

The Strengths and Challenges of Glaucoma Care Today

Practitioners are better able to detect structural and functional changes than ever before, but improvements in the assessment of progression and treatment are needed.



BY GEORGE R. REISS, MD

The best way to appreciate the strengths of glaucoma care today is to consider the advances made during the past 20 years.

DIAGNOSIS

Goldmann perimetry has been completely replaced by full-threshold automated fields, which are standardized and comparable regardless of where (city or country) the test was performed. Newer field protocols (short-wavelength automated perimetry and frequency-doubling technology) can detect deficits earlier, and strategies such as the Swedish interactive threshold algorithm on the Humphrey Field Analyzer (Carl Zeiss Meditec, Inc., Dublin, CA) and those available with the Octopus 900 (Haag-Streit USA Inc., Mason, OH) have improved the tolerability—and hence the reliability—of these psychophysical tests.

Disc photographs that had been limited by their format (slides and prints) can now be reviewed sequentially on a computer screen.

Once the pipe dream of ocular scientists, nerve fiber layer thickness can be measured in most clinical settings to a thickness as fine as 5 μm . The promise of following progression with this objective test excites even the most jaded glaucomatologist, who hopes to relegate visual fields to neuro-ophthalmology.

Diurnal tonometry is being re-examined using different technologies, and this test may help identify patients at risk for disease progression due to nocturnal spikes in IOP. Home units are being developed to enable patients to provide valuable data to their physicians.

The field of glaucoma is gradually moving toward more finite measurements. Predictability in diagnosis—a luxury enjoyed for many years in the subspecialties of cornea and retina—is now a possibility in the glaucoma subspecialty.

TREATMENT

Medical

The popularity of medications such as dipivefrin, pilocarpine, and timolol has largely been superseded by that of hypotensive lipids, α -agonists, and fixed-combination agents. Unlike 20 years ago, diurnal pressure regulation and, with it, the promise of less disease progression seem possible.

Laser Therapy

The argon laser has been replaced by less thermally damaging selective lasers. Gradually, clinicians are becoming more accepting of performing laser treatment prior to initiating medical therapy, and newer, more powerful lasers are beginning to enter the market. The result is more choices for patients and earlier intervention, which may prevent late progression.

Surgery

Surgical techniques have been refined to reduce complications while improving the predictability of outcomes. Trabeculectomy has been fine-tuned with antifibroblastic agents such as 5-fluorouracil and mitomycin C as well as laser suture lysis and releasable suture techniques. Unguarded sclerostomies, for example, are no longer performed, and the rate of complications after filtering surgery has dropped.

Angle-based surgery is the current hot topic among glaucoma surgeons. These procedures may be associated with less morbidity, which could encourage earlier intervention and, in turn, reduce visual field loss and preserve a higher quality of life for patients.

CHALLENGES

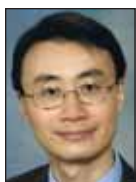
Economic, professional, and philosophical challenges lie ahead. Although care is becoming more standardized and outcomes are more easily monitored, lower reim-

bursement rates decrease the time that physicians can spend evaluating and educating their patients. Further drops in the reimbursement for these services may reduce the number of physicians who can specialize and survive in the field of glaucoma.

The explosion of new diagnostic devices, such as the several competing for spectral domain optical coherence tomography platforms, leads to questions on which will prove to be the most useful for glaucoma and which will survive on the market long term. In other words, which technologies should practitioners adopt, and which should they avoid?

Similarly, physicians must predict which new surgical procedures will prove to be the most efficacious and will stand the test of time. An abundance of procedures and devices, their cost, and their associated learning curves mean that no single surgeon will be able to offer them all.

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BY ARTHUR J. SIT, SM, MD

The management of glaucoma is a continually evolving paradigm.

STRENGTHS

Unlike 3 to 4 decades ago, today, automated perimetry, along with the software to analyze progression based on both events and trends,¹ allows effective monitoring of visual function. Improvements in the reliability and speed of the test² have made this a well-tolerated and essential part of glaucoma practice.

We are also now far better at identifying structural changes. Although the comparison of serial stereoscopic optic disc photographs remains the gold standard for detecting structural progression in glaucoma, this is often not feasible for eye care practitioners other than glaucoma specialists. The process can also be extremely time consuming and impractical in an increasingly time-pressured health care environment. Optic nerve and retinal nerve fiber layer imaging have simplified the identification of glaucomatous progression. This technology may be particularly useful in helping to identify preperimetric changes, but the devices seem to show only a modest correlation with each other or stereo-

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—Arthur J. Sit, SM, MD

scopic disc photographs in detecting glaucoma.³ The technology continues to evolve, and clearly, further validation studies are required. Nonetheless, the devices can still act as a useful adjunct to clinical practice.

Medically, our first line of treatment is prostaglandin analogues. These agents are highly effective and have few significant systemic side effects. In addition, once-a-day dosing can lead to better compliance among patients, and the agents' duration of action beyond 24 hours provides a window of safety for individuals who are less than perfect at taking their medication as prescribed.^{4,5}

Our surgical options are many and can be tailored to individual clinical situations based on the degree of glaucomatous optic neuropathy and surgical risk factors. For glaucoma patients with target pressures in the midteens or higher, "blebless" surgeries such as the Trabectome procedure (NeoMedix Corporation, Tustin, CA) or canaloplasty (iScience Interventional, Menlo Park, CA) are low-risk options.⁶ For patients who need lower pressures, the techniques for trabeculectomy have evolved to produce safer outcomes. Changes include fornix-based flaps, the use of widely dispersed antimetabolites, and lenses to facilitate suture lysis under all conditions, thus minimizing the risk of early hypotony.⁷ Drainage tube techniques and devices have also improved, as has our understanding of their uses.⁸

CHALLENGES

At present, IOP is still the only risk factor for glaucoma that we are able to treat, and our ability to fully characterize this parameter is extremely limited. Current clinical practice involves measuring IOP every few months, which provides an extremely limited view of this parameter by ignoring circadian⁹ as well as intervisit variations.¹⁰ Although the availability of devices to provide ambulatory 24-hour IOP monitoring appears to be imminent, no independently validated devices are clinically available at this time.¹¹

No new class of glaucoma medications has come to market since the development of prostaglandin analogues. New compounds and new modes of drug delivery are needed.

The detection of glaucoma and of disease progression remains a significant challenge. Despite the aforemen-

tioned advances in functional and structural monitoring, we are unable to detect the fundamental damage in glaucoma: the death of retinal ganglion cells (RGCs). Researchers have reported exciting developments in imaging RGCs in animals,¹² but a method suitable for use in humans remains elusive.

Perhaps the most important challenge in glaucoma treatment is that we currently have no way of stopping or reversing RGC death. Despite excellent control of IOP, many patients continue to lose vision, likely due to risk factors not related to IOP. Unfortunately, efforts to develop neuroprotective therapies for glaucoma have been very disappointing, even though many compounds appeared to show preclinical promise.¹³ Nevertheless, new treatment targets for neuroprotection, including the use of stem cell transplantation,¹⁴ continue to be investigated as potential new therapies.

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BY JESS T. WHITSON, MD

When I began practicing 20 years ago, little, if any, definitive evidence could be found in the literature showing that reduc-

ing IOP was beneficial for glaucoma. In fact, the Health Care Financing Administration proposed eliminating reimbursement for glaucoma treatment because no large, well-controlled trials had demonstrated its effectiveness. Fortunately, several landmark prospective studies have since shown that lowering IOP prevents, or at least delays, the progression of this disease. These studies have also provided us with a framework for treating patients with different forms or stages of glaucoma and have improved our ability to manage patients based on their individual needs and risk profiles.

Evidence that the care we provide is valuable is just one strong point of current glaucoma practice, but hurdles remain.

STRENGTHS

Imaging devices provide an objective, reproducible measure of the structural health of the optic nerve and retinal nerve fiber layer, information that can assist our decision-making process. The variety of drug classes currently available allows us to tailor a patient's medical regimen in a simpler, safer, and often more effective way than in the past. New options such as canaloplasty (iScience Interventional, Menlo Park, CA) and the Trabectome (NeoMedix Corporation, Tustin, CA) offer unique approaches to the surgical reduction of IOP and point us forward in our quest for "blebless" glaucoma surgery.

One strong point of glaucoma care that has not changed during my career is the long-term doctor-patient relationship that it often fosters. I am now starting to take care of the second generation of family members I began treating early in my practice. For example, I recently saw a young woman in clinic on whom I operated for congenital glaucoma when she was a baby. She is now leading a normal, productive life with good vision and looking forward to graduating from high school.

Those of us who work in an academic setting are in a unique position to interact with the upcoming generation of glaucoma specialists. Since joining the faculty at University of Texas Southwestern, I have had the privilege of training more than 25 glaucoma fellows. Although the popularity of subspecialty fellowships can sometimes be cyclical in nature, I can say that, during the past couple of years at least, interest in glaucoma among graduating ophthalmology residents is stronger than ever.

CHALLENGES

Recent studies have taught us a great deal about the pathophysiology of glaucoma, but they have also raised

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some important questions. For example, several large, population-based surveys have demonstrated an increased risk for glaucoma among patients with low ocular perfusion pressure.^{1,2} Other trials have shown a greater risk of disease progression in patients with large fluctuations in IOP.³ How best to measure these variables and use this information to manage individual patients remains unclear.

The prostaglandin analogues have set a high standard for both the safety and efficacy of medical therapy. Their success may make it difficult for drug companies to develop new classes of medications to compete with these agents.

As yet, new "blebless" surgical procedures have not replaced trabeculectomy or standard tube shunt surgery as the gold standard for IOP reduction. Still to be determined are where these new procedures fit into our practices and how to increase their ability to reduce IOP as safely as possible.

Finally, we all face the new health care reform legislation, although it is a current target for repeal. How do we maintain an efficient, financially viable practice in the face of an ever-increasing patient load and declining reimbursements? I remain optimistic.

CONCLUSION

The treatment of glaucoma will continue to be challenging but also rewarding. Future innovations will enhance our ability to care for patients, and I look forward to my next 20 years of practice with the same enthusiasm I had for the first. □

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