Is rapid initiation of peritoneal dialysis feasible in unplanned dialysis patients? A single-centre experience

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Abstract

Background. Starting dialysis in an unplanned manner is a frequent situation in a dialysis centre even for patients with a regular nephrology follow-up. For no clear reason, chronic haemodialysis (HD) is more frequently used than peritoneal dialysis for unplanned dialysis patients.

Objective. The purpose of this study was to evaluate the results of a dialysis policy dedicated to unplanned dialysis patients. The aim of this policy was to increase the use of peritoneal dialysis (PD) in an attempt to reduce the need for tunnelled catheter.

Methods. One hundred seventy-one patients from a single centre, who started dialysis between 1 January 2004 and 31 December 2006, were prospectively followed until 31 December 2006. Unplanned dialysis patients were defined as patients entering in dialysis with no vascular access or peritoneal dialysis catheter. PD was presented as a modality of choice for renal replacement therapy to avoid the need for a tunnelled HD catheter.

Results. There were 60 unplanned dialysis patients during the study period. Among these patients, 34 agreed to be treated by PD. Compared with unplanned peritoneal dialysis patients, unplanned haemodialysis patients had a greater modified Charlson’s comorbidity index (5.9 ± 2.4 versus 4.4 ± 1.9, P < 0.05). The mean duration of the temporary catheter period was 32 ± 29 days (median: 24 days) for haemodialysis patients compared with 26 ± 21 days (median: 25 days) for peritoneal dialysis patients (P = NS). The initial hospitalization duration was similar in haemodialysis patients and peritoneal dialysis patients (24 ± 28 versus 30 ± 33 days; median value: 17 versus 20 days, P = NS). PD was started 8.6 ± 10 days (median: 4 days) after catheter insertion. A tunnelled catheter was used only in three patients until peritoneal dialysis was initiated. Acute automated peritoneal dialysis was used in 19 patients. Among 26 haemodialysis patients, 23 were dialyzed through a tunnelled catheter. Of these 23 patients, 15 were successfully converted to fistula. Median time for fistula creation was 2.6 months after dialysis initiation; median time for fistula utilization was 4.4 months. Actuarial patients survival at 1 year was 79% on haemodialysis compared with 83% on peritoneal dialysis (P = NS). After adjustment of the initial modified Charlson’s comorbidity index, dialysis modality had no impact on patient’s survival. There was no significant difference between haemodialysis patients and peritoneal dialysis patients regarding survival free of re-hospitalization. Actuarial survival free of peritonitis was 73% at 6 months and 58% at 1 year.

Conclusion. Peritoneal dialysis is a safe and efficient alternative to haemodialysis for unplanned dialysis patients. Peritoneal dialysis offers the advantage of reducing the need for tunnelled catheter in unplanned dialysis patients.

Keywords: catheter; haemodialysis; peritoneal dialysis

Starting dialysis in an unplanned manner is a frequent situation in a dialysis centre even for patients with a regular nephrology follow-up [1]. Unplanned dialysis initiation can be defined as an end-stage renal disease patient beginning dialysis with no functional vascular access or peritoneal dialysis catheter. However, unplanned dialysis initiation is not necessarily associated with tunnelled dialysis catheters. Therefore, we believe that starting haemodialysis through a temporary catheter is a better definition for unplanned dialysis initiation. Urgent dialysis initiation is also used to define unplanned dialysis initiation but the need for urgent dialysis is subjective.

Those patients starting haemodialysis with a temporary catheter are frequently converted to a tunnelled catheter pending a native fistula creation or whilst waiting for fistula maturation.

Despite many efforts to decrease the use of tunnelled catheters the prevalence of this type of vascular access remains relatively high in dialysis centres [2]. Furthermore, it has been shown that unplanned dialysis and using temporary haemodialysis catheters are independently associated with mortality in incident dialysis patients [3]. Unplanned renal replacement therapy affects the choice of the dialysis modality. For no clear reasons, peritoneal dialysis is underused in unplanned dialysis patients [1]. Nevertheless,
peritoneal dialysis may present the advantage of reducing the need for tunnelled catheters in unplanned dialysis patients. In France, 46% of incident end-stage renal disease patients start renal replacement therapy through a catheter. In addition, among these patients only 50% needed urgent dialysis (unpublished data from REIN registry report 2005). So it is clearly needed to show that peritoneal dialysis is a suitable method for unplanned dialysis patients and that acute automated peritoneal dialysis may help nephrologists to deal with patients without any permanent vascular access at dialysis initiation.

The main objective of this study was to report the results of a dialysis policy for unplanned dialysis patients in a dialysis programme. The aim of this policy was to increase the use of PD for unplanned dialysis patients in an attempt to reduce the need for tunnelled lines. This study was also carried out to determine the patient profile at dialysis initiation and the outcome of those patients on dialysis.

Patients and methods

In our centre, in an attempt to increase the use of peritoneal dialysis for unplanned dialysis patients, a programme devoted to this group of patients was set up on 1 January 2004. A temporary catheter can be inserted rapidly by every nephrologist, at the bedside if necessary, which is not the case for a tunnelled catheter. In addition, tunnelling line insertion is not necessary if unplanned dialysis patients can be transferred to peritoneal dialysis after <1 month on haemodialysis. The need to start dialysis was based on the clinical judgement of the nephrologists in charge of any individual patient. These patients had to start dialysis urgently or could not wait >1 week for peritoneal catheter insertion or fistula creation.

For these patients, a temporary femoral or jugular single lumen catheter was used for dialysis initiation. Thereafter, medical or social contraindication to peritoneal dialysis was evaluated by nephrologists and PD nurses. PD was presented to the patient as a modality of choice for renal replacement therapy to avoid the need for a tunnelled HD catheter. Assisted PD was also presented as a modality of choice to patients with functional impairment or cognitive dysfunction. The decision concerning the dialysis modality was made according to the patient’s choice. Since 1 July 2004, acute automated PD was started the day after PD catheter insertion in order to decrease the time exposed to the temporary catheter. Low intra-peritoneal volume and intermittent peritoneal dialysis (IPD) were used during the first week of PD in order to prevent peritoneal leak. Using the Procard™ of the Home Choice Pro™ cycler, a standard prescription of acute automated PD was used. The procedure for acute PD has been published recently [4]. It is obvious that acute APD cannot provide adequate small solute clearance for long-term peritoneal dialysis therapy. Therefore, acute APD was only used to prevent acute uraemic complications such as hyperkalaemia and pulmonary oedema before optimal peritoneal dialysis initiation.

When haemodialysis was the modality of choice, a tunnelled catheter was inserted pending fistula placement and maturation. Furthermore, a tunnelled line was also used if peritoneal dialysis had to be postponed for medical reasons or by the patient’s choice.

Patients were followed prospectively until 31 December 2006 or death. The demographic data and Charlson’s comorbidity index (CCI) at dialysis initiation were noted. The modified CCI was calculated to evaluate patients’ comorbidities independently of their age. The need for urgent dialysis initiation was extracted from the patients’ file. The reasons for dialysis modality choice as well as contraindication to PD were noted. The absence of residual renal function at dialysis initiation was recorded (anuric patients at dialysis initiation). Glomerular filtration rate (GFR) was obtained 3 months, 6 months and 1 year after the beginning of dialysis. Transfer to haemodialysis and renal transplantation was censored for technique survival evaluation. Acute APD was performed during daytime on an in-patient basis. Therefore, hospitalization was defined by a hospitalization stay of >2 days. The time between the initial hospitalization and the first episode of re-hospitalization was calculated to determine survival free of re-hospitalization. The time between peritoneal dialysis initiation and the first peritonitis episode was evaluated to calculate survival free of peritonitis. Peritoneal dialysis patients were separated into two groups according to PD initiation modality (acute PD group and delayed PD group) in order to evaluate the impact of acute PD on technique survival and on survival free of peritonitis.

Intent-to-treat analysis was used to analyse patient survival. Continuous variables are expressed as mean ± standard deviation and median. Categorical variables are expressed as proportion. The univariate analysis was performed using Fischer’s exact test for the categorical variables and the unpaired t-test or Mann–Whitney’s test when required for the continuous variables. The multivariate Cox proportional hazards model was used to adjust survival on baseline characteristics. The statistical difference was considered to be significant for \( P < 0.05 \).

Results

Patient characteristics

Between 1 January 2004 and 31 December 2006, 171 patients started renal replacement therapy in our centre. Among these patients, 60 (35%) had no vascular access or peritoneal dialysis catheter at dialysis initiation. Of these unplanned dialysis patients, 46% had a nephrology referral. Thirty-four agreed to be treated by peritoneal dialysis, whereas seven patients made the choice to be treated by haemodialysis. There was no significant difference between peritoneal dialysis patients and haemodialysis patients regarding the mean age at dialysis initiation (Table 1). Haemodialysis patients had a greater modified CCI compared with peritoneal dialysis patients (5.9 ± 2.4 versus 4.4 ± 1.9, \( P < 0.01 \)) whereas there was no significant difference between the two groups concerning the Charlson comorbidity index. The main
cause of end-stage renal disease was vascular renal disease (5/34 for PD and 5/26 for HD). There was more diabetes nephropathy in the HD group compared with the PD group (5/26 versus 3/34).

**Dialysis initiation**

For unplanned dialysis patients, a temporary venous catheter was inserted to start haemodialysis. Among these 60 unplanned dialysis patients, 27 needed urgent initiation of renal replacement therapy (PD: 16/34, HD: 11/28, \(P = NS\)). Of these unplanned dialysis patients, 18 were anuric at dialysis initiation. Patients treated by HD were more frequently anuric than patients treated by PD (12/25 versus 6/32, \(P < 0.05\)). The proportion of anuric patients was similar in the acute PD group and the delayed PD group (3/18 versus 3/12, \(P = NS\)). A temporary femoral catheter was used for 15 patients on PD and 10 patients on HD. Only one patient on PD had a temporary subclavian catheter. Patients were otherwise treated with a temporary jugular catheter. The mean duration of the temporary catheter period was 32.4 ± 29.2 days (median: 24.5 days) for haemodialysis patients compared with 26.1 ± 20.6 days (median: 25.5 days) for peritoneal dialysis patients (\(P = 0.68\)). The initial hospitalization duration ranged from 0 to 126 days (mean: 29 ± 33 days, median: 20 days). The initial hospitalization duration was similar in both the groups (24.3 ± 28.1 days for PD versus 29.9 ± 33 days for HD; median: 16.5 days versus 20 days, \(P = 0.16\)).

Out of 26 haemodialysis patients, 23 were dialyzed through a tunneled catheter.

For peritoneal dialysis patients, PD was started 9.6 ± 10.3 days (median: 4 days) after catheter insertion. A long-term tunneled catheter was used in three patients until peritoneal dialysis was initiated. Among 34 peritoneal dialysis patients, 31 started peritoneal dialysis after 1 July 2004. Of these 31 peritoneal dialysis patients, 19 patients were treated by acute APD. The mean duration of acute APD per patient was 9 ± 3 days (6–15 days), and the mean number of acute APD sessions per patient was 5 ± 1 (3–7 sessions). There were 12 patients who started peritoneal dialysis 19 ± 9 days after catheter insertion. The main causes for delayed PD utilization were department organization (\(n = 5\)), increased risk of peritoneal leak after the surgical procedure (\(n = 3\)), transfer to intensive care (\(n = 3\)) and patient’s choice (\(n = 1\)).

**Outcome on dialysis**

Only two patients on acute PD had a peritoneal leak. For these patients, PD was postponed for 2 weeks and subsequently resumed. After being discharged from hospital 21/34 patients (62%) were on automated PD, and 17 were treated by assisted PD.

Among haemodialysis patients, 23 were dialyzed through a long-term tunneled line. Thereafter, 16 patients were successfully converted to fistula and 7 patients were still being dialyzed through a long-term tunneled catheter at the end of the observation period. The median time of fistula creation was 2.6 months after dialysis initiation; the median time of fistula utilization was 4.4 months.

On univariate analysis, peritoneal dialysis patients had a similar survival on dialysis to that of haemodialysis patients (Figure 1). The actuarial patient survival at 1 year was 78.9% for haemodialysis compared with 82.9% for peritoneal dialysis (\(P = 0.26\)). After adjustment on the initial modified Charlson’s comorbidity index, dialysis modality did not adversely affect patients’ survival on dialysis [adjusted hazard ratio: 1.03 in favour of HD (\(P = NS\)); adjusted hazard ratio per modified CCI point: 1.25 (\(P < 0.05\))].

There was no significant difference between haemodialysis patients and peritoneal dialysis patients regarding survival free of re-hospitalization. The actuarial survival free of re-hospitalization for HD patients and PD patients was respectively 51% versus 36% at 6 months and 36% versus 21% at 1 year (\(P = 0.12\)). The mean duration of hospitalization/patient/months on dialysis and the number of hospital stay/patient/months on dialysis were similar on peritoneal dialysis and on haemodialysis (7.1 ± 7.8 versus 6.4 ± 7.0, median: 4.7 versus 3.9 and 0.43 ± 0.48 versus 0.35 ± 0.37, median: 0.34 versus 0.24). Among the patients entering on PD after 1 July 2004 there was no difference between acute APD patients and delayed PD patients regarding survival free of re-hospitalization. The actuarial survival free of re-hospitalization for acute APD patients was 30% at 6 months and 18% at 1 year compared with 39% at 6 months and 28% at 1 year for delayed PD patients.

The actuarial technique survival was 90% at 6 months and 88% at 1 year. Among patients starting PD after 1 July 2004, the actuarial technique survival for acute automated PD patients and delayed PD patients was respectively 89% versus 74% at 6 months and 89% versus 62.5% at 1 year (\(P = 0.19\)). In the acute automated PD group, three patients were transferred to haemodialysis at 1.2, 1.3 and
A high proportion of patients start dialysis without any permanent dialysis access or peritoneal dialysis catheter [1,3,5]. Numerous studies have shown that late referral to nephrologists is associated with unplanned dialysis initiation [3,5–8]. Furthermore, late nephrology referral is frequently associated with the need for urgent dialysis [8,9]. Nevertheless, it has been recently emphasized that despite having a nephrology follow-up, half of the patients starting dialysis had no permanent vascular access or peritoneal dialysis catheter at renal replacement therapy initiation [1]. This is consistent with the findings of our study where 36% of end-stage renal disease patients entering in dialysis were unplanned dialysis patients. In addition, 34% of these unplanned patients had a nephrology follow-up on a regular basis.

Late referral patients frequently need dialysis through a temporary catheter, especially if urgent dialysis is mandatory. Lorenzo et al. showed that late referral and temporary catheters are independently associated with mortality in incident dialysis patients [3]. Emergent dialysis initiation also increases the cost of patient care [9]. In order to wait for fistula placement and maturation, tunneled catheters are frequently used in patients without vascular access. However, due to both surgical delay and fistula maturation, the prevalence of tunneled catheters among chronic haemodialysis patients is relatively high in some dialysis centres, despite tremendous efforts to convert those patients to native fistulae [2]. Tunneled catheters are also associated with a higher mortality risk compared with fistulae in chronic dialysis patients [10,11]. Our study shows that, with the help of peritoneal dialysis, the use of tunneled catheters can be significantly reduced in unplanned dialysis patients. The period of exposition to a temporary catheter was not significantly reduced by the use of peritoneal dialysis. However, the fact that acute APD was used only for 19 patients in our study may explain this finding.

Timing of referral and unplanned dialysis initiation may influence patient choice regarding the chronic dialysis modality [1,7,12]. For no clear reason, chronic haemodialysis is more frequently used for unplanned dialysis patients [1]. The lack of the information procedure may explain this finding [1,12,13]. However, our study shows that when information concerning the risk of tunnelled catheters is provided, many of the patients agreed to be treated by peritoneal dialysis. It should be emphasized that infection risk is higher in haemodialysis patients compared with peritoneal dialysis patients when patients are dialyzed through a temporary catheter [14]. Furthermore, one may argue that the decline of the residual renal function is lower in peritoneal patients compared with haemodialysis [15]. In addition, it has been hypothesized that haemodialysis, even for a break-in period, may have a negative impact on the residual renal function [16]. Moreover, peritoneal dialysis used as first-line therapy has the advantage of preserving the vascular network. Unplanned dialysis patients should be treated like other patients using an integrative approach [17].

A recent publication shows that acute automated peritoneal dialysis is a suitable alternative to haemodialysis for chronic patients needing urgent renal replacement therapy [4]. In this study, automated peritoneal dialysis was started the day following catheter insertion with a relatively low rate of mechanical complication of PD. In addition, according to Shah et al.’s study, peritoneal dialysis does not have to be postponed after surgical treatment of abdominal hernia, showing that PD can be resumed early after a surgical procedure [18]. However, acute PD is certainly not suitable in patients with severe pulmonary congestion or urgent hyperkalaemia. In addition, an agreement for an early PD catheter placement has to be made with the surgical team. Temporary catheters are safe and efficient vascular accesses for acute haemodialysis patients for a limited period of time. Acute APD does not provide an adequate small solute clearance for long-term therapy. However acute APD can prevent the risk of acute uraemic complication pending optimal peritoneal dialysis therapy. Acute PD was used for 9 ± 3 days in our centre. Our study shows that peritoneal dialysis may be used for unplanned dialysis patients after a short time on acute haemodialysis. With the help of acute
automated PD the need for long-term tunnelled catheters in unplanned dialysis patients can be reduced.

In view of the difference concerning the modified Charlson’s comorbidity index between the two groups, one could argue that patient selection may bias the result. However, the randomized study of the dialysis modality is certainly not acceptable for patients or nephrologists [19]. The fact that assisted PD is available in France may have an impact on patient choice [20].

In conclusion, our study shows that with a devoted policy the use of peritoneal dialysis for unplanned dialysis patients can be increased. Peritoneal dialysis is a suitable method for unplanned dialysis patients and presents the advantage of reducing the need for a long-term tunnelled catheter compared with haemodialysis. However, the need for acute automated peritoneal dialysis has to be planned for in such a programme in order to reduce the time of exposure to a temporary haemodialysis catheter.

Conflict of interest statement. None declared.

References


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