Battling Open-Angle Glaucoma

A global perspective.

BY ALFRED SOMMER, MD, MHS

In the United States, ophthalmology is a competitively sought-after residency. As Dr. Sommer astutely points out, the field is less revered and does not pay as well in less developed nations. Some subspecialists in poor countries choose to make more money as tour operators, or they may leave their country for better jobs elsewhere. Those subspecialists who stay often focus their attention on patients who pay premiums rather than serve the poor. The low number of ophthalmologists per capita, their overconcentration in large cities, and the poor infrastructure that prevents patients' access to care, paint a grim picture of blindness from glaucoma.

Cataract surgery is a one-time expenditure. When performed well and cost-effectively, this procedure is worth the investment, because it enables individuals to be productive members of society instead of legally blind. Glaucoma therapy, on the other hand, produces no visible improvement, achieves varying degrees of success with not insignificant complication rates, and may require regular life-long visits by patients.

Methods of screening that do not depend on IOP, as this criterion is neither sensitive nor specific for detecting glaucoma, are needed.[1] I am currently developing low-cost and portable telemedicine-enabled screening techniques that are not IOP dependent. If these algorithms prove successful, the next step will be to develop safer, more cost-effective therapies. If such treatments can be created, glaucoma can rightfully compete with other systemic diseases in the global battle for improved quality of life.

—Alan L. Robin, MD, section editor

Open-angle glaucoma (OAG) is a global problem that is responsible for as many as 8 million cases of blindness worldwide.[2] A frequent topic at glaucoma meetings, myriad symposia, and task forces is what practical solutions can be implemented to prevent glaucomatous visual impairment and blindness in low- and middle-income countries. The answer, unfortunately, is not much.

With the (relative) decline in infectious disease morbidity and mortality in the developing world, global health advocates have successfully advocated for a new, "chronic disease" agenda.[3,4] Glaucoma would naturally fall within this priority initiative, but its inclusion makes little sense given the low priority that governments in low- and middle-income countries assign to vision.

COMMON BARRIERS

Glaucoma is difficult to control in developing countries for several reasons, many of which relate to the conditions in which eye care is delivered. The general public lacks access to skilled ophthalmologists, mainly because the transportation infrastructure is nonexistent. Most trained ophthalmologists live in urban centers, particularly in the financial capitals, while most patients live in the rural countryside.

Exacerbating the problem is the limited number of fully trained ophthalmologists in virtually all developing countries. The United States has roughly one ophthalmologist per 10,000 population. In comparison, India and China have one ophthalmologist per 50,000 to 100,000 population, and Africa has one per 1 million. The relatively small number of trained ophthalmologists in these countries is a result of many factors: training programs can be quite long (the West African College of Surgeons requires 5 to 6 years of residency); residencies often provide limited practical, hands-on surgical experience; and the quality of training can vary tremendously.

Unlike in most Western countries, ophthalmology is not a particularly attractive specialty in low- and middle-income countries. As a result, the quality of the residents is often subpar, and residency positions frequently go unfilled. Among the many reasons, I suspect, is the relatively low income most ophthalmologists receive, an obstacle compounded by the need for considerable upfront capital to purchase examination equipment and surgical instruments.

Further, well-trained ophthalmologists ("human capital")

can migrate to other regions. For example, there is an internal migration of physicians within Africa from poor to less poor countries and then to the United Kingdom and the United States. According to a recent survey, more Ghanian physicians work in the United Kingdom than in Ghana. This lack of human capital is a major impediment to all eye care, but the peculiarities of glaucoma make it especially problematic.

DIAGNOSTIC AND TREATMENT CHALLENGES

Cataract remains the leading cause of blindness throughout the developing world, accounting for 50% of all blindness.[5] Manual small-incision cataract surgery is a straightforward and effective procedure that can be performed with all costs covered (including a surgeon's fee and the procurement of inexpensive IOLs and disposable instruments manufactured in India and elsewhere in the developing world) for $75 to $100 per case. Yet, the cataract surgical rate (the annual number of cataract surgical procedures per million population) in China, Indonesia, and especially Sub-Saharan Africa, based on my calculations and observations, is roughly 1/10th to 1/20th the number needed and experienced in wealthier countries.

OAG poses a far more difficult and complicated problem than cataract. To begin with, the diagnosis of OAG is anything but straightforward. Even if technicians were trained and incentivized to roam urban slums and vast rural areas measuring individuals' IOPs, it would not prove particularly helpful. In the United States, half the patients with diagnosed glaucoma have an IOP of 20 mm Hg or less. Screening criteria set at greater than 21 mm Hg would miss more than half the cases of OAG and suggest the need for further workup in many individuals who do not have glaucoma but happen to have an IOP greater than 21 mm Hg at the initial screening.

There is a higher rate of OAG among Africans than whites, as seen in studies in Africa and in African Americans in the United States and elsewhere. OAG begins earlier in life in African Americans compared with whites, but the distribution of IOP among African Americans is identical to that in whites. If diagnosing cataracts poses a problem in developing countries, it is easy to imagine how difficult it would be to diagnose and treat OAG, with the need for extensive and repeated follow-up examinations involving visual field studies and the evaluation of optic disc parameters and the integrity of the nerve fiber layer.

Even when the diagnosis is made, effective therapy for OAG is generally problematic. The typical paradigm in wealthy countries involves medical treatment, perhaps followed by a laser trabeculoplasty, and finally filtering surgery, all of which depend upon patients' compliance and follow-up examinations at regular intervals to be successful. Because patients' access to ophthalmologists is a major hurdle in developing nations, follow-up care proves impractical.

Medical therapy is generally ineffective, particularly because appropriate medications are frequently unavailable. When drugs are available, they are comparatively very expensive, particularly for people who exist on $30 to $60 per month. The cost of lasers and therefore of a laser trabeculoplasty is high. Many ophthalmologists have concluded that the only cost-effective and potentially sustainable intervention for OAG in developing regions is filtering surgery. Such intervention, however, requires a skilled and accessible ophthalmic surgeon, the use of ORs (often controlled by the department of surgery, which will exercise precedence when required), and sophisticated equipment. Africans, like African Americans (in whom operative results have been most studied), are prone to scarring of their filtering sites with a relatively early loss of IOP control.

CONCLUSION

Nearly insurmountable challenges presently face all attempts to control glaucomatous damage in the developing world. What ophthalmologists await, for the benefit of Western patients as well as those in low- and middle-income countries, are simpler and more effective and definitive techniques for the diagnosis and control of OAG. Only then will it behoove physicians and agencies to begin to deal with other constraints to effective intervention such as the paucity of skilled human resources and the cost of care. ■

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