

One Role in the Evolution of Modern Cataract Surgery

Reflections on the AIOIS, formulae for IOL power calculations, and more.

BY KENNETH J. HOFFER, MD, FACS

The single ophthalmologist responsible for creating, organizing, and nurturing what is now one of the most prestigious ophthalmic organizations in the world, the ASCRS, is Ken Hoffer. In addition to his many other firsts, the ASCRS will be his crowning glory and legacy.

—Herve M. Byron, MD, Section Editor

It is hard to look at the evolution of modern cataract surgery without seeing the effect of the American Intra-Ocular Implant Society (AIOIS) on providing open fora and stimulating advancements in this field throughout the world. This article shares my inspiration and efforts for that organization as well as some of the other landmarks in my career.

THE AIOIS

The year 1974 was a hectic and exciting time for me (Figure 1). I was just turning 30 and was only a year or so out of residency. It was in April, when I implanted my first IOL, that I realized there was really no authority to turn to for help. The ophthalmologists who were implanting IOLs in the US were a disparate group with many factions and philosophies regarding the best lens designs and procedures. I knew that not one of them would be successful in forming an organization and that the effort could only be accomplished by an unknown. My mother's sudden death at age 57 was the stimulus for me to proceed.

My plan was to make sure the AIOIS had scientific meetings where surgeons could present their ideas and designs without censure in an environment that was not hostile. There also needed to be a scientific (ultimately peer-reviewed) journal to document and disseminate this information. It was difficult but exciting organizing these meetings at the Century Plaza Hotel in Los Angeles



Figure 1. Dr. Hoffer performs surgery at Santa Monica Hospital in 1974.

(Figures 2 and 3) and pasting together journal material for the printer, usually late into the night. I chaired the AIOIS meetings from 1975 to 1980, and I was the scientific editor of the society's journal from 1975 to 1976 and the managing editor from 1976 to 1980. After adding refractive surgery to their agenda, they became the American Society of Cataract & Refractive Surgery (ASCRS) and the *Journal of Cataract & Refractive Surgery*, respectively.

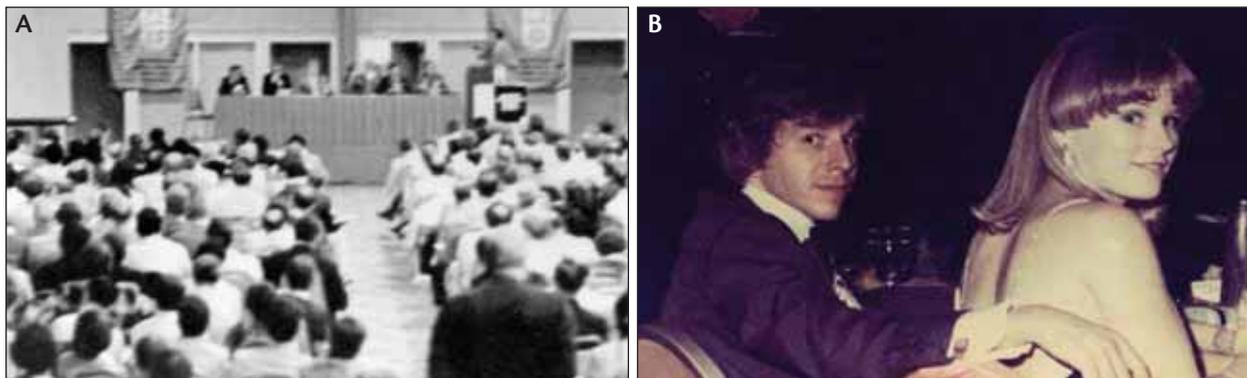


Figure 2. A panel is convened during the first meeting of the AIOIS at the Century Plaza Hotel in Los Angeles in 1975 (A). Kenneth and Marcia Hoffer attend the Gala Dinner (B).

Those years were a lot of fun, and I could never list here all of the colleagues and friends who helped make these goals the reality they are today. Two extremely difficult accomplishments were getting the ASCRS approved to authorize CME credits for its activities and getting the AMA to recognize it as one of the three ophthalmic organizations that could send delegates to the AMA. It was almost as difficult as establishing the Binkhorst Medal Lecture and my work against IOLs with metal loops for implantation after intracapsular cataract extraction.

METAL AND IOLS

In the 1980s, I twisted the arms of manufacturers to remove IOLs that had metal loops from the US market. It was also dicey sending postcards warning of the problems associated with these lenses, because I feared that the companies would sue me. I sent out warnings about Luminex for fungal infections; Medical Workshop for hypopyons from gamma radiation sterilization; Surgidev Corp. for large, mislabeled IOL powers; McGhan, Surgidev Corp., and lolab for IOLs with metal loops for intracapsular cataract extraction; lolab for sharp-edged Choyce AC IOLs; and Cilco, Inc., for Sputnik lenses that caused cystoid macular edema and corneal edema.

Believe it or not, the AIOIS and I were never sued. I always wondered how many surgeons would have donated to my legal defense fund if action had been taken.

BINKHORST

I have fond memories of my interaction with Cornelius Binkhorst, MD, of Terneuzen, the Netherlands, in the mid-1970s. He steered me to implant the iridocapsular two-looped lens with the phacoemulsification technique I had been performing since being taught by Richard Kratz, MD, and Robert Sinsky, MD, in October 1972 at their first course without Charles Kelman, MD. Dr. Binkhorst's advice saved me from experiencing most of the many complica-



Figure 3. Drs. Peter Choyce, Kenneth Hoffer, and Robert Drews attend the AIOIS Meeting in Los Angeles in 1976.

tions common with the early IOLs. I am forever grateful to him for that.

Back then, however, Dr. Binkhorst continuously pestered me about how the AIOIS I had formed would ultimately lead to the downfall of the International Intraocular Implant Club, which Harold Ridley and Peter Choyce formed and for which he was then the president. To stop his harassment, I proposed he form a European Implant Lens Council and invite each of the European national implant societies to join it. I also suggested he become the first president of the council. Without ever communicating with me about it, he did exactly that. He was the organizer and first president of what later became the European Society of Cataract & Refractive Surgery (ESCRS) after the AIOIS changed its name. This is the reason I keep up my membership in the ESCRS and attend its meeting every other year.

IOL FORMULAE

My most pleasurable activities during these many years have been based on my competitive attempts to make all eyes emmetropic postoperatively. In March 1974, I performed the first A-scan, ultrasound, axial length measure-



Figure 4. Dr. Hoffer uses the original Sonometrics DBR-100 at Santa Monica Hospital in 1975.



Figure 5. This photograph was taken in November 1979 at the first meeting in San Francisco of the group that pioneered RK. Top row, left to right: Kenneth Hoffer, MD; John Darin, MD; Peter Le Haye; Michael Dietz, MD; and Jack Baker, MD. Bottom row, left to right: Syvatoslav Fyodorov, MD; William Myers, MD; Jack Katzen, MD; and Leo Bores, MD.

ment for IOL power calculation in the US. As a result, I altered Professor M.C. Colenbrander's formula to write the original Hoffer formula and later was the first to put a formula for IOL power calculation on a programmable calculator. It also stimulated me to push for the design of the first A-scan specifically for IOLs, the Sonometrics DBR-100 (Figure 4).

After making the calculators available to colleagues in 1990, some begged for computer software. The effort resulted in the first available computer program for IOL power calculation in May 1993.

My research on predicting IOL power led to my recommending not my formula alone but rather a combination of formulae based on the axial length of the eye. This research also led to a formula to predict the postoperative axial position of PCIOLs based on the axial length of the eye¹ (second-generation formulae). This area of ophthalmology became my favorite hobby, and I will continue with it long past my retirement from active practice. It has

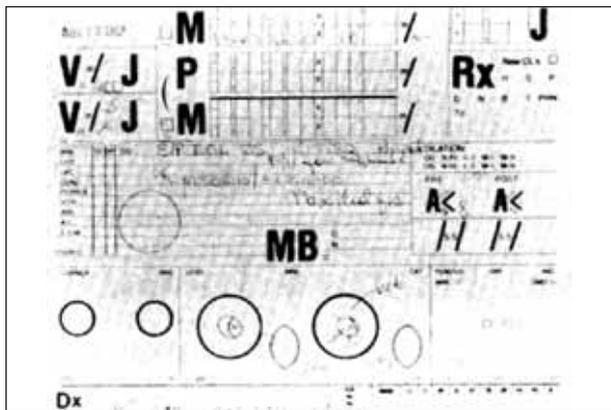


Figure 6. This is the patient’s chart that led to the invention of the first bifocal IOL in 1982.

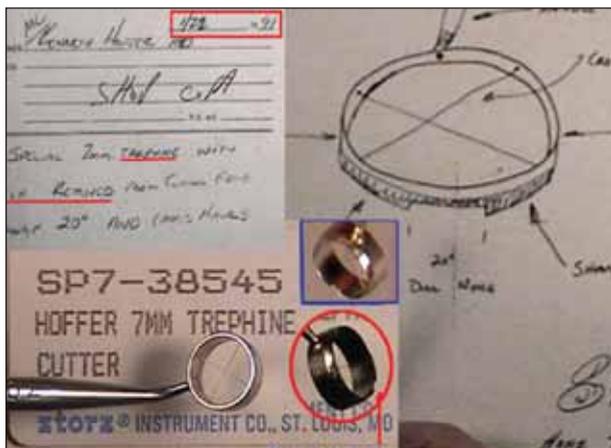


Figure 7. Documentation of the invention of LASEK and the Storz trephine in 1991.

been fun working with H. John Shammas, MD; Wolfgang Haigis, PhD; Thomas Olsen, MD; Jack Holladay, MD; John Retzlaff, MD; Donald Sanders, MD; Manus Kraff, MD, and the many others who have contributed to this “esoteric” subject.

SURGERY AND INNOVATION

I liked developing solutions for what I thought were problems that needed to be fixed. In 1975, I designed the first angled I/A tip with Luminex.² In 1979, I was the first to use Healon (Advanced Medical Optics, Inc., Santa Ana, CA) in the US and advised Pharmacia Corp. (then the manufacturer) on how the viscoelastic should be provided to the surgeon.

During the same year, thanks to Leo Bores, MD, and John Darin, MD, I performed the first RK in the western US (Figure 5). That experience led to the design of the crosshair optical zone markers and the dry technique. While searching for solutions to my objections to the

original Shearing PCIOL in 1975, I also conceptualized a sharp, annular ridge on the lens’ posterior surface to prevent posterior capsular opacification and create a space safe for capsulotomy—a concept still popular today.

In the early 1980s, I performed the first endothelial/Descemet’s transplantation with informed consent. Unfortunately, it did not work well. In 1983, I developed and implanted (in three eyes) the first bifocal IOL in the world³ (Figure 6), but I could not get any company to follow through with its manufacture at that time. My associate Joan McFarland, MD, and I were the first to describe vital dye staining of the anterior capsule in white mature cataracts in 1993.⁴

Thanks to Jared Emory, MD, of Houston, I was the first to inject a monoclonal antibody⁵ to prevent posterior capsular opacification in 1993. Too bad this concept was never pursued. I first presented the idea of LASEK in 1990^{6,7} (Figure 7), several years before the procedure was ever attempted. I also enjoyed trying to popularize the use of phakic IOLs during the 1990s.

CONCLUSION

For 32 years, I have happily given courses at the ASCRS, ESCRS, and AAO meetings on IOL power, secondary implants, endothelial cell counts, Nd:YAG capsulotomy, and phaco/IOL surgery. Looking back, it has been fun, but the friends I have made are what I cherish the most. ■

Section Editor Herve M. Byron, MD, is Clinical Professor for the Department of Ophthalmology at the New York University School of Medicine in New York. Dr. Byron may be reached at (212) 249-8494; byronmd@mac.com.



Kenneth J. Hoffer, MD, FACS, is Clinical Professor of Ophthalmology at the University of California, Los Angeles. He is the owner of Eyelab, which sells computer software for IOL power calculations, including the Hoffer Programs and the Holladay IOL Consultant. Dr. Hoffer may be reached at (310) 451-2020; khoffermd@aol.com.



1. Hoffer KJ. The effect of axial length on posterior chamber lenses and posterior capsule position. *Current Concepts in Ophthalmic Surgery*. 1984;1:20-22.
2. Hoffer KJ. The reversed Cystotome and the Hoffer angled aspiration tip. In: Kelman C, ed. *Proceedings of the Fifth Annual Meeting*. David J. Kelman Foundation. September 1975.
3. Hoffer KJ. Personal history in bifocal intraocular lenses. In: Maxwell A, Nordan LT, eds. *Current Concepts of Multifocal Intraocular Lenses*. Thorofare, NJ: Slack, Inc.; 1991: 127-132.
4. Hoffer KJ, McFarland JE. Intracamer subcapsular fluorescein staining for improved visualization during capsulorrhexis in mature cataracts. *J Cataract Refract Surg*. 1993;19:566.
5. Hoffer KJ. Early results with immunotoxin. *Ocular Surgery News*. 1993;11:14:57.
6. Hoffer KJ. Reuse of autologous corneal epithelium with excimer laser. Paper presented at: The Annual Meeting of the International Society of Refractive Keratoplasty; October 12, 1991; Anaheim, CA.
7. Hoffer KJ. Reflections on the origins of LASEK, 1990 (letter). *Review of Ophthalmology*. 2003;10:5:35.