eye is uninvolved the operated eye is very unlikely to become their better seeing eye.

The growing literature on the management of HIV related retinal detachment provides other useful insights into the disease process and also the surgical use of silicone oil. Published series have varied in their reported incidence of proliferative vitreoretinopathy.[3 5 6 8–11] There is, however, a consensus that epiretinal membrane formation does occur in these cases and a high incidence has been observed in some series.[6 9] This is notable in relation to the pathogenesis of proliferative vitreoretinopathy since T lymphocytes have been observed in the periretinal proliferation in this condition and it has been suggested that they may play a role in its progression.[19 20] It would appear, at least in the setting of an inflammatory viral retinitis, that despite profoundly abnormal T cell function (in particular CD4+ T cells, known to be involved in fibrogenesis and wound healing[21]) there remains a fibrogenic stimulus sufficient to result in epiretinal membrane formation.

The initial impression of a low incidence of cataract formation in HIV related retinal detachment eyes treated with silicone oil[8] was attributed to the protective effect of an intact anterior hyaloid face and the lack of multiple interventions. It is clear, however, from the current study by Irvine and colleagues and other recent series,[11 18] that with relatively longer survival of patients undergoing surgery progressive cataract formation does occur in many eyes and may be visually significant. The incidence of corneal opacification, raised intraocular pressure, hypotony, and oil emulsification appears to be low.[11]

Several issues remain unresolved in the management of AIDS patients with necrotising retinitis and retinal detachment. The role of laser photocoagulation at the time of surgery is still uncertain and the possible role of inferior retinectomy in eyes with significant epiretinal membrane formation may also justify investigation. Late cataract extraction and silicone oil removal must also be considered in a minority of patients. Advances in antiviral chemotherapy and the availability of drug delivery by intraocular depot systems provide hope of treating the late visual loss in AIDS patients with necrotising retinitis although the interaction of such treatments with intraocular silicone oil is as yet unknown.

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Deep lamellar keratoplasty—an alternative to penetrating keratoplasty

Penetrating keratoplasty is at present the accepted mode of treatment for patients with corneal endothelial damage resulting in corneal oedema. Where the corneal endothelium remains healthy, such as in keratoconus, corneal stromal dystrophies, and stromal scarring, the case for penetrating keratoplasty becomes unclear, and the debate as when to perform lamellar keratoplasty or penetrating keratoplasty continues.

The techniques of corneal grafting were first reported in the ophthalmic literature in 1824 by Reisinger,[1] with experiments in rabbits. Kissam seems to be the first to have operated on humans using a pig cornea as the donor, but with little success. Von Hipple, in 1877–8, was the first to show an improvement in vision using his standardised technique[2] which forms the basis of modern corneal transplantation. Zirm[3] in 1906 is credited for the first corneal transplant to retain a moderate degree of transparency. Castroviejo gives a detailed review of the literature in his paper.[4]

Since then much work has gone into perfecting this operation, not only by modifications in the techniques, but also by the introduction of the operating microscope and associated improvements in microsurgical instruments and suture materials. Much work and progress has also been

achieved in the storage and preservation of donor endothelial viability. In 1934 Filatou showed that grafts were viable if removed from the cadaver 41 hours after death. Initial storage media included physiological saline,[3] sterile olive oil,[5] and haemolysed cadaver blood. The introduction of M-K medium by McCarey and Kaufman[6 7] enabled donor corneas to be stored for 3 to 4 days. Further advances based on tissue culture techniques have now enabled the preservation of donor tissue for up to 30 to 40 days.[8–11]

Penetrating keratoplasty is a relatively easy surgical procedure to perform and with the above improvements both in surgical technique and donor storage, the outcome is generally good.[12] One of the commonest indications for penetrating keratoplasty in the UK is keratoconus.[12] The results show a good visual prognosis, and graft survival of between 90% and 97% at 4 years[13 14] and 90% at 11 years[15] are reported. Despite these good survival rates, graft rejection episodes are common varying from 20% to 35% in the literature.[14 16] The reason why so few grafts are lost is thought to be the early diagnosis and aggressive management of graft rejections.

In high risk cases (for example, corneal vascularisation, large grafts, and previous rejections) the results of penetrating keratoplasty are much worse. In an attempt to improve graft survival most surgeons will concurrently use some form of systemic immunosuppression, with all their associated risks. Penetrating keratoplasty, it must be remembered, is also an intraocular procedure, with all its inherent operative risks including damage to the iris, chamber angle, and lens. Endophthalmitis, although rare, is a devastating but possible complication. The main drawback of penetrating keratoplasty is the postoperative loss of grafts as a result of endothelial rejection. Graft rejection, despite the advances in its management, remains the major cause of corneal graft failure.

Lamellar keratoplasty was introduced as a logical step in the surgical treatment of corneal opacification where the endothelium remains functional. Unlike in penetrating keratoplasty, where endothelial cell viability is critical to graft success, in lamellar keratoplasty donor endothelium is not a consideration. By preserving the recipient's own healthy endothelium the risk of endothelial rejection is virtually eliminated. Other obvious attractions of lamellar keratoplasty include the fact that it remains an extraocular procedure and thus avoids possible intraocular damage. It also limits postoperative astigmatism and rehabilitation time. Despite these advantages lamellar keratoplasty has not become a popular procedure, firstly, because of the interface scarring which results in poorer postoperative visual acuities compared with penetrating keratoplasty and, secondly, because it is a more challenging and time consuming technique.

The concept of deep lamellar keratoplasty (DLK) is not new. It is without doubt a difficult and time consuming technique when compared with penetrating keratoplasty. However, it retains the advantages of lamellar keratoplasty over penetrating keratoplasty, while avoiding the problem of poor postoperative visual acuities compared with those of penetrating keratoplasty. The technique of DLK using air to help identify and separate the deep stromal fibres from Descemet's membrane was first popularised by Archila in 1985,[17] and later by Price in 1989.[18] Chau *et al*, in 1992,[19] again drew our attention to the usefulness of this procedure.

Sugita and Kondo, in their paper in this issue of the *BJO* (p 184) provide further experience in DLK with further surgical refinements. They have demonstrated, in their large series of patients, using hydrodelamination to identify and remove the deep stromal fibres, especially in the visual axis, how to achieve postoperative visual acuities approaching those reported with penetrating keratoplasty. The surgical technique is no doubt both challenging and time consuming, but worth acquiring if the results are as promising as suggested.

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