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D J COSTER

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techniques are inevitable and should ensure that MRI becomes an increasingly valuable tool which contributes further to the understanding, and therefore management, of ocular motor disturbances.

CAROLINE J MACEWEN

Department of Ophthalmology,
Ninewells Hospital and Medical School, Dundee DD1 9SY

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Evaluation of corneal transplantation

Corneal transplantation is the most widely practised form of clinical allografting. First successfully carried out almost a century ago, its place in clinical practice was well established before the vagaries of immunological privilege and allograft rejection were appreciated.

Early on, the cornea and anterior segment of the eye were established as 'privileged sites'[1] which led to a widely held view that corneal grafts were invariably successful. This is far from the truth.

Paradoxically, corneal transplantation is both the most successful and the least successful form of clinical transplantation. Grafts done for dystrophic conditions, particularly keratoconus, seldom reject, with a graft survival rate of 50% after 5 years. However, grafts done for acquired diseases fare badly.[2 3] This is a great pity since acquired corneal blindness is second to cataract as a cause of visual loss on an international scale.[4]

The mechanisms of these frequent failures are many. Various factors account for the differences which are reflected in the wide variations in outcome seen between various centres. This variation is common in other branches of transplantation, is referred to as the 'centre effect', and defies specific elucidation.[5]

Dissecting out the various factors contributing to graft outcome demands extensive multicentric prospective analyses. Vail and others report such a study in this issue of the *BJO* (p 631). They confirm some widely held clinical beliefs, provide support for intuitions, and report some new and perhaps unexpected findings.

In recent years, the importance of recipient factors has been established and is further confirmed by their study. Corneal inflammation and vascularisation are known to be associated with a high risk of rejection.[2 3] Inflammatory disease erodes corneal privilege. Patients with acquired diseases are much more likely to reject their corneal transplants.

The importance of allograft rejection is further confirmed by the small but significant benefit bestowed by class I HLA matching. That a degree of class II matching was associated with less rejection than zero HLA-DR matches[6 7] is interesting in view of an emerging understanding of the various mechanisms contributing to corneal allograft rejection. It is generally believed that indirect presentation of antigen is important in allograft rejection[8] and particularly so in corneal rejection where the graft carries fewer passenger cells.

The essential elements of this process involved the bone marrow derived cells of the host, principally macrophages and interstitial dendritic cells, presenting foreign histocompatibility antigens of the donor to the host immunocytes.[8] This process is class II restricted. The concept of indirect presentation of antigen is important in understanding the biology of corneal allograft rejection and in establishing the principles of management for patients undergoing this procedure. Corneal allografts are more likely to be rejected if placed in a recipient cornea replete with high numbers of inflammatory cells.[9] Grafts complicated, for one reason or another, by postoperative inflammation are more likely to suffer allograft rejection.[10] Postoperative care is aimed at reducing the influx of host inflammatory cells into the graft. The use of non-reactive monofilament nylon sutures, the use of topical corticosteroids, the prompt and energetic treatment of inflammatory events, such as infections or ulceration, are directed at reducing the accumulation of host inflammatory cells in the graft.

Of immediate relevance to the surgeon are the issues where there is a choice in the management options of a particular case. For example, all other things being equal, it would seem better to avoid large grafts. This has been observed in other studies.[3]

The importance of clinicians making appropriate decisions is emphasised by the better results achieved by high volume surgeons. This difference is likely to be the result of making better management decisions based on greater experience than on better developed surgical skills. Immediate post-surgical failure is uncommon.

It is important that the authors have taken the evaluation of graft outcome beyond an assessment of endothelial failure. Not all grafts which are clear and functioning provide good vision,[10] and not all grafts providing reasonable levels of acuity contribute to the patient's visual ability in the general sense. Although the majority of grafts are done for visual reasons the evaluation of their outcome is complicated. Best corrected acuity is not always satisfactory for patients. More relevant is the level of acuity with a form of correction which is acceptable and usable by the patient. Furthermore, binocular acuity is important. Visual ability is related to vision in the better eye, rather than the worse eye.[11] Unless patients achieve vision in the grafted eye better than or comparable with the contralateral eye very little is gained from the procedure.

The claim of Vail and his colleagues that, 'Far more is known concerning corneal transplantation in the UK than was known at the outset of the Corneal Transplantation Follow up Study', is entirely justified. What is disappointing is that the authors have been forced to provide their conclusions at such an early stage. As a 1 year study the data will not supply anywhere near their full potential of information. Transplantation is a long term intervention

demanding long term evaluation. Anything less can be misleading. For example, the 1 year graft survival rate is 88% and, as the authors point out, is comparable with the 91% reported by the Australian Corneal Graft Registry at 1 year.[10] However, prolonged follow up of the Australian patients demonstrates an alarming deterioration of grafts with time. By 5 years the graft survival rate has fallen to 74% and by 10 years to 62%. Furthermore, any assessment of acuity or visual function is not meaningful within a year. Final acuity with a stable refraction is not achievable within a year and often not within 3 years.

Studies like this should not be subject to the uncertainties of grant funding with a finite time frame. They should be mandatory. Evaluation along the lines described by Vail and his colleagues is the only satisfactory way to evaluate the process of transplantation and should be a part of the operation of all eye banks.

D J COSTER

Department of Ophthalmology,
Flinders Medical Centre,
Bedford Park, South Australia, SA 5042,
Australia

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