOV Tears. The compound has been tested in a non-controlled prospective study, showing safety and efficacy of improved both far (0.5–1 D) and near (2–3 D) vision, especially with continued use; a controlled study is planned. Dr. Vejarano also provided data about his own personal experience with the drops as well.

Jorge Alio, MD, PhD, Alicante, Spain, provided an update on photorefractive intrastromal corneal tunneling (PISTOL), Care Group, Vadodara, India), which is commercially available in Europe and some parts of Asia. This posterior chamber IOL is apodizing, trifocal, and diffractive. Dr. Alio said it offers full vision at a range of distances, provides a balanced distribution of light for better contrast sensitivity, and causes virtually no glare or halo. Sam Mosquera, PhD, Frankfurt, Germany, shared what might be next in refractive surgery, including photorefractive intrastromal cross-linking (PIXL, Avedro, Waltham, Massachusetts, U.S.); myopia control with agents such as atropine, orthokeratology, peripheral defocus modifying contact lenses, and others, like drops that induce keratocytes to produce type II collagen, which stiffens and thickens the cornea; SMILE, allogenic lenticules placed in a pocket or under the epithelium; trans-PK; and scleral crosslinking, to name a few.

Sri Ganesh, MD, Bangalore, India, expounded upon SMILE and whether it could be used for all refractive errors. The short answer is yes. Dr. Ganesh presented case reports showing success of SMILE in low myopia; high myopia, such as a case of –19 D sphere and –5 D cylinder, combined with ICL implantation; high astigmatism with intraoperative cyclotorsion compensation, which at this point is done with manual rotation and alignment of the cone; mixed astigmatism; hyperopia; and presbyopia with monovision.

Current commercial software is limited to myopia and myopic astigmatism, but things like automated cyclotorsion and wavefront and topography-guided SMILE might be possible in the future, allowing for a customized lenticule profile.

For descemetorhexis, she said, iOCT can help check for Descemet remnants and debris. This is extremely important to help avoid graft detachments. For graft orientation, iOCT can help determine where the graft is in the anterior chamber and help to get it correctly oriented. Dr. Martin noted that this technology may be particularly useful when the graft is very tightly rolled.

Relating to graft unfolding, iOCT may be particularly useful in difficult situations, especially if the graft is upside down or hard to turn. She described a case where the graft was rolled like a taco and unfolding was very difficult. Without iOCT, the case could have been a failure, she said. It helps the surgeon to see when the graft is unfolded correctly and enables faster graft position, she said.

For graft adhesion, Dr. Martin said that this technology is useful when visualization is bad.

In summary, she said that iOCT has a number of benefits in DMEK surgery: it modifies surgical decisions and optimizes additional maneuvers; it reduces surgical time and unnecessary manipulations of the graft; it provides constant check of the endothelial side of the graft; and for Dr. Martin, it has helped increase DMEK candidates.

She added that iOCT facilitates the transition from DSAEK to DMEK and improves surgeon confidence. It also provides security in difficult cases with compromised anterior chamber visualization, she said, and decreases the risk of failure due to an inverted graft and detachment due to Descemet remnants.

Also during the session, Antoni Sabala, MD, Barcelona, Spain, discussed difficulties with DMEK transition, highlighting his personal experience with DMEK surgery.

DSAEK is a great surgery, but you can also get very poor vision without explanation, he said. DMEK can offer better visual acuity and less rejection. He suggested different ways to learn DMEK: courses, articles, visiting a DMEK surgeon, practicing with deep anterior lamellar keratoplasty (DALK) donors, and looking at videos on YouTube. Dr. Sabala also discussed patient selection called DMEK, noting that you may want to avoid this technique in patients with large iris defects, filtration tubes, poor visualization, an AC lens, large pupils with inability to constrict, previous vitrectomy, difficult posturing. He suggested starting with pseudophakic Fuchs’ dystrophy cases.

Dr. Sabala also said that the two most difficult steps in DMEK surgery are the insertion and the unfolding. He also said that variations on the DMEK technique could help improve reproducibility. He detailed the Hybrid-DMEK technique, which is a concept of using a DSAEK method for DMEK. Dr. Sabala said he has done four cases testing this technique (one with a primary failure). He used DSAEK cut tissue, Descemet’s membrane (DM) dissection using Muraine punch, and an 8-mm punch (posterior lamellar graft with detached DM). He said that next step may be to try using tissue with the DM partially detached.
Fourth ‘Landmark Achievements’ session highlights medical retina, neuro, and orbit and oculoplastics

by Liz Hillman EyeWorld Senior Staff Writer

The fourth and final session of the “WOC Day of Landmark Achievements” Sunday afternoon reviewed relatively recent advances in medical retina, neuro-ophthalmology, and orbit and oculoplastics.

Nancy Newman, MD, Atlanta, Georgia, U.S., addressing landmark research within the last few years in neuro-ophthalmology, first called attention to papers from around the world that have found a significant percentage of patients presenting with central retinal artery occlusion (CRAO), branch retinal artery occlusion (BRAO), or transient monocular vision loss (TMVL) have a positive diffusion weighted images (DWI)-MRI.

“At the same time they had a retinal event, they had acute cerebral infarction that was silent,” Dr. Newman said, noting that the research identified a subgroup of patients who were at “extremely high risk of major strokes.” Dr. Newman added that these strokes were likely to occur within the week, sometimes within 48 hours of the acute infarction. As such, DWI-MRI needs to be performed within 24–48 hours of vision loss to allow for effective prevention.

Dr. Newman said this is great news for the ophthalmologist. “You send them to the closest stroke center immediately.” Going forward, ophthalmologists need to put in place procedures for where to send these patients when they’re identified, and figure out how to get the message to patients that acute vision loss should be considered concern for possible stroke and that they should thus seek medical attention.

Dr. Newman addressed other categories of neuro-ophthalmology that have seen advances as well. In terms of optic neuritis, she said there are “two new kids on the block” that should be considered and tested for when a patient presents with optic neuritis that is bilateral, accompanies a normal MRI, when it doesn’t get better or is recurrent, or is otherwise abnormal. These are neuromyelitis optica (NMO) antibodies and myelin oligodendrocyte glycoprotein (MOG) antibodies. Dr. Newman conducts NMO antibody testing on all optic neuritis patients, because they have a totally different management and some drugs used in multiple sclerosis, which is associated with more typical forms of optic neuritis, could make the condition worse. These patients

MFIOL update

by Stefanie Petrou Binder EyeWorld Contributing Writer

Modern approaches to IOL multifocality was a hot topic on Monday morning during a session that addressed all aspects of MFIOLs.

According to Warren Hill, MD, Mesa, Arizona, U.S., lens power calculations are always the elephant in the room, with accuracy really only evident postoperatively. His recommendations included sticking to one type of preoperative keratometry, making avail of optical biometry, obtaining an aberration profile prior to surgery, performing a round, centered capsulorhexis, adjusting for axial length in the high myope, using the ASCRS website for IOL calculations, optimizing lens constants for each IOL model, and incorporating IOL power selection methods “from this century.”

The speakers had different preferences and experiences with some of the newer IOL models. Co-moderator Yehia Mostafa, MD, PhD, Cairo, Egypt, believes that extended depth of focus IOLs offer better quality for all distances and decreased dysphotopsias. They are more forgiving for decentration and biometry errors and can be used after LASIK and PKR. His own studies showed almost 95% patient satisfaction, with 5% mild glare, 15% mild halos, and only 10% of patients requiring distance glasses and 21% requiring reading glasses, 25% of the time.

Co-moderator Leonidas Mavroudis, MD, Thessaloniki, Greece, feels that asymmetric, split bifocal IOLs offer unique advantages over diffractive lenses, with contrast sensitivity almost as good as that seen with monofocal IOLs, limited halos at night, visual acuity as good as with monofocals, and less tear film quality dependency. He elucidated careful patient selection, late IOL tilt, coma with the potential need for late lens rotation, and intermediate vision not meeting patient expectation, among some of the challenges he experienced with these IOLS.

Trifocal IOLs have come a long way, according to session co-moderator Baha Toygar, MD, Istanbul, Turkey, whose experience with the FineVision trifocal IOL (Physiol, Liege, Belgium) implanted binocularly showed good visual outcomes at all distances, especially for intermediate and near vision. All of his patients achieved spectacle independence and had satisfactory contrast sensitivity. Dr. Toygar had good predictability with this lens with all eyes within 0.25 D of target.

The clinical defocus curve is the best way to anticipate the clinical behavior of an MFIOL in terms of image fociality, said Jorge Alio, MD, PhD, Alicante, Spain. Defocus curves, however, do not include data on the amount of light that exists at each focal point. He said that the best way to get complete information about an MFIOL’s clinical behavior was through contrast sensitivity function. He noted that ex-vivo data was only an orientation, as it did not include the neuro-processing of the multifocal image.

Mahmut Kaskaloglu, MD, Izmir, Turkey, reminded that the management of unhappy MFIOL recipients needs to be preempted at the preoperative stage, as once the operation is performed, the patient’s complaints become the surgeon’s responsibility. Most patients adapt to their MFIOL, will usually turn down an IOL exchange, and may need up to 1 year for neuroadaptation. Time is the best remedy, he said, however, the surgeon needs to be ready at all times to deal with residual refractive errors and persistent patient complaints.

Monovision was discussed by Fiomena Ribeiro, MD, PhD, Lisbon, Portugal, who feels that monovision is a satisfactory solution for patients who cannot afford or may not be suited for MFIOLs. While most of what we know comes from the contact lens literature, data on monovision is adding up and the evolution seems to be pointing in the direction of micro-monovision. It gives good quality of vision, is less sensitive to decentration and capsular opacification, and is preferable for patients who develop macular disease. Ocular dominance is key for the success of this approach.
need to be on IV steroids for more than 5 days with plasma exchange being initiated if they don’t respond. Steroids need to be very slowly tapered to prevent reoccurrence, and the patient should be treated with chronic immunosuppressants. Optic neuritis associated with MOG antibodies, which Dr. Newman pointed out never tests positive along with positive NMO—it’s one or the other—merits similar treatment, though slightly less aggressive.

She also discussed advances in treatment of Leber hereditary optic neuropathy, which results from mutations in mitochondrial DNA. This condition can actually be prevented pre-conception with a nuclear transfer technique in which the mother’s nucleus is extracted and put in a donor cytoplasm (without mitochondrial DNA mutations), which is then fertilized. Other excitations in mitochondrial DNA. This results in neuropathy, which results from mutations in mitochondrial DNA. This condition can actually be prevented pre-conception with a nuclear transfer technique in which the mother’s nucleus is extracted and put in a donor cytoplasm (without mitochondrial DNA mutations), which is then fertilized. Other exciting research for this condition is in gene therapy, specifically allotopic rescue where the non-defective gene is inserted into nuclear DNA, which then makes wildtype proteins that are necessary for mitochondrial function and that enter the mitochondria with this therapeutic gene. Rodent and primate studies have shown proof of principle, and Phase 1 studies have found it safe to be injected into the human eye. Two Phase 3 multicenter trials are underway, with preliminary data from one of them showing significant preservation of both retinal ganglion cells and nerve fiber layer and better contrast sensitivity in the treated group.

Rajendra Apte, MD, PhD, St. Louis, Missouri, U.S., speaking about advances in medical retina, detailed research comparing the various anti-VEGF therapies in DME. Studies have shown aflibercept, bevacizumab, and ranibizumab as having similar results in terms of visual acuity and reduction in central subfield thickness over time.

In terms of the benefit of vitrectomy for DME, Dr. Apte said it’s “something to consider as data accumulates with the role of the vitreo-retinal interface,” because there is improved oxygenation after vitrectomy (supplemental nasal oxygen has been shown to improve DME over the short term) and inflammatory cytokines in the vitreous could be promoting DME.

Gene therapy for retina only has one FDA-approval (Luxturna, Spark Therapeutics, Philadelphia, Pennsylvania, U.S.), which Dr. Apte noted serves only a specific small percentage of patients with retinal pathology and costs $425,000 per eye. But there are a number of other therapies in different stages of clinical trial, he said.

Wendy Lee, MD, Miami, discussed achievements in orbit and oculoplastics. First, she addressed treatment of lacrimal gland adenoid cystic carcinoma, a rare but deadly ocular cancer, with intra-arterial cytoreductive chemotherapy. Since first being described for use in ophthalmology by David Tse, MD, and Pasquale Benedetto, MD, in 1998, the mortality rate from lacrimal gland adenoid cystic carcinoma for patients treated with this therapy, which includes several rounds of intra-arterial cisplatinum and IV doxorubicin preoperatively and post-tumor excision, has been drastically reduced, as has the reoccurrence rate, compared to traditional treatments. There have also been advances in thyroid eye disease, specifically with teprotumumab, which has breakthrough therapy designation from the FDA, and in 3-D applications for surgical planning, customizable templates and implants, and surgical instruments. EW

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Tuesday WOC 2018

Current options in keratoconus treatment

by Liz Hillman Eyeworld Senior Staff Writer

What are the current options for treatment of keratoconus and corneal ectasia? What might be available in the future? How is it detected and diagnosed? How can the cornea be regularized? And what combinations of procedures are there for stopping progression and regularizing the cornea? These questions and more were answered during a Monday morning session hosted by the Barraquer Institute.

Jose Lamarca, MD, Barcelona, Spain, discussed the indications for crosslinking, its contraindications, and the various ways in which the procedure can be performed. There are different agents that can help induce a corneal collagen crosslinking effect, but the most effective, to date, is riboflavin and UV-A exposure. There is also debate on whether the epithelium needs to be removed or not. If the epithelium is left on, there are different modalities being employed and/or evaluated to improve the crosslinking effect, including femtosecond laser-assisted crosslinking, iontophoresis, intracameral injection of riboflavin, and nanoriboflavin.

There are also different applications of treatment, such as central, peripheral, and customized crosslinking. There are also different protocols, including the standard Dresden, accelerated, and continuous vs. pulsed.

Dr. Lamarca emphasized that while much is being done in the way of research to preserve the epithelium and expand indications for crosslinking, “at the end, we will need more research to know how it’s going,” he said.

Rafael Barraquer, MD, PhD, Barcelona, Spain, tackled the topic of intracorneal ring segments (ICRS) and how to choose the best combination for specific cases. ICRS are implants that occupy space, Dr. Barraquer said. They force collagen to “make a detour,” resulting in the collagen increasing tension and creating a change in curvature through a biomechanical/compressive effect.

Local ICRS of 90 degrees have an astigmatism-correction effect, while circular ICRS have a spherical, flattening effect. Coma can be corrected by asymmetrical implantation of one or two ICRS, Dr. Barraquer said.

Some keratoconus cases can be corrected with ICRS, Josef Alfonso Sanchez, MD, Oviedo, Spain, said, focusing his thoughts on morphological classification of the disease. Overall, he said, that classic classification grades in keratoconus are not enough to establish a nomogram for deciding upon treatment, but classification of keratoconus into phenotypes is possible, with correction strategy depending on phenotype.

How to combine techniques for conservative correction of keratoconus and other forms of ectasia, Juan Alvarez de Toledo, MD, PhD, Madrid, Spain, said, is a “fascinating subject of anterior segment surgery with so many options now available to ophthalmologists. The main factors that can help physicians choose a treatment protocol include age, eye rubbing (allergy), profession, progression, disease stage, refraction, whether keratoconus is combined with axial myopia, and whether any prior optical treatments have been conducted and failed. Young patients with documented keratoconus should be considered for crosslinking, possibly ICRS if their refraction cannot be corrected with glasses or contact lenses, and should be advised to stop eye rubbing, Dr. Alvarez de Toledo, said. Those with stable keratoconus and a refractive defect could have ICRS with or without an ICL. DALK or PK, of course, might be needed in more advanced stages.

Even with all the techniques that are available to manage keratoconus and ectasia in a less invasive way, there is still a role for keratoplasty, Jorge Alio, MD, PhD, Alicante, Spain, said. He provided a decision flow chart for corneal transplantation in grade IV or IV+ keratoconus. If Descemet’s and endothelium is intact, DALK is a good option, while tears and severe deep scarring should move to PK. If there is an isolated deep scar DALK and PK could be considered, depending on the scar’s orientation with the visual axis. Dr. Alio also provided a brief overview of surgical considerations for performing these procedures.

Another new avenue in keratoconus are biomarkers, which are now being identified and could be used to detect keratoconus disease early. Isabel Lema, MD, PhD, Santiago de Compostela, Spain, described a hypothesis involving an inflammatory pathway that leads to cell death and results in alterations in the stroma, causing keratoconic conditions. Based on several studies, TLR2 and TLR4 in corneal epithelial cells, Dr. Lema said, may play an important role in keratoconus pathogenesis and could be predictive biomarkers for the disease. EW
An interactive session on Monday afternoon featured video cases of cataract surgery complications being presented. The videos were paused at specific points, with audience members voting on management decisions. Panels also discussed the cases.

Some of the cases during the session touched on rapid cataract post-vitrectomy, toric IOL and PCR, traumatic cataract and zonular dialysis, rock hard nucleus and fixed pupil, traumatic cataract, and an unhappy multifocal IOL patient.

One case Dr. Chang shared was using a high power toric IOL in a patient’s second eye. The patient was a 96-year-old who already had a T5 toric in the right eye and presented with a cataract in the left eye with lots of cylinder. The patient needed a T6.

Dr. Chang noted that in this case he experienced temporal PC rent with subincisional I/A and vitreous coming up in incision.

He asked the audience to weigh in on what vitrectomy plan they would choose for a torn PC with vitreous prolapse. Over a third (35%) said they would use CCI and split infusion.

Dr. Ravindran said he would use split infusion and anterior vitrectomy through the limbus with a new incision (and 24% of the audience agreed with him).

Dr. Spalton also agreed that he would use a new limbal incision and split infusion.

While 29% of the audience voters said they would do pars plana plus a limbal infusion cannula, none of the panelists said they would use...
"everything's fine." Meanwhile, 21% of respondents said they wouldn’t mention any complication, unless a problem should arise later, and 29% said they would discuss the PCR but not the lack of the 3-piece MF.

Dr. Ribeiro said that you must tell the patient what happened.

Dr. Ribeiro said that, though the pars plana approach is not dangerous, she just doesn’t frequently use this approach.

Dr. Chang next questioned the audience about which IOL option they would choose moving forward. Of the respondents, 10% said they would choose a toric SPA IOL in the bag, 25% would choose a toric SPA IOL in the bag with reverse optic capture, 10% would choose a non-toric SPA IOL in the bag, 55% would choose a non-toric 3-piece IOL in the sulcus, and no one in the audience voted to enlarge the incision and use an AC or PC PMMA IOL in the sulcus.

Dr. Crandall said, in this case, since the patient is 96, you don’t want to go back to the OR. He added that alignment could be problematic if you’re trying to reverse optic capture, and he would choose to abandon the original plan and do an LRI or something else. You could consider an anterior chamber lens, he said.

Dr. Chang chose to still proceed with the toric because he already had a toric in the other eye. The worst thing that could happen is dislocation, he said.

During the procedure, Dr. Chang said the haptics unfolded slowly and the case ended looking good. He put Miochol in to bring the pupil down as quickly as possible.

Dr. Chang emphasized that, during the procedure, he was doing everything to not expand the tear, but he also noted that the tear won’t wrap around if you don’t put a lot of pressure on it and pull vitreous up through it.

With the case completed, Dr. Chang asked the audience what they would tell the patient immediately postop. Half (50%) of the respondents indicated that they would discuss the unexpected “difficulty” but not specifics and tell the patient that correct with spectacles, while 3% would reposition in the bag, 19% would reposition in the bag and do reverse optic capture, 6% would do an IOL exchange with a 3-piece IOL in the sulcus, and 6% would refer the patient. EW
Monday morning session on progress in excimer laser surface ablation highlighted some of the most recent innovations in this area of ophthalmology.

During the session, Shigeru Kinoshita, MD, PhD, Kyoto, Japan, highlighted clinical efficacy of phototherapeutic keratectomy (PTK) performed in over 1,000 cases, particularly detailing a study he did on this topic.

PTK is a minimally invasive, excellent surgical procedure to remove superficial corneal opacity and/or to promote remodeling of the corneal epithelial basement membrane, Dr. Kinoshita said. The clinical outcome of improvement of visual acuity and/or its recurrence varies in disease according to previously published articles.

Before conducting his own study, Dr. Kinoshita looked at previously published papers, but he noted that cohort sizes were generally small, and the follow-up periods were less than desired.

The goal of Dr. Kinoshita’s study was to see the long-term clinical efficacy of PTK at the Kyoto Prefectural University of Medicine (KPUM) affiliated eye institutes. He said that “up to now, we have performed approximately 1,900 PTKs for various corneal diseases.” He added that 725 have been analyzed receiving PTK for the initial treatment between 1998 and 2010.

He found best corrected visual acuity to be improved by PTK in most corneal dystrophies including granular dystrophy, gelatinous-drop-like dystrophy, and lattice dystrophy.

Also during the session, Parag Majmudar, MD, Chicago, Illinois, U.S., highlighted mitomycin-C (MMC) in complex cases. MMC has a long history in refractive surgery, which spans over 20 years, he said, and it’s safe to say that it has helped us in a number of “nightmare” situations.

Dr. Majmudar noted that the term “nightmare” has changed over the past 20 years, and he detailed several cases throughout the years where MMC was used.

He first shared a case from around 1996/1997 of a patient referred for dense haze after PRK. The patient was ready for a corneal transplant, he said, and he began to think about using MMC to prevent recurrence of scarring. With use of MMC, the patient’s scar responded very nicely, Dr. Majmudar said, preventing the patient from immediately needing a transplant.

He next shared a case from 2003 where a flap in the epithelium needed to be addressed. However, he said that doing PRK or PTK in this scenario can cause more incidence of corneal haze.

Flap-related complications are largely a historical footnote, he said, but in the late 1990s and early 2000s, these were a problem. Buttonholes and partial flaps were often treated with PRK, with severe haze, so MMC proved to be a godsend.

Dr. Majmudar said that by 2010, prophylactic use of MMC in high-risk PRK had become widespread. However, he also said that, despite use of prophylactic MMC, there can still be haze.

Finally, Dr. Majmudar’s last case was a patient referred after initial LASIK treatment some years prior. That patient had required enhancement and had PRK with prophylactic MMC for 30 seconds. This patient, he said, developed a severe haze response to PRK despite use of MMC. For this patient, Dr. Majmudar had to use an “old school” treatment and remove the epithelium. He then carefully polished the scar. He also stressed that MMC does not get rid of scar but prevents additional fibrotic tissue, so you have to remove the scar as thoroughly as possible.

Dr. Majmudar concluded that, despite advances in excimer technology, haze can still persist in the modern refractive surgery era. Although MMC has been very effective in preventing haze, certain cases can have breakthrough haze, Dr. Majmudar said. Even if MMC has been used in the initial case, repeat application of MMC may be required, he said.
Looking back on ophthalmic history

by Liz Hillman EyeWorld Senior Staff Writer

Attendees learned about the history of the eye and various ophthalmic techniques, diagnostic tests, and more in a unique session Monday afternoon.

In the pre-Cambrian era, which accounts for 80% of Earth's entire history, Javier Ascaso, MD, Zaragoza, Spain, said life was quiet and most creatures were blind. But vision had to start somewhere, he continued, explaining that the first visual organs appeared after the Cambrian explosion 540 million years ago.

"Refined visual organs with sharp vision were elaborated for locating food and avoiding predators. Life opened its eyes," Dr. Ascaso said.

The trilobite's eye is the earliest, well-reserved visual surface in the fossil record. Thinking that an eye was primitive at this time is a mistake, Dr. Ascaso said. Most trilobites, he explained, have compound, holochroal eyes, which are covered by small lenses (up to 15,000 per eye) pointing in a slightly different direction and all covered by a single membrane. Other trilobites had aggregate eyes where each rigid lens had different refractive indices, with an individual cornea and separation with sclera. These animals, he said, had remarkable depth of field and minimal spherical aberration.

What was missing was evidence of the eye's connection to the brain in the fossil record, due to the issue of soft tissue preservation over time. But in 2012, a dark structure in the front part of the head of a fossil, discovered in the Chengjiang Rock Deposit, matched the position and shape of living, sea-dwelling relatives and was identified as the first preserved brain. Dr. Ascaso also described a huge, predatory shrimp called Anomalocaris, which had compound eyes on stalks and likely had keener vision than many modern arthropods. Each of its eyes were 2–3 cm across, equating to 28,000 pixels; in context, modern houseflies have 3,000 pixels.

Overall, Dr. Ascaso said there is "no evidence that the eye evolved at all."

"Primitive animals had excellent vision," he continued, and "fossil findings show that eyes appeared abruptly and fully formed or, at least, sophisticated vision evolved very quickly."

Jumping forward millions of years, Tetsuro Oshika, MD, PhD, Tsukuba, Japan, described the history of the color blindness test developed by Shinobu Ishihara, MD. Dr. Ishihara worked at a military medical school in World War I when he was asked to devise a test to screen for abnormal color vision. Dr. Oshika pointed out that Dr. Ishihara had a color-blind assistant, making it a good partnership for the task. He started by studying the existing color blindness tests, namely the Spilling test, which was found to result in a lot of false positives and could not detect mild color vision defects, Dr. Oshika said.

The test developed by Ishihara, which is now the gold standard for color vision screening, consists of four different plates of different designs. The vanishing plate has a design among colored dots that only people with normal vision can see; the transformation plate is one where those with defective color vision will see a different sign than normal color vision; the hidden digit design is one where only those with defective color vision will spot the sign; and the classification design is used to differentiate between red-green color abnormality.

Dr. Ishihara's first plates were personally hand painted in watercolors with Japanese numbers. He published his test in 1917 and sent free copies to universities and ophthalmic societies but didn’t hear anything until the early 1920s when the test was first used to screen northern European sailors and railroad workers. It became a standard test for color deficiency by the International Council of Ophthalmology in 1929.

Albert Franceschetti, MD, Meyrin, Switzerland, co-chair of the session who said he himself is color blind, called it the "perfect test because no color blind person can pass it."

Pamela Sieving, MA, MS, Bethesda, Maryland, U.S., gave a historical perspective on night vision improvement tactics for WWII pilots, specifically with carrot and bilberry juice. First regarding carrot juice and vitamin A, Ms. Sieving said there are a number of historical publications discussing the vitamin's ocular benefits, and one paper in 1933 mentioned vitamin A's effect on the retina as it pertains to night blindness. But the idea that carrots improve night vision for pilots, that was a propaganda campaign of the British Ministry of Defense and Ministry of Food, meant to help hide the fact that their planes were equipped with night vision radar.

Royal Air Force pilots were also fed bilberry jelly, but Ms. Sieving said she's spent 25 years searching archives, without success, to find rationale or evidence that this also might have been propaganda. Studies, on the whole, have not supported that bilberry improves night vision, she said.

Other presentations included the history of Charles Bonnet and the syndrome in his name, cryo-extraction in cataract surgery and other innovations by Tadeusz Krewawicz, MD, and the history of the Zhongshan Ophthalmic Center and Sun Yat-Sen University. Elena Barraquer, MD, Barcelona, Spain, gave an overview of her family's legacy in ophthalmology, which includes several generations involved in the profession and worldwide recognition for their contributions, and the founding of the Barraquer Institute. EW
CME Policy Statement of Educational Need

A Scientific Program Committee of 21 scientists/clinicians reviewed previous feedback, the literature, and personal experiences, to identify the educational needs and topics to cover. Due to the diverse, clinically focused educational offering to international clinicians of all levels, participants can tailor a personal program to meet their own educational needs. Delegates should have their interests covered during the symposia of WOC2018 from general ophthalmology to their dedicated subspecialty area.

Disclosure of Financial Interest

The full listing of the faculty financial disclosures will be provided in due course.

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Target Audience

This activity has been designed to meet the educational needs of ophthalmologists, nurses, ophthalmic technicians and other healthcare professionals who are engaged in the diagnosis and treatment of eye diseases.

Learning Objectives

Having attended WOC2018, the learners shall be able to:

1. Define the most recent advancements in the diagnosis and treatment of eye diseases.
2. List and discuss the recent results of clinical trials and other basic research in key sub-specialty areas of ophthalmology.
3. Apply new techniques and cutting-edge technology in ophthalmic practice and ophthalmic surgery.
4. Describe new developments in teaching and assessing ophthalmic knowledge and promote the use of new tools in ophthalmic education.

Credit Information

WOC2018 has been planned and implemented in accordance with the accreditation requirements and policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of Siyemi Learning and the ICO. Siyemi Learning is accredited by the ACCME to provide continuing medical education for physicians. Siyemi Learning designates this live activity for a maximum of 26.5 AMA PRA Category 1 Credits(TM). Physicians should claim only the credit commensurate with the extent of their participation in the activity.

The industry-sponsored symposia and the evening networking events (opening ceremony, welcome reception, scientific program reception) are NOT eligible for CME credits. Attendees registered as exhibitors, spouses or guests are not eligible to receive CME credit.

Asia-Pacific team takes gold

by Ellen Stodola EyeWorld Senior Staff Writer/Digital Editor

The Cataract Surgery Olympics session took place late Sunday afternoon, led by David Chang, MD, Los Altos, California, U.S. The session featured four teams of cataract surgeons, each representing a certain region from around the world (North America, Latin America, Asia-Pacific, and Europe/Middle East), competing in a video program highlighting management of cataract complications. There was also an international panel of four judges, and at the conclusion of the session audience members voted for the overall individual event and team winners.

Teams competed in four categories: “Cataract Pentathlon,” which was a competition for best use of surgical devices; “Cataract Marathon,” which was a competition to see who presented the most “challenging and agonizingly difficult case”; “Cataract IOL Gymnastics,” which was a competition based on demonstration of surgical skill and or creative maneuvers in managing IOL complications; and “Freestyle Cataract Surgery,” an open category.

The Latin American team included team captain Samuel Masket, MD, Los Angeles, California, U.S., and Jorge Alio, MD, Barcelona, Spain. The European team included team captain Boris Malyugin, MD, PhD, Moscow, Russia, and Tetsuro Oshika, MD, Tel-Aviv, Israel. The North American team included team captain Soon-Phaik Chee, MD, Singapore, and Gerard Sutton, MD, Sydney, Australia. The Middle Eastern team included team captain Soon-Phaik Chee, MD, Singapore, and Gerard Sutton, MD, Sydney, Australia.

The judges for the session were Alan Crandall, MD, Salt Lake City, Utah, U.S., Roberto Zaldívar, MD, Mendoza, Argentina, David Spalton, MD, London, U.K., and Charles McGhee, MD, Auckland, New Zealand.

Presenting first was the North American Team including team captain Mitchel Weikert, MD, Houston, Texas, U.S., George Beiko, MD, St. Catharines, Canada, Kendall Donaldson, MD, Plantation, Florida, U.S., and Samuel Masket, MD, Los Angeles, California, U.S. The European/Middle Eastern team included team captain Boris Malyugin, MD, PhD, Moscow, Russia, Jorge Alio, MD, Barcelona, Spain, and Tetsuro Oshika, MD, Tel-Aviv, Israel.

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In this case, Dr. Masket used the femtosecond laser. He noted that there was milk coming out of the capsulotomy.

You have to be prepared to do SICS-type surgery in these cases, he said.

Dr. Masket’s “first order of business” was to get the white stuff out and stain the capsule and see what the laser had been able to do. Then, he put in OVD.

He noticed that the laser had opened only about 2 clock hours of the anterior capsule, which meant he needed to finish what the laser had started manually, but there was enough impression to go around 360 degrees and gradually complete the capsulotomy.

Though he had a good capsulotomy, Dr. Masket still wanted to handle this very large nucleus in a manual fashion.

He noted that since he was using both the laser and manual techniques, he was using both Old World and New World technology.

Dr. Masket said it was remarkable how much white material was still in eye that needed to be cleaned out.

Once this was accomplished, he could choose any lens to put in the eye, and he was prepared to use a variety of different lens types, ultimately choosing a 3-piece silicone lens.

Presenting in the “Cataract Pentathlon” category for the Latin America team, Dr. Orlich shared a case of a 21-year-old patient who had aniridia, cataract, and glaucoma. For this patient, he did cataract surgery and also implanted an artificial iris. He placed the artificial iris in the capsular bag, but to give more support to the artificial iris, he used a technique for tilted lenses, placing a suture in front of artificial iris to keep it in place. This suture, he placed inside the scleral tunnel.

Dr. Sutton presented in the “Freestyle Cataract Surgery” category for the Asia-Pacific team. He shared several cases of dealing with challenging lenses.

In one, the patient had a lens that was causing significant dysphoria. The key issue, he said, is to use a scaffold lens to make sure you can protect the posterior capsule. Rather than trying to fold the lens, he prefers to cut it, and in this case, he used a cutting technique to divide the lens in half.

Dr. Sutton also shared a case he handled of a patient with 11 D of astigmatism whose lens was unstable. He removed the lens and inserted a customized lens that would effectively address the 11 D of topographic astigmatism.

In the “Cataract IOL Gymnastics” category for the Europe/Middle East team, Dr. Malyugin shared some tips for dealing with weak zonules in cataract surgery. He noted that a femto rhexis may be particularly helpful in these cases because you can create the capsulorhexis without pressing on the zonules.

At the end of the session, audience members voted for the winners in each category, as well as overall team winners.

Dr. Oshika won the “Cataract Marathon” category; Dr. Sutton won the “Freestyle Cataract Surgery” category; Dr. Ventura won the “Cataract IOL Gymnastics” category; and Dr. Ramamurthy won the “Cataract Pentathlon” category.

It was the team from the Asia-Pacific that took home the gold medal, with North America taking silver, and Europe/Middle East winning bronze.
Tuesday WOC 2018

Cataract Surgery Olympics
Video Reporter

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