

THE PROBLEM OF DONOR EYES

A REVIEW

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Corneal grafting has been practised in Singapore since 1960. A little over 30 cases have been done at General Hospital, Singapore. This relatively small number is entirely due to the shortage of donor eyes.

The best donor material is the autograft. This is biologically understandable. Unfortunately this is rarely possible except in the case of a patient with one eye affected with corneal disease with a reasonably healthy retina and optic nerve, and the other eye is blind from retinal disease or optic nerve degeneration but where the cornea is normal. Another example is in lamellar grafting when the corneal tissue may be rotated to bring a clear peripheral portion into the pupillary area. The use of corneal graft from an identical twin is a very extreme rarity (iso keratoplasty).

The homograft is naturally the most widely used. Heterografts (from other species *e.g.* gibbon in Thailand, eyes from frogs etc) have been attempted from time to time but have met with little success. Finally, experimentation has carried research and clinical workers in U.S.A. and the Continent into the field of prostho-keratoplasty, where plastic and similar synthetic materials are being used. These procedures are very recent and still in the experimental stage.

Up to the present time therefore, the only widely used tissue for grafting of the cornea is that derived from man (homografting). The only reservoir for donor material is man himself.

Donor material, in any quantity therefore, must come from the cadaver. The eyes must be removed from the deceased donor within 6-8 hours after death. Most surgeons agree that from the technical point, it is better to work on whole eyes rather than just the dissected corneae, although the latter can give as satisfactory results in penetrating keratoplasty.

Absolutely fresh eyes, generally agreed as the best material, can only come under rare circumstances, *e.g.*

- a) autograft
- b) eyes excised for posterior neoplasm or from severe injury which has left the cornea intact.

Relatively fresh material *e.g.* eyes excised from cadaver within 6-8 hours after death and kept in either:-

- a) watervapor at 4°C.
- b) liquid Paraffin at 4°C.
- c) Stocker's method-serum at 4°C. (Recipient's Serum-claims-Stocker (for corneal tissue) reduced antigenic activity).

Such material remains satisfactory for grafting up to a week or so, but it is generally agreed that the earlier it is used, the better the results.

Corneae may be preserved by various methods *e.g.*

- a) 95% glycerol dehydration (King) only good for lamellar grafts.
- b) Silicone dessication only good for lemellar grafts.
- c) at -79°C after 15% glycerol protection. Here the whole eye is preserved, and successful results with penetrating by Rycroft et al.
- d) at -190°C. with liquid Nitrogen—Kaufman et al have used this for successful penetrating grafts as well as lamellar. This is being developed in U.S.A. and eyes can be kept up to 2-3 weeks for use in this manner. So far this may prove to be the best method of preserving tissue for any length of time for both penetrating and lamellar grafts.

It may well be a solution to the difficulties of transportation and distribution of donor material to various parts of the world short of donor graft material. Although the jet age makes the time factor less urgent, nonetheless, if this method of preservation proves to be significantly successful, then it will solve quite a number of difficulties and remove the danger of delays in the collection, and distribution of eyes.

Prosthokeratoplasty is indicated in very unfavourable eyes as in severely vascularized scars and corneal dystrophies with severe corneal oedema (*e.g.* Fuch's dystrophy late stage). Silicone or acrylic buttons are used. In some

instances the silicone or acrylic is built into a rim of bone or dentine in the hope that the latter will serve as better bonding substances than synthetic material. Such buttons have also been placed intracorneally for purposes of altering refraction (*e.g.* high myopes, aphakics). The work is still in its early stages and can be considered to be experimental only. The future problems facing the research workers are:-

- a) Finding a suitable material which will ensure biological bonding at the edges and therefore prevent expulsion.
- b) Preventing the formation of retrocorneal membrane.

The situation regarding the donor tissue therefore remains the same and in the less fortunate countries (and this is in the major part of the world), the donor problem is the critical factor. Preserved eyes or cornea have limited application. Absolutely fresh or relatively fresh human eyes are still the best and most widely applicable graft material.

The legislation of the Medical Act 1965 (Therapeutic, Research and Educational) has now opened the way for the formation of a Tissue Bank in Singapore. The Singapore Eye Bank has already been formed. There is no dearth of patients requiring corneal grafting which would relieve their blindness, or prevent the onset of blindness.

Passing a law for setting up an Eye Bank does not solve the problem of getting donor material. It only opens the door. Acquainting the public of the need for donor material, and dispelling traditional beliefs and customary misconceptions about the removal of parts of the body after death, will be necessary in order to make a break through in the right direction. This will take time and persistent effort. The medical profession in Singapore can play and should play a most vital role in this effort. It can help by acquainting patients of the problem. It can help to enrol donors.

A little publicity has been given to the Singapore Eye Bank since it started, and no doubt the modest exhibition it held at the Blind Bazaar contributed to some degree the encouraging increase in written bequests of eyes to the Eye Bank. There are nearly 50 names now. However very much more will have to be done.

Registration of bequests is a very important step in reaching our aim, but the truly practical source of steady and numerically satisfactory supply of fresh donor eyes will finally have to

come from hospitals. The public must be made receptive to the idea so that whenever anyone is admitted to hospital he or she will be prepared to signify his bequest by the signing of such forms. This then is our objective and we hope to reach it with the help and co-operation of the medical profession and the public.

THE SINGAPORE EYE BANK

The principal purpose of an Eye Bank is to obtain fresh human eyes, removed within six hours after the demise of the donor and to forward them to eye surgeons by the fastest means possible so that these surgeons may use them for corneal transplantation. Besides this, an Eye Bank also renders other forms of service. Fresh eyes which may not be required immediately are processed by special ways in order to preserve them so that they may be used at some later date. Similarly other parts of the eye *e.g.* the sclera (white of the eye) or vitreous humour (the clear transparent jelly within the eye) may be either used when fresh or preserved for many other eye diseases.

There are well over one thousand blind people in Singapore. More than two hundred of these are tragically deprived of sight because of corneal disease which causes opacification of this area of the eye which is vital to vision. Corneal transplantation can restore sight to a majority of these unfortunate people, many of whom are in the prime of their lives. Eyes are needed not only to restore sight to those blind in both eyes from corneal disease, but also for those who may be blind on one eye from such disease. In the latter category there are several hundred more cases, and every week there are additions to this particular group. There are many more suffering from corneal inflammation, degeneration or injury whose disease process may be cured by corneal transplantation.

The Singapore Government has recognised this urgent and great need by passing the Medical Act (Therapeutic, Research, Educational) 1955. This Act now legalises the donations of eyes for therapeutic, educational and research purposes and therefore opens the way for the legal operation of an Eye Bank in Singapore. The Ministry of Health has taken this up without delay and the necessary preliminary steps have already been completed to set up an official Eye Bank at the Ophthalmic Department in General Hospital, Singapore.

Whilst corneal transplantation has been performed in General Hospital since 1960, only

30 cases have had this special form of surgery. They have been fortunate mainly because of the generosity of Eye Banks from overseas. However there are several people in Singapore who have had their sight restored from donations of eyes of local citizens. These citizens have rendered a tremendous humanitarian service to their fellow-men by giving sight to them.

A register of those who have indicated their desire of bequeathing their eyes after their demise is kept at the Ophthalmic Department, General Hospital. This register will be taken over in the near future by the Eye Bank. There are already quite a number of names on the list and it is hoped many more will step forward and enrol themselves as eye donors.

There must be a number of questions in the minds of those who are interested in this generous endeavour. These are probably best dealt with in question and answer form.

1. How are eyes obtained?

Eyes are removed from persons after death who have generously authorized their use whilst they were alive.

2. What donated eyes can be used?

Any eye from any person of any age can be used, even those who have had cataract operation before.

3. Does removal of eyes mar the appearance of the body?

No. Eucleation (removal) of the eyes is carefully done by trained doctors, and no disfigurement is apparent.

4. Can a person who wears glasses donate his or her eyes?

Yes. The wearing of glasses does not affect the usefulness of the corneal tissue for this kind of operation.

5. How are donated eyes allocated?

Eyes cannot be designated for a specific person. Eyes are used on patients according to their priority which will be determined by the surgeon on medical reasons only.

6. Who can be helped?

Many are waiting for operations in Singapore. In the Eye Department at General Hospital there is already a long waiting list for corneal transplantation. Eyes donated may return a sightless person to a useful place in society.

7. Is there any cost involved for the Donor?

There is no cost involved. All the costs incident to the rendering of this service are borne by the Eye Department and the Ministry of Health.

8. How may you donate your Eyes?

By signing the accompanying donor form, and getting two witnesses to attach their signatures, notifying your next-of-kin of your desire and by informing your family physician if you have one, of your action. This will ensure that when the time comes; your wish to help some blind person may be realized. The name of the donor and the recipient will not be disclosed without written consent.

There isn't an act in the world that offers greater satisfaction to the individual or offers new life and happiness for the blind than this humanitarian deed of helping to restore sight.

You can participate in a miracle—your GIFT OF SIGHT.