A History of Modern Cataract Surgery

Today’s procedure is a far cry from that of the 1950s.

BY ROBERT M. SINSKEY, MD

Cataract surgery began around 800 BC, when couching was the procedure of choice. In the 1700s, Jacques Daviel published the first account of a cataract extraction through a limbal incision. Anesthesia for cataract surgery did not exist until the late 1800s when topical cocaine was introduced. Walter Atkinson, MD, made the procedure for local anesthesia easier with the invention of his retrobulbar needle. Aspects of these surgical practices remained when I was a fellow, but great changes were on the horizon.

THE 1950s

In 1951, I traveled to Japan to examine the survivors of the atomic bomb for radiation effects on the eyes. I visited the Red Cross hospital in Hiroshima where ophthalmologists were performing extracapsular cataract extraction on mature cataracts under topical anesthesia (cocaine drops). Surgeons created a 180º corneal section, stripped off the anterior capsule with a toothed forceps, expressed the nucleus, washed out the cortex, and then replaced the cornea. No sutures were used. Both of the patient’s eyes were covered (Figure 1), and he had to lie flat on his back, without bathroom privileges, for 10 days. The complication rates were horrendous.

In 1954, I was chief resident at Duke University in Durham, North Carolina. I performed intracapsular cataract extraction with retrobulbar anesthesia and three corneal-scleral, 6-0, black, silk track sutures (Figure 2). Only the operated eye was patched, and the sutures, which felt like rope in the eye, remained in place for 4 to 6 weeks. After recovering from surgery, patients had to wear thick glasses. Although the surgery itself was relatively painless, the postoperative course was onerous. Patients were bedridden for 5 days and were not permitted to bend over or lift anything for an additional 6 weeks. In addition, they wore Coke-bottle cataract glasses. As a result, people postponed surgery until they could no longer see well enough to get around.

THE EARLY IOLs

In 1949, Sir Harold Ridley had introduced the IOL. High complication rates resulted from the insertion of these crudely made lenses, which came loose in time when the nylon loops dissolved (Figure 3). Consequently, two kinds of surgeons evolved in England in the 1950s and 1960s: (1) those...
who put IOLs in and (2) those who took them out.

In the late 1960s, Cornelius Binkhorst, MD, developed four- and two-loop, iris- and capsule-supported IOLs that had a much improved complication rate. His innovation renewed the interest of intraocular surgeons in the US and Europe. Turgot Hamdi, MD; Norman Jaffe, MD; Herve Byron, MD; and Henry Hirschman, MD, were the earliest American pioneers of intraocular implants.

In 1974, I attended the International Congress of Ophthalmology in Paris. After the conference, I joined a busload of American doctors who spent a week with Dr. Binkhorst in Terneuzen, the Netherlands, and with Jan Worst, MD, in Groningen, the Netherlands. We wanted to learn about IOLs and to begin implanting them when we returned to our home towns. Richard Kratz, MD, a couple of other surgeons on the bus, and I combined phacoemulsification with the implantation of a two-loop Binkhorst lens or a Worst Medallion lens. We felt that these designs were superior to the purely iris-supported lenses or the anterior angle-supported lenses of Peter Choyce, MD, after intracapsular cataract extraction.

In 1977, Steven Shearing, MD, of Las Vegas reported 1 on the first flexible, J-loop PCIOL (the design of Joaquin Barraquer, MD). This lens stimulated the practice of extracapsular cataract extraction, but it did not increase interest in phacoemulsification, which was still frowned upon by 90% of American eye surgeons and 98% of eye surgeons worldwide, according to my estimates.

LIMITING PHACOEMULSIFICATION

In the mid-1970s, the US government decided that Medicare would not reimburse ophthalmologists for cataracts removed via phacoemulsification, and it designated the procedure experimental. Dr. Kratz and a number of other physicians, including myself, convinced the government that phacoemulsification was simply another way to perform cataract surgery. We explained that, if Medicare did not pay for the surgery, insurance companies would follow suit, thereby stifling the development of innovative and different ways of performing any type of surgery. We subsequently went through the same process with IOLs.

Phacoemulsification involved expensive equipment, including the phaco machine (invented in 1979 by Charles Kelman, MD, in conjunction with Cavitron, $40,000) and a microscope (preferably a coaxial-type microscope [Carl Zeiss Meditec Inc., Dublin, CA] with an assistant microscope attachment, $20,000). The combination of the equipment’s price and the procedure’s level of difficulty limited the number of surgeons performing phacoemulsification.

THE 1980s

In 1980, Danièle Aron Rosa, MD, introduced the Nd:YAG laser, which opened the cloudy posterior capsule noninvasively. That same year, David Miller, MD, and Robert Stegmann, MD, introduced Healon (now manufactured by Advanced Medical Optics, Inc., Santa Ana, CA), a viscoelastic that made cataract surgery dramatically easier and safer. Also in 1980, I modified the J-loop lens to make it easier to implant. Then, because the complication rate from acrylic PCIOLs with polypropylene loops was so low, I decided to start implanting these lenses in children. It took years before I was able to convince pediatric ophthalmologists to perform the procedure (Figure 4).

Phacoemulsification finally underwent a surge of popularity in 1984, when Thomas Mazzocco, MD, introduced the first flexible, silicone-plate IOL that could be introduced through a 3-mm incision. The lens caused complications because of its plate design, and the silicone caused increased tissue reaction. Only when the foldable optic was changed to an acrylic three-piece design with polypropylene loops or an acrylic single-piece with loops did the complication rate drop precipitously. Later, the silicone used in the lenses was modified to be as inert as acrylic.

THE BENEFITS OF PHACOEMULSIFICATION

In the early days of phacoemulsification, we surgeons did not realize all the advantages of the small incision and of leaving the posterior capsule intact. The benefits included lower occurrences of retinal detachment, iritis, and corneal complications from vitreous contact; lower amounts of postoperative astigmatism; early mobilization of the patient; and the ophthalmologist’s total control of the eye during surgery (despite interruptions such as from the patient coughing or an elevated IOP). We thought that, by eliminating hospitalization for cataract surgery, we would reduce insurance costs and save Medicare a lot of money. Instead, because patients could
have a relatively painless procedure that immediately achieved superb postoperative results, they chose to undergo the surgery as soon as their golf score dropped or the moment they were unhappy with their vision for any reason.

**CATARACT SURGERY TODAY**

Advances such as topical anesthesia, sutureless incisions, ultraviolet protection in IOLs, and accommodating technologies are leading surgeons to remove the crystalline lens whether it is cloudy or not (refractive lens exchange). Because the litigious US public is so intent on a perfect result, the stress level of the ophthalmic surgeon has increased dramatically. At the same time, insurance payments for cataract surgery have dropped dramatically. Future research in ophthalmology seems to be shifting toward correcting retinal problems such as senile macular degeneration and retinitis pigmentosa as well as toward artificial corneal implants.

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