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Approach to the management of end-stage renal disease

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What is end-stage renal disease?

The two terms end-stage renal disease (ESRD) and failure (ESRF) are used to describe the irreversible loss of kidney function which, without treatment by dialysis or kidney transplantation, is likely to lead to fatal complications such as hyperkalaemia or pulmonary oedema over a period of days or weeks. Residual renal function in terms of glomerular filtration rate in such patients is generally below 10 ml/min/1.73m^2.

Early identification

It is important to:

- identify and refer patients with advanced and progressive renal failure as they will be at risk of developing ESRD
- look for reversible factors (eg obstructive uropathy, drug nephrotoxicity or renal vasculitis), and
- try to conserve renal function, principally by controlling hypertension.

Early recognition of patients destined for ESRF is also necessary to allow time for them to become fully informed about their treatment options and to institute therapy electively. However, ESRD may occur unpredictably, for example following acute kidney injury, and 20% of patients still present requiring urgent or emergency dialysis.[1,2]

Incidence and prevalence

All patients in the UK starting renal replacement therapy (RRT) (ie dialysis or renal transplantation) are registered by the UK Renal Registry and their subsequent progress recorded year on year. Approximately 110 adults per million population start RRT each year; in 2009 almost 50,000 patients were alive on RRT.[2,3] The number of patients deemed unsuitable because of severe comorbidity or of those who decide not to receive RRT but receive conservative or palliative care is uncertain.

Survival and quality of life

Despite improvements in outcome, life expectancy remains significantly reduced for patients with ESRD undergoing RRT, principally due to increased cardiovascular and infection death rates.[4] There is no convincing evidence of better survival with one type of dialysis compared with another. Increasing age, comorbidity and late presentation are adverse prognostic factors.[4,5] Comparison of outcomes between patients wait-listed for transplantation but remaining on dialysis with those receiving transplants suggests a significant survival benefit from transplantation over dialysis.[6] Anticipating when ESRD will occur and avoiding dialysis by undergoing pre-emptive renal transplantation is the optimum treatment for ESRD[7] and also the most cost-effective. For suitable patients, successful transplantation offers better quality of life than dialysis, with improved physical well-being and sexual function, more personal freedom and less dietary and fluid restriction.

Assessment for renal transplantation

Ultimately, fewer than 40% of patients undergoing RRT want to receive a kidney transplant and are deemed suitable. A multidisciplinary team (MDT), including specialist nurses, renal physicians, transplant surgeons and other specialists as necessary, is required to assess and prepare a patient for transplantation. This includes discussing with the patient both absolute and relative contraindications to transplantation,[8] such as:

- cardiac or respiratory disease that would make surgery and anaesthesia unacceptably hazardous
- peripheral vascular disease or obesity that would make transplantation technically difficult
- active malignancy or chronic infection such as HIV or hepatitis that could be exacerbated by immunosuppressive therapy, and
- non-adherence with medication that would lead to organ rejection.

It is also important to recognise those few patients who are at risk of early graft failure due to disease recurrence in the transplanted kidney.

Types of transplantation

The potential for a live donor transplant should be fully explored. Ideally, those within six months of the anticipated date of ESRD should proceed to pre-emptive live donor transplantation (Fig 1). If this is not possible, they should be placed on the transplant waiting list - although the average waiting time for a deceased donor kidney is currently more than three years.[9] If the patient also has type 1 diabetes, a combined deceased donor kidney and pancreas transplant should be considered, for which there is a waiting time of less than eight months.[9,10]

Long-term dialysis

Suitability

Patients not eligible for transplantation will usually be suitable for treatment by dialysis if that is their wish.[11] Extensive or severe comorbidity that limits life expectancy to less than a few months is generally considered a contraindication to dialysis, but some patients with a better prognosis may elect not to be dialysed and instead to receive conservative and, later, palliative care.

The assessment of patient suitablity for dialysis is best carried out by an MDT. When there is uncertainty, either in the mind of the patient or in the decision of the MDT, a trial of dialysis is indicated.

Peritoneal dialysis

Peritoneal dialysis (PD) is less efficient than haemodialysis (HD) in removing waste

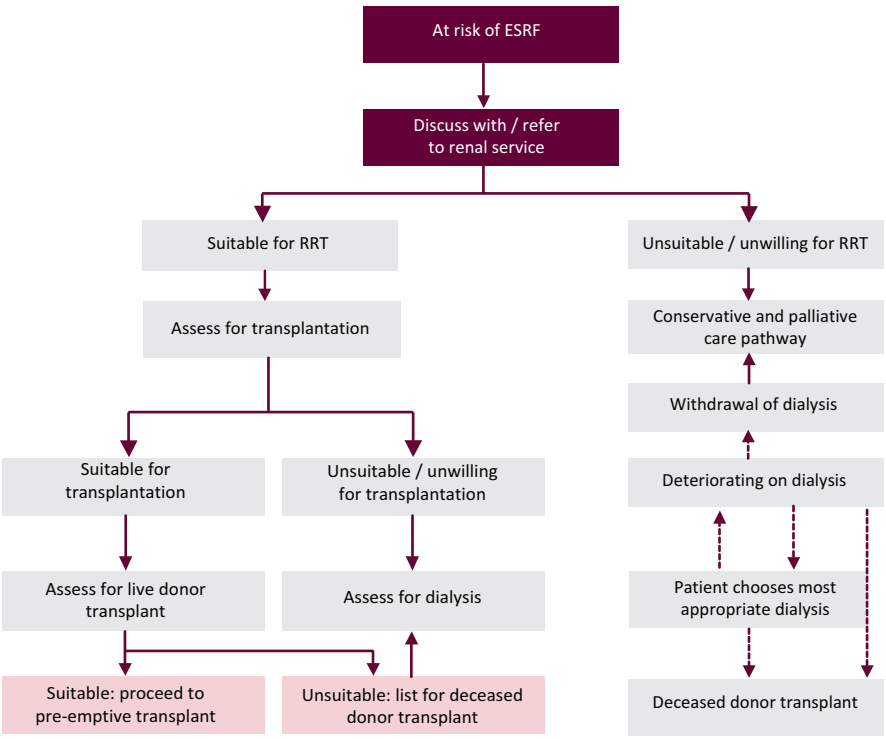

Fig 1. Care pathway for patients approaching end-stage renal disease ESRD. (ESRF = end-stage renal failure; RRT = renal replacement therapy).

products. It usually needs to be carried out daily at home, whereas conventional HD is a thrice-weekly treatment carried out either at home or in hospital. PD may not provide adequate dialysis for large patients and those who have lost all renal function, and many patients will transfer to HD within 2–3 years of starting PD unless they receive a kidney transplant.[12]

PD is relatively simple. Most patients who can self-care or have a carer and whose peritoneum is intact will be medically suitable for this type of dialysis (Fig 2). In appropriately selected and trained patients, infective peritonitis should occur less than every 18-24 patient-months. Sclerosing peritonitis leading to intractable bowel obstruction is a rare but serious complication.[13,14]

Conventional haemodialysis

The range of HD treatment times is generally 3–5 hours and some patients experience symptoms of hypotension during dialysis and increased fatigue afterwards, limiting its acceptability. It is more complicated to perform than PD and, for those able and willing to self-care, the training period is longer. Most patients who receive HD attend a hospital or satellite dialysis unit. For them, the travelling and waiting times to start dialysis and for their transport to arrive to take them home are a major source of frustration.

Septicaemia is a serious complication of HD. Delay in its recognition or treatment will increase the risk of sequelae such as endocarditis and discitis.[15] It is least likely to occur in patients whose vascular access is an arteriovenous fistula, while those with central lines (venous catheters) are at much greater risk.[16]

Daily and overnight dialysis

Daily HD with shorter treatment times is popular with some patients who dialyse at home, and may be associated with an improvement in quality of life, blood pressure, fluid balance control and laboratory parameters.[17] Longer treatment times thrice weekly, often delivered overnight, may offer similar advantages and are not restricted to patients dialysing at home.[18] Both these options are more expensive than standard HD treatment in terms of dialysis consumables, but may offer savings in drug costs because of better control of hyperphosphataemia and anaemia.

Haemodiafiltration

In haemodiafiltration (HDF), a variation of HD, blood in the extracorporeal circuit is delivered to a highly permeable membrane so that waste product removal occurs principally by convection but also by dialysis. HDF is also more expensive and its superiority over HD is unproven, but it may improve intradialytic symptoms in some patients.[19]

Self-care and home dialysis

When deciding on their most suitable dialysis modality patients need unbiased counselling from the MDT who should usually see the patient at home and not just in the

Key points

Identify and refer patients at risk of end-stage renal disease (ESRD)

Ensure patients can choose their most appropriate treatment

Renal transplantation is the best and most cost-effective renal replacement therapy for suitable patients

Create an arteriovenous fistula in preparation for haemodialysis to avoid using central line access

Ensure appropriate conservative/palliative care services are available for patients with ESRD

KEY WORDS: conservative care, haemodialysis, peritoneal dialysis, renal failure, renal transplantation

Fig 2. Catheter for peritoneal dialysis.

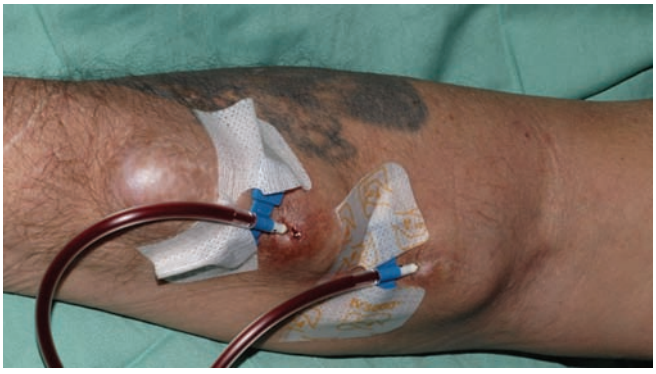

Fig 3. Radial-cephalic arteriovenous fistula during haemodialysis.

hospital setting. In making their choice, patients will often initially be attracted to the idea of receiving their dialysis fully cared for by nurses because they are frightened by their illness and lack the confidence that they can treat themselves. It is important to allay these fears and to reassure the patient, their carers and family.

The appropriate level of self-care should be part of the assessment. Once this has been gauged, the patient should decide whether they would ideally prefer to receive their treatment at home or in a hospital or satellite dialysis setting with other patients.[11] The most cost-effective forms of dialysis are home or self-care, but patient choice is paramount. Currently, most patients elect for hospital-based haemodialysis.[3]

Starting dialysis: have access established

The first RRT for most patients will be some form of dialysis. With early identification, appropriate counselling and forward planning, this should be an anxiety-free experience with very little risk. A key factor is to have had successful dialysis access surgery at least 2–3 months previously to create an arteriovenous fistula ready to use for haemodialysis (Fig 3). This will avoid the need for dialysis via central lines with a much increased risk of serious infection. For those patients who present late and have an unscheduled start to dialysis there should be a pathway in place to allow more urgent patient education and access surgery.[11]

Conservative and palliative care

Many patients with ESRD will not be suitable for or not wish to have dialysis, while others who receive RRT will deteriorate leading to the withdrawal of dialysis (Fig 1). Clinical teams managing such patients need to have expertise in these scenarios and in symptom control in ESRF. Close liaison between renal, palliative and primary care services has developed in recent years to improve this aspect of patient care.[11,20]

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