XXX Congress of the European Society of Cataract and Refractive Surgeons

OTEurope provides a brief review, with a focus on the IOLs from this year's event

Sleep impacted by IOLs

By Felicity Thomas

"There needs to be a greater awareness of the effects of cataracts and IOL implantation on the quality of sleep of our patients," asserted Dr G. Ratnarajan (Oxford Eye Hospital, Oxford, UK) during the *Best of the Best* session at this year's ESCRS meeting.

In his presentation, Dr Ratnarajan revealed the one month data of a comparative study examining the impact of UV-blocking or blue-filtering IOLs on sleep quality. "To give you a bit of background," he said, "the circadian rhythm regulates all optical and biological events specific to our light-dark cycle, one of which is sleep. It's the change in quality of life particularly at dawn and dusk that is the important regulating factor of circadian rhythm."

It is known, from transmission curves, that cataract preferentially blocks out blue light so on ageing and developing a cataract this light transmission into the back of the eye will significantly drop but longer wavelengths are not as dramatically affected. Dr Ratnarajan noted that cataract surgery and IOL implantation increases the blue-light transmission. "So, we would expect sleep patterns to be potentially improved after cataract surgery," he added. "But, what we don't know is whether a difference is experienced with UV-blocking or blue-filtering lenses."

The study

"So, we did a comparison of sleep quality in patients with visually significant cataract," said Dr Ratnarajan. The patients were evaluated before surgery and 1 month after surgery, which was the data presented at this session. The study will be continued and the patients will undergo a follow up at 12 months post-op as well.

Two patient groups were formed, one at the Oxford Eye Hospital (Oxford, UK) and the other at the Prince Charles Eye Unit (Windsor, UK). Patients at the first location received the UV-blocking lens, AcrySof SA60AT (Alcon Laboratories, Fort Worth, Texas, USA), and those in the latter location received the blue-filtering lens, AcrySof IQ SN60AT (Alcon Laboratories).

"Demographic information was collected on patients as well as their best-corrected visual acuity (BCVA) in either eye and presence of any inconsistent pathology **[QA: Is this edit OK? I couldn't quite catch what you said clearly.]**," added Dr Ratnarajan. The team used the Pittsburgh Sleep Quality Index (PSQI) questionnaire to evaluate the patients at each visit. "It's a well-established and validated sleep study questionnaire and is based on seven branches of sleep… it also gives a global sleep function and a score of greater than 5 would indicate poor sleep," he said.

Results

The two cohorts were well matched with regards to age, gender and presence of any existing ocular co-morbidities explained Dr Ratnarajan. "The baseline pre-op visual acuity (VA) was slightly better in the UV-blocking IOL group and we deemed good VA to be 6/9 or better," he continued. "In both groups, 49% of patients were reported to have a PSQI of greater than 5 and so were classified as poor sleepers. The mean score was slightly higher in the blue-filtering group compared with the UV-blocking group."

At the postoperative 1-month visit Dr Ratnarajan noted that there was a highly statistically significant improvement in the PSQI score for the UV-blocking IOL group, which went from 6.4 to 5.64. However, the blue-filtering IOL group did not perform as well although an improvement between pre-op and 1-month post-op scores was still seen. He went on to reveal that the UV-blocking IOL group experienced improvements in sleep quality, sleep latency (time taken to fall asleep) as well as sleep duration whereas the blue-filtering IOL group demonstrated a significant improvement in sleep duration alone.

Performing a sub-analysis based on the pre-op VA, Dr Ratnarajan noted an interesting trend. "In the UV-blocking group those with good pre-op VA did demonstrate a statistically significant improvement in sleep but it was those patients with the poor pre-op VA that benefitted more. Interestingly, in the blue-filtering IOL group this pre-op VA made no difference," he said.

Difference in lens type

"In summary, poor sleep is common, affecting half the patients presenting for cataract surgery," Dr Ratnarajan confirmed. "We saw a statistically significant improvement after 1-month with a UV-blocking IOL, particularly in those with poor pre-op VA, the blue-light filtering IOL did not demonstrate the same improvement and there was no correlation with the pre-op VA." This is the first study to demonstrate a difference between lens types and the results were unexpected in that previously it has been thought that the type of IOL would not have an impact on sleep.

Dr Ratnarajan emphasized the importance of awareness of these findings particularly for patients in poorly lit environments who may benefit more greatly from a clear lens implantation. "This work is on going, we are looking at the results after 12 months as well as the effect on pupil size, which will hopefully give us more information," he concluded.

Dr Ratnarajan has indicated that travel had been funded (fully or partially) by one of the companies mentioned within this piece.

Measuring LCA of IOLs

According to Professor Susana Marcos, "Aberrometry at different wavelengths allows us objective *in vivo* measurements of the LCA in eyes implanted with IOLs as well as the impact of longitudinal chromatic aberration (LCA) on image quality." Prof. Marcos (Visual Optics & Biophotonics Lab, Institute of Optics, Madrid, Spain) discussed her study on measuring chromatic aberrations of IOLs *in vivo* during the second day of this year's ESCRS symposium.

Chromatic aberrations

"There are two types of chromatic aberrations," added Prof. Marcos. "The LCA refers to a situation when blue light

focuses in front of the retina and red light behind… There is also transverse chromatic aberration that arises primarily from misalignment in the ocular components." However, in her discussion, Prof. Marcos highlighted the aforementioned chromatic aberrations, LCA, which can be attributed to dispersion from the aqueous content of the eye but can also be affected by IOL material.

IOLs are given different Abbe numbers that refer to the optical dispersion of the material used in the lens. The higher the Abbe number, the lower the LCA. "The goal of the study was to measure objectively and *in vivo* the LCA in eyes implanted with two lenses of different materials and also to assess the impact of the LCA on retinal image quality in pseudophakic eyes," Prof. Marcos said.

In this study, Prof. Marcos' clinical colleagues at Fundacion Jimenez Diaz implanted their study group with the Tecnis ZB99 1-piece acrylic IOL (AMO, Santa Ana, California, USA) or the AcrySof SN60WF IOL (Alcon Laboratories, Fort Worth, Texas, USA), which have different Abbe numbers. "So, the study involved 18 patients, 9 in each group," she added. "They were matched in age and IOL power, and measurements were taken 1 month after surgery with pupil dilation (ranging from 4–6 mm in diameter)."

The team used a custom-developed laser ray tracing aberrometer to measure the aberrations of the patients' eyes at two wavelengths, one in green at 532 nm and one in infrared (IR) at 768 nm. Monochromatic wave aberrations were measured five times at each wavelength and the team used the 7th order Zernike polynomial to describe the outcomes of these measurements. Additionally, the spherical error was estimated for each wavelength with 2nd order Zernike coefficients. "We calculated the LCA from the difference of the spherical error between the two wavelengths," Prof. Marcos added.

Results and discussion

"We found that the Tecnis had lower amounts of LCA (about 0.46 D) than the AcrySof (about 0.7 D), the latter being similar to the phakic chromatic aberrations we had found when using the same method in an earlier study," said Prof. Marcos. However, the repeated wave aberration measurements were highly reproducible in the patients and no significant differences were found across the wavelengths in higher order aberrations.

The team found that using aberrometry to measure LCA in eyes implanted with different IOLs was a reliable technique. "LCA in eyes implanted with the Tecnis was lower by 0.3 D in the measured wavelength range than the AcrySof but this lens is similar to the physiological values in phakic eyes," concluded Prof. Marcos. The estimation of the Point Spread Functions (PSF) in green and IR allowed evaluating the actual impact of LCA on retinal image quality. In the presence of high order aberrations, the increase of the width of the PSF by the LCA was 30% and 37% respectively, with no statistically significant differences between lens types.

Dr Marcos indicated funding for the research had been partially provided by one of the companies mentioned in this piece.

FROM THE SHOW FLOOR

CE Mark and European launch

Abbott Medical Optics (AMO) announced the receipt of the European CE Mark for the Tecnis multifocal toric 1-piece IOL and the Tecnis iTec preloaded delivery system at this year's ESCRS congress. In light of this news, the company will be launching these products in CE Mark countries immediately.

The Tecnis multifocal toric 1-piece IOL is a premium lens solution designed for astigmatic cataract patients. This lens joins the Tecnis portfolio from AMO. The company reports that the toric lens can also correct both presbyopia and corneal astigmatsim in addition to the conventional distance vision correction.

The Tecnis iTec preloaded delivery system enables implantation of the Tecnis 1-piece aspheric acrylic IOL without requiring manual loading of the lens. This system is disposable, which minimizes infection risks, and it can be used in a 2.2–2.4 mm incision size. It uses a controlled, screw-style delivery system that, according to AMO, provides reliability and efficiency.

Senior vice president of AMO, Jim Mazzo, commented, "Cataract surgeons in Euope now have two new products available to address the unique lifestyle needs of their patients. By receiving the CE Mark for the Tecnis multifocal toric IOL and the Tecnis iTec preloaded delivery system, Abbott continues to demonstrate its commitment to advancing cataract vision care innovation and providing high quality patient outcomes."

More information may be found at the company's website **www.abbottmedicaloptics.com**

Astigmatism correction

Available from Bausch + Lomb is the *enVista* Toric hydrophobic acrylic IOL for astigmatsim correction. The company announced the launch of this lens during the ESCRS congress in Milan, Italy.

According to the company, this lens represents a step forward in IOL technology, offering predictable astigmatism correction through its unique single-piece, modified-C haptic design.

Luis Cadarso, Clinica Cadarso, Pontevedra, Spain, gave a peronal review of the lens stating, "In my experience, the new *enVista* Toric is very stable. Since this lens is also clinically proven to be glistening-free, it allows me to provide better, more consistent vision for my astigmatic patients."

The lens has two key features to enhance its rotational stability: unique fenestrated step-vaulted haptics and a 56 degree contact angle. Additionally, in a recent study presented at ASCRS, 2-year data revealed that no glistenings were detected with the lens.

"The addition of this new lens to our portfolio means that Bausch + Lomb no offers surgeons more complete range of IOLs to meet their patients' needs," said Dr Cal Roberts, executive vice president and chief medical officer, Bausch + Lomb.

Further detailed information can be found at **www.bausch.com**

Trifocal preloaded MICS IOL

Carl Zeiss Meditec featured its next generation of multifocal IOLs, the trifocal IOL AT LISA tri 839MP. This new lens is based on the established AT LISA platform and is designed to produce predictable outcomes for active patients.

The company reports that the IOL features a unique asymmetrical light distribution between three different foci, 50% distance, 20% intermediate and 30% near. Additionally, sensitivity rate and lower visual disturbances are maintained as a result of increased light transmittance.

This lens is suitable for use in micro-incision cataract surgery (MICS) and is pre-loaded using the BLUEMIXS 180 injector, which enables implantation through an incision of 1.8 mm. Furthermore, the lens has an anti-PCO posterior profile to prevent posterior capsule opacification.

"We would like to assist our customers in optimally addressing the challenges of surgical cataract and presbyopia correction," said Dr Ludwin Monz, president and CEO of Carl Zeiss Meditec. "With the AT LISA tri trifocal IOL this means that patients are provided with the most natural postoperative vision possible without being reliant on glasses."

To learn more visit the website **www.meditec.zeiss.com/lisa-tri**

Effective IOL explantation

In collaboration with Dr Michael E. Snyder and Dr Robert H. OSher from Cincinnati Eye Institute, Cincinnati, USA, Geuder has developed IOL scissors and forceps to effectively explant an IOL. These new products were presented at this year's ESCRS congress.

The Snyder-Osher IOL scissors feature sturdy and sharp scissor blades that ensure a high cutting efficiency. Additionally, they feature grooves on the lower blade to prevent slippage during cutting and a unique handle geometry enables a wide opening angle of the blades. The Snyder-Osher forceps offer secure grip with special grooves in the handle so that a secure grasp on the lens can be achieved and lens fragments can be easily removed.

Additional information can be found on Geuder's website **www.geuder.com/explantationset**