INTRODUCTION

Institution of hemodialysis treatment for chronic renal failure necessitates decisions by the physician which together with preferences by the patient, allow for considerable latitude in devising a treatment regimen. Selection of the hardware for performance of hemodialysis (delivery systems, dialyzers, and monitors) is discussed elsewhere in this volume. In this chapter, the problems and questions involved in timing the initiation of dialytic treatment, selection of a specific dialysis schedule and proffering dialysis therapy to high risk patients will be addressed. A scheme for routine medical monitoring of long term patients will be provided.

INITIATION OF MAINTENANCE HEMODIALYSIS

WHEN TO BEGIN

There is no difficulty in deciding to begin dialysis in a severely symptomatic uremic patient. The asymptomatic patient inexorably deteriorating in terms of measured renal function does create a problem in judgement as to when to abandon conservative therapy in favor of dialysis. Controversy exists over the optimal time to initiate regular dialysis treatment. The most therapeutically aggressive view is held by Bonomini and coworkers (1), who believe that regular hemodialysis should begin when the endogenous creatinine clearance falls between 15 to 21 ml/min. Correlating survival rates of their patients with the creatinine clearance at which hemodialysis was begun (0 to 21 ml/min), Bonomini and coworkers found the best survival (85% over four years) in those patients who started dialysis with higher creatinine clearances. Bonomini (2) explained these results by suggesting that in patients whose endogenous creatinine clearances is no higher than 5 ml/min uremic complications are more pronounced and will progress despite maintenance hemodialysis. It is difficult to find data to justify the dialysis of any patient whose creatinine clearance exceeds 10 ml/min. Scribner (3) points out that Bonomini's patients may not be representative of general selection criteria.

Survival in Bonomini's control group (those...
patients with a creatinine clearance of 0 to 5 ml/min who were dialyzed 2 to 3 times per week for 5 to 10 h) was inexplicably poor (only 40% were alive after four years). Depending on age and coexisting systemic diseases, annual mortality in regularly dialyzed patients ranges from 5 to 10% in most large centers around the world. Poor survival together with deterioration of motor nerve conduction velocities in Bonomini’s patients were interpreted by Scribner as evidence of inadequate dialysis in the control group, thereby invalidating the conclusions as to efficacy of the “experimental” treatment schedule.

Substantial clinical experience indicates that maintenance hemodialysis is best initiated when the patients’ creatinine clearance is approximately 5 ml/min. As residual renal function falls below this level, the patient becomes catabolic, loses weight, and develops complications, such as peripheral neuropathy and pericarditis, which interfere with subsequent rehabilitation. Berlyne and Giovannetti (4) concur in advising beginning hemodialysis at a creatinine clearance of 5 ml/min. Admittedly with strict dietary protein restriction, it is possible to postpone dialysis in some patients until glomerular filtration rate diminishes to as low as 2 ml/min. This, however, is not to be advised unless both patient and physician are attuned to a regimen of frequent visits and close monitoring of the patients’ overall condition. On the other hand, starting maintenance hemodialysis at a glomerular filtration rate in excess of 15 ml/min is not justified, except perhaps in malignant hypertension or intractable nephrotic syndrome. Not only would such early treatment over-load presently available dialysis facilities but patients would be exposed to unnecessary risks.

Maher (5) found that depending on diagnosis, renal diseases progress at differing rates; occasional patients survive without dialysis for as long as three years after reaching a serum creatinine of 10 mg/dl. By contrast explosive deterioration in renal function over weeks to months is common in systemic sclerosis, malignant hypertension and rapidly progressive glomerulonephritis. While we have generally subscribed to the 5 ml/min starting point, the patient’s clinical condition is obviously more important than laboratory measurements of glomerular filtration. Our “sick” diabetics have been begun at 7 to 9 ml/min. We have not had cause to dialyze any patient with a creatinine clearance greater than 10 ml/min. On one occasion, an elective bilateral nephrectomy was performed at a creatinine clearance of 10 ml/min in a patient whose massively enlarged polycystic kidneys caused intractable vomiting due to pressure on the stomach.

**PREPARING THE PATIENT**

Ideally, with early recognition of renal disease and progressive renal failure, there is adequate opportunity to plan for smooth initiation of long term hemodialysis. As soon as it becomes clear that a patient has progressive renal failure, the patient, family and medical advisors ought to review the probable rate of deterioration, the types of treatment available, and the suitability of dialysis or transplantation as specifically applied to the patient considering age and diagnosis. In our program, every new patient meets with both transplant surgeon and nephrologist. We have appointed a “Patient Affairs Coordinator”, a woman who has undergone 12 years of maintenance hemodialysis, to act on behalf of the frequently frightened and confused patient. She visits each newly diagnosed renal failure patient, providing an opportunity to discuss mutual problems while at the same time, proffering living evidence that a person can live longer than a decade on regular dialysis therapy, leading an active, productive life. Hurdling the barriers of psychological adjustment to regular dialysis is made easier by full and frank disclosure of all facts to the patient.

**CHOICE OF VASCULAR ACCESS**

Appropriate management of renal failure should include provision of vascular access well in advance of need to allow the access to “mature”. In our program the Cimino-Brescia arteriovenous fistula (7) is the access of choice for most patients. Elderly, obese, and diabetic patients may require two to four months before a fistula is ready for use. Patients with small or thrombosed veins, who will be entering home dialysis training, diabetics or the very obese, may have a bovine carotid heterograft performed as the procedure of choice (8), especially when their creatinine clearance is less than 8 ml/min. We usually operate to create vascular access at a creatinine clearance of approximately 10 ml/min. Patients who can be anticipated to have a “slow maturation” includ-