

ESCRS EUROTIMES

A EUROPEAN OUTLOOK ON THE WORLD OF OPHTHALMOLOGY

Studies on the oldest IOL provide clues that may lower the incidence of PCO

Roibeard O'hEineachain
in Rome

In the years since Harold Ridley invented the IOL, several changes have been made in

IOL material and design. This was helpful in reducing the incidence of posterior capsule opacification and other complications. Recent studies from South Carolina have shown that

some of the features of Ridley's original lens may provide clues to help in designing modern lenses to reduce such complications according to Andreas F Borkenstein MD.

Several authors have noticed that total filling of the capsular bag with a lens made of a soft biomaterial may, by filling the space where opaque material normally is situated, reduce PCO. This has been seen in animal models and in laboratory experience but rarely shown conclusively in clinical studies. However, an opportunity to address this issue has recently arisen during laboratory studies where Dr Borkenstein and his colleagues made several observations of eyes containing Ridley's original IOL. Dr Borkenstein, in a presentation to the 13th ESCRS Winter Meeting, noted that new data shows that the concept of capsular bag filling helps in understanding the pathogenesis and hence the treatment of PCO. These lenses help demonstrate that this concept is correct, Dr Borkenstein said.

Dr Borkenstein, working as a research fellow with Prof David J Apple in his laboratory for Ophthalmic Devices Research, Sullivan's Island, South Carolina, performed a photographic analysis of human eyes containing Ridley implants. These specimens were obtained from patients who underwent implantation with Ridley's original lens 45 years to 57 years ago, previously reported by Charles E Letocha, MD in the April 1999 issue of the *Journal of Cataract and Refractive Surgery*. One case had a traumatic cataract at age 13. The others had surgery for unilateral cataract of unknown aetiology at about age 40.

In addition, the investigators also reviewed the findings of an ultrasound biomicroscopy examination of a living 81-year-old patient who underwent implantation of the Ridley lens by Dr Ridley himself in 1952. W Ayliffe and D Reinstein performed several clinical examinations in London, UK. However, because of the patient's non-ocular infirmities, no exact acuity data was available but the patient had absolutely no complaints.

This lens is very special since it provides a follow-up of 57 years, the longest ever reported.

Dr Borkenstein and his team found that in all five cases there was virtually no PCO and the visual axis was clear. "A common denominator to all cases was the fact that the lenses were perfectly well centred and they had no space to move within the capsular bag," he added.

He noted that the Ridley lens was quite large by modern standards with an overall length of 10.0mm. As a result, it left no space between the surface of the lens and the posterior capsule. In this way, the lens stopped any growth of cells from the peripheral lens equator towards the centre, he said.

He added that previous research in Dr Apple's laboratory has shown that there are three surgical and three IOL-related factors that can reduce PCO following IOL implantation and three IOL-related factors. The surgical factors include in-the-bag fixation of the IOL, hydrodissection with enhanced cortical clean-up and clearing the capsular bag, and a small anterior capsulorhexis. The IOL-related factors include a biocompatible IOL material, a requirement fulfilled by all today's material, ie, hydrophobic material and tissue-friendly hydrophilic materials and PMMA, and a square truncated optic edge, which includes the optic haptic junction. Another factor, which has generally received less attention by IOL designers is maximal contact between the IOL optic and the posterior capsule to prevent migration of epithelial cells across with visual axis by depriving them of space to grow.

"In this case, the Ridley lens has been in place for up to 57 years with no evidence of secondary cataract and this is by far the longest documented survival of a healthy IOL. The Ridley lenses shown here provide strong, clinically significant evidence that the presence of the disc-shaped IOL filling the capsular bag can block any growth of cataractous material. This verifies the concept of 'No space – no cells'," he added.

Dr Borkenstein noted that it is possible to apply the 'no space – no cells' concept to today's IOLs with designs more similar to conventional IOLs which do not completely fill the capsule, eg, lenses that adhere close to the posterior capsule (sticky material) or thick biconvex optics. This principle has been cleverly applied to the AMO – Tecnis 1-piece tri-fix hydrophobic acrylic lens, he said.

This AMO lens has three fixation points so that its offset angulated haptics pushes back against the posterior capsule. Unlike first generation one-piece lenses, the edge design Tecnis 1-piece IOL has no interruption at the haptic-optic junction.

Dr Borkenstein concluded that the results of the study are clinically significant that the presence of a disc-shaped IOL filling the capsular bag or its equivalent can block growth of cataractous material. This verifies the concept of 'No space – no cells'.

crustalith@gmx.at

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Hennigsdorf / Germany

Phone: +49 (0) 3302-202 6000