agreement in respect of this was excellent and these overall findings held good for each observer. It has been claimed that it is difficult to assess the presence and severity of, for example, diarrhoea,⁴ but we found that the variation between observers was only 1.8% for the presence of diarrhoea and only 6% for its severity. Comparisons between operations, or between centres, in terms of the presence or absence of symptoms are therefore not likely to be invalidated by large variations between observers. Unfortunately, the same cannot be said of the overall assessment by Visick's system of grading. The initial variation among observers in recording this grade (both between qualified and non-qualified observers) was unacceptable. It could be argued, of course, that this merely reflected the inexperience of some members of the assessing panels, but the initial observer variation was not person specific, and each member of both panels had spent at least one year carrying out research in gastric follow-up clinics before the study; indeed each of the clinical members had for several years taken part in follow-up studies after gastric surgery. Hence, whatever its intrinsic merits, Visick's grading system is inappropriate for comparing results from different surveys or centres, unless the observers in both centres have undertaken joint observer variation trials and discussed the system between themselves.

The Visick classification is not, however, valueless. Certainly when it first appeared in 1948 it was an immense improvement on anything that had existed before then, and it is a perfectly valid means of assessment by which workers in a specific centre may compare the results of different operations. Nevertheless, even used in this way, Visick's grading is rather imprecise in that small differences between operations may pass unnoticed owing to the intrinsic observer variation in the method of assessment; this is like the adverse signal:noise ratio that is familiar to electronic engineers: the "signal" (the difference between operations) is lost in the "noise" (the intrinsic variation between observers). One would therefore expect, in the light of our findings, to find that the results of any trial would show the incidences of Visick grades for various operations all lying within a few per cent of each other. Perhaps it is not too far fetched to assert that this has been the experience of British trials of surgery for peptic ulcer over the past 30 years.

There is some evidence (from figs 1 and 2) that the Visick grades do not even correspond to patients' own feelings about the results of their surgery. This was particularly so in patients graded Visick III (because they cannot control their symptoms),

who regarded themselves as either perfectly fit or very nearly so. This finding rather bears out Visick's concept that patients could be graded Visick III at a particular visit yet overall may be regarded as "satisfactory" and rather mitigates against the more modern trend of expressing the "success rate" of an operation in terms of the proportion of patients graded Visick I or II. Which is the "right" assessment is, for the moment, an open question, but the discrepancy exists and is worthy of further study.

We make three specific suggestions. Firstly, the use of Visick grading should be limited to comparisons made in single centres between different operations using single teams of observers. Secondly, comparisons between different centres (or between different teams of observers in the same centre) should concentrate on the presence or absence of specific symptoms; whatever the deficiencies of this form of analysis, it does at least seem to be more reliable and reproducible. Thirdly, this is an appropriate time to examine alternative means of assessing patients. We have described one such method in this report—using linear analogue scales. We have also carried out studies with "state flow charts," which are to be reported elsewhere.⁵ Psychiatric assessments of patients' responses have been analysed,⁶ and, clearly, the patients' own apparent responses are often at variance with the response elicited during the "traditional" clinical follow-up interview. Any future modification of this traditional "symptomatic" assessment should, however, remain simple, practical, and, above all, reproducible.

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Causes of failure to harvest cadaver kidneys for transplantation

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Summary

Fifty-two possible donors of cadaver kidneys were referred to the Nuffield Transplantation Surgery Unit, Edinburgh, in 12 months. Only 12 (23%) yielded kidneys, while a further 12 were medically unsuitable as donors. Refusal by relatives to allow cadaver nephrectomy was

the largest avoidable loss of potentially transplantable kidneys. A similar but unavoidable loss occurred through sudden death of the possible donor.

Introduction

The shortage of cadaver kidneys for transplantation is a well-recognised problem in most transplant centres. Probably many potentially satisfactory cadaver kidneys are lost mainly through failure to refer the possible donors to a transplant unit. Experience of the Nuffield Transplantation Surgery Unit (NTSU) at the Western General Hospital (WGH), Edinburgh, however, has shown that we failed to harvest kidneys from a high proportion (77%) of possible donors who were referred to the unit. To assess the incidence and reasons for this failure we surveyed all

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referrals of possible kidney donors to the transplant unit for one year.

Clinical material

All 52 possible cadaver kidney donors referred to the NTSU in one year from 1 August 1974 were included in the study. During this period 23 transplant operations were performed. At the beginning and during the study a printed card indicating suitable categories of donors was circulated to units in five Edinburgh hospitals from which donors might be referred. It was also sent to eight peripheral hospitals together with written or telephoned communication indicating the need for donor kidneys. The guide indicated the age group acceptable in this centre (3-60 years) and the necessity for the donor to be free of systemic infection and neoplasia other than primary intracranial tumours. In general, these measures evoked a widespread willingness to help, though the results in terms of actual donor kidneys proved disappointing.

To avoid transplanting non-viable kidneys it is now our policy to harvest organs only from those donors maintained on a respirator when it has been decided to cease support measures. This enables the nephrectomy team to remove the kidneys without delay, and, in general, warm ischaemia times of less than 15 minutes were achieved. The policy of accepting only those potential donors who are being ventilated is now widely practised. While the number of acceptable donors must thereby be reduced to some extent, this is compensated for by the enhanced quality of the organs obtained. During the study every transplant enabled the recipient to be freed from dialysis at least for a time.

In all cases of referred donors permission to use the kidneys was sought from the next of kin and from the Procurator Fiscal, who in this area has been highly co-operative and helpful. On all occasions relatives were interviewed by a single member of the staff and he alone raised the question of the kidneys being used for transplantation.

Results

Fifty-two possible kidney donors were referred and 12 of these (23%) yielded 22 usable kidneys. The source of referral and yield of kidneys is shown in the table. The Royal Infirmary of Edinburgh (RIE) and WGH together produced 21 of the kidneys. Only two peripheral hospitals referred possible donors, resulting in a single transplantable kidney.

Units referring 52 possible kidney donors

Referring hospital or unit	Total No of donors offered	Donors abandoned for all reasons	Donors yielding kidneys
Royal Infirmary of Edinburgh:			
Head injury and intensive care units	26	17	9
General medical wards	7	7	0
Accident and emergency	1	1	0
Coronary care unit	2	2	0
Western General Hospital:			
Surgical neurology unit	10	8	2
General medical wards	1	1	0
Coronary care unit	1	1	0
Falkirk and District Royal Infirmary	2	1	1
Dundee Royal Infirmary	2	2	0
Total	52	40	12

In 50 instances referral of the donor was spontaneous by the unit caring for the patient and in two instances it resulted from direct inquiry by the transplant staff.

There were several reasons for abandoning possible donors. Twenty potentially usable kidneys were lost owing to refusal of permission by relatives (nine donors) and by the Procurator Fiscal (one donor). In the latter instance a murder charge was expected. Of the 11 patients who died suddenly before arrangements for kidney removal could be made, two were being ventilated and the likelihood of harvesting their kidneys had been rated as high. Of the 12 potential donors who were abandoned as medically unsuitable five were hypotensive and anuric before death, two developed haematuria, two had infective problems, one developed an unexplained increase in blood urea, one had a previous history of renal disease, and one was considered too old.

In common with other series^{1 2} most cadaver kidneys were obtained from patients with head injury—16 organs from nine donors. Six organs were also harvested from three donors who died from subarachnoid haemorrhage, cyanide poisoning, or cerebral tumour.

Of the 22 usable kidneys removed locally from 12 donors, 16 were transplanted in Edinburgh and six were sent to other centres through the National Organ Matching Service (NOMS). A further 12 were offered through NOMS. Seven were accepted and transplanted and five were refused as unsuitable. A total of 23 kidneys were transplanted during the year.

Discussion

Most transplant units are aware of the constant loss of transplantable kidneys through failure of medical staff to appreciate the urgent need for cadaver kidneys.³⁻⁶ This apathy has been emphasised by the British Transplantation Society.⁷ In Edinburgh a high degree of co-operation has been achieved between both neurosurgical and intensive care units and the transplant staff. It is unlikely that any potential cadaver kidneys were lost from those units through failure to refer the donors during the year of the study. The position regarding other hospitals is less satisfactory. Only one kidney was successfully harvested from hospitals other than the RIE and WGH during the year, and probably some possible donor kidneys were lost through failure to inform the transplant unit. The problem of encouraging a working liaison between peripheral hospitals and the area's transplant unit has been emphasised by others.^{1 3 6} Nevertheless, the co-operation of doctors from peripheral hospitals has to be achieved to supply adequate numbers of donor kidneys. Experience has shown that this is best obtained by frequent personal contact by a member of the transplant staff. Written communications and general appeals by the medical administration are no substitute for personal liaison. In Edinburgh the card-carrying campaign has had no noticeable effect on the supply of organs, and in no instance during the study was a possible donor found to possess a donor card.

The refusal by relatives to allow removal of the kidneys from nine possible donors reflects an understandable response in the face of tragedy. Continuing education of the public, however, may reduce this attitude. It was noticeable during the study that refusal was more likely if the possible donor was a child, and that refusal was least likely if the relatives had an educated background. The 17% incidence of refusal correlates with the findings of others.¹

Of the 11 donors who died before arrangements for nephrectomy could be made, few represent an avoidable wastage. At least two hours are required to complete preparations for kidney removal, and in most cases death occurred shortly after admission. In two cases, however, the kidneys were needlessly lost as the relatives were sent away immediately before the transplant staff were told of the possible donor. It would be of practical help if doctors caring for these patients could be aware of this point; otherwise if death of the patient seems imminent the transplant staff may be faced with the decision of abandoning the donor or recalling the relatives to the hospital by telephone or even more undesirably by police message, possibly at night.

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