

The problem of educating blind children in Benin City.

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SUMMARY:

This is a preliminary report on 5 Nigerians who were blind from supposedly hopeless corneal conditions where keratoplasty stood no chance of survival. They all had light perception vision. After the surgery, three of the five patients had a best corrected vision of 6/36, one had 6/48 and another 6/9. Complications encountered were uveitis and retroprosthetic membranes of which the later was one significant.

KEY WORDS: *Keratoprosthesis, corneal opacities, retroprosthetic membranes.*

INTRODUCTION

Keratoprosthesis is an artificial cornea - lens complex that combines the optical properties of the cornea and the crystalline lens. It is for now the only and last surgical resort for severely damaged cornea and anterior segment where keratoplasty has no chance of survival^{1,2}. Keratoprosthesis was first experimented about 200 years ago (1789) by Guillaume Pellier de Quengsy³. There are about 10 million corneal blind worldwide of which a substantial percentage has light perception and a large percentage of this 10 million corneal blind are in the less developed world where non-transparent cornea represents important percentage of incurable blind⁴. Non transparent cornea is a common cause of blindness in Nigeria⁵. In the less developed world - Nigeria inclusive - apart from lack of donor material, the long term poor result of previous keratoprosthesis^{6,7} partly explain why the cornea blinds are neglected. The keratoprosthesis used in this preliminary report is the WORST-SINGH keratoprosthesis which design and fixation technique have largely eliminated the complications responsible for the poor results of previous keratoprosthesis.

There are about 200 institutes in 17 countries in the world that carry out keratoprosthesis surgery⁸ and Nigeria is not one of these countries. In Nigeria, the best effort today is optical iridectomy as a way around corneal opacities; but this is useless if the opacity is large⁹. Corneal graft (keratoplasty) has been performed on sporadic cases with donor materials obtained from abroad and this has been mainly in a privileged few that can afford it. Apart from the problems involved in obtaining donor material from

abroad or setting up eye banks, many of the corneal blinds will not have successful corneal graft because of the nature of the corneal disease which results in many corneas being very scarred and vascularised or the anterior segments disorganized from trachoma, native medications to mention a few.

This preliminary report is to encourage ophthalmologists in Nigeria to offer a fresh hope for these country men and women through keratoprosthesis surgery and also add Nigeria to the 17 countries that offer keratoprosthesis surgery to restore sight to their otherwise "Hopeless" corneal blinds.

MATERIALS

The Worst Singh keratoprosthesis is designed like a collar - stud and fixed like the cork on a champagne bottle unto the healthy sclera (vast majority of other prosthesis are fixed unto damaged cornea). This design and fixation technique have solved the common complications encountered in other keratoprosthesis. The shape makes the keratoprosthesis to act as a valve. The scleral fixation keeps the valve on the trephine hole against the back of the hat of the mushroom. The resulting pressure on the interface between the keratoprosthesis and cornea (instead of traction inherent in other keratoprosthesis) prevents such complications, as extrusion, leak, melting away, epithelial down growth and endophthalmitis.

There are two varieties as regards fixation. One variety has eight, 80 micron sutures with needles for direct scleral fixation while the other has four loops which are anchored to the sclera by steel sutures. the

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Worst-Singh keratoprosthesis is also very much cheaper than other type because Philips helped to produce them cheap and thus the surgery, etc costs less than two hundred dollars (\$200 US D).

Selection criteria

Good vision in the eye before the incurable corneal disease. Good light perception and projection in the eye. Eye where keratoplasty stands no chance of survival. Eye with no chance of keratoplasty being performed in the foreseeable future due to non availability of donor material. Patients who can emotionally stand failure of the surgery.

Steps of operation

The surgical steps outlined below are as developed by Worst-Singh Andel.

- (A) A 360 degree peritomy of the entire conjunctiva, radial conjunctival incisions and reflection of the conjunctiva up to the equator is carried out on the severely burnt eye or disorganised anterior segment.
- (B) 3mm trephine is used to make an opening in the centre of the diseased cornea.
- (C) Two horizontal cuts are made in the trephine opening (3 and 9 o'clock).
- (D) The opening is widened to remove the iris, lens or any membrane that may be present. If necessary a vitrectomy is performed.
- (E) Two or three steel sutures (40 microns) are passed through the horizontal cuts in the trephine opening and small loops kept clear of the opening are made.
- (F) The prosthesis is passed through the opening and the loops of the prosthesis fixed at the equator by four inter quadrantal stainless steel sutures or pre placed 80 micron fixation sutures are pulled.
- (G) The pre placed and knotted 40 micron sutures are tied under the anterior flange of the prosthesis essentially completing the local fixation.
- (H) the conjunctival flaps are brought back and sutured so as to cover the eyeball up to the limbus.
- (I) Pressure is raised by infusing the anterior chamber.

When normal pressure is obtained the inter quadrantal scleral fixation sutures are tightened and given a second knot. Post operatively patients are admitted for 1–2 weeks and are on systemic and

topical antibiotics, topical steroids, sub conjunctival steroid, analgesic anti-glaucoma medication.

RESULTS

- (1) A 76 year old man who resides about 450 kilometres from our practice is a bilateral aphakic and had advanced glaucoma in both eyes. Right eye had an ICCE some ten years before and developed corneal decompensation some years later and light perception vision in the eye (L.P). The left eye had about 100% disc cupping and vision was mere hand movement. A successful keratoprosthesis surgery in the right eye improved the vision to 6/48. Patient was happy and able to sign his cheques and read assisted with hand magnifier. He visited the clinic on two occasions for shaving of conjunctiva off the prosthesis. Three years later his vision fell to 6/60 with the onset of development of a retro-prosthesis membrane. He was referred for yag laser. Patient has not been seen since the referral for yag laser disruption of the retro-prosthetic membrane.
- (2) 39 year old male. He was bathed with a bowl of acid 10 years before. Patient had total corneal blindness and severe acid burns and scarring of the face. Visual acuity was light perception in the right eye and in the left eye hand movement. Keratoprosthesis surgery was successfully done in the right eye. At discharge, vision was 6/36. He failed to come for refraction at three months appointment. He was seen 3 years later with a dense retro-prosthetic membrane. Patient opted to go abroad for yag laser disruption of the membrane. We have not heard from him since referral for yag laser.
- (3) A 36 year old male was involved in a carbide explosion accident some 6 years before. Both eyes had the cornea affected and were vascularised. Vision in the left eye was light perception and right eye hand movement. The eye with light perception has a successful keratoprosthesis surgery. On removing the eye pad first day, the patient exclaimed he could see the wall clock. More important was that he saw the wife's face for the first time in the 3 years of their marriage and he was satisfied he made a good choice. His joy was short lived in that he developed a dense vascularised retro-

prosthetic membrane a year later. He was sent for yag laser. This was unsuccessful as the membrane was very tough and bleeding was severe. We tried to excise the membrane invasively but there was much bleeding and the result could not be assessed. We are waiting for the vitreous haemorrhage to clear in 6-9 months, vision now is LP.

- (4) 54 year old man that had gun powder blast 25 years ago. Both eyes were affected. He had NLP in one eye and LP in the other. He had attended a school for the blind and he is no an instructor in handicraft in a school for the blind. Word got to him that he had a chance to see. His surgery is a success story for now. At his last visit his best corrected vision was 6/36. He is able to read bold prints and attends clinic alone. The fundus can be seen clearly with numerous chorio-retinal scars.
- (5) A 42 year old male who was attacked with concentrated mixture of formalin and sulphuric acid. The left eye was completely destroyed while the right globe was saved and vision light perception. He had a successful keratoprosthesis surgery a year later and vision was 6/9 after correction. He has been quite happy and rides his motor bike about. Recently, had a planitis that got us worried and we suspected a retinal detachment. An ultrasound scan suggested a retinal detachment. He was referred to a vitreo-retinal centre that believed the retina is intact. He has recovered and he is quite happy. Vision as at last assessment was 6/9-.

DISCUSSION

The cornea act of 1993 empowers corneal grafting in Nigeria¹⁰. Corneal transplant is the most successful tissue transplant surgery in the world today. The practice is practically non-existent in the developing world, Nigeria inclusive. The limiting factors include lack of donor material, skilled personnel, storage facilities; with lack of donor material as the major limiting factor. This situation has consigned many corneal blind Nigerians to schools for the blind or beggars on the street without any hope⁹. The authors of this preliminary report on keratoprosthesis in Nigeria have decided to address the situation by challenging it with keratoprosthesis surgery.

Under materials and methods we enumerated the design induced complications encountered in keratoprosthesis surgery and solutions preferred. Of the other known complications of vitreous haemorrhage, raised intra ocular pressure, uveitis, retinal detachment, retro-prosthetic membrane, extrusion of implant, endophthalmitis, only retroprosthetic membrane and uveitis were encountered in the five cases under review. The case with uveitis was vigorously treated and the patient regained his vision 6/9.

Three patients have developed retro-prosthetic membrane. Two of the three patients developed tough membranes that reduced their vision to hand movement and the other patient developed a light membrane that reduced vision to 6/60. Only one of the three patients sent for yag laser disruption of the membrane kept post yag appointment. More studies have to be made of the retro-prosthetic membrane.

Table 1: Grafted eyes.

No	Corneal problem	Duration of implant	Complications encountered	Duration before complication	Vision before complication	Vision after complication	Treatment of complication	Vision after treatment
1.	Cornea Decompensation	48 months	Conjunctival over growth, thin retroprosthetic membrane	24 months	6/48	6/60	Referred for Yag Laser	Not seen yet
2.	Acid burns	45 months	Dense retroprosthetic membrane	38 months	6/36 (uncorrected)	Fain Hand Movement	Referred for Yag Laser	Not seen yet
3.	Alkaline burns	19 months	Dense retroprosthetic membrane	36 months	6/36	Hand Movement	Failed Yag Laser & Failed Surgery	Light perception
4.	Blast injury	8 months	Nil yet	12 months	6/36	6/36	Nil	6/36
5.	Chemical burn (formalin)	7 months	Uveitis	Nil	6/9	6/60	Steroid & Antibiotics	6/9

We wish to place our next set of patients on two monthly subconjunctival depot steroid injection and

Cataract and IOL 1993; 1st Edition, pages 264–267, Jaypee brothers.

Table 1: Age Distribution of blindness and visual impairment

No	Age	Sex	Corneal problem	Duration of problem before surgery	Duration of implant since surgery	Vision before surgery	Vision post surgery
1.	76yrs	Male	Corneal Decompensation	10 yrs	48 months	Light perception	6/48
2.	39yrs	Male	Acid burns	10 yrs	45 months	Light perception	6/36 (uncorrected)
3.	36yrs	Male	Alkaline burns (carbide)	6 yrs	19 months	Light perception	6/36
4.	45yrs	Male	Gun powder blast injury	25 yrs	8 months	Light perception	6/36
5.	42yrs	Male	Chemical burns (formalin)	10 months	7 months	Light perception	6/9

another set on topical anti metabolite drops. We are also beginning to observe that eyes damaged by alkaline & acid burns tend to develop tougher membrane and also earlier (table 1). The duration of the corneal disease before surgery does not seem to be important in the development of the membrane (table 2). These are all subjects for further study.

CONCLUSION

Severely damaged corneal blind Nigerians should not be labelled as "hopeless cases". Keratoprosthesis offers them a ray of hope; at least to see their loved ones and share emotions once more. If further studies and long term follow up show keratoprosthesis to be highly successful in the developing world, then the large number of corneal blinds will have more hope as the problems posed by donor materials, eye banks etc in penetrating keratoplasty would be overcome.

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