CORNEAL GRAFTING

AN ANALYSIS OF 28 CASES DONE IN THE OPHTHALMIC DEPT., GENERAL HOSPITAL, SINGAPORE

By R. C. K. Loh, M.B., D.O., F.R.C.S.
(Senior Ophthalmic Surgeon)

Since 1960, a little more than 30 corneal grafts have been performed at the General Hospital in Singapore. This article will account for 28 of these in which the author was personally concerned. This is a small number and would be smaller still if not for the several occasions when eyes or preserved corneal tissue were generously sent to the hospital from abroad.

MATERIAL AND METHODS

A register of cases requiring corneal grafting is kept at the Ophthalmic Department of the General Hospital. Whenever donor material became available, patients were immediately informed by telephone, or through the Lady Almoner or by personal contact to come up to the hospital for admission. As far as possible, the cases that were called for were done so moving down the priority list. No strict selection of cases from groups that would be divided into those that were favourable to grafting and those less favourable was made. Preserved corneae (in 95% glycerine with or without molecular sieve) were used in 7 instances. In 21 cases (18 full thickness grafts and 3 lamellar grafts), fresh donor tissue was available. Operation was performed without waiting for the culture report because of the time factor. Patients were rejected at the time of calling up only on these grounds:-

i) Sepsis in the conjunctival sac and in the face.
ii) Blocked naso-lacrimal duct.
iii) Frank focal sepsis.
iv) Raised intraocular pressure.

In all cases direct suturing with silk (6-0 or 7-0) was the procedure. In the first 20 cases, the graft was protected by egg membrane. In the latter 8 cases, it was decided not to. A minimum of 8 sutures were placed in all grafts. In the latter grafts, at least 12 sutures were placed. In the earlier penetrating grafts, the Anterior Chamber was restored by air on completion of the operation. In the later cases, normal saline was used. Subconjunctival antibiotic was given in every case at the end of each operation. Sutures were removed not earlier than 3 weeks after surgery.

RESULTS AND DISCUSSION (See Table I)

Of 10 Lamellar grafts done, 6 of them had a successful result with the graft remaining clear. All 3 grafts using fresh material remained clear. Only 3 grafts using preserved material were clear. It must be mentioned, however, that of the 4 opaque grafts, all using preserved material, 3 were done in cases that could not really be deemed favourable from the prognostic point of view. 2 of these were in cases of caustic (lime) burns. Another was a case of leprosy with poor 5th nerve function and vascularization of the cornea. Of the 18 penetrating grafts, 12 were absolutely clear, 3 were reasonably clear with visual improvement and 3 cloudy.

Table II—gives the analysis of the results. The only fair way of assessing the successful outcome of a graft operation is to judge by the clarity of the result. 21 out of 28 cases showed a clear or reasonably clear graft. This is a 75% result.

Table III—This table shows the corneal condition preexistiting before lamellar grafting was done. Cases with trachoma gave very encouraging results. Chemical Burns (lime) did not. As mentioned before the case with superficial leprotic keratitis associated with decreased 5th nerve sensation did not do well.

Table IV—shows a similar analysis of the preexisting corneal condition before penetrating graft was done.

In the cases with trachoma, all of them had central opacities going down to the deepermost layers due to previous ulceration from secondary infection.

In the case with thyrotropic exophthalmos and Exposure Keratitis, the endocrine dysfunction had remained fairly static in its behaviour and a preliminary tarsorrhapphy was done before the graft.

TABLE I

ANALYSIS OF 28 GRAFTS DONE IN GENERAL HOSPITAL, SINGAPORE

Type	No.	Male	Female	Using Fresh Material	Results	Using Preserved Material	Results
Lamellar	10	5	5	3	3 clear	7	3 clear 4 cloudy
Penetrating	18	16	2	18	12 clear 3 partially clear 3 cloudy	0	0

Note: Oldest patient aged 71 (clear graft)

Youngest patient aged 12 (cloudy)
(case of caustic burns using preserved material for lamellar graft)

TABLE II

Type	Nos. done	Nos. clear	%	Nos. Partially clear	%	Nos. cloudy	%
Lamellar	10	6	60%	-	-	4	40%
Penetrating	18	12	66·6%	3	16·6%	3	16·6%

Total Successful Grafts 21 out of 28 = 75%

TABLE III

LAMELLAR GRAFTS—ANALYSIS OF CORNEAL AETIOLOGY

Cause	No.	Result	Donor Material
Trachoma	3	Clear	2 Fresh 1 Preserved
Burns (Chemical)	2	(both became cloudy)	2 Preserved
Corneal opacity (from superficial corneal ulcer)	3	2 Clear (1 became cloudy) (preserved donor material)	1 Fresh 2 Preserved
Band shaped Keratopathy (old chronic uveitis)	1	Clear	Preserved
Leprosy	1	Cloudy	Preserved

TABLE IV

ANALYSIS OF THE AETIOLOGY OF 18 PENETRATING GRAFT CASES

Cause	No.	Completely clear result	Partially clear result	Cloudy result
Trachoma	4	3	-	1
Adherent Corneal Leucoma	4	2	1	1
Interstitial Keratitis	3	3	0	0
Disciform Keratitis	3	3	0	0
Corneal Dystrophy	2	1	0	1
Deep Corneal Opacity (old ulcer)	1	0	1	0
Thyrotropic Exophthalmos with Exposure Keratitis	1	0	1	0

TABLE V

CAUSES OF OPACIFICATION OF GRAFTS

Cause	Lamellar (4)	Penetrating (3 Dense opacity 3 Partial)
Vascularization	3 { 2 Lime Burns; 1 superficial opacity	2 { 1 Trachoma; 1 Adherent Leucoma (associated with post. op. ant. synechiae) Remained partially clear.
Non-union	1 (Leprosy)	
Graft Membrane	-	3 { 1 Adherent Leucoma; 1 Thyrotropic Exophthalmos; 1 Deep corneal opacity
Recurrence of Initial Pathology	-	1 Corneal Dystrophy

(Note: Graft Membrane 2 Partially clear)
1 Opaque)

TABLE VI

COMPLICATIONS SEEN

Type	Number	Remarks
a) Non-union	1	Opaque result
b) Ant. Synechiae	3	All abscised: 2 clear 1 partially clear
c) Recurrence of Initial Pathology	1	Opaque result
d) Ant. Uveitis	1	Cleared with local and oral steroids—in a lamellar case (band shaped)
e) Secondary Glaucoma	1	Pupillary block—treated with iridectomy and Diamox
f) Oedema	3 (2 Full Thickness) (1 Lamellar)	All cleared with steroids—local and oral
g) Vascularization	9 (3 Lamellar) (6 Full Thickness)	No improvement with steroids, oral and local. One no improvement with steroids, oral and local. Five improved.
h) Graft Membrane	3	2 partial 1 complete
i) Maladie du Greffon	Nil	See a). This may be a case of Maladie du Greffon

Table V—gives the cause of opacification of the graft in the 10 cases which showed total clouding or partial clouding of the graft.

Table VI—shows the post operative complications seen. Double and occasionally triple complications were observed. Altogether 18 cases showed complications. Prompt management of these complications brought satisfactory results in 61% of these cases. Non-union was seen in the one case with leprosy. The graft simply did not take and was rejected. It turned opaque after 3 weeks. This may well be a case of immunological rejection.

Ant. Synechiae (prolapse of Iris) occurred in 3 cases. All were abscissed. In one however some adhesions did remain and the graft became partially cloudy.

One case of corneal dystrophy, the exact aetiology of which was not certain, after a period of relative clarity of about 3 months, gradually opacified with changes similar to those seen before surgery.

Mild Uveitis inevitably results in almost all penetrating grafts but none gave any significant difficulty. An interesting situation arose however in one case with band shaped keratopathy (from chronic uveitis) in which a lamellar graft was done. A severe hypopyon uveitis resulted a short time after surgery and had to be treated vigorously with sub-conjunctival steroids, as well as oral steroids before it cleared, giving a satisfactory result. This was reported previously in a separate paper.

One case developed secondary glaucoma with pupillary block. This was treated with iridectomy and Diamox but the case unfortunately developed a certain amount of ectasia and a graft membrane which caused the graft to turn opaque.

Fig. 1. Clear 7 m.m. Full Thickness Graft.

Fig. 3. Clear 7 m.m. Full Thickness Graft.

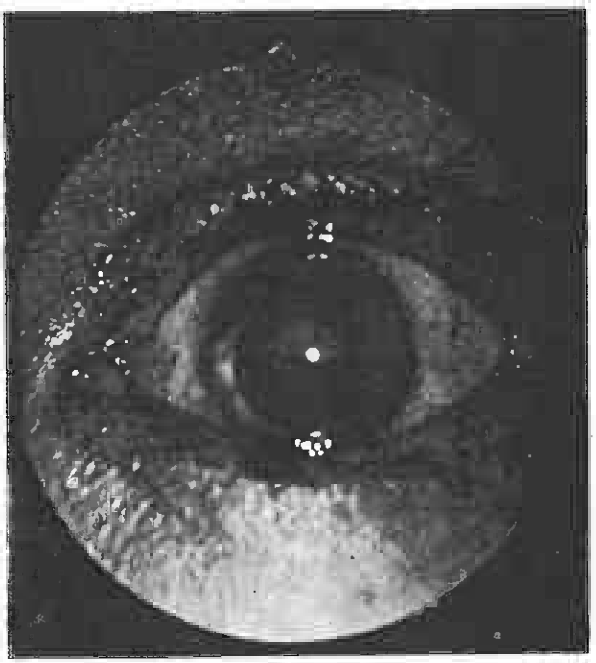

Fig. 4. Clear 7 m.m. Full Thickness Graft showing a cataract behind it. Case of Dense Leucoma.

Fig. 2. Clear 5 m.m. Full Thickness Graft showing a cataract behind it.

Fig. 5. Case of Lime Burn. 5 m.m. Lamellar Graft done. Opaque result. Ingrowth of vessels appear to be limited by the graft.

Oedema of the graft was seen in 3 cases (one lamellar, 2 Full Thickness). All occurred more than 8 weeks after surgery. In one case, oedema was first seen 3 months after surgery and recurred again after a short period of oral steroids. In all 3 cases, oral steroids over a fairly prolonged period of 2-3 months brought about a resolution. It is probable that this kind of oedema is due to an immunological mechanism.

Vascularization was seen in 9 cases (3 Lamellar, 6 Full Thickness). In all cases the cornea had already shown vessels before surgery. Oral and local steroids were started ten days after surgery except in 2 cases operated on earlier in the series. In the latter 2 (one lamellar, one full thickness) steroids were given more than 3 weeks after surgery, and in these cases the vascularization was perhaps far too well established. The case with full thickness graft however did remain partially clear. It is also fair to mention that another 2 cases (both lamellar grafts) did not clear despite early institution of steroid therapy. Both of these were lime burns. The other 5 cases (all full thickness grafts), completely resolved, leaving clear graft results. I have had no experience with Beta Radiation. I believe suppression of vascularization can be achieved with the use of steroids, locally and orally, and it must be done quite early in the post operative period, and kept up for 6-8 weeks at least. The use of steroids does not significantly delay the healing or 'taking' of the graft.

Graft membrane (the formation of a membrane, probably derived from the recipient stroma, behind the graft) was seen in 3 cases. In 2 it was partial, and in one complete. Graft membrane is believed by Rycroft and many others to be a common cause (50% or more according to Rycroft) of failure in graft operations. It is not necessarily complete. It is the result of poor apposition with or without anterior synechiae.

Maladie du Greffon is due to homograft immunological reaction, usually seen after 3 weeks after operation. Severe cases do not respond well to treatment, and opacify rapidly, whilst mild cases may manifest itself as oedema coming several weeks to several months after surgery. As mentioned before, 3 cases showed this mild oedema, which responded well to steroids. In one case mentioned above where rejection of the graft occurred (leprotic case), 3 weeks after surgery, graft sickness was possibly the cause.

CONCLUSIONS

Despite the fact that strict selection of cases according to their prognostic favourability was not observed, reasonable results (75%) have been achieved. Preserved material for lamellar grafting can be used with successful results. Fresh material would seem to be better though and of course, without any doubt in full thickness keratoplasty.

The common immediate post operative complication was anterior synechiae formation due to incarceration of the iris at the edges of the wound. No case of infection was seen. The common late complications were oedema, vascularization (most common, occurring in almost 30% of the cases) and graft membrane. Oedema and vascularization were dealt with satisfactorily with the use of local and oral steroids.

The overall results are encouraging and with the legislation of the Medical Act (Therapeutic, Research and Educational) 1965 in Singapore and the formation of an official Eye Bank as a result, greater supplies of donor material from local sources should become available and thereby facilitating the increased use of this procedure of keratoplasty.

SUMMARY

An analysis of the results of 28 cases of keratoplasty performed in the Ophthalmic Department, General Hospital, Singapore, is presented. Ten cases of Lamellar grafts and 18 cases of Full Thickness grafts were done. 75% of these were successful. A discussion of the complications and as to the way in which they are dealt with is presented.

REFERENCES

1. R. Castrovieho (1962): Tr. Oph. Soc. Aust. p. 34-47.
2. Fine, Max (1964): Arch. Oph. 72 p. 50-56.
3. Government Gazette—Republic of Singapore—Medical Act 1965—7th Jan. 1966.
4. King, John Harry & Berens, Conrad (1961): Atlas of Ophthalmic Surgery, J.S. Lippincott & Co.
5. Loh, R.C.K. (1964): S.M.J. Vol. 5: 2: p. 66-68.
6. Rycroft, B.R. (1965): Tr. O.S.U.K. p. 459-518.