

Results of partial penetrating keratoplasty related to the size of the graft

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The aim of the present study is to discover the best size for grafts (as judged by the incidence of postoperative complications) for use in partial penetrating keratoplasty for central deep non-adherent corneal opacities measuring 4 to 5 mm. across. Grafts smaller than 4 mm. rarely remain transparent and those above 7 mm. often become opaque and may be complicated by glaucoma (Stallard, 1965). In grafts of 4 mm. or less it is difficult to handle the direct sutures and to allow for peripheral opacification where the graft joins its bed. The resulting opacity may extend to the centre and obstruct the pupil.

The incidence of postoperative complications, such as loss of anterior chamber, anterior synechia, iris prolapse, secondary glaucoma, and graft opacity, was studied in fifty cases.

Case reports

In the fifty cases studied, deep central non-adherent corneal opacities measuring 4 to 5 mm. across were the result of ulcers with mucopurulent or purulent conjunctivitis.

The general condition of the patients was good. There were no septic foci, and conjunctival cultures were negative. The visual acuity was less than 6/60. The anterior chambers and ocular tensions were normal and there was no corneal vascularization.

In all cases normal saline was injected to reform the anterior chamber at the end of the operation. Atropine ointment 3 per cent. and cortisone ointment were applied during the daily dressing post-operatively.

The sizes of the grafts used are shown in the Table, together with the incidence of postoperative complications.

Table *Incidence of complications after penetrating keratoplasty in fifty cases*

Size of graft (mm.)	No. of cases	No. of border-to-border sutures	Complications				Clear grafts (3 yrs follow-up)	
			Loss of anterior chamber for a few days	Anterior synechia	Iris prolapse	Secondary glaucoma (3 yrs follow-up)	No.	Per cent.
5	10	8	1	1	—	1	7	70
5.5	20	10	2	2	1	2	15	75
6.5	10	12	4	3	1	3	5	50
7.5	10	14	5	3	2	4	5	50

COMPLICATIONS

Loss of anterior chamber was mostly due to lid spasm or strain, and usually occurred on the third postoperative day and persisted for about 4 days. The incidence was higher in the larger grafts. It was the cause of anterior synechia, iris prolapse, and secondary glaucoma.

Anterior synechia was treated by synechiotomy, iris prolapse by excision of the prolapse and wound suturing, and secondary glaucoma by an iris-inclusion operation.

The smaller grafts were accompanied by fewer postoperative complications, and a greater percentage of successes.

Discussion

The operation of partial penetrating keratoplasty requires not only surgical skill and good instruments but also very fresh sterile donor eyes, healthy recipient eyes (apart from corneal opacity), and good general health in the patient. It is also necessary to be very careful to avoid operative and postoperative complications.

The cause of postoperative anterior synechia and iris prolapse with risk of secondary glaucoma is contact between the iris and the graft edge. To prevent this contact during and after the operation, the following measures are necessary:

- (1) The anterior chamber must be kept formed after the operation by:
 - (i) Hermetically sealing the wound by a sufficient number of properly-placed border-to-border sutures;
 - (ii) Injection of air or normal saline to reform the anterior chamber at the end of the operation (Rycroft, 1957);
 - (iii) Avoidance of strain (especially lid spasm) that may evacuate the anterior chamber.
- (2) The pupil must be dilated to a size larger than the graft from the time the border-to-border sutures are inserted. This can be achieved by injecting subconjunctival mydraine during the operation, but it is troublesome for the patient to have such injections daily. Local atropine eye ointment 3 per cent. is usually applied daily with the dressing, and this usually dilates the pupil to about 6 mm. especially in a dark iris with postoperative mild iritis. The graft must therefore be 5 to 5.5 mm. across. Larger grafts of 6.5 or 7.5 mm. carry the risk of anterior synechia or iris prolapse during the insertion of border-to-border sutures or after the operation if the anterior chamber is lost.

One cannot easily judge the exact centre of the trephine hole opposite the centre of the pupil if the latter is dilated from the start, so the operation is begun with the host pupil constricted by pilocarpine. After the site of the circular trephine has been marked, a subconjunctival mydraine injection is given. When the disc of scarred cornea and the donor disc have been removed, the host pupil is dilated outside the graft edge and the surgeon can begin the border-to-border sutures without any risk of anterior synechia.

The 5 to 5.5 mm. penetrating keratoplasty has the following advantages:

- (1) Quicker wound healing with eight to ten border-to-border sutures,
- (2) Quicker formation of the anterior chamber,
- (3) Less likelihood of loss of anterior chamber,
- (4) Easier nourishment of the graft in its early days, and less tendency for graft vascularization and opacification.

As the pupil dilates easily to about 6 mm. with local atropine 3 per cent., these smaller grafts make the development of anterior synechia or iris prolapse less likely.

Summary

- (1) Fifty cases of central deep non-adherent corneal opacity 4·5 mm. across were treated with corneal grafts of different sizes from 5 to 7·5 mm. to find out which were followed by the fewest complications.
- (2) To be sure that during or after operation there is no possibility of anterior synechia or iris prolapse, either during the insertion of the border-to-border sutures or because of loss of the anterior chamber, the graft should be smaller than the dilated pupil. As daily local application of atropine ointment 3 per cent. usually dilates the pupil to about 6 mm. the best size for the graft is 5 to 5·5 mm.
- (3) The operation begins with a constricted host pupil to enable the trephine to be correctly centred on the cornea. After the trephine marking has been made, a subconjunctival mydrine injection is given to dilate the pupil.

References

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