

## THE TEN YEAR CELEBRATION OF LIVER TRANSPLANTATION IN SCOTLAND\*

The Scottish Liver Transplant Unit (SLTU) based at the Royal Infirmary of Edinburgh was established in 1992. Since that time 450 liver transplants have been performed. The 10th anniversary symposium held at the Royal College of Physicians of Edinburgh in October 2002 was in many ways a celebration of the achievements made in the establishment and maintenance of a liver transplant programme. Recently published statistics from the National Surgical Clinical Audit Group based at the Royal College of Surgeons of England have demonstrated that the SLTU has performed consistently well since its foundation in all criteria assessed. In particular, the survival rates of patients receiving liver transplants for both acute and chronic liver disease were among the best in the United Kingdom (UK) and have demonstrated that the collective efforts of the staff involved have resulted in a quality of service equal to that of longer established units with no evidence of a learning curve.

The symposium was enhanced by a number of very high-quality lectures by internationally renowned speakers. Many of these presentations related directly or indirectly to the problem of maintaining transplant activity in the face of a diminishing organ donor pool. A state-of-the-art lecture on advances in techniques of liver transplant surgery by Professor Olivier Farges (Paris) described a number of ways in which the use of donor organs can be optimised. In selected donors it is now possible to divide the donor liver in such a way that the larger portion (usually the right lobe) can be transplanted into an adult and the left lateral segment can be transplanted into a child. The SLTU has undertaken a number of these procedures in conjunction with colleagues at other transplant centres. The livers currently considered for liver splitting all come from donors who are under 40 years of age, have a short period between onset of illness and brain-death and do not have hepatic steatosis. The use of such procedures has largely been responsible for the abolition of a waiting list (in the popular sense of the term) for children in the UK who require liver transplantation. The shortage of donor organs may require greater application of these techniques.

Professor Farges also presented data on the results on living-donor liver transplantation which has expanded following the success of the technique in Japan, where no cadaveric transplant programme exists. In addition to maximising the use of organs available for

\*A joint symposium by the Royal Colleges of Physicians and Surgeons of Edinburgh.

transplantation, protection of these organs from immunological rejection also has potential to aid transplant rates through reduction in the requirement for re-transplantation. Dr John O'Grady (London) gave a thoughtful and authoritative presentation on the current status of anti-rejection immunosuppressant protocols and the possibilities for future developments in this field.

Hepatitis C is now the most common indication for liver transplantation in most UK transplant centres, though not in Scotland. Dr David Mutimer (Birmingham) highlighted, very elegantly, the possible impact on liver transplantation of the increasing number of patients with chronic hepatitis C infection. He presented various models projecting the need for transplantation in this patient group. The symposium was told that not only would the number of transplants required increase, to keep pace with such patients developing hepatocellular carcinoma, but that re-infection in transplanted patients resulted in accelerated damage to the engrafted organ, such that re-transplantation would need to be considered for a proportion of patients. Even if re-transplantation for hepatitis C is 'not allowed', some of the projections presented indicated that this single indication for liver transplantation may require much of the donor organ supplies. Recrudescence hepatitis C infection is most damaging to grafts from older donors and the case was made to use grafts from younger donors for liver transplantation in all patients with hepatitis C.

While 2002 was a year of celebration for the SLTU, this was partly tainted by the highest number of deaths of patients on the liver transplant waiting list. These deaths occurred because of progression of liver disease in patients fit for transplant but for whom no suitable organ was found, and was against the background of a much longer waiting list. It is clear that the major challenge currently facing the SLTU and transplantation as a whole in the UK is how to increase the number of organs available for transplantation. The SLTU has attended on average 60–70 multi-organ retrievals in Scotland per annum and this figure has remained relatively constant over the past five years. A proportion of livers are exported to England under recognised circumstances where a patient with acute liver failure at another centre requires urgent transplantation or if no suitable local recipient exists because of blood group incompatibility or size considerations. An equal number of livers are 'imported' into Scotland from England and the Republic of Ireland for the same reasons. The system of geographical zoning for organ retrieval in the UK works well and has reduced

the percentage of donors attended by the liver transplant team outside Scotland from 15.5% before the introduction of zoning to 5%.

The symposium heard an excellent presentation from Dr Matesanz (Florence) describing the Spanish model which he is now introducing to northern Italy. It is clear that with an established network of coordinators and enquiry into potential organ donation after every patient death in intensive care units (ICU), that it is possible to increase the number of organ donors from 15 to 34 per million people. The UK healthcare system differs from that in Spain in a number of important areas. First, there are fewer ICU beds in the UK per million people compared with Spain and this has a direct impact on the potential for donors to be identified: there is no easy solution to this particular problem that would not require a major financial investment into the National Health Service. Second, the Spanish model relies on a system of central control and monitoring of local organ retrieval rates. In areas where donor rates fall below the national average, resources are put in to support services and facilitate identification of donors. Organ retrieval in the UK is overseen by UK Transplant but organised at a regional level and the same infrastructure and resource support is not currently available. Third, there has been recognition in Spain that the position of transplant coordinator is stressful and that local organ retrieval rates tend to fall after a period of time and so coordinators (usually doctors in Spain) are replaced after three years. In the UK there is a tradition of transplant coordinators being nurses and the question of coordinator 'fatigue' has not really been addressed. There has been much debate both in the medical and the lay press about possible changes in legislation to required request or presumed consent for organ transplantation. Spain has adopted an 'opt-out' in law, but actually operates 'opt-in' (the same arrangement as the UK) and its donor rate per million people is double that in the UK.

The organisation of organ retrieval services in Scotland is multicentred. Heart and lung retrievals are conducted by teams from Glasgow while liver and pancreas retrieval operations are conducted by teams from Edinburgh. Kidney retrievals are conducted by either the Edinburgh Liver Pancreas team or by local units such as Aberdeen or Glasgow. Multiorgan donors may require the attendance of three separate surgical teams. The creation of a Single Organ Retrieval Team for Scotland would offer some advantages, particularly in organisation and potentially also in improvements in donor care by the provision of dedicated anaesthetists with expertise in donor management.

The cloning of Dolly the sheep raised the profile of Scotland as an academic centre in transplant-related research, and interest in the potential for xenotransplantation in the future remains high. The

principal concerns about the use of animal organs for transplantation surround the possible transmission of porcine retroviruses and their incorporation into the human genome, problems with accelerated rejection because of tissue antigen incompatibility and premature senescence of organs derived from cloned animals. Although certain concerns are being addressed, it may be that stem cells provide a more useful and safer alternative to xenotransplantation. A number of groups in Scotland are contributing to stem cell research and one of the goals of this work is the transdifferentiation of pluripotential cells into functionally useful cells such as hepatocytes. These cells could then potentially be used to regenerate acutely diseased organs or using tissue engineering to construct new organs. A third application of these cells is to provide the core for a bioartificial liver. Bioartificial livers are in some ways similar to kidney dialysis machines but rather than using a filter, the blood is passed through a column containing hepatocytes. Several examples of such machines have been described and their function is either as a bridge to transplantation or to provide support for the patient with acute liver failure in whom there is a real prospect of regeneration of the native liver and recovery, thus obviating the need for transplant.

The history of transplantation is very brief when compared with the history of medicine. The opportunities for improvement in patient quality and quantity of care are enormous and the future is optimistic. This success in transplantation should be highlighted to encourage organ donation in every potential case where it is possible.