PART VII

TRANSPLANTATION 2

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A patient with chronic renal failure has the best chance of survival and rehabilitation if he is in a community where there is adequate dialysis and renal transplantation available and where there is free movement from one to the other mode of therapy. Although living related donor renal transplantation has a role to play, in a society where small families are the norm most patients have not a well-matched, fit and willing donor from within the family. They therefore require free access to a pool of cadaver donors to obtain a physiologically excellent, well-matched cadaveric donor organ. Every transplant surgeon has his own local problems in obtaining donor kidneys and must adopt his own ways to overcome them. This paper documents the experiences in the West Midland area of England where one transplant team is responsible for the treatment of patients from a population of $5.5 \times 10^6$.

Twenty-five per cent of this population live in the Birmingham conurbation within a 20 km radius from the transplant unit and are served by six large general hospitals. The remainder are within an 80–100 km radius and consist of urban and rural communities. There are 24 general hospitals of various sizes. There is one specialist trauma hospital and one neurosurgical hospital both within 10 km of the transplant unit.

In the nine years (May 1968–1977) 1,000 offers of prospective kidney donors were made to the transplant unit. These resulted in the transplantation of 422 cadaveric kidneys. During the first year kidneys were harvested locally and used locally. Then for three years personal contacts allowed kidneys to be exchanged with neighbouring transplant centres. From February 1972 kidneys have been exchanged more widely through UK Transplant. Of the 1,000 offers 544 were of potential cadavers in the West Midlands and 456 were of cadaver kidneys from outside the Midlands on the basis of tissue typing. Over the period the number of kidneys imported has been in balance with the number of kidneys exported and represents approximately 40% of the total transplanted.

Let us consider the 544 offers from the West Midlands in more detail, as it is here that the influence of local factors can be studied. Three hundred and
twenty-one of these offers came from hospitals in the Birmingham Health Area and from a population of $1.5 \times 10^6$. The remaining 223 came from the other $4.0 \times 10^6$. Although there is some referral of head injuries and subarachnoid haemorrhage patients to the two specialist hospitals in Birmingham this referral does not account for this striking disproportion. It might suggest that the influence of the transplant unit is most felt in the neighbouring hospitals. This however is not the whole explanation as will be explained later. It is clear however that this disproportion exposes a still unused pool of potential donors.

The experience of donors from the hospital with the transplant unit will illustrate some of the changes that have taken place in the nine years. In 1968 there were very few intensive care units in England but there was one in our hospital. However, between 1968–71 the majority of the potential donors were identified in the hospital wards rather than the intensive care unit (ICU). Progressively throughout the region intensive care units have opened and nowadays virtually all the offers of potential donors come from ICU patients. In the initial 18 months (1968–69) only 25% of the offered potential donors were treated on ventilators whereas in 1977 65% were. The other marked change has been in the primary diagnosis of the potential donors. Although head injury and subarachnoid haemorrhage have always been common, in the early years patients with coronary thrombosis were often used. The latter have almost disappeared as donors as it is rare for a patient to die in hospital from an arrhythmia without a low cardiac output.

Overall in recent years 40% of the offers have been of head injury patients and 40% of subarachnoid patients. These have provided 90% of the donors actually operated upon. Eighty-five per cent of offers of patients on ventilators lead to nephrectomy and consent was refused by only 5% of relatives of ventilated patients. In contrast only 20% of offers of patients not on ventilators led to nephrectomy and in this group there was a 25% refusal rate by relatives. The average age of the donors used was $35.2 \pm 18.5$ years. The male/female sex ratio was 3:2. Some of this difference is due to the higher rate of head injury death in males but is also due to the greater reluctance of males to give consent for removal of their wives' kidneys.

The UK has lagged behind some countries in accepting the heart beating cadaver for donor nephrectomy. The diagnosis of brain death was recognised officially in the UK in 1977 by the Medical Royal Colleges. Some units, including ourselves, have been harvesting from heart beating cadavers for some years. This has not resulted in any decrease in the rate of increase in donor nephrectomy (Figure 1) and has increased the rate of primary transplant function.

A comparison of the donor offer pattern from hospitals serving similar-sized populations shows some marked differences (Table I). Hospitals A and B are in towns of almost equal size and receive all the trauma and medical emergencies for their districts. During the time under review hospital A has offered three times as many potential donors as hospital B. Further, all the fruitful offers from hospital A died from subarachnoid haemorrhage whereas most of the fruitful donors from hospital B died of head injury. It is highly
Figure 1. The number of cadaver donor offers related to the number of transplants performed in the Birmingham Transplant Unit.

**TABLE I**

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Population x 10^8</th>
<th>Diagnosis</th>
<th>Offers</th>
<th>Kidneys used</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>50</td>
<td>Head injury</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAH</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>B</td>
<td>47</td>
<td>Head injury</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAH</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>C</td>
<td>250</td>
<td>Head injury</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SAH</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL</td>
<td>16</td>
<td>15</td>
</tr>
</tbody>
</table>
unlikely that the success in treatment of the two conditions differs so widely. A more logical explanation is that the attitudes of the medical and surgical staff concerned determines whether an offer is made. Hospital C serves a population five times as large as A or B. The number of offers is similar to hospital A and were almost exclusively head injuries. Although hospital C houses an excellent active regular dialysis unit medical cases from here are not often offered as kidney donors. Other hospitals in our region could have been used to illustrate similar differences which must reflect the attitudes of our own profession.

In the UK the law governing transplantation (Human Tissue Act 1961) is a liberal one. It only requires that a lack of objection on the part of the potential donor, the relatives and the person in possession of the body be ascertained within the time available. All the surveys in the UK have shown a low rate of public dissent. This review shows a low (5%) refusal rate by the relatives of brain dead individuals but unfortunately a higher rate by the relatives of patients not on a ventilator. Increasingly offers are originated by the relatives of the prospective donor prompted by the kidney donor card scheme which started five years ago.

This survey illustrates that more effort must be made to encourage doctors to refer all suitable donors to the transplant team. This will be made easier when they are made more fully aware of the results of cadaveric renal transplantation which compares very favourably with the results of treatment with intent to cure some of the common solid tumours (Figure 2). First class kidney

![Graph](image)

**Figure 2. A comparison of the survival of first cadaveric renal transplants and the survival of patients from breast, renal tract, lung and gastrointestinal cancer treated surgically with intent to cure. The cancer figures are in the 15—55 age groups from the Birmingham and West Midlands Regional Cancer Registry**

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donors are only produced from first class intensive care units where the highest standards of care are continued until the organs for transplant have been removed. At present even in our materialistic society in the UK the transplant surgeon and his patients can only say “thank you” to the donors’ relatives for their thoughtfulness and to the donors medical and nursing team for their extra hard work. Fortunately there has been a steady increase in the number of kidneys available each year (Figure 1) but at the present rate of increase it will be the late 1980s before everyone can be provided with a graft. The fall in the number of offers in the past two years is the result of the less suitable donors no longer being offered and a reduced proportion of kidneys transported outside the region.

I am indebted to all the past and present members of the Birmingham Transplant Unit and the supporting dialysis units for their help and also to the relatives and people looking after all the donors.

Summary

In a community where cadaveric renal transplantation is the mainstay for the treatment of chronic renal failure a review of 1,000 prospective cadaveric renal donors shows that failure by the medical and surgical teams in the intensive care units to notify the transplant team every time of a potential donor is the major cause for the lack of donor organs. Lack of consent by the donor’s relatives is also a significant factor but is less common when the donor is brain dead on a ventilator than when they still have spontaneous respiration. Gradually the transplant team is persuading their colleagues in medicine and trauma to help but at the present rate of progress it will be another decade before enough kidneys are available.

Open Discussion

McMASTER (Cambridge) You have told us what is happening in Birmingham, but you have not quite told us why it is happening. What do you think are the various factors amongst your medical colleagues which determine this extraordinary variation in referrals?

BARNES I have a few ideas. Before I did this survey I did not realise quite how marked the differences were between different hospitals. I think one has now got to go out and talk to the individuals who are obviously defaulting and find out why this is. Some of it, I am sure, is ignorance about the results of transplantation. What they do not realise is how graphs of transplant survival are very similar to graphs of survival for patients with other conditions. A lot of my colleagues think they can cure cancer of the colon. We know darn well that they can’t, but they won’t accept this. I think this is the sort of information that needs to be put across to people.

STRUYSVENBERG (Amsterdam) Do you know of any hospitals in the United Kingdom where an analysis has been made of all patients who died and might have been prospective donors, in order to evaluate the reasons why they were not presented as donors?
BARNES I do not know of any hospital in which a systematic search has been made for this. The information on which I base this survey is from contacts with the transplant unit offering kidneys. It is very difficult to know what goes on in the hospital unless somebody tells you about it. We have been very conscious that we should not hover around intensive care units like vultures, because I think this tends to be counter-productive rather than productive. Maybe if one got somebody who was not a transplant surgeon going into this we might perhaps win over more people. A suggestion has been made that one gets a nice-looking nurse, or some other person who would be regarded without suspicion, to go into the hospital and sort out where the deficiencies are. All I can tell you about is what we have actually been offered and why we failed with the offers that we have had, rather than why these hospitals cannot provide us with the kidneys. I think it has shown us that the kidneys are there.

GELIN (Gothenburg) It is so apparent that we cannot get the cooperation with neighbouring hospitals unless we ask our friends. That is very significant. Another point I would like to stress is the acceptance of the concept of brain death by the public, by doctors, by lawyers. Have you seen an improvement in results concerning primary onset of function and a decrease of infection rate?

BARNES I have not got a detailed analysis of this, but certainly we get a very much higher incidence of kidneys functioning straight away now than we had early on. I am not sure about the infection side of it, but certainly the point about the general public is very well made. In fact, brain death in the United Kingdom was not recognised as early as it was in some other European countries, but we have been using brain death criteria in our series for the last three years, and as far as the general public is concerned they obviously accept this as perfectly satisfactory.

COHEN (Leiden) In the United Kingdom you have a system similar to the Netherlands and many other countries in which you have to ask permission of the relatives of the potential donor for taking out the kidneys. Do you expect any improvement as to the number of potential donors which would be offered to you if you had a system in which you did not have to ask permission unless objection has been made by the potential donor?

BARNES I think the system that we have got at the moment, in our hands, is not a major barrier. My feeling is that if we make very stringent efforts to change the system the anti-transplant ‘lobby’ will gain very much more than the pro-lobby’. That is my own personal feeling. As you see, most of the donors are ventilator switch-offs. They are elective procedures and very rarely is it now that we cannot get the kidneys, having asked for them. There has been a suggestion that kidneys should just be removed without consent unless the potential donor has objected during life. The worry I have got is recognition of who has contracted out and who has not. You only need to make one mistake and the whole programme can be put back very severely indeed.

COHEN What you are stressing is that you have to motivate the public continuously.
BARNES I think the public motivation is relatively easy. The problem is that donating kidneys puts much more work on the doctors. You have, I know, a system in your country where the doctors are remunerated or the hospitals are remunerated for providing donated kidneys, and I gather in the USA it is even more dramatic. In our country there is no system like that. But the amount of extra work involved for the donor doctors is quite enormous. All we can say to these chaps is “thanks”. It is sometimes not quite enough.

WING (London) Who are our friends? Are they the young doctors whom you have had as recent medical students? And does the rate of offering kidneys in your survey change every six months or every twelve months as the young men working in these intensive therapy units move on? Because we may have a continuing educational problem here in order to enlist their support.

BARNES That is a very good point. In fact we build the question of donation into our undergraduate and postgraduate education. We have from time to time seen this sort of pattern. People who have been working in an intensive care unit perhaps have been exposed to dialysis or transplantation. They tend to be our friends. It is not just age-related. The nurses I think are terribly important people. In one or two intensive care units over the years it was senior nursing sisters or even one of the junior nurses in the intensive care unit who had motivated the donors’ relatives and told the doctors what to do. One just has to keep this up. The nurses change jobs; the junior doctors change jobs. It’s a continuing process of education. The same applies to eye donation and the factors there are very different. We have tried to get eyes for the ‘eye doctors’. Relatives won’t have the eyes removed. They will have kidneys or hearts removed, but not eyes. It’s a personal matter.