August 2017 Research Update

Anterior Eye and Contact Lenses

- Patients' perception of DED and its relation with time to diagnosis and quality of life

This international study examined the experiences and perceptions of dry eye disease (DED) patients in 5 European countries, including the UK. Of the 706 respondents, 31% perceived DED as a "disease" or "handicap," whilst 66% felt it was a "discomfort." DED was more likely to have a significant negative impact on quality of life if there were delays in diagnosis, visits to more than one healthcare provider before diagnosis and with a high frequency of treatment use. The authors propose that the language-specific keywords generated from patient response could form the basis for a new quality of life questionnaire to be used in clinical settings.

http://bjo.bmj.com/content/101/8/1100

- Incidence of Posterior Vitreous Detachment after Femtosecond LASIK Compared With Microkeratome LASIK

Globally, LASIK is the most common refractive surgery procedure. Although rare, there are known posterior segment complications including retinal detachment, macular haemorrhage, macular hole and cystoid macular oedema. This prospective observational study included 20 myopic patients (40 eyes) who underwent either microkeratome LASIK (10 patients, 20 eyes) or femtosecond LASIK (10 patients, 20 eyes). At 1 month post-treatment, PVD was detected by ultrasonography in 4 eyes (20%) of the microkeratome group, and 17 eyes (85%) of the femtosecond laser group. This significant difference may be due to longer suction time during femtosecond LASIK, despite lower suction pressure. The authors suggest that screening patients for posterior segment complications after femtosecond LASIK may be appropriate.

Cornea 36 (9): 1036-1039 DOI: 10.1097/ICO.0000000000001277
Enhancement after Myopic Small Incision Lenticule Extraction (SMILE) Using Surface Ablation

SMILE has become a widely-available treatment for myopia, with previous research suggesting it is comparable with LASIK in terms of safety and efficacy. Similar to LASIK, re-treatment may be needed in cases of primary refractive undercorrection or myopic regression. This retrospective study is the largest to date on retreatment with surface ablation and mitomycin C (to prevent haze) after SMILE and included 40 eyes of 28 patients. After SMILE and before surface ablation, spherical equivalent was \(-0.86 \pm 0.43\) D, improving to \(0.03 \pm 0.57\) D at 3 months after ablation, with a significant improvement in uncorrected distance visual acuity, from \(0.23 \pm 0.20\) to \(0.08 \pm 0.15\) logMAR. Combined with application of mitomycin C, surface ablation seems to be a safe and effective method to enhance refractive results if necessary after SMILE.


Limbal rebound tonometry

Rebound tonometry readings taken from the central cornea have been shown to be significantly correlated with Goldmann applanation tonometry, considered the gold standard in IOP measurement. Contact tonometry may be affected by disorders affecting the biomechanical properties of the central cornea, so this study explored the reliability of rebound tonometry measurements (with the iCare tonometer) on the corneo-scleral limbus instead of central cornea. Limbal readings were found to be well-correlated with standard central corneal rebound tonometry as well as GAT readings, suggesting that taking measurements from this region may be useful in clinical practice when conventional techniques and devices are not appropriate.


Conjunctival Bacteria Flora of Glaucoma Patients During Long-Term Administration of Prostaglandin Analog Drops

In this interesting study, bacterial isolates were collected from the conjunctival sacs of 68 glaucoma patients who had been receiving continuous monotherapy with prostaglandin analogs for at least one year. The positive culture rate was 90.5 %, with 79 bacterial strains isolated. Methicillin-resistant S. epidermidis (MRSE) was more frequently isolated from eyes treated with 0.005 % latanoprost, compared to travoprost. The results indicate that long-term use of glaucoma eye drops affects the indigenous conjunctival flora and that the tendency for increased MRSE isolates in eyes treated with
latanoprost should be considered to prevent selecting for resistant strains that could lead to uncontrollable infection.

**Investigative Ophthalmology and Visual Science 58 (10): 3991-3996**
http://iovs.arvojournals.org/article.aspx?articleid=2648684

- **Rate and risk factors for the conversion of fovea-on to fovea-off rhegmatogenous retinal detachment while awaiting surgery**

This UK-based retrospective study examined the risk factors for progression of fovea-on to fovea-off rhegmatogenous retinal detachment (RRD) whilst awaiting surgery. This type of progression is rare, and affected 10 (1.1 %) of the 930 RRDs presenting with fovea-on. All except one of those affected had a superotemporal RRDs extending to at least the vascular arcades and all had superotemporal breaks within detached retina. Six of the 10 patients converted within a few hours, while the remaining 4 progressed the following day. Visual outcomes were generally good, with 8 patients maintaining their presenting acuity, and the remaining 2 losing 1 Snellen line. The authors conclude that offering same-day surgery to high-risk fovea-on RRDs may not have a significant impact on visual outcomes and may only prevent about half of the conversions to fovea-off.

**British Journal of Ophthalmology 101 (8): 1011-1015**
http://bjo.bmj.com/content/101/8/1011

- **Uvemaster: A Mobile App-Based Decision Support System for the Differential Diagnosis of Uveitis**

Diagnostic decision support systems (DDSSs) are automated computer-based systems which can aid the differential diagnosis procedure. Uveitis has a wide variety of clinical presentations and multiple aetiologies, meaning that differential diagnosis can be difficult for non-experts in the condition. The authors explored the accuracy and performance of Uvemaster, a mobile app DDSS for uveitis, in this retrospective study. The app was found to have a diagnostic accuracy of 96.6 %, and in 71 patients originally diagnosed with idiopathic uveitis, the app made 19 new diagnoses. The results indicate that the app is accurate and may detect more cases of specific uveitis than a clinician-only approach.

**Investigative Ophthalmology and Visual Science 58 (10): 3931-3939**

- **Viral Retinopathy in Experimental Models of Zika Infection**

Zika virus has well-known teratogenic effects, with the ocular abnormalities occurring after vertical transmission during pregnancy including microphthalmia, chorioretinal atrophy and gross pigmentation. This laboratory-based study using mice found that Zika virus can enter retinal tissue and cause irreversible retinal injury, before the blood-retinal barrier and host immunity are well-
developed. The ocular abnormalities found in microcephalic infants may not just be attributable to Zika virus-induced impairment of neurodevelopment.

**Investigative Ophthalmology and Visual Science 58 (10): 4075-4085**
http://iovs.arvojournals.org/article.aspx?articleid=2649079

- **OCT in Alzheimer’s disease**

Previous research using OCT has indicated nerve fibre layer and macular layer thinning occurs in patients with Alzheimer’s disease (AD). In this spectral domain (SD) OCT study of 50 patients with mild AD and 152 individuals without AD, the peripapillary retinal nerve fibre layer was significantly thinner for the AD group globally and in the superotemporal quadrant. Overall retinal thickness was also reduced in two superior sectors, by mean levels of 9.92 µm and 11.65 µm. The findings suggest there are characteristic retinal changes in early AD, meaning that SD-OCT may aid diagnosis of the condition, although further work is needed to determine which layers and sectors are the most relevant potential biomarkers.

**Graefe’s Archive for Clinical and Experimental Ophthalmology 255 (9): 1827-1835**
https://link.springer.com/article/10.1007/s00417-017-3715-9

**Ocular Examination, Refractive Error and its Correction**

- **Coloured overlays and precision-tinted lenses: poor repeatability in a sample of adults diagnosed with visual stress**

In this study, the authors describe the repeatability of selection of coloured overlays and tinted lenses for visual stress in 21 adult participants affected by the condition. Visual stress manifests as perceived distortions or discomfort while reading, and it is claimed that a specific coloured overlay or precision tint for affected individuals can alter visual cortex excitation and improve symptoms. On two separate occasions, only around half (n = 10) of participants selected the same (n = 7) or similar (n = 3) coloured overlay, while 11 selected a completely different overlay colour. Across the whole cohort, the colorimetry setting shifted by an average level of 9.6 just noticeable differences. The results indicate that individuals affected by visual stress are unlikely to find exactly the same colour to be optimal on different occasions. This may indicate that the use of colour to alleviate symptoms of visual stress when reading is not a valid approach, or that the use of colour is valid, but it does not have to be precisely prescribed.

**Ophthalmic and Physiological Optics 37 (4): 542-548**
A 5-Minute Interval between Two Dilating Eye Drops Increases Their Effect

Although it is often advised to wait 5 minutes between eye drops to avoid the second drop washing out the first, the only previous study on this effect found that a 10 minute interval between drops did not enhance their combined effect. In this study, the investigators instilled 1 drop of 10% phenylephrine followed by 1 drop of 0.5% tropicamide either immediately, or after a 5 minute interval in 40 eyes of 20 participants. Digital photographs of the pupils indicated that there was a 5.6% increase in pupil surface (ratio or pupil to iris area) after waiting 5 minutes, rather than instilling the second drop immediately after the first. This level of additive effect may be difficult/impossible to detect in terms of diameter hence suggesting no benefit of waiting between drop instillation.

Optometry and Vision Science 94 (8): 838-844
http://journals.lww.com/optvissci/Abstract/2017/08000/A_5_Minute_Interval_between_Two_Dilating_Eye_Drops.7.aspx

Saccades and fixations in children with delayed reading skills

Some previous research has suggested that eye movements differ between good/average readers and poor readers. However, as these studies have involved analysing eye movements during reading-related tasks, the observed differences may be due to deficits in higher cognitive processes rather than oculomotor performance. This study examined eye movements in 120 children with normal reading skills, and 43 children with delayed reading skills (4-11 years old). An eye tracker was used to record eye movements as a cartoon character was moved horizontally in 5 degree steps to study saccades and an animated non-moving stimulus presented to examine fixation stability. The eye movements between the children with delayed reading skills and those without, were similar. None of the optometric parameters including visual acuity, refractive error, stereopsis or accommodation accuracy were associate with delayed reading skills. The research suggests that delayed reading skills are not linked to eye movements, and questions the validity of interventions aimed at improving eye movement control.

Ophthalmic and Physiological Optics 37 (4): 531-541

Drilling into the functional significance of stereopsis

The functional benefits of stereopsis have been debated for many years, with one suggested advantage being the facilitation of fine motor control, although there is little empirical evidence to support this assertion. This interesting study used a high-fidelity virtual reality simulator to examine how the performance of dentists during a range of tasks is affected by removal of horizontal retinal disparities under direct viewing and indirect (mirror) observation. Depth-related errors were significantly more common under non-stereoscopic viewing conditions, although lateral errors did not vary between conditions, confirming that dentists do use stereopsis and its presence improves
performance. Whether individuals with stereo-deficits can compensate adequately is not answered by this study, and further research is needed.

Ophthalmic and Physiological Optics 37 (4): 498-506

-End-

All articles were reviewed by Aston University and Bausch + Lomb were not privy to the original article.