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Increasing Awareness Regarding Corneal Blindness

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ABSTRACT

In the majority of poor nations, corneal disorders rank as the second most common cause of blindness. Large-scale expenditures in basic eye care services and public health infrastructure around the world have created a solid foundation for preventing further corneal blindness. However, there are 4.9 million people with bilateral corneal blindness who could potentially need a corneal transplant in order to regain their vision. Increased corneal transplantation has historically faced formidable obstacles, including high costs and logistical impossibilities due to the scarcity of trained corneal surgeons and limited tissue availability. Now that cataract surgery rates are rising and some Asian and African nations have more developed eye care systems, there is a strong foundation from which to significantly increase corneal transplantation rates. Due to its vast population of corneal blind people and excellent infrastructure ready to increase its keratoplasty numbers quickly, India appears as a clear global priority. The infrastructure of the eye bank must also be technologically updated. The creation of Hospital Cornea Recovery Programs and the development of qualified eye bank managers are two important elements. The adoption of these contemporary eye banking approaches in India recently has resulted in commensurately rapid growth rates in the procurement of transplantable tissues, enhanced usage rates, realization of operating efficiency, and higher financial sustainability. The widespread adoption of lamellar keratoplasty methods may also increase the success rates of corneal transplants. To satisfy the requirements of the millions of people who are now blind, the international ophthalmology community is now prepared to expand universal access to corneal transplantation.

Key words: Avoidable blindness, cataract surgical rate, corneal blindness, eye care services

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1. INTRODUCTION

A difficult but manageable objective for the future decades is the eradication of curable corneal blindness. From a public health perspective, significant progress has been done over the past 30 years in addressing the primary causes of corneal blindness. Trachoma control, vitamin A supplementation to prevent keratomalacia, onchocerciasis eradication, and investment in a primary eye care health infrastructure to prevent and cure infectious keratitis have all received significant funding on a global scale. The World Health Organization (WHO) said in their 2009 Action Plan that the continuous challenge for the global health communities is to quickly expand global eye care services at a time when life expectancy and demand for eye treatments are both rising. [1] It is commonly known that people in the poor world bear a disproportionately large burden of eye disorders, and that the majority of these conditions are either curable or preventable. This is especially true for corneal conditions. Over the past two decades, Asia's countries like India and Nepal have seen a tremendous rise in the number of cataract surgeries performed, laying the groundwork for a larger-scale effort to address the problem of treatable corneal blindness.

2. EPIDEMIOLOGY

In many less developed nations, corneal blindness is thought to be the second most common cause of blindness, although epidemiological data are scarce and complex, covering a wide range of infectious and inflammatory illnesses. Using WHO 2010 global blindness statistics and WHO 2002 sub-region causes (updated by 2010 data) to determine regional prevalence, it is projected that there are 4.9 million people worldwide who have bilateral corneal blindness, or 12% of the 39 million blind. [2,3] In comparison to the WHO classifications of "corneal opacities" and "trachoma," studies in India and Africa show that 14.6–15.4% and 11–30% of total blindness, respectively, are caused by corneal defects. [4-6] An estimated 20% of the WHO "undetermined" causes category—with regional factors ranging from 2% to 40%—was allocated to corneal blindness in order to be consistent with country-level demographic studies and WHO data. Furthermore, it is believed that corneal blindness accounts for 20% of infantile blindness, with regional variations ranging from 2% to 50%. [7] With 98% of bilateral corneal blindness occurring outside of affluent countries, the global breakdown demonstrates the disproportionately severe impact of corneal blindness on emerging and developing nations.

The prevalence of trachoma, corneal opacities, and onchocerciasis has dropped from 9.5% to 7%, whereas the prevalence of blindness due to "undetermined" causes has increased from 13% to 21%. One of the main causes of ocular morbidity, keratitis, is linked to socioeconomic factors, with active Vitamin A deficiency programs taking place in many areas as well as economic changes. Contrarily, it is estimated that trauma in southern India accounts for 26% of the causes of corneal blindness, with 71.4% of cases occurring in metropolitan areas before the age of 15 and no sign of a slowing in the annual rate of occurrences. No trends have been found, however traditional medicines are still listed as a major contributor to corneal ulcers. Additional significant causes of corneal blindness include bullous keratopathy and corneal dystrophies, which are more significant in the developed world.

In addition to prevalence, corneal blindness places a greater burden on the community due to its younger average age at onset and higher disability adjusted life years (DALYs) than cataract blindness. According to a population-based study conducted in Hyderabad, the average age of cataract-related blindness is 68.5 years old (n = 21), while the average age of corneal opacities-related blindness is 5.0 years old (n = 4). [5] Although the sample size is too small to estimate a precise age delta, it shows that corneal blindness affects many people during their most productive years and suggests that the group with corneal blindness may have more overall DALYs than the population with cataract blindness.

Public health advancements in preventing corneal blindness

All corneal blindness, or nearly 80% of it, is preventable. [1] At a basic level, corneal disorders are strongly linked to poverty and significantly shorten life expectancy, particularly for children who become corneal blind. An predicted decline in corneal blindness cases should follow as public sanitation and nutritional health in the world's poorest populations improve. Through primary health care measures, a number of global projects to reduce corneal blindness are being managed:

Trachoma

The WHO Alliance for the Global Elimination of Blinding Trachoma (GET 2020), founded in 1998, was established with the objective of eradicating trachoma worldwide by the year 2020. The preferred strategy is to promote the SAFE strategy, which includes S-eyelid surgery, A-antibiotics, F-facial hygiene, and E-environmental measures to minimize transmission. Trachoma elimination has been confirmed during the past five years in a number of Middle Eastern nations (Saudi Arabia, Oman), in North America (Mexico), and most recently in a Sub-Saharan African nation (in 2009). (Ghana). The reported prevalence of trachoma looks to be continuously dropping, which is encouraging given that epidemiological reliability is still a significant issue. [10] Trachoma eradication is conceivable, and the overall cost of adopting the SAFE method in all known endemic nations is projected to be between $430 and $748 million. [9]

Onchocerciasis

In some regions of Africa and the Americas, new cases of corneal opacity caused by river blindness have virtually disappeared thanks to coordinated global health initiatives. Onchocerciasis is not "eradicable," although it has been reduced because to increased awareness and Ivermectin distribution in endemic nations. Onchocerciasis was previously the main infectious cause of blindness.

Vitamin A deficiency

Keratomalacia, a vitamin A deficiency-related condition, is still the greatest cause of infant death and the main cause of new blindness in children. Between 25,000 and 500,000 new cases of corneal blindness are thought to occur annually. [11] Primary health measures, such as extensive vitamin A distribution, breastfeeding promotion, food fortification, and dietary change counseling, are used to treat vitamin A deficiency. With a significant emphasis on preventing ophthalmic neonatorum and vitamin A deficiency, national initiatives aiming at tying eye health to mother and child health programs are especially crucial for ongoing

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success. Community-based eye care professionals are the backbone of the effort to stop corneal blindness globally.

Primary eye care health

Primary prevention is especially important for vitamin A deficiency, neonatal ophthalmia, trachoma, preventing eye injuries, detecting and treating corneal ulcers early on, and discouraging the use of dangerous folk treatments for the eyes. [12] In nations with weak health care infrastructure and low rates of cataract surgery, primary eye health workers are probably the most economical contemporary method of managing corneal blindness. To lower occurrence rates of corneal blindness, primary eye health must continue to be strengthened in the world's poorest regions.

CORNEA TRANSPLANTATION

The major treatment for treating corneal blindness to restore vision is corneal transplantation. Although people aged 50 or over make up 82% of the world's total blind population, corneal blindness affects a much younger population in developing nations than other types of blindness. [3] Therefore, corneal transplants may offer a larger social return than cataract surgery. This contributes to the justification of the procedure's higher costs and dangers.

Barriers-Not all corneal blindness can be treated with keratoplasty to restore vision. The long-term success rates of grafts are significantly decreased by ocular comorbidities like corneal vascularization, adherent leukoma, glaucoma, retinal illness, and ocular surface disease.

Significant logistical and societal obstacles must also be overcome for keratoplasty to be successful. Many corneal sufferers are underprivileged financially and have limited access to care. Many sections of the world lack access to high-quality steroid and antibiotic medications. Last but not least, the extensive follow-up needed during keratoplasty raises the possibility of graft failure. The greatest predictor of success in one extensive research of keratoplasty results in Nepal was the patient's residence's proximity to the tertiary hospital, underscoring the difficulties of efficient postoperative care in numerous locales. [14]

In most regions of the world, a dearth of skilled corneal surgeons continues to be a significant barrier to raising the rate of keratoplasty. Even though additional doctors are required for corneal fellowship training, this is only one aspect of the problem. Despite a high patient demand for this service, many doctors in the developing world simultaneously take on clinical, instructional, and administrative responsibilities, which may leave little time to "scale up" keratoplasty volume.

UNDERDEVELOPED EYE BANKING INFRASTRUCTURE

However, the widespread scarcity of donor tissue at a reasonable price is by far the biggest obstacle to lowering blindness through greater keratoplasty rates. Simply explained, the current system of eye banks around the world is unable to match the demand for tissue. For a variety of reasons, including a lack of trained human resources, ineffective operations, limiting laws, inadequate distribution infrastructure, expensive long-term storage media, inadequate adherence to medical standards, and sociocultural factors related to organ donation, eye banking services have remained underdeveloped. In India, there are already over 700 registered eye banks, however they each only provide 25 transplantable corneas on average per year. Not a shortage of eye banks, but a lack of sizable, specialized eye banks

that can successfully carry out the four essential responsibilities of an eye bank—approach and consent, recovery, processing, and distribution—are to blame for the lack of tissue.

EXPANDING KERATOPLASTY SURGERY VIA INCREASED EYE BANKING

The infrastructure for eye healthcare has rapidly grown in many sizable nations, most notably India. This is demonstrated by the sharp rise in ophthalmologist employment and the CSR's climb to more than 4000 cataract operations per million people. There is a natural pull of surgeons toward specialist ophthalmologic care as cataract blindness is addressed, and more institutional and human resources are made available to expand corneal care and increase the number of keratoplasties. An analysis was done to determine each nation's need and "readiness" for corneal transplantation based on the prerequisite of a healthcare infrastructure to support the creation of eye banks and the training of corneal surgeons.

SUCCESSFUL EYE BANK MODEL IN INDIA

Based on the success of 8 sizable eye banks since 2009, the potential of eye banking to address the need for transplantable corneas is clear in India. The new operational model facilitated 5,600 transplants, or 31% of all transplants in India, with yearly internal growth rates of 34% (2010—5 eye banks) and 20% (2011—8 eye banks) (SightLife, internal data). The establishment and growth of professional eye bank managers and the creation of Hospital Cornea Recovery Programs (HCRP), where trained eye donation counselors are stationed in major hospitals to approach potential donor families and secure consent, are two important factors that contributed to the success of the growth. Contrast this with the normal Indian eye bank operation, which employs a "volunteer" method with an emphasis on raising public awareness and attending to requests for recovery from families. The Indian government (National Program for Control of Blindness) and non-governmental organizations (NGOs) created a national strategy in 2004 to treat corneal blindness, with a goal of doing 1 lakh (100,000) transplants annually by 2020. By adopting HCRP and concentrating on the top 100 hospitals in the nation, a model of large professional eye banks may produce more than 1 lakh of transplantable tissue. This strategy can only be successful if the collaborating hospitals and the eye banks work closely together.

EVOLVING SURGICAL TECHNIQUES

Surgeons all across the world are choosing more lamellar treatments, particularly deep anterior lamellar keratoplasty (DALK) and endothelial keratoplasty, as corneal techniques continue to evolve (EK). The poor world could benefit from faster adoption of these lamellar methods by having less follow-up requirements, lower rates of endothelium rejection, less steroid-induced glaucoma, and fewer suture-related problems. [15] The use of lamellar procedures, which enable one corneal donor to provide sight to two recipients, may also help increase the corneal supply.

[16] Low endothelial cell count corneas and those stored in long-term storage media such glycerin with shelf life of more than a year can both be used thanks to anterior lamellar methods. [17] Last but not least, there is mounting evidence that the Boston keratoprosthesis is a successful alternative to keratoplasty in the poor world, particularly in cases where the corneas are vascularized or have other high-risk characteristics. [18]

The world's ophthalmological community is prepared to greatly expand access to corneal transplantation to fulfill the requirements of the millions of people who are now blind, even while public health programs and preventative care provide the long-term solution to addressing corneal blindness. Countries like India are in a good position to create widespread, cutting-edge, and sustainable methods for giving transplantation, similar to how cataract procedures have increased in popularity.

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