Innovations and technological advancements are largely the themes for this issue of the CME newsletter. Ophthalmologists enjoy being able to play with new toys in the fields of diagnostic and intervention, particularly if there is significant improvement to patient care outcomes.

Femtosecond lasers have enabled greater accuracy in laser refractive surgery. Nowadays, we also see this technology enhancing cataract surgery. Both these surgeries demand precise results and understanding aberration can enhance outcomes.

Ophthalmic imaging is fast developing into a world of its own. Our glaucoma team shares with us how the evaluation of the angle structures is now more extensively and accurately done.

Ophthalmology has always been surging ahead with new equipment and technologies. It is important for us to be kept abreast of the advances so that we can continue to improve ourselves and patient care.
FEMTOSECOND LASIK: THE SNEC JOURNEY

Presented by Dr Cordelia Chan and Dr Mohd Rosman on 4 July 2012 | Written by Dr Marcus Ang

FEMTOSECOND LASERS IN SNEC

Laser in situ keratomileusis (LASIK) is currently the corneal refractive procedure of choice to correct myopia. Flap creation, traditionally performed with a microkeratome, is now increasingly being performed using a femtosecond (FS) laser. Femtosecond lasers have been shown to have more reproducible flap creation with greater precision. Other reported advantages include a lower risk for incomplete or button-hole flaps, an improved side cut profile and improved flap-thickness predictability.

There are two systems existing in SNEC currently, the VisuMax (Carl Zeiss Meditec AG, Germany) 500kHz or IntraLase (Abbott Medical Optics Inc., USA) 60kHz femtosecond laser systems (Figure 1). There are several differences between femtosecond laser platforms; for example the IntraLase uses a higher-pressure system, has a larger diameter cone and is more difficult to centre in smaller eyes or eccentric pupils. In comparison, the VisuMax uses a lower pressure system with no visual loss during the procedure, with easier centration on the pupil. Secondly, the IntraLase causes a horizontal deformation of the cornea to allow the laser pulses to form in a raster pattern to create a linear flap parallel to the cornea surface and thus create a regular planar flap. On the other hand, the VisuMax uses a curved corneal interface that allows the cornea to remain in its more natural state – using a spiral pattern of femtosecond laser pulses in a curved plane parallel to the cornea surface in order to create a planar corneal flap.

PRACTICAL POINTERS FOR VISUMAX

Patient selection is very important: be careful of the patient with teary or sensitive eyes, with a strong Bell’s phenomenon. Ocular factors to consider include eyes with either thick corneas or thin flaps (<110 microns).

PRACTICAL POINTERS FOR INTRALASE

Patient factors to be wary of include those with tight, small palpebral apertures or small white-to-whites and eccentric pupils. During IntrLase the eyelids usually get in the way of adequate suction, thus a good tip is to always dock slightly superiorly and nasally. Subconjunctival hemorrhage is quite frequently seen so it would be good to warn the patient pre-operatively.

SMALL INCISION LENTICULE EXTRACTION (SMILE)

SMILE is an all-in-one femtosecond refractive procedure using the VisuMax (Carl Carl Zeiss Meditec, Germany) femtosecond system with no excimer laser used. As this is a flapless surgical method, there are no flap-related complications, with faster epithelial healing, increased corneal biomechanical stability and preservation of corneal nerves, thus theoretical decrease in neurotrophic dry eye. Other advantages include: a higher predictability for higher refractive errors, no laser calibration or fluence tests necessary and reduction in logistics such as patient transfer, less work space needed with reduction in overall treatment time.

CONCLUSION

Refractive surgery in SNEC has evolved through the years. SNEC’s Femtosecond LASIK programme with the IntraLase and VisuMax systems has been extremely successful, yielding excellent visual outcomes since its inception. Small Incision Lenticule Extraction (SMILE) may be the future of refractive surgery, offering a flapless, minimally invasive alternative to LASIK to our patients.
PRIMARY ANGLE CLOSURE GLAUCOMA

Primary angle closure glaucoma (PACG) is an important cause of glaucoma estimated to affect 30 million people worldwide. It is the leading cause of glaucoma blindness in Singapore, Mongolia, India and China. Various findings on PACG suggest a genetic basis for the condition. For example, the prevalence of PACG amongst first degree relatives in the white population ranges from 1-12%. This is in comparison to the 0.1% prevalence in the general population. Similarly, first degree relatives of Inuits with PACG have a 3.5 times greater risk of developing PACG compared with the general Inuit population. Within the Chinese population, sibling recurrence risk of narrow angles is 49%. There is also a sibling relative risk of 7.6. That is, the sibling of a patient with PAC/PACG has almost 8 times greater risk of narrow angles compared to the general population. Recent studies have found that the inheritability of shallow anterior chambers to be greater than 90% amongst Chinese compared to 51-88% in Caucasians. Thus it is clear that there is a strong genetic factor in the development of PACG but the exact gene or genes remain to be identified.

In order to verify these observations, more than 100 nuclear families with PACG were collected for family based linkage analyses by Professor Aung Tin and team. The results showed that 81 families had more than 4 members were affected by PAC/PACG, whilst 19 families had less than 4 members affected. Although PAC/PACG appeared to segregate in an autosomal dominant inheritance pattern [fig 1] in several of these pedigrees, the vast majority was complex with no family history.

To identify the exact gene, the genome wide association study (GWAS) was used to discover susceptibility loci for PACG. GWAS involves rapidly scanning markers across genome of many people to find genetic variations associated with a particular disease or trait. GWAS studies can be used to find genetic variants for binomial traits, quantitative traits, as well as to identify common genetic variants that contribute to common complex diseases. In ophthalmology, many genetic traits have been found using the GWAS, such as the CFH gene in age related macular degeneration, LOXL1 in pseudoexfoliation syndrome, and CAV1/CAV in primary open angle glaucoma.

For such studies, a large number of subjects are needed as associations between single nucleotide polymorphism (SNP) and causal variants are expected to show low odds ratio, typically below 1.5. Furthermore, in order to obtain a reliable signal, given the very large number of tests that are required, associations must show a high level of significance to survive the multiple testing correction (p=<5x10^-8). In order to achieve the numbers required, patients with the previous APAC or chronic PACG phenotypes and normal controls were recruited from Singapore, Hong Kong, Malaysia, India and Vietnam. A total of 1854 PACG subjects and 9608 controls were recruited and assessed. SNPs that showed a significance of < 1x10^-5 for association for PACG in stage 1 were replicated for a stage 2 validation using the Sequenom technology. In stage 2, additional subjects were recruited from Singapore, China (Beijing and Shantou), Saudi Arabia, United Kingdom and India. A total of 3,771 PACG subjects and 18,551 controls underwent stage 2 validation.

RESULTS

The GWAS showed 3 SNPs that had a significant association with PACG and they are: PLEKHA7, COL11A1, PCMTD1-ST18. These results were published in the recent nature genetics paper (Vithana et al. Genome –wide association analyses identify three new susceptibility loci for Primary Angle Closure Glaucoma. Nature genetics. 2012)

PLEKHA7

The PLEKHA7 encodes for Pleckstrin-homology-domain-containing protein 7, which is critical for the maintenance and stability of adherens junctions. In adult tissues, the adherens junctions maintain tissue homeostasis-control epithelial and endothelial paracellular permeability. In the eye, tight junctions and adherens junctions play an essential role in structures of particular relevance to glaucoma such as the ciliary body, iris, the aqueous humour outflow system and the choroid by providing a barrier to fluid leakage. Factors, such as an attenuated reduction in iris volume with papillary dilation and choroidal expansion have been proposed as having a significant role in angle closure pathogenesis. Given its role in maintaining a protein complex that regulates paracellular permeability, we speculate that PLEKHA7 may be involved in the pathophysiology of angle closure related to abherrant fluid dynamics.
RECENT DISCOVERIES IN THE GENETICS OF ANGLE CLOSURE GLAUCOMA

**COL11A1**

The COL11A1 encodes one of the two alpha chains of type XI collagen. Pathogenic mutations of COL11a1 cause Marshall and Stickler type 2 (STL2) syndrome, both of which are associated with ocular, orofacial, auditory and skeletal manifestations. These diseases are associated with non-progressive axial myopia likely caused by an aberrant fibrillar collagen matrix within the sclera. Our hypothesis is that causal variants predisposing towards PACG within COL11A1 may alter its gene expression such as to engineer a reverse effect to that observed in myopic eyes. COL11A1 is also expressed in the human ocular trabecular meshwork cells, hence the aberrant action of this gene, albeit mild, could be at multiple sites within the PACG eye.

**PCMTD1**

The third PACG locus, rs1015213 on chromosome 8q, is located within an intergenic region located 120Kb upstream to PCMTD1 and 130K downstream of ST18. The LD block where rs1015213 was located extends into PCMTD1 but not ST18 suggesting PCMTD1 to be the likelier candidate susceptibility gene for PACG at this locus. PCMTD1 encodes for protein-L-isoaspartate O-methyltransferase domain-containing protein 1. Its function is as yet uncharacterized. ST18 encodes for suppression of tumourgenicity 198, a protein significantly down-regulated in breast cancer cell lines.

Subjects with the genes had an increased risk of developing PAC/PACG (PLEKHA7 OR=1.22, COL11A1 OR=1.2, PCMTD1-ST18 OR=1.5) and this risk was magnified with greater number of risk alleles (1 loci OR=1.32, 2 loci OR=1.65, 3 loci OR=3.40; p<1x10-10)

In conclusion, this is the first ever GWAS to study PACG disease. More than 20,000 independent samples from 11 independent collections from 7 countries were studied and 3 novel susceptibility genes for ACG have been identified. This landmark study will form the foundation of defining the genetic architecture of this important blinding disease.
Spherical aberration results from differential focusing power throughout the lens. For example a convex lens is usually higher powered at the peripheral regions than the central portions. The most common aberrations in our vision include defocus (e.g. myopia or hyperopia), astigmatism and spherical aberrations. To obtain a good quality of vision after cataract surgery spherical aberration must be minimised.

The total spherical aberration in the eye increases with age due to changes in the lens, however the corneal spherical aberration remains constant. A spherical aberration compensating IOL has a reduced power in the periphery of the lens to neutralise the spherical aberration of the cornea. These IOLs are commonly referred to as “aspheric”. Spherical aberration increases with increasing refractive power. So in low powered conventional IOLs spherical aberrations are minimal hence aspheric IOLs are only available in for higher powered IOLs of more than 5 diopters, where the spherical aberration is more significant.

A larger pupil size leads to increased spherical aberration and this may result in a myopic shift. The refractive power of an aspheric IOL is independent of the pupil size. In contrast when implanting a conventional IOL, the spherical aberration may vary according to pupil size and this may result in a myopic shift in dark conditions where the pupil is large. Previous studies have shown that there is no loss of best corrected visual acuity due to feared lack of depth of field from aspheric IOL optics.

The tilt of the lens is more significant in the higher powered IOLs. If a significant tilt is present, the higher powered aspheric IOLs will no longer have an advantage over a conventional IOL. Decentration of the lens is more significant in lower powered IOLs. Similarly, if significant decentration is present, the lower powered aspheric IOLs will no longer have an advantage over a conventional IOL. Tilt and decentration of an aspheric IOL may induce coma which may reduce quality of vision.

In Asian patients, there is a still a residual spherical aberration despite the use of aspheric IOLs. Previous local studies have shown that the spherical aberration in Asian eyes is higher than in Caucasian eyes. The proportion of patients with higher spherical aberration is also higher in the Asian population. Hence aspheric IOLs designed for the Caucasian population may still leave many Asian patients with residual spherical aberration.

One previous study showed that spherical aberration was responsible significant halos, glare and starburst post LASIK surgery. In post- LASIK IOL studies, patients with high myopia experienced residual spherical aberration despite implantation of a spherical correcting IOL. Low myopia patients have less residual aberration.

In summary spherical compensating IOLs improve vision especially contrast sensitivity. These IOLs also diminish photic phenomenon (e.g. glare and halos) and reduce myopic shift, improving the accuracy of pre-operative IOL calculations. This is especially relevant in our East Asian population with higher levels and rates of spherical aberration. Even with some tilt or decentration these IOLs are still equal to or better than conventional IOLs. Their limitations include inaccurate IOL calculation, IOL malposition, lack of customisation and quality control. Pre-existing spherical aberration is currently not routinely measured and surgical induced spherical aberrations may also occur.
Uveitis is an important potentially treatable cause of blindness, especially in adults within the working age group. It was estimated to cause up to 10% of blindness. The spectrum of clinical presentation varies with the geographical location and the ethnicity of the patients. Developed nations have fewer ocular infections such as tuberculosis (TB) or toxoplasmosis. Ocular toxoplasmosis and TB are very prevalent in India and Indonesia. Behcet’s disease and Vogt Koyanagi Harada disease (VKH) are more common among Asians & Eurasians.

Although Asia is one of the most populous continents, there were few major epidemiological studies on uveitic conditions. Besides a few studies from Japan and India, two were reported from China and two were from Thailand. There were no data among the Malay population. It is difficult to conclude from direct comparison between studies due to the heterogeneity in diagnostic criteria and definitions, and the availability of different diagnostic investigations.

We present the findings of a retrospective cross sectional medical chart review of 1244 consecutive Singaporean patients from our Singapore National Eye Centre uveitis database from 1997 to 2010. Patients who were not Singapore citizens or permanent residents, who had episcleritis, scleritis or orbital inflammatory disease, or post surgical exogeneous endophthalmitis, traumatic iritis or corneal graft rejection were excluded. 79.3% were Chinese, 10.7% were Malays, 7.4% were Indians, and 2.6% were of other ethnicity.

The mean age of the patients was 46.2 years. 51.4% were male and the majority (73.2%) were adults within the working age group (21 to 60 years). There were no significant differences between the gender and ethnic demographics among the various age groups, except for a higher proportion of female patients in the youngest age group. Anterior uveitis (AU) was the commonest, followed by panuveitis, posterior uveitis (PU) and intermediate uveitis (IU). AU was more common among male patients (70.3% versus 58.3%), while IU was more common among females (10.9% versus 4.2%). AU was more common among older patients, while IU was commonest among younger patients.

Anterior uveitis was most commonly HLA-B27 related, idiopathic and cytomegalovirus (CMV) related. Intermediate uveitis was most commonly related to TB, primary intraocular lymphoma and systemic sarcoidosis. The commonest posterior uveitis were CMV retinitis, toxoplasmosis and dengue maculopathy. Among our twenty-five patients with CMV retinitis, only eight were infected with human immunodeficiency virus. The rest had altered immunity from systemic immunosuppressant or systemic malignancies. The commonest causes of panuveitis were VKH, idiopathic, TB-related and Behcet’s disease.

HLA-B27+ AU and CMV AU were more common among Chinese. Syphilitic uveitis was slightly more common among Indians although the number was small.

HLA-B27+ AU was more common among younger adults and males. Herpetic AU was commonest among elderly and middle-aged patients. Poshner Schlossman Syndrome mainly affected working adults. HLA-B27+ AU, CMV AU and possibly syphilitic AU were more common among male patients.

Dengue maculopathy and toxoplasmosis mainly affected younger patients. CMV retinitis was more common among male patients, even after we excluded all patients with HIV infection. TB-related panuveitis was more common among Malay and Indian patients. In general, TB-related uveitis was also more common among Malays and Indians compared to Chinese. Syphillis and sarcoidosis related uveitides were also more common among Indians. Syphilitic uveitis was more common among the oldest age group. Sarcoidosis affected more females than males.

In summary, infective anterior uveitides were more common among in our case series. HLA-B27+ AU was very common among Chinese, young adults and male patients. CMV AU was more common among Chinese male patients. Herpetic and syphilitic AU were more common among elderly patients. Dengue maculopathy and toxoplasmosis mainly affected younger patients, and TB-related uveitis and sarcoidosis related uveitis were more common among Malay and Indian patients.
CONVENTIONAL AND EMERGING TREATMENTS IN THE MANAGEMENT OF ACUTE PRIMARY ANGLE CLOSURE

Presented by Dr Boey Pui Yi on 19 December 2012 | Written by Dr Woo Jyh Haur

The incidence of acute primary angle closure (APAC) in Singapore has been reported to be 12.2 cases per 100000 per year.1 The patients affected are typically elderly Chinese females above the age of 60 years. Within 5 years of APAC, 58.1% of patients require medication for intraocular pressure (IOP) control, while 48% of patients develop glaucomatous optic neuropathy within 4-10 years of the attack.2, 3

The goals of treatment of APAC include the lowering of IOP as quickly as possible, prevention of further attacks and slowing the progression to chronic angle closure glaucoma. Management strategies in APAC can be divided in to those which lower IOP and improve cornea clarity and those which relieve pupil block.

Conventional medical therapy involves the use of systemic carbonic anhydrase inhibitors (CAI) and hyperosmotic agents as first line treatment, the concurrent administration of various combinations of IOP lowering agents such as beta-blockers, prostaglandin analogues, alpha-adrenergic agonists, CAI and miotics; and topical steroids. However, it has been reported that 2.2% of APAC cases may have medically uncontrolled IOP necessitating surgery.4 Furthermore, the risks of systemic complications associated with medical treatment cannot be underestimated. Other treatment modalities may provide a more rapid onset of action together with quicker IOP reduction.

Iridoplasty involves the application of laser burns to peripheral iris to incite the contraction of iris stroma and mechanical opening of the angles to facilitate aqueous drainage. In a randomized controlled trial of 73 eyes with APAC, Lam et al5 compared iridoplasty with medical therapy and reported lower IOP in the iridoplasty group at 15, 30 and 60 mins, though not after 2 hours. There was also no difference in mean IOP, need for medications and extent of peripheral anterior synechiae (PAS) formation. In terms of long term benefits of iridoplasty in the treatment of primary angle closure glaucoma (PACG), the combination of iridoplasty with peripheral iridotomy (PI) resulted in a reduced extent of PAS formation, though there was no difference in IOP control, need for medications and surgery and visual function at 1 year, compared to PI alone.5

Anterior chamber (AC) paracentesis is a repeatable method of rapid IOP lowering in APAC. However, it may be technically challenging to perform in an eye with a shallow AC, particularly in patients who are distressed. There are also risks of corneal and lens trauma, malignant glaucoma and potential complications of rapid decompression such as suprachoroidal hemorrhage, decompression retinopathy and hyphema. There is limited literature on the use of AC paracentesis in APAC. A small case series showed that AC paracentesis lowered IOP more rapidly than medical therapy, though the effect is short-lived. Hence, it should be considered at best as a temporizing procedure until definitive treatment is instituted in APAC.

Laser peripheral iridotomy is the treatment of choice in APAC. It serves to relieve pupil block although refractory cases may have plateau iris configuration or lens-induced mechanisms resulting in persistent high IOP, which needs to be separately addressed. Peripheral iridotomy alone is sufficient to control IOP in 65-76% of cases in the Caucasian population; however in Asian eyes, there is a subsequent rise in IOP in 76.6% of cases with the first 6 months despite the presence of a PI, with 58.2% eventually requiring the use of anti-glaucoma medications and filtration surgery.7,8

Lens extraction relieves pupil block and markedly decreases angle crowding. Technical difficulties during surgery may include the shallow AC depth, small pupils and/or floppy iris, subluxed lens and corneal edema. The timing of surgery in the acute setting should also be considered after weighing the risks and benefits of rapid lowering of IOP against surgery in an inflamed eye. Various authors have reported both short-term and longer term effects of lens extraction on IOP. Zhang et al reported a reduction
of 10.2mmHg in IOP 1 week after primary lens extraction for APAC.9 Jacobi et al compared primary phacoemulsification vs surgical iridectomy in APAC and found that the phaco group had larger proportion having achieved IOP control while having lower proportion requiring additional surgery.10 Similarly, when early phacoemulsification was compared with laser peripheral iridotomy for APAC, the LPI eyes were 15 times more likely to have IOP higher than 21mmHg and were more likely to require additional medications at 18 months.11

Goniosynechiolyis (GSL) and viscogoniosynechiolyis are useful adjuncts to lens extraction, in which the PAS is physically stripped from the angle wall, hence restoring aqueous access to the trabecular meshwork. Many authors have reported that these procedures are effective in lowering IOP and reducing PAS in APAC eyes.12-15

Trabeculectomy or combined phacotrabeculectomy may also be considered in APAC eyes refractory to all other modalities of treatment. However, the outcomes are guarded in an acutely inflamed eye with high IOP. Potential complications include a shallow or flat AC, malignant glaucoma, suprachoroidal hemorrhage and endophthalmitis. Tin et al reported that the success rates (defined as IOP <22mmHg) of trabeculectomy in APAC is lower compared to that performed in a quiet eye with PACG (56.2 vs 70-95%) and hence concluded that trabeculectomy may not be the procedure of choice in view of the high risk of surgical failure and complications in medically unresponsive APAC.

In conclusion, medical treatment followed by LPI remains the conventional management of APAC. Alternative methods such as iridoplasty and primary lens extraction may offer some benefits, especially when medical treatment is inadequate or unsuitable. Goniosynechiolyis may be considered as a useful adjunct to manage PAS while filtration surgery remains the last resort.

References
INNOVATIONS IN ANGLE IMAGING. IS GONIOSCOPY OBSOLETE?

Presented by Dr Desmond Quek on 19 December 2012 | Written by Dr Woo Jyh Haur

An accurate angle assessment is essential in the early detection of anatomically narrow angles. This is particularly important as there is a spectrum of disease in primary angle closure glaucoma, the majority of which may be asymptomatic until severe to end-stage visual loss is present.

Gonioscopy is currently the gold standard in angle assessment. However, it is a subjective test with only moderate agreement among observers. There are varying annotations of findings across different grading schemes. Findings may also differ according to the different gonioscopic lenses used, the lighting condition, lens placement and any mechanical compression on the eye.

Three novel forms of angle imaging include ultrasound biomicroscopy (UBM), anterior segment optical coherence tomography (ASOCT) and EyeCam.

ULTRASOUND BIOMICROSCOPY

In ultrasound biomicroscopy, electric signals are converted into 50MHz sound waves which are then transmitted to the eye via saline solution held in a cup reservoir. The sound waves travel at different speeds through tissues of varying acoustic impedance and are reflected at differing time intervals. The computer system then collates and magnifies reflected sound waves. There is a high degree of agreement with gonioscopy in a completely dark room, however, UBM slightly underestimates the angle width compared to gonioscopy in eyes with occludable angles. The test is sufficiently sensitive for differences in measurements of each gonioscopic angle grade to be detected. In addition, UBM may also be used to visualize posteriorly located structures such as the ciliary body, zonules and anterior choroid. As such, UBM is useful for the investigation of mechanisms of angle closure such as anterior rotation of the ciliary body in plateau iris, iridociliary masses, choroidal effusions, posterior bowing of the iris in pigment dispersion and lens subluxation. However, disadvantages will include the need for supine positioning and contact which may cause discomfort, corneal abrasions, and angle distortion from inadvertent indentation. Lastly, UBM is also time-consuming, operator dependent and requires patient cooperation.

ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY

ASOCT is a rapid non-contact imaging device which captures high resolution cross-sectional images using low coherence interferometry, in which the delay and intensity of light reflected from tissues is measured and then compared to light that has traversed a known reference path length. There are 2 main types of ASOCT – time and spectral domain.

Time domain ASOCT produces A-scan images by varying the position of a reference mirror. The angle parameters are then quantitatively assessed using customized software devices such as TISA, ARA and AOD. Visante is a time-domain ASOCT which performs 2000 A scans/ second and has a resolution of 18um (axial) and 60um (transverse). For angle closure detection, it has a sensitivity of 98% and specificity of 55%. Compared to gonioscopy, it detects more closed angles especially in the inferior and superior quadrants. The slit lamp OCT (SL-OCT) has a slower image acquisition with a resolution of 25um (axial) and 100um (transverse). It requires the manual rotation of the scanning beam and detects more closed angles than gonioscopy. There is good agreement with gonioscopy as visible light is used in both examinations. However, there is poor correlation between the Visante
Spectral domain ASOCT (SD-OCT) utilizes light of shorter wavelength (830nm) and a fixed reference mirror. There is a faster scanning speed of 26000 A-scans/second and higher resolution of 5um (axial) and 15um (transverse). As such, it results in more images taken in a single pass and better image delineation and visualization of novel ACA landmarks. Two currently available SD-OCT include the i-Vue and Cirrus high definition OCT. There is moderately strong interdevice agreement and fair agreement between both devices with gonioscopy for identifying angle closure.

There are a few differences between the ASOCT and gonioscopy, particularly in the exposure of the pupil to light and inadvertent pressure on the globe during gonioscopy compared to ASOCT. In particular, there is a difference in the definition and description of landmarks used to define angle closure. The apposition of iris and PTM and contact between iris and structures anterior to the scleral spur are used to define angle closure in gonioscopy and ASOCT respectively.

The main advantages of the ASOCT are the ease of operation, rapid image acquisition, non-contact and the automated analysis software for rapid estimation of anterior segment parameters. However, the ASOCT is unable to detect structures posterior to the iris, requires manual localization of the scleral spur (which may be identifiable in up to 30% of cases).

**EYECAM – GONIOPHOTOGRAPHY**

The EyeCam was originally designed to yield wide-field paediatric fundal photographs but has since been modified to visualize angle structures. The subject needs to be in a supine position, after which a lens probe on a coupling gel is used to image the eye. The EyeCam acquires images similar to gonioscopy and allows for 360-degree visualization of the angle. It is easy to interpret and has a 76% sensitivity and 81% specificity for angle closure detection. However, it is more expensive, time-consuming and has limited reproducibility in addition to the need for supine positioning and inability for indentation.

**CONCLUSION**

These novel imaging devices has the advantages of objectivity, reproducibility, non-contact approach, rapid image acquisition, image storage and possibility of quantitative analysis and imaging through opaque corneas. Each device attempts to address the shortfalls of gonioscopy but is not without their own limitations. As such, they may be useful in complementing clinical practice especially when gonioscopy is difficult. However, clinical dynamic indentation gonioscopy remains the current reference standard.
ANSWERS TO PHOTOQUIZ 22

Q1: What is the likely diagnosis?
A: Nodular Basal Cell Carcinoma of the left lower eyelid

Q2: How would you manage the patient?
A: Incisional biopsy to confirm the diagnosis followed by excisional biopsy with frozen section or Mohs’ micrographic technique and reconstruction

Q3: How would you reconstruct the defect, assuming that the defect measures 40% of the lower eyelid after excision?
A: Possible accepted answers:
- Tenzel semi-circular flap
- periosteal flap with skin rearrangement / sliding flap

Q4: What are some of the predisposing risk factor for this condition?
A: - fair-skinned individuals
- prolonged sun exposure
- smoking
- xeroderma pimentosum
- basal cell nevis syndrome

Q5: What are the typical pathological findings?
A: - nest of tumour cells with nuclear palisading
- artifactitious cleft-like separation of tumour cells from surrounding stroma
- tumour cells have bland, monomorphous nuclei and a high nuclear-to-cytoplasmic ratio
- anaplastic features and abnormal mitotic features
A 3-month old baby presented with swelling over the left lower lid area. The swelling was evident since birth but had been enlarging in the past 3 weeks. There was no history of trauma.

Q1: List 4 differentials.

Q2: What useful clues would you elicit in the clinical history?

Q3: What specific feature is seen on image (C) and (D) which could point towards the diagnosis?

Q4: The baby (F) was empirically treated with an oral medication for which she showed a dramatic response. What is this medication and what do you think is the diagnosis?

Q5: From the ophthalmic point of view, what do you need to monitor during this period of treatment?

Please send your entries to: cmenewsletter@snec.com.sg or fax to: (65) 6226 3395 Attention: CME Newsletter Secretariat. Winners will each receive a 4GB thumbdrive and will be notified by post. The answers will be published in the next issue.