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PRIMARY eyecare

Research Roundup:
Obstructive Sleep Apnea and Optic neuropathy - AMD, Bevacizumab and Mortality - Tear Film Changes in Older Patients - 3D Printing for Customised Spectacles - Presbyopia Worldwide - Orbital Fractures in Children

In this issue of Primary Eyecare Quarterly we have put together a summary of interesting research where the concerns of eye health and general practice overlap. We at the NZ Association of Optometrists totally support general practice as the cornerstone of primary health care and hope that our colleagues in general practice will continue to recognise the contribution that optometry makes to primary **eye** health care.

There are many ways that poor eye health and low vision intersect with general health and well-being. The acute eye problems and eye diseases that cause blindness will always be at the forefront of our collective minds but it is useful to consider irreversible loss of vision as a long term condition, one which has health, social, and psychological elements. There are many known links between systemic conditions and effects on the eyes and vision, however, there are emerging new research directions which point to previously unexplored connections.

We hope you enjoy the following research round-up featuring published abstracts.

Association between obstructive sleep apnea and optic neuropathy: a Taiwanese population-based cohort study

(Ming-Hui Sun, Yaping Joyce Liao, Che-Chen, Rayleigh Ping-Ying Chiang & James Cheng-Chung Wei M.D, *Eye,* volume 32, pages1353–1358 (2018)

Abstract

Obstructive sleep apnea (OSA) is associated with many systemic diseases including diabetes, hypertension, stroke, and cardiovascular disease. The aim of our study was to investigate the association between OSA and optic neuropathy (ON), and to evaluate the efficacy of treatment for OSA on the risk of ON.

Methods

We used the data from the Longitudinal Health Insurance Database, which involved one million insurants from Taiwan National Health Insurance program (Taiwan NHI).

Results

OSA patients had a 1.95-fold higher risk of ON compared with non-OSA patients in all age group. The risk was significantly higher (adjusted hazard ratio: 4.21) in the group aged <45 years and male individuals (adjusted hazard ratio: 1.93). Meanwhile, sleep apnea was associated with ON regardless of the existence of comorbidity or not. OSA patients treated with continuous positive airway pressure (CPAP) had an adjusted 2.31-fold higher hazard of developing ON compared to controls, and those without any treatment had an adjusted 1.82-fold higher hazard of developing ON compared to controls. Moreover, ON patients had a 1.45-fold higher risk of OSA, and those aged between 45 and 64 years (hazard ratio: 1.76) and male individuals (hazard ratio: 1.55) had highest risk.

Conclusions

Our study showed that OSA increased the risk of developing ON after controlling the comorbidities; however, treatment with CPAP did not reduce the risk of ON. Further large population study accessing to medical records about the severity of OSA and treatment for OSA is needed to clarify the efficacy of treatment for OSA in reducing the risk of ON

Mortality after a cerebrovascular event in age-related macular degeneration patients treated with bevacizumab ocular injections.

(Acta Ophthalmol; 2018 Apr 16; EPub Ahead of Print; J Hanhart, DS Comaneshter, S Vinker ; Acta Ophthalmologica Scandinavica Foundation. Published by John Wiley & Sons Ltd. doi: 10.1111/aos.13731)

Abstract

Purpose: To analyse the mortality associated with intravitreal injections of bevacizumab for age-related macular degeneration (AMD) in patients previously diagnosed with stroke or transient ischaemic attack (TIA).

Method

We reviewed bevacizumab-treated AMD patients with a diagnosis of stroke or TIA prior to their first bevacizumab injection (n = 948). Those patients, naive to any anti-vascular endothelial growth factor (anti-VEGF) at the time of stroke/TIA, were then compared to age- and gender-matched patients who had a stroke/TIA at the same time and had never been exposed to anti-VEGF. Survival analysis was performed using adjusted Cox regression. The main outcome measure was survival. Adjusted variables were age, smoking, alcohol abuse, hypertension, diabetes mellitus, obesity,

ischaemic heart disease, congestive heart failure and liver cancer.

Results

Age and gender distribution of bevacizumab-treated patients and controls were similar (mean age: 83.4 versus 83.7 years, p = 0.3; 51.7% males versus 52.5% males, p = 0.7). The adjusted mortality in patients who received bevacizumab within 3 months after stroke/TIA was significantly different than in patients non-exposed to bevacizumab (OR = 6.92, 95%, CI 1.88–25.43, p < 0.01). Within 6 months after stroke/TIA, the difference in adjusted mortality showed a strong trend (OR = 2.00, 95%, CI 0.96–4.16, p = 0.064). Within

12 months, it was insignificant (OR = 1.30, 95% , CI 0.75–2.26, p = 0.348).

Conclusion:

We found increased mortality within three months after a cerebrovascular event in patients treated with bevacizumab for AMD compared to patients for whom there was no record of a prescription to any anti-VEGF agent.

Key words: anti-VEGF – bevacizumab – mortality – neovascular AMD – stroke

Image courtesy of National Eye Institute, US.

Age-Related Changes to Human Tear Composition

Alessandra Micera, Antonio Di Zazzo, Graziana Esposito, Rosa Longo, William Foulsham, Roberto Sacco, Roberto Sgrulletta, and Stefano Bonini. Invest Ophthalmol Vis Sci. 2018;59:2024–2031.

https://doi.org/10.1167/iovs.17-23358

Purpose: We characterize age-associated alterations in the expression of inflammatory mediators and tissue remodelling factors in human tears.

Methods A total of 75 consecutive volunteers (32 male/44 female; 19–93 years) underwent clinical assessment of ocular surface status, ocular surface disease index (OSDI) grading and tear sampling. The volunteers were categorized into three groups: young (18–40 years), middle -aged (41–60 years), and old (>60 years). Total protein profiles and chip-based protein array evaluations were conducted to investigate the expression of 60 potential candidates, including pro-/anti-inflammatory mediators and tissue remodelling factors. Appropriate validations were performed using conventional assays. Multiple comparisons for regression between potential candidates and age were performed, as well as statistical analyses among the three age groups. Non-pooled samples were used for quantifications.

Results: Pearson analysis of chip-arrays identified 9 of 60 potential candidates. Specifically, IL-8, IL-6, and regulated on activation, normal T cell expressed and secreted (RANTES; P < 0.0083) protein as well as matrix metalloproteinase (MMP)-1, IL-3, and TNF-a (P < 0.05) correlated positively with ageing. MIP-3b showed an opposite tendency. Western blot and ELISA analysis corroborated the array data. OSDI grading did not correlate with aging.

Conclusions: Dynamic changes to tear protein profiles occur with aging. Our study identifies the expression of IL-8, IL-6, RANTES, MMP-1, and MIP-3b as increasing with age. These select inflammatory and matrix remodelling factors may be relevant to the development of novel diagnostic tools and therapeutics in the context of age-related ocular surface disease.

Keywords: aging, protein tear-print, inflammation, ocular surface, discomfort, parainflammation.

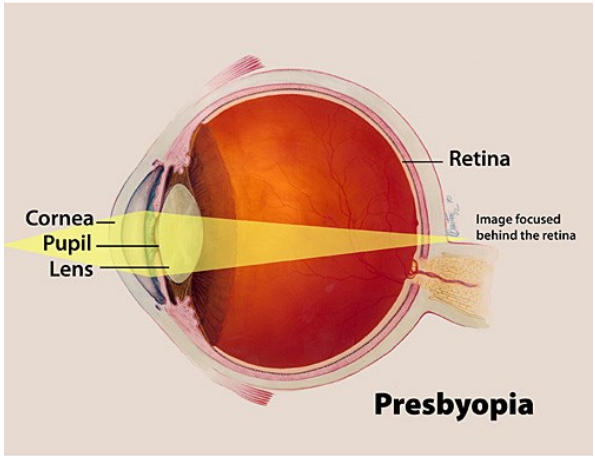


Image courtesy of US National Eye Insititute - NIH

Global Prevalence of Presbyopia and Vision Impairment from Uncorrected Presbyopia: Systematic Review, Meta-analysis, and Modelling.

Timothy R. Fricke, Nina Tahhan, Serge Resnikoff, Eric Papas, PhD, Anthea Burnett, Suit May Ho, Thomas Naduvilath, Kovin S. Naidoo. Ophthalmology 2018;125:1492-1499,

Topic: Presbyopia prevalence and spectacle-correction coverage were estimated by systematic review and meta-analysis of epidemiologic evidence, then modelled to expand to country, region, and global estimates.

Clinical Relevance: Understanding presbyopia epidemiologic factors and correction coverage is critical to overcoming the burden of vision impairment (VI) from uncorrected presbyopia.

Methods: We performed systematic reviews of presbyopia prevalence and spectacle-correction coverage. Accepted presbyopia prevalence data were gathered into 5-year age groups from 0 to 90 years or older and meta analyzed within World Health Organization global burden of disease regions. We developed a model based on amplitude of accommodation adjusted for myopia rates to match the regionally meta-analyzed presbyopia prevalence. Presbyopia spectacle-correction coverage was analyzed against country-level variables from the year of data collection; variation in correction coverage was described best by a model based on the Human Development Index, Gini coefficient, and health expenditure, with adjustments for age and urbanization. We used the models to estimate presbyopia prevalence and spectacle-correction coverage in each age group in urban and rural areas of every country in the world, and combined with population data to estimate the number of people with near vision impairment.

Results: We estimate therewere1.8 billion people (prevalence, 25%;95%confidence interval [CI],1.7e2.0 billion [23%e27%]) globally with presbyopia in 2015, 826 million (95% CI, 686e960 million) of whom had near vision impairment because they had no, or inadequate, vision correction. Global unmet need for presbyopia correction in 2015 is estimated to be 45%(95%CI, 41%e49%). People with presbyopia are more likely to have adequate optical correction if they live in an urban area of a more developed country with higher health expenditure and lower inequality.

Conclusions: There is a significant burden of vision impairment from uncorrected presbyopia, with the greatest burden in rural areas of low-resource countries.

Orbital fractures in children: clinical features and management outcomes

Atanu Barh, Meenakshi Swaminathan, Bipasha Mukherjee. Journal of American Association for Pediatric Ophthalmology and Strabismus {JAAPOS}, December 2018; Volume 22, Issue 6, Pages 415.e1–415.e7

DOI: https://doi.org/10.1016/j.jaapos.2018.07.353

Purpose: To report the clinical characteristics and management outcomes of orbital fractures in children.

Methods: The medical records of pediatric patients (<18 years of age) who presented with orbital fractures over a 15-year period (January 2001-December 2015) were reviewed retrospectively. The cause of injury, imaging findings, clinical features, management, and outcomes were noted.

Results: A total of 52 patients (39 males) were included. Mean age at presentation was 10.9 years (range, 2-18). Road traffic accidents (18/52 [35%]) were the most common cause, with the orbital floor (42/52 [81%]) being the most common fracture site. The most common complaint was double vision (52%). Thirty-eight patients underwent surgical intervention, and extraocular muscle entrapment (56%) was the most common indication for surgery. Early surgical intervention within 15 days of injury resulted in complete resolution of diplopia.

Conclusions: In our study cohort, orbital floor fracture was most common. The trapdoor type of fracture was seen in almost half of the patients, with diplopia being the most common presenting complaint. Early surgical intervention was associated with complete resolution of ocular motility limitation and diplopia.

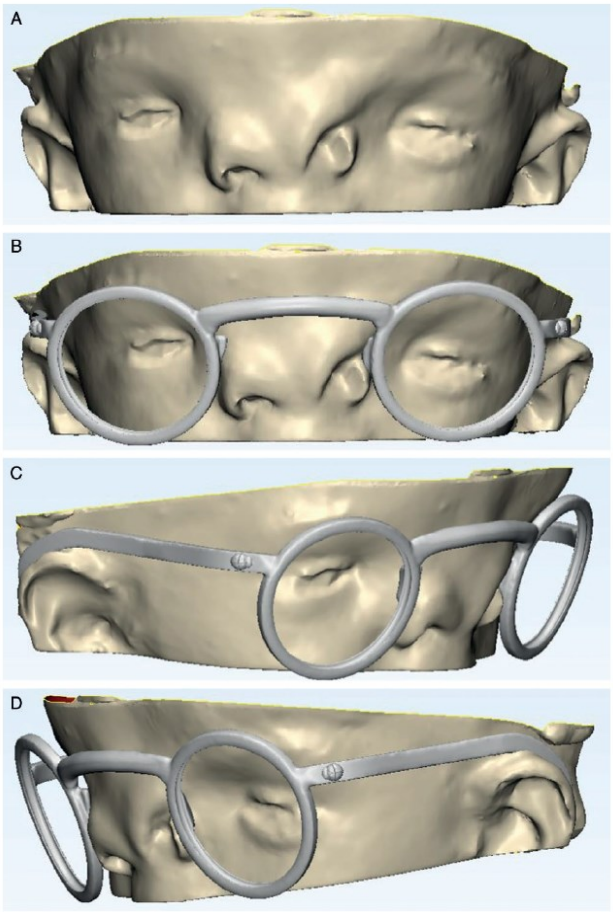


Image courtesy of Optometry Australia

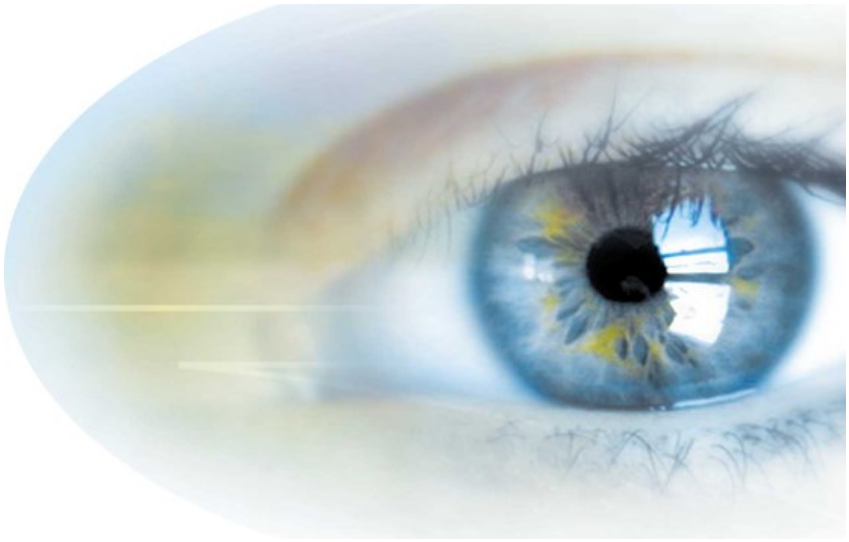
Customised spectacles using 3-D printing technology

Onder Ayyildiz. Clinical and Experimental Optometry, 2018; 101: 747–751. DOI:10.1111/cxo.12795

Background: This study describes a novel method of customised spectacles prototyping and manufacturing using 3-D printing technology.

Methods: The procedure for manufacturing customised spectacles using 3-D printing technology in this study involved five steps: patient selection; using surface topography; 3-D printing of the phantom model; 3-D designing of the spectacles; and 3-D printing of the spectacles.

Results: The effective time required for 3-D printing of the spectacles was 14 hours. The spectacles weighed 7 g and cost AUD$160.00 to manufacture. The 3-D-printed spectacles fitted precisely onto the face and were



considered to provide a superior outcome compared with conventional spectacles. Optical alignment, good comfort and acceptable cosmesis were achieved. One month after fitting, the 3-D-printed spectacles did not require further changes.

Conclusion: Customised 3-D-printed spectacles can be created and applied to patients with facial deformities. As a significant number of children with facial deformities require spectacle correction, it is essential to provide appropriate frames for this group of patients. The 3-D printing technique described herein may offer a novel and accurate option. It is also feasible to produce customised spectacles with this technique to maximise optical alignment and comfort in special conditions.

Key words: 3-D printing, customised spectacles, facial deformities, frame fitting.

CORRECTION

In our recent issue on post-concussion vision syndrome we advise that "If the time taken to complete the post-event test is 5 seconds longer or there are 2 or more errors made the advice is to remove the player from the field and seek further investigation." **This is wrong.**

In sideline testing with the King Devick any time longer than the baseline and/or any errors made are a fail and the individual should be removed for further investigation.

We thank Doug King, Lead CNS(MI) in the Emergency Department at Hutt Valley District Health Board for bringing this error to our attention.