RECOVERY OF KIDNEY FUNCTION FOLLOWING PROLONGED ACUTE RENAL FAILURE

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Summary

Twenty-two patients with prolonged acute renal failure (ARF), successfully treated by haemodialysis, were analysed. The clinical course was oliguric in 16 and non-oliguric in 6 cases. Twenty-seven haemodialyses on average (15–54) during a mean duration of 66.9 (30–172) days were needed for recovery of kidney function. Overall, maximum improvement of renal function was achieved within 116.4 (51–259) days, in oligo-anuric cases within 80.1 (51–208) days, in non-oliguric cases within 160.3 (90–259) days.

In the latter group pre-existing renal damage was probably the cause of the more extended duration of acute renal failure.

Introduction

Since the introduction of haemodialysis recovery of kidney function can be expected because of possible reversibility of acute renal failure (ARF). Usually, adequate renal function returns within 7 to 12 days [1]. However, the course of acute renal insufficiency may be prolonged up to several weeks, as described in isolated reports [2,3]. The following study presents patients with anuric, oliguric or non-oliguric course of prolonged ARF who achieved normalisation of renal function or incomplete recovery without need of further dialyses.

Patients and Results

Twenty-two patients (11 male, 11 female), aged from 12 to 70 years (mean age 47.6) had evidence of prolonged ARF lasting more than 30 days. Underlying renal diseases were fulminating pyelonephritis in 5 cases, exacerbation of chronic glomerulonephritis in 3, rapidly progressive glomerulonephritis in 2, lupus nephritis in 1, multiple myeloma in 1, and haemolytic uraemic syndrome in 1 case. Further causes were major abdominal surgery such as splenectomy, papil-
lotomy, hysterectomy and renal artery stenosis operation, complicated by haemato-
toperitoneum, peritonitis, paralytic sub-ileus and acute pancreatitis respectively. 
One had a septic abortion [4], 1 transfusion incompatibility, 1 severe haemolysis 
in glucose-6-phosphate dehydrogenase deficiency, 1 necrotising pancreatitis and 1 
had nephrotoxic injury.

Dialysis treatment was carried out for a mean duration of 66.9 days, ranging 
from 30 to 172 days. A mean of 27 haemodialyses, (minimum 15, maximum 54) 
were necessary, until sufficient renal function was achieved. The course of pro-
longed ARF was non-oliguric in 6 and oliguric in 16 individuals. Eight out of the 
latter group had anuria persisting for more than 48 hours. In 1 case anuria lasted 
for 28 days.

Six cases with persistently normal urine volumes and ARF [5] needed artificial 
kidney therapy for an average of 101.1 days. In the 16 oligo-anuric cases dialysis 
was necessary for a mean of 57.3 days; 8 of them without hypercatabolism were 
dialysed for 51.5 days, 8 with hypercatabolism for 63.2 days. Complete recovery 
of global renal function was seen 9 times, incomplete recovery 13 times. Four 
subjects returned to the dialysis programme again, because of nephritis in sys-
temic lupus erythematosus, exacerbation of chronic glomerulonephritis and 
recurrence of pancreatitis.

Mean duration of maximum azotaemia, defined by the period from the onset 
of acute renal failure, until decrease of serum creatinine value was 79.5 days 
(38–196). Maximum improvement of renal function was observed 116.4 days on 
average (51–259) after development of acute renal failure. In 8 patients with 
hypercatabolism the mean frequency of dialysis procedures per week was 5.1, 
whereas in the total material only 2.8 dialyses per week had to be performed. 
Maximum improvement of renal function in this high risk group, however, was 
reached within 84.7 days (51–152). Optimum time of recovery in the 6 non-
oliguric patients took a mean of 160.3 days, a fact possibly attributable to pre-
existing renal damage.

A review of the material indicates in 11 cases prior renal diseases with normal 
serum creatinine levels in 3, and elevated serum creatinine levels in 8. After the 
acute episode, complete recovery was achieved in the 3 cases mentioned above 
and incomplete recovery in the 8 cases with previously impaired renal function. 
Despite good clinical condition in this latter group, after recovery previous levels 
of function were never reached.

In patients aged up to 45 years, maximum return of function took 103.2 days 
on average (51–208). In elderly patients a mean period of 127.9 days (88–259) 
was needed for optimum convalescence [3,6,7].

Prolonged ARF was complicated by severe disturbance of vital functions such 
as cerebral oedema, shock lung, ileus and grave liver damage in 5 subjects. Three 
had one additional disturbance of vital functions, 1 had two and another one 
even recovered from 3 major vital function disturbances. In this high risk group 
maximum improvement of kidney function after onset of prolonged ARF took, 
on average, 126.4 days (66–225).

Among all the patients under study in the stage of oligo-anuria during dialysis 
treatment, the frequency of severe diseases is summarised as follows:
1 Cardiovascular complications were observed in a total of 18 cases. Particular susceptibility to arrhythmias was seen 14 times, including paroxysmal atrial tachycardia, atrial fibrillation and ventricular extrasystoles. Cardiac insufficiency and pulmonary oedema were found in 11, pericarditis in 2 individuals.

2 The most common alimentary tract disorders were: bleeding from oesophageal lesions, diffuse gastritis, and gastric or duodenal ulcers in 10 cases. Seven patients had paralytic sub-ileus and five had severe diarrhoea. During the course of prolonged ARF surgical intervention was needed in 3 cases; cholecystectomy in 2, vagotomy and pyloroplasty in 1.

3 Severe liver damage and acute pancreatitis were noted 8 and 3 times respectively.

4 Severe complications resulted from bacterial, viral or fungal infections in 20 patients. Bacterial meningitis in 1 and pneumonia in 4 cases necessitated intensive medical care. Nine patients were troubled by thrombophlebitis of the Scribner Shunt, and 14 by urinary tract infection. Candidiasis in 7 persons affected the oropharyngeal, gastrointestinal and vaginal mucous membranes. The incidence of herpes simplex was as high as 73%.

After recovery, abnormal findings on urinalysis [3,7] were noted only in 7 patients. Two had a significant bacteriuria, 5 mild to moderate proteinuria, microhaematuria, or cylindruria-alone or in combination. Long-term observation revealed hepatitis B infection in 6 cases.

Discussion

As the data show, prolonged acute kidney failure with an anuric, oliguric or non-oliguric course lasting more than 30 days does not necessarily indicate a poor prognosis. Rather, complete or incomplete return of renal function should be anticipated [1,3,7]. The outcome depends to a large extent on the background of underlying illness [8] leading to the acute event, on related complications such as cardiorespiratory failure, alimentary tract disorders or infections. Dialysis therapy in cases with prolonged ARF requires individual management. Our material shows the need for early and frequent dialysis [9,10], being 5.1 per week on average in hypercatabolic cases, whereas for the total group mean dialysis frequency was 2.8 per week. It is of interest that there was no striking difference in duration of dialysis treatment and maximum improvement of renal function between patients with hypercatabolic oligo-anuric prolonged ARF, and oligo-anuric patients without hypercatabolism. In addition, severe clinical complications, such as disorders of the heart, of the respiratory or hepato-biliary system, septicaemia and cerebral oedema are compatible with recovery of renal function. Furthermore, the chance of survival depends on proper management and intensive medical care. Duration of dialysis treatment and maximum improvement of kidney function were markedly more extended in cases with non-oliguric ARF when compared with oligo-anuric cases. This can be explained by the high incidence of pre-existing renal damage in the group of so-called 'high output' ARF. In accordance with the conclusions of others [3,7], a low rate of late complications even after prolonged ARF may be expected.

In summary, severe acute renal failure with a need for dialysis over a long
period of time should never be regarded as a hopeless irreversible situation.

References

3 Siegler, RL, Bloomer, HA (1973) J. Amer. med. Ass., 225, 133

Open Discussion

KLEINKNECHT (Paris) In our experience, approximately 4% of all patients with acute renal failure (excluding those with glomerulonephritis and systemic disorders) had severe permanent renal damage. Most of them were of obstetrical origin. Half of these patients had total or partial cortical necrosis, and the others had tubular atrophy or interstitial fibrosis. In your series, nine patients had presumably acute tubular necrosis. Had you, in these patients, the histopathological diagnoses? In our patients with renal cortical necrosis and tubulointerstitial nephropathy, chronic haemodialysis was required again several months or years after the initial renal insult in about half of the patients. Did you observe the same outcome in your patients having the same diagnosis?

KOPSA In our material, also, about three or four per cent of the patients had prolonged acute renal failure but 95% or 96% had short lasting acute renal failure.

From those nine cases who had complete recovery we had biopsy specimens from about five cases. In the other four cases the diagnosis was established on clinical signs and symptoms or on skin or muscle biopsies. From these five patients, four had acute tubular necrosis whereas one had an intrinsic renal disease such as rapidly progressive glomerulonephritis.

Now to your second question, the outcome in those patients with acute tubular necrosis or with the clinical suspicion of acute tubular necrosis we had the same experience as you that they had a better prognosis than the others with major pre-existing renal damage.

VALEK (Prague) I think there is now a broadly accepted policy to start dialysis in patients with acute renal failure earlier and to dialyse them often and so long as necessary and if necessary to put patients on regular dialysis treatment. I should like to ask how many patients who started as patients with ARF have you put on regular dialysis treatment?

KOPSA In our practice we have on regular dialysis treatment about eighty or ninety patients per year and from these, per year, about one or two had pro-

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longed acute renal failure. This study comprised the last ten years and within ten years we had twenty-two patients with a prolonged course of acute renal failure which ended positively. And four patients with prolonged acute renal failure unfortunately died.

ONEN (Istanbul) Have you done sequential GFR determinations in the recovery periods in these cases and have you found special patterns as far as GFR values are concerned?

KOPSA We only studied the glomerular filtration rate in three cases and had a follow up to three years but according to the literature inulin, PAH and creatinine clearance showed that there was a gradual increase of glomerular filtration rate up to a certain point of maximum improvement and then very slow deterioration of renal function started again within the next years so that it can be expected that these patients, if they survive, fall back into the chronic dialysis programme again after several years or even after ten or fifteen years.