Glaucoma 25 Years Ago

Two ophthalmologists reflect on what was new and what has changed.

BY M. BRUCE SHIELDS, MD

In 1985, we physicians were taking advantage of several advances in the diagnosis and management of glaucoma made during the previous 15 years. They included trabeculectomy, laser trabeculoplasty, automated perimetry, and topical ß-blockers.

SURGERY

Trabeculectomy

By the early 1970s, following Cairns' report[1] in 1968, many of us were beginning to employ a guarded sclerectomy in filtering surgery. The procedure was called *trabeculectomy*, because the original concept was that removing a block of trabecular meshwork provided direct access to Schlemm's canal. It was soon discovered, however, that the cut ends of the canal scarred closed and that trabeculectomy was really a form of filtering surgery.

Initially, we did not use antifibrotic agents, and although the procedure offered fewer postoperative complications than full-thickness surgery, the long-term pressure control was not as good. As a result, I continued to use a posterior-lip sclerectomy for patients with advanced damage who needed especially low pressures and trabeculectomy for the others. With the advent of antifibrotic agents in the 1980s, however, we were able to achieve very low pressures with trabeculectomy, and I eventually switched to this procedure exclusively for filtering surgery.

Today, new operations (including canaloplasty [iScience Interventional, Menlo Park, CA] and Trabectome surgery [NeoMedix Corporation, Tustin, CA]) are returning to the concept of enhancing outflow through the trabecular pathway. It is to be hoped that future research will continue to focus on enhancing the physiologic routes of aqueous outflow.

Laser Therapy

By the 1980s, laser technology had become a major part of our surgical approach to managing glaucoma. Laser peripheral iridotomy had replaced incisional iridectomy, and cyclophotocoagulation had replaced cyclocryotherapy and the other cyclodestructive procedures. The hottest glaucoma topic in the early 1980s, however, was laser trabeculoplasty. Three seminal presentations at the 1980 AAO Annual Meeting in Chicago set off the laser treatment's rise in popularity, and its use virtually exploded in the years that followed.[2-4] By 1985, I devoted 1 clinical day each week to laser surgery, most of which was argon laser trabeculoplasty. We gradually learned that the procedure's benefit did not last, however, and that repeat treatment was rarely effective. The use of trabeculoplasty subsequently decreased considerably until the more recent introduction of selective laser trabeculoplasty.

DIAGNOSTICS

In the mid-1970s, manual Goldmann perimetry was being replaced by computerized automated perimetry. This significant paradigm shift represented a major advance in our ability to diagnose and observe patients with glaucoma. At first, many companies vied for a piece of the market. The Octopus (Haag-Streit USA Inc., Mason, OH) was essentially the prototype and had a corner on the US market. The popularity of the device was eventually eclipsed by that of the Humphrey Field Analyzer (Carl Zeiss Meditec, Inc., Dublin, CA), in part because of the software algorithms that took advantage of normative databases. Although the Octopus is still used in many parts of the world, the Humphrey Field Analyzer had become the gold standard in the United States by the mid-1980s.

Research on image analysis of the optic nerve head began in the late 1970s. During the 1980s, my track record with this technology was rather poor, since I had chosen primarily to work with the Rodenstock optic nerve head analyzer and the Glaucoma-Scope, neither of which survived. The concepts of confocal scanning laser tomography and confocal scanning laser polarimetry held more promise as reliable clinical tools, but their roles are now dwarfed by the success of optical coher-

ence tomography. As with automated perimetry in the 1970s, several companies are competing for market share with spectral-domain optical coherence tomography. Time will tell which instrument(s) will prevail.

MEDICAL THERAPY

By the late 1970s, we had access to the first new glaucoma medication since the introduction of systemic carbonic anhydrase inhibitors (CAIs) in the 1950s. Timolol and the other topical ß-blockers that would follow represented a revolution in the medical management of glaucoma. These agents were more effective and had fewer ocular side effects than existing topical drugs. Moreover, their development stimulated further research into glaucoma pharmacology, which has since provided us with several important additional classes of topical medications.

The use of topical ß-blockers was not universally embraced in the early days, owing primarily to the potential systemic risks. By the mid-1980s, however, these drugs had become our first line for glaucoma therapy, although we still used topical cholinergics, epinephrine, and systemic CAIs. Today, we rarely use the last three classes, thanks to the advent of prostaglandin analogues, α2-agonists, and topical CAIs. I still occasionally have patients who benefit from topical pilocarpine or echothiophate iodide and from the short-term use of systemic acetazolamide. For the future, I believe we need new classes of drugs that will enhance aqueous outflow.

CONCLUSION

Twenty-five years ago, ophthalmology departments were the darlings of medical schools because of the generous reimbursement rates, and glaucoma laser and incisional procedures were no exception. That picture has changed drastically in recent years and is not likely to get better. All we can say is that the patients and their need for quality care have not changed. Nor has the satisfaction that comes from doing our best for each patient.

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BY ELIZABETH A. HODAPP, MD

In 1985, I was an assistant professor at Bascom Palmer Eye Institute. The other three glaucoma specialists there were Douglas Anderson, MD; Paul Palmberg, MD; and Richard Parrish II, MD. We also had two excellent fellows. Our practice was mainly referral, and most of our patients returned to their comprehensive ophthalmologists after a consultation with and treatment by us.

I spent a lot of time in the library. A literature search that takes less than a second now could easily require an entire day of working through volumes of *Index Medicus*, pulling journals, and taking notes—on paper. We gave our lectures using slides loaded into carousels. Pictures meant film, and copies were never as good as the originals. Journals came in the mail. I did not have a computer or a cell phone, and my secretary did my typing on a word processor. Despite the technological differences, the outline of glaucoma clinical practice remains today what it was long before 1985.

DIAGNOSTICS

Bascom Palmer Eye Institute owned one automated perimeter, an Octopus (Haag-Streit USA Inc., Mason, OH) that took up an entire room and stored data on floppy discs specific only to our machine. Our standard visual field test was manual kinetic perimetry performed on a Goldmann perimeter. We had access to excellent ophthalmic photographers who took disc photographs for us, which we then reviewed using a light box and stereo slide viewer. If we used the term *imaging*, we meant neuro-imaging, not scans with the HRT (Heidelberg Engineering GmbH, Heidelberg, Germany), GDx (Carl Zeiss Meditec, Inc., Dublin, CA), or Stratus OCT (Carl Zeiss Meditec, Inc.).

TREATMENT

In 1985, as now, we tried to lower pressure as inoffensively as possible to a level at which our patients kept their vision for their lifetimes. The options for treatment were medical therapy, laser therapy, and incisional surgery. Medical treatment *always* came first. In most cases, our first-line drug was timolol if the patient could tolerate and afford it. Then, we usually added pilocarpine. We might try epinephrine before pilocarpine, and we sometimes used combined epinephrine and pilo-

carpine drops. If drops were insufficient, we added either methazolamide or acetazolamide.

If all medical treatment failed, we turned to the argon laser. By the mid-1980s, we had abandoned the 360° laser trabeculoplasty, which often caused serious pressure spikes, in favor of a planned two-staged procedure. We did not expect to control the pressure without medication; we wanted to avoid filtering surgery or at least get the patient off pills.

If laser therapy failed, we moved to trabeculectomy (I did not implant a single drainage device in 1985). The procedure, excluding antifibrotic agents, was similar to today's surgery, but the eyes on which we operated often looked very different. Many of our patients had undergone intracapsular cataract extraction, and virtually all cataract surgery was performed through large, superior limbal incisions. To avoid scarred conjunctiva, we often performed trabeculectomies inferotemporally. Later, we would deal with the complications of leaks and infections in those exposed blebs.

Miami was at the center of a major advance in glaucoma treatment in 1985. Dr. Parrish had recently pioneered the use of 5-fluorouracil injections after trabeculectomy. The protocol then was twice-daily injections for 1 week and daily injections for a second week. We were encouraged by the early results and, along with our collaborators around the country, were organizing the Fluorouracil Filtering Surgery Study.

CONCLUSION

Drugs that we take for granted now—the prostaglandin analogues, the topical carbonic anhydrase inhibitors, the α-agonists—were being studied in 1985, but it was not clear that they would ever make it to market. I do not know if we realized that automated perimetry would almost entirely replace manual kinetic testing, but we surely did not anticipate the marked increase in the use of glaucoma drainage devices that would occur during the coming decades (probably related, at least in part, to the complications of the filtering operations that functioned thanks to 5-fluorouracil and its successor mitomycin C). As for the explosion of information we now navigate, I certainly did not see it coming.

In 1985 in Miami, we were *au courant*, as we are today and as I expect our current fellows to be in 2035. *Modern*, of course, will be very different then. ❑

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