

Treating Corneal Blindness in China

New technologies and outreach efforts are helping surgeons restore the sight of patients in need.

BY MING WANG, MD, PhD



This month, Ming Wang, MD, PhD, shares his insights into some of the issues surrounding corneal blindness in China. Dr. Wang travels to the country every year to teach local ophthalmologists how to perform corneal surgery.

Despite the presence of state-of-the-art subspecialty ophthalmologic services in most of China's major cities, 9 million people in the country are blind from cataracts or corneal opacities. Although top-level phacoemulsification is being performed in the cities, more refractive surgery was performed in China than cataract surgery in 2006, and the rural poor often have no access to quality eye surgery. It is through educational programs like Dr. Wang's and the development of initiatives that provide free or low-cost surgery that eyecare providers can reduce the excessively high rate of needless blindness in China.

—Geoffrey Tabin, MD, Section Editor

Data collected by the Chinese Prevent Blindness Association in 2000 show that 9 million people in China are currently classified as blind and 4 million are considered visually disabled. Although the leading cause of blindness in this population is cataract, sampling studies also show that 4 million people are blind due to corneal diseases or injuries.¹

This article discusses the etiology and prevalence of corneal blindness in China and describes the technology that is making it possible to restore the sight of affected individuals.

CAUSES OF BLINDNESS

Unlike cataract and glaucoma, corneal blindness affects people of all ages² and can be associated with primary corneal diseases³ or secondary trauma.³⁻⁵ Studies show that children are at risk of injury from metallic objects (iron wires, scissors),³⁻⁵ fireworks, tree branches, explosions, glass, and playing sports.³⁻⁵ Corneal trauma among adults tends to be work related and includes injuries by solid (17%), liquid (31%), and gaseous (52%) chemicals,³ explosions, projectiles, and electricity.⁴

Fortunately, corneal transplantation has one of the highest success rates of all human organ transfers. Approximately 80% of patients who are blind due to corneal disease or trauma can regain some vision

through this procedure.² In one study, 83.7% of 176 school-aged children in China who lost their vision due to a corneal injury recovered their sight after undergoing a corneal transplantation.⁶ Similar results were observed for 392 eyes of children who sustained corneal trauma from explosions, glass objects, or scissors. Surgeons were able to reduce the percentage of significant visual loss in this population from 48.98% to 32.91% through corneal transplantation.⁶



Figure 1. Dr. Wang (right) confers with his colleagues during an educational trip to China.

Chinese surgeons currently transplant approximately 3,000 corneas every year.² Although the procedures are successful, especially for correcting keratoconus, a need for donor corneas remains. Due to a shortage of donor tissue, the total volume of penetrating keratoplasties performed in China per year (adjusted for population size) is one one-hundredth of the number performed in the US.³ To rectify this situation, surgeons in China must overcome several obstacles.

BRIDGING THE DONOR GAP

Organ donation is not widely practiced in Asia, and the technology for storing donor corneas was not well developed until recently. Despite growing support from China's central government, the introduction of technological advances for storing tissue, and a public appeal for organ donors, average Chinese citizens rarely donate their corneas for transplantation. Because most of the country's donated tissue comes from death row inmates, its availability is intermittent and usually corresponds with the criminals' execution.

The scarcity of corneal tissue in China forces surgeons to rely on techniques besides penetrating keratoplasty. When corneal tissue is available, physicians use lamellar transplantation techniques to divide one piece of donor tissue among multiple patients. The IntraLase FS (Advanced Medical Optics, Inc., Santa Ana, CA) and other femtosecond lasers allow surgeons to (1) customize the shape of the transplanted cornea and (2) produce corneal incisions and delaminate tissue at any desired location.

Surgeons have also explored the use of artificial corneas and they have transplanted amniotic membrane⁷ and limbal cells⁸ to treat ocular surface disease. They are also studying the utility of transplanted conjunctival tissue for covering areas of the eye after pterygium excision. Excimer laser-based phototherapeutic keratectomy is becoming increasingly popular for the removal of corneal scars. It is estimated that 1,500 excimer lasers are being used in China with almost all major US manufacturers represented.

COMMUNITY OUTREACH

Various nonprofit charities, including the Wang Foundation for Sight Restoration (Nashville, TN), are collaborating with local hospitals in Shanghai and Shenzhen, China, to increase the public's awareness of the need for donated corneal tissue (Figure 1). In December 2005, the Wang Foundation held its first Eye Ball in Nashville to raise funds for patients who can benefit from but cannot afford to pay for sight-restoring corneal surgery. Last year, the foundation organized its first major charitable

event in China. More than 2,000 people attended the Eye Ball in Shenzhen, an event that raised more than ¥200,000 (\$26,933 US) to support free sight-restoring surgery for patients who cannot otherwise afford it. Participating doctors donate their services, and the money raised by the Eye Balls covers patients' travel, lodging, and nonmedical expenses. In the US, the Wang Foundation for Sight Restoration has already organized three Eye Balls and has helped patients from more than 55 countries worldwide. My colleagues and I travel to China three to four times a year to perform free surgeries and to teach Chinese ophthalmologists about new anterior segment procedures.

CONCLUSION

During the past 2 decades, explosive economic growth has tremendously boosted the fields of corneal and anterior segment surgery in China. As new technologies and information flow into that country and patients demand better care, these specialties should improve further. In the next 5 years, I anticipate that the popularity and success rate of cornea- and lens-based surgery will at least double in China. It is of paramount importance, therefore, to educate and train Chinese surgeons so they may meet the country's growing need for sight-saving corneal surgery and visual rehabilitation. ■

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