



## PERSPECTIVES IN EYE BANKING

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### ABSTRACT:

Corneal transplantation is the most successful among all forms of organ transplant procedures. Organ donation is a sensitive issue all over the world. Ironically the impact of shortage of donor eyes is most glaring in the developing conservative Asian countries where corneal diseases account for a large proportion of curable blindness. Collection of donor eyes is therefore a priority in any organised effort to alleviate the needless scourge of blindness. There are several impediments to collection of donor eyes. An understanding of strategies that may be useful in overcoming these constraints is helpful. Properly organised eye banks will be able to optimise our efforts and scientifically retrieved tissue will be safer and less often liable to be rejected for use. It is our endeavour to summarise in this work issues related to constraints in collection of donor eyes and strategies to overcome them, structure of eye banks and safe tissue retrieval techniques.

**KEYWORDS:** technique of corneal transplantation , needless scourge of blindness.

### 1. STATISTICS ON EYE DONATION AND RELATED ACTIVITIES

The first 'successful' human to human corneal transplant was done in 1903 in present day Czechoslovakia by Zirm to visually rehabilitate a patient of alkali burn. Since then the technique of corneal transplantation underwent various changes and transformed into a clinically acceptable procedure benefiting the corneal blind.

In response to the demand for corneal tissue by increasing number of ophthalmologists, the first 'Eye Bank for Sight Restoration' was started in 1944 in the State of New York by Paton. The objective of this bank was to collect and distribute eyes for corneal transplantation. In 1961 ten such eye banks in the United States of America joined to constitute the 'Eye Bank Association of America' (EBAA) to establish and certify uniform standards and promote the various objectives of eye banks.

During the year 1994, the member eye banks of EBAA collected about 96,700 eyes of which about 41,300 corneas were used for transplantation. The major source of this tissue were hospitals.

In the USA, progressively liberal legislative sanctions to facilitate eye donation were enacted. These legal provisions besides the public awareness efforts, have helped in increasing the supply of corneal tissue in the USA. The development of eye banking was aided by advances in corneal tissue storage which permitted storage of upto 4 days with McCarey Kaufman, 5 to 10 days with Dexsol, upto 2 weeks with Optisol and 4 weeks with Organ culture storage procedure.

The eye banking movement since 1944 has spread world wide and in India the first eye bank was started in Madras in 1945. According to available statistics in India 12,746 eyes were collected in 1992 and approximately 8,400 corneal transplants performed. In 1993, there were 166 eye banks in India, of which approximately 27 eye

banks collected more than 50 eyes per year and 6413 corneal grafts were done as reported by 104 eye banks.[6] Most eye banks in the developed countries have adopted storage media for cornea preservation. In 1994, 96% of donor corneas in Australia and in 1993, 100% of donor corneas in USA were preserved in storage media. Chondroitin sulphate containing media are often employed by 33% and 99% eye banks in Australia and USA respectively. Moist chamber preservation is rarely practiced in developed countries. Post inflammatory corneal disorders account for only 11.5% to 14% of corneal transplants done in the developed world. In India approximately 190,000 persons are blind in both eyes and 590,000 persons are blind in one eye with corneal disorder according to the National programme for control of blindness - World Health Organisation Survey (1986-89). There is an inherent demand for nearly one million eyes and an estimated 20,000 persons are added to this backlog each year. These statistics, however, may not reflect the actual magnitude of the problem. A significant number of the corneal blind happen to be children. As emphasized by these statistics there is a great need for eye donations in India.

## **2. IMPEDIMENTS TO COLLECTION OF DONOR EYES**

In India legislation was first passed by the then Bombay state in 1957 to regulate eye donation. The Transplantation of Human Organs bill which includes corneal transplantation in its purview, enacted in 1994 does not help eye donation significantly as it does not liberalise the law to include 'presumed consent' and 'required request' aspects which increased the availability of corneal tissue in the USA nearly five fold. Tissue Banks International (TBI) has initiated eye banking projects in Egypt, Saudi Arabia, India, Czechoslovakia and Myanmar. An association of eye banks named as the Eye Bank Association of India (EBAI) with its head quarters in Hyderabad was established in 1989 to promote eye donation, advance eye banking and co-ordinate the activities of various eye banks in India. A facility to produce McCarey Kaufman corneal storage medium was started in 1994 at the Ramayamma International Eye Bank in Hyderabad.

There is worldwide shortage of transplantable corneas. Fortunately corneas can be procured for several hours after death. The procurement of cadaveric tissues is in turn, significantly influenced by the technical, financial and social requirements, public support and numerous legal issues. Our inability to reduce demand-supply gap of donor corneas falls into either of the two categories.

### **2.1 Inability to fully employ existing avenues for cornea procurement and use**

#### **2.1.1 Soliciting for eye donation by health care professionals**

Despite social and legal approval, procurement rates of donor corneas remains dismal. It occurs partly because of the reluctance of health care professionals to employ the provisions of existing social and legal approvals. Unwillingness of health care professionals to facilitate donations results from presumed fears of liability, lack of initiative and inability to ask for donations of cornea of decedent. All legal provisions incorporate immunity to health care professionals involved in eye donation and courts have upheld this repeatedly unless there are charges of malpractice. Studies have demonstrated that wherever provisions of existing legal approval are enthusiastically applied, donations of corneas have substantially improved. For example, legal provisions which empower forensic pathologists to authorize eye donations have helped many eye banks to raise donations of eyes by as much as 60%. While careful management by local morgue and eye bank is needed to ensure that law is carried out in all of its requirements, the resulting yield has been overwhelming and has also helped obtain more of younger tissue. Similarly even the most restrictive laws provide for obtaining eye donations with consent of family or next of kin. Health professionals have generally failed to organize trained teams who would make a request for eye donations. It has been demonstrated that mere asking for permission to obtain eye donation has helped significantly in improving the number of eye donations.

#### **2.1.2 Inadequate availability and practice of corneal preservation**

Currently it is possible to prolong the viability of corneal endothelium which helps to maximize the use of donor eyes. Employing methods to preserve cornea helps enlarge geographical area of procurement of donor eyes because it gives more time to overcome the operational time constraints of providing usable corneas to the

surgeons. Longer preservation allows better donor tissue screening for contraindications and more effective organised elective surgical use. Prolonging the viability of corneal tissue by preservation media has significantly enhanced the supply of corneal tissue. Unfortunately because of constraints of finances, trained manpower and infrastructure, many eye banks are not able to practice intermediate term cornea preservation.

### **2.1.3 Operational constraints**

There is a significant scope to optimise and involve professionals in improving inadequacies in operational organisation for eye donation. Lack of transport, inadequate availability of trained manpower, communication problems, inadequate processing facilities are limiting eye donations in many parts of the world. The organisational efficiency should be such as to be able to collect consented eye donations quickly within the stipulated time from feasible geographical area.

### **2.1.4 Lack of finances**

For good reasons, efficiency in eyebanking needs adequate trained manpower and funds. Sale of donated eyes is prohibited legally and is unethical. Eye Banks have to look for funds from Governments or social organisations. Several eye banks now charge a processing fee to sustain their working. Lack of funds is a major constraint in organising and sustaining efficiency in eye banks in many parts of the world. It is not possible to recruit, retain and motivate manpower, overcome basic operational constraints or employ preservation of cornea or sustain publicity on meager funds.

## **2.2 Inadequate awareness and acceptability for organ donations and related legislation**

### **2.2.1 Inadequate public awareness**

In many parts of the world, large number of people are not even aware of the need and benefits of eye donations. On the contrary there are many myths that are disseminated rapidly. To the extent consent of decedent or his family is crucial to initiate the process of eye donation, lack of awareness becomes a major obstacle to convince and obtain consent. In many Asian countries strong cultural and religious beliefs of rebirth and reincarnation have a negative influence on eye donations. No major religion however bans eye donation. Although in some Muslim countries there is religious controversy over use of cadaver organs and tissues, many countries including Syria, Iraq, Kuwait and Egypt have enacted laws to help eye donations. Some other countries including India, Greece, Finland, United Kingdom and Hungary exempt those with known strong philosophical or religious views opposed to cadaver donations. Even those who are aware of eye donation do not often know of operational procedures. Publicity such as occasional posters in limited area and number does not create necessary impact.

Another reason for public ambivalence in donating cadaver eyes is the reluctance of individuals to contemplate their own deaths and the disposition of their bodies after death. Public opinion polls show that even though when individuals support the concept of eye donation, there is widespread reluctance to consider one's own death and the prospect of bodily mutilation that harvesting of eyes would entail.

In public opinion polls, individuals reluctant to donate eyes have expressed a fear that becoming a donor would encourage physicians to prematurely decrease the level of care. We need to expressly address the fears of premature termination of care and reinforce religious sanction.

Reluctance of health care professionals to solicit eye donation is an important obstacle. Reorientation publicity to change attitudinal factors and the fear of presumed liability of health care workers is required in most parts of the world. In light of estimates that approaching all families might at least double the yield of eye donation, many countries have established protocols to ask families of patients attached to life-support equipment about donation.

### **2.2.2 Legislation**

State legislation has enabled eyebanks to proactively apply societal approval regarding the use of cadaveric tissues for surgical procedures. Progressive legislation favoring corneal donation has prevented a far

more serious shortage of donations. Legislation also enforces ethical and orderly donations.

Enacted laws governing organ or tissue procurement all over the world have incorporated one of the two general approaches. Both philosophies incorporate the notion of consent but express consent by opposing methods. One philosophy requires prior to tissue removal voluntary, affirmative consent by the decedent before death or the survivors in legal possession of the body after death. The second approach presumes consent and allows tissue removal in the absence of prior objections. The approach in each country is to a large extent determined by its need for organs, legal and social heritage and the public support for such laws. The choice of law and its enthusiastic application by health care workers in turn, influence the success of efforts to develop a sufficient supply of corneas.

There are 160 countries where it is legal to procure cadaveric eyes. Countries with 'voluntary consent' or 'opt-in' structure depend heavily on the surviving family consent to facilitate eye donation (Uniform-Anatomical Gift Act 1969, USA or its variants). Most Asian countries including India have legal "Opt-in" system. Even within this "Opt-in" system, to facilitate consenting, some countries including USA have refined "mandated choice consent" and "Routine Inquiry laws". Individuals are required under "mandated choice consent" to indicate along with some other state requirements like Income Tax return filing or driver's license, if they will want to be listed by choice as voluntary eye donors. Under the provisions of 'Routine inquiry' health care workers are mandated to compulsorily ask for cadaveric eye donation. (Routine Inquiry law, 1986, USA) These legal provisions have helped improve procurement of voluntary donor corneas. In many countries there are separate legal provisions authorizing eye donations by forensic pathologist without the requirement of obtaining consent. (The Justice of Peace of 1975, USA or its variants). Hospitals, physicians, and tissue banks are authorized under presumed consent laws to remove eyes in the absence of a known objection to donation by the decedent or surviving family in 24 Countries. To facilitate easier operational procedures, legal provisions permit removal of cadaveric eyes by non-ophthalmologists also. (Cornea Tissue ACT 1986, U.K. and its variants).

The available laws can be grouped along a spectrum based on the level of consent needed. At one end of the spectrum, reflecting customs and heritage, the surviving family has controlling authority to donate a deceased one's cornea. At the other end, unless an objection is registered prior to death, corneas can be removed as needed. Geographically, culturally and philosophically, Asian and Latin American countries are concentrated in the former group while Continental European nations constitute most of the 'presumed consent' nations. Countries with strong English or American legal heritage tend to follow a more middle course. Not coincidentally, Asian Countries have the greatest difficulty in obtaining donor eyes compared to Anglo-American and European countries. Both non-facilitatory legislation as well as ineffective implementation of existing provisions have been shown to be among the major impediments to enhance donor eyes procurement.

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