Hospitalization risks related to vascular access type among incident US hemodialysis patients

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Abstract
Background. The excess morbidity and mortality related to catheter utilization at and immediately following dialysis initiation may simply be a proxy for poor prognosis. We examined hospitalization burden related to vascular access (VA) type among incident patients who received some predialysis care.

Methods. We identified a random sample of incident US Dialysis Outcomes and Practice Patterns Study hemodialysis patients (1996–2004) who reported predialysis nephrologist care. VA utilization was assessed at baseline and throughout the first 6 months on dialysis. Poisson regression was used to estimate the risk of all-cause and cause-specific hospitalizations during the first 6 months.

Results. Among 2635 incident patients, 60% were dialyzing with a catheter, 22% with a graft and 18% with a fistula at baseline. Compared to fistulae, baseline catheter use was associated with an increased risk of all-cause hospitalization [adjusted relative risk (RR) = 1.30, 95% confidence interval (CI): 1.09–1.54] and graft use was not (RR = 1.07, 95% CI: 0.89–1.28). Allowing for VA changes over time, the risk of catheter versus fistula use was more pronounced (RR = 1.72, 95% CI: 1.42–2.08) and increased slightly for graft use (RR = 1.15, 95% CI: 0.94–1.41). Baseline catheter use was most strongly related to infection-related (RR = 1.47, 95% CI: 0.92–2.36) and VA-related hospitalizations (RR = 1.49, 95% CI: 1.06–2.11). These effects were further strengthened when VA use was allowed to vary over time (RR = 2.31, 95% CI: 1.48–3.61 and RR = 3.10, 95% CI: 1.95–4.91, respectively). A similar pattern was noted for VA-related hospitalizations with graft use.

Discussion. Among potentially healthier incident patients, hospitalization risk, particularly infection and VA-related, was highest for patients dialyzing with a catheter at initiation and throughout follow-up, providing further support to clinical practice recommendations to minimize catheter placement.

Keywords: hemodialysis; hospitalization; vascular access

Introduction

The most recent United States Renal Data System annual data report presents encouraging data that mortality in end-stage renal disease (ESRD) patients continues to decline, with the exception of patients who are new to dialysis (incident patients). In this subpopulation, which represents 110 000 patients annually, mortality rates, particularly in the first 6 months, are substantially elevated [1–3]. Moreover, incident patients experience on average two hospitalizations in their first year; these events have a significant and negative impact both clinically and economically [1].

Considerable efforts have been made to identify potential mortality risk factors for patients initiating dialysis [2–5] with the goal of developing potential interventions to help reduce the high mortality burden immediately following initiation. Two areas of particular focus have been whether patients received predialysis nephrologist care [6–12] and the vascular access (VA) type in use [3, 4, 6, 11, 13]; both factors have consistently been associated with mortality risk. Less attention, however, has been spent investigating hospitalization risks, which have significant health care resource utilization implications. Catheter access use, in particular, may be an important predictor of future hospitalization events given that catheters are prone to infection and other complications [14–16].

In order to better understand the morbidity burden related to catheter use, we examined the risks for all-cause and cause-specific hospitalizations related to the type of VA in use at dialysis initiation and throughout the first 6 months on dialysis using a random sample of incident US hemodialysis (HD) patients who participated in the Dialysis Outcomes and Practice Patterns Study (DOPPS) between 1996 and 2004 (prior to the initiation of the Centers for Medicare and Medicaid Services’ (CMS) Fistula First initiative [17]). We restricted our study to those patients who had evidence of predialysis nephrologist care at least 1 month prior to dialysis initiation to help separate out effects related to VA type from those associated with access to care and the need
for emergent dialysis. Since it has been previously shown that not receiving any predialysis nephrology care is strongly predictive of mortality risk within the first 120 days [3], this restriction may help to minimize potential residual bias due to unmeasured confounding.

Methods

Data source

Data from DOPPS phases I (1996–2001) and II (2002–2004) were used for this analysis. Detailed descriptions of data collection and elements are available [18, 19]. Briefly, DOPPS is an international cohort study of HD patients designed to evaluate the association of practice patterns and selected patient outcomes, including mortality, hospitalization, quality of life and VA survival. In DOPPS I, dialysis facilities from France, Germany, Italy, Japan, Spain, the UK and the USA contributed data. Facilities treating ≥25 patients were eligible for selection. Moreover, dialysis facilities from Australia, Belgium, Canada, New Zealand and Sweden were added for DOPPS II. A similar study design was employed in DOPPS I and II.

Data collection questionnaires were standardized across all countries. Stratified by provider type, a random selection process was used to identify facilities for participation. Census information including basic demographic characteristics and mortality data were collected on all treated HD patients. Within each of the selected dialysis facilities, 20–40 patients aged ≥18 years were randomly selected from the facility census for participation in the DOPPS cohort. In DOPPS I, patients who left the study due to death, modality change or transfer to another facility were replaced regularly by randomly selected new patients. Replacement was not performed in DOPPS II; as an alternative, the cohort was supplemented with up to 15 consecutive patients for facility initiating HD within 30 days of study entry. At enrollment, site investigators collected patient information including demographic characteristics, predialysis medical care, laboratory testing and medical history. Throughout follow-up, treatment, laboratory, hospitalization and mortality information from patient records were abstracted at 4-month intervals. Primary and secondary causes of hospitalization including admission and discharge dates, along with information on VA procedures (creation, salvage procedures, removal and first use), were also collected throughout follow-up. The DOPPS study received institutional review board approval, and patient consent was obtained as required by local medical research ethics committees.

Study population

We limited our study to US patients who had <30 days on dialysis at enrollment into DOPPS, received some nephrologist care >30 days before initiating chronic HD and had at least 1 day of follow-up after study enrollment (designated index date).

Exposure

All patients were categorized according to the VA type [arteriovenous (AV) fistula, AV graft and temporary or cuffed percutaneous catheter] in use at study enrollment (baseline) and throughout the first 6 months on dialysis. Using an approach described previously [20], we determined one VA type in use on each day during the follow-up period.

Outcomes

We identified all hospitalization events recorded during the first 6 months on HD and assigned the date of hospital admission as the initial hospitalization date. The hospitalization reason was determined based on the primary diagnosis recorded in the medical record and were categorized as follows: cardiovascular [heart failure (HF), myocardial infarction, angina, valvular heart disease and cardiomyopathy], infection (pneumonia, sepsis, endocarditis and meningitis), VA-related (aneurysm and clotted, failing and infected accesses), gastrointestinal (GI) (GI bleeding, gastritis/peptic ulcer disease and diverticulitis) and other (which primarily included neurologic and pulmonary diseases, claudication, gangrene, deep vein thrombosis and those with no recorded diagnosis). Hospitalization events lasting <1 day (i.e. outpatient visits) were excluded from the analysis. We assessed the length of stay (LOS) for each hospitalization as the time between the admission and discharge dates and censored after 90 days to exclude outlying values and account for nonnormal distributions.

Covariates

Patient characteristics were assessed based on data abstracted from the medical records at DOPPS enrollment (baseline). Demographic characteristics included age, body mass index (kg/m²), gender, race (white and nonwhite), primary etiology of ESRD (diabetes, hypertension, glomerulonephritis and other) and number of permanent accesses placed prior to HD initiation (0, >1 and unknown/missing). Medical history information collected at baseline was categorized as yes (which included suspected) or no and included the following conditions: coronary artery disease, cancer, other cardiovascular disease (CVD), cerebrovascular disease, HF, diabetes mellitus, GI bleeding in the past 12 months, hypertension, lung disease, neurologic disease, psychiatric disorder, peripheral vascular disease (PVD) and recurrent cellulitis. Laboratory parameters were assessed as continuous parameters in the descriptive statistics and as categorical parameters in multivariate modeling and included albumin (g/dL), haemoglobin (Hb; g/dL) and white blood cell count (WBC; 10³/µL).

VA use time

Participants were followed from index date until the first of the following: date of death; loss to follow-up for reasons including transplantation, renal recovery, change to peritoneal dialysis therapy, withdrawal from dialysis and transfer to another dialysis facility; or 182 days. The length of time spent in the hospital was not included in the calculation of total person-time at risk.

Statistical analysis

We used basic descriptive statistics for continuous variables (mean and SD) and categorical variables [count (N) and percentage (%)] to characterize patients according to the baseline VA type used. We evaluated the proportion of patients with one or more VA conversions during the follow-up period, as well as the mean (SD) number of conversions, according to the baseline VA type. We estimated all-cause and cause-specific hospitalization rates (per 100 person-years) and 95% confidence intervals (CI) for patients according to the VA type in use at baseline and throughout the follow-up period (time-varying). SE estimates were calculated using the Poisson approximation to the binomial distribution. Mean (SD), median and 25th/75th percentiles were estimated for the length of time spent in the hospital (in days) during the first 6 months. In addition, since deaths and other reasons for loss to follow-up are competing events, we also estimated the mortality rate and the proportion of deaths occurring in the hospital, as well as the proportion of patients receiving a transplant during the follow-up period, according to the baseline VA type.

We then used multiple variable Poisson regression to estimate the relative risk (RR) of all-cause and cause-specific hospitalizations during the first 6 months according to the VA type in use at baseline and over follow-up. The time-dependent analysis was used to evaluate whether the risks attributable to any one access type would change if VA type was allowed to vary over time. All analyses adjusted for case-mix differences assessed at baseline (the variables listed in Table 1); patients with fistulas were the reference group. Patients with multiple hospitalization events could contribute events within the same category and/or to more than one outcome category (assuming the hospitalization events were in different categories). In the time-varying analyses, hospitalization events were attributed to the VA type in use on the day preceding the hospitalization event, and an exchangeable covariance matrix was used to account for the correlation between measurements introduced by allowing patients to contribute multiple events [21]. All analyses were conducted using SAS version 9.1 (Cary, NC).

Results

We identified 4532 incident US HD patients participating in DOPPS I and II. Of these, 2635 (58%) received some predialysis nephrologist care >1 month before initiating chronic HD, had complete information on the VA type in use at HD initiation and were included in the final analysis. The study population had a mean (SD) age of 63 (±15) years, 56% were male, 67% were white and 51% had diabetes as the primary cause of ESRD. The distributions of
baseline VA types were 18, 22 and 60% for fistula, graft and catheter, respectively. On average, patients with catheters had a greater comorbidity burden (more CVD, lung disease, neurologic diseases, psychiatric disorders, PVD and recurrent cellulitis), higher WBC counts and lower albumin and Hb levels (Table 1). In contrast, patients with fistulas were more likely to be male and were least likely to have many of the measured comorbidities, most notably congestive HF, other CVD and PVD.

During the follow-up period, the proportion of patients who had at least one VA conversion was 43, 18 and 20% for patients with a catheter, graft or fistulae in use at baseline. Among those patients, the mean number of VA conversions during follow-up was 2.3 (±0.7), 2.7 (±0.9) and 2.4 (±0.6), respectively. There were 109 deaths among patients dialyzing with a catheter at the time of the event (17 per 100 person-years), 30 deaths among patients dialyzing with a graft (12 per 100 person-years) and 27 deaths among patients dialyzing with a fistulae (13 per 100 person-years). Of the deaths, a substantial proportion occurred in the hospital (74, 43 and 55%, respectively). The proportion of patients who received a transplant during the follow-up period was quite low in each VA group (1.3, 0.3 and 0.9%, respectively).

Patients dialyzing with a catheter at baseline experienced 1113 hospitalization events [incidence rate (IR) = 170 per 100 person-years; 95% CI: 160–180], those with a graft experienced 313 hospitalizations (IR = 121 per 100 person-years; 95% CI: 108–136) and those with a fistula experienced 222 hospitalizations (IR = 104 per 100 person-years; 95% CI: 90.5–118) (Figure 1). When the VA type in use was allowed to vary over time, the all-cause hospitalization rates changed modestly. For patients dialyzing with a catheter, the rate increased to 192 per 100 person-years (95% CI: 180–204), whereas the rates decreased for both grafts (IR = 117 per 100 person-years; 95% CI: 106–129) and fistulas (IR = 92.9 per 100 person-years; 95% CI: 81.4–106).

In the cause-specific analyses, patients with catheters in use at baseline and throughout follow-up experienced the highest hospitalization rates for each cause evaluated; patients dialyzing with a fistula generally had the lowest rates in both the baseline and time-varying analyses (Figure 2). However, the magnitude of the differences in rates obtained between the analyses of baseline and time-varying VA type differed depending upon hospitalization cause. Only small differences were observed for cardiovascular, GI bleeds and other events. For infection-related hospitalizations, the rates associated with catheter accesses increased, whereas the rates decreased for both grafts and fistulae. For VA-related events, rates once again were elevated for catheters but declined with graft and fistula accesses.

The crude and adjusted RR estimates and 95% CI for the association between the VA type at baseline and assessed over time (time-varying) and risk of all-cause and cause-specific hospitalizations are provided in Table 2. In the adjusted models and compared with fistulae, catheters were associated with the highest risk of overall hospitalization, RR = 1.30 (95% CI: 1.09–1.54) for the baseline VA assessment, and RR = 1.72 (95% CI: 1.42–2.08) when VA was allowed to change over time. Compared with fistulae, grafts were associated with only a modestly higher risk of all-cause hospitalization when assessed at baseline

### Table 1. Distribution of baseline patient characteristics by VA type in use at baseline among patients who received predialysis nephrologist care >1 month before initiating dialysis therapy

<table>
<thead>
<tr>
<th>Patient characteristics, N (%), mean (±SD)</th>
<th>Fistula (n = 476)</th>
<th>Graft (n = 571)</th>
<th>Catheter (n = 1588)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (year)</td>
<td>61.1 ± 15.7</td>
<td>64.6 ± 13.9</td>
<td>62.2 ± 15.6</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>27.2 ± 7.1</td>
<td>28.2 ± 8.0</td>
<td>27.3 ± 7.3</td>
</tr>
<tr>
<td>Male (%)</td>
<td>72.5</td>
<td>43.6</td>
<td>55.6</td>
</tr>
<tr>
<td>White (%)</td>
<td>71.2</td>
<td>63.0</td>
<td>67.1</td>
</tr>
<tr>
<td>Other characteristics</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes as cause of ESRD (%)</td>
<td>44.5</td>
<td>55.5</td>
<td>51.4</td>
</tr>
<tr>
<td>≥1 Predialysis VA placement (%)</td>
<td>91.4</td>
<td>88.8</td>
<td>74.0</td>
</tr>
<tr>
<td>Comorbidities (% yes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>46.8</td>
<td>49.2</td>
<td>54.5</td>
</tr>
<tr>
<td>Cancer</td>
<td>12.6</td>
<td>12.6</td>
<td>12.2</td>
</tr>
<tr>
<td>Other CVD</td>
<td>21.0</td>
<td>24.0</td>
<td>33.0</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td>13.4</td>
<td>19.6</td>
<td>19.8</td>
</tr>
<tr>
<td>Congestive HF</td>
<td>33.8</td>
<td>40.1</td>
<td>52.1</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>48.9</td>
<td>60.8</td>
<td>56.5</td>
</tr>
<tr>
<td>GI bleeding</td>
<td>7.8</td>
<td>5.8</td>
<td>7.7</td>
</tr>
<tr>
<td>Hypertension</td>
<td>86.6</td>
<td>86.9</td>
<td>86.3</td>
</tr>
<tr>
<td>Lung disease</td>
<td>13.4</td>
<td>11.0</td>
<td>15.4</td>
</tr>
<tr>
<td>Neurologic disease</td>
<td>7.4</td>
<td>8.4</td>
<td>9.3</td>
</tr>
<tr>
<td>Psychiatric disorder</td>
<td>21.4</td>
<td>23.1</td>
<td>29.6</td>
</tr>
<tr>
<td>PVD</td>
<td>20.8</td>
<td>26.1</td>
<td>30.5</td>
</tr>
<tr>
<td>Recurrent cellulitis</td>
<td>6.1</td>
<td>7.7</td>
<td>9.3</td>
</tr>
<tr>
<td>Laboratory parameters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albumin (g/dL)</td>
<td>3.6 ± 0.5</td>
<td>3.5 ± 0.5</td>
<td>3.3 ± 0.5</td>
</tr>
<tr>
<td>Hb (g/dL)</td>
<td>10.2 ± 1.6</td>
<td>10.1 ± 1.5</td>
<td>10.0 ± 1.6</td>
</tr>
<tr>
<td>WBC count (10³/µL)</td>
<td>7.4 ± 2.4</td>
<td>7.9 ± 3.0</td>
<td>8.6 ± 3.4</td>
</tr>
</tbody>
</table>
(RR = 1.07, 95% CI: 0.89–1.28) and over time (RR = 1.15, 95% CI: 0.94–1.41).

When cause-specific hospitalizations were examined separately, catheters were strongly associated with an increased risk of VA-related events in the adjusted models, both when assessed at baseline (RR = 1.49, 95% CI: 1.06–2.11) and was markedly elevated when allowed to vary over time (RR = 3.10, 95% CI: 1.95–4.91) after adjustments for covariates. Compared with a fistula, graft use was also associated with an elevated RR of VA-related hospitalizations, both at baseline (RR = 1.46, 95% CI: 1.03–2.06) and over time (RR = 1.91, 95% CI: 1.21–3.02). For infection-related hospitalizations, catheters were associated with only a modest increase in risk when assessed at baseline (RR = 1.47, 95% CI: 0.92–2.36). However, when assessed over time, catheter exposure was associated with a distinctly elevated risk of infection-related hospitalizations (RR = 2.31, 95% CI: 1.48–3.61). The risks for cardiovascular, GI bleeding and ‘other’ hospitalizations were not strongly related to the type of VA in use at baseline or throughout the follow-up after case-mix adjustment.

During the 6 months of follow-up, the overall mean LOS in the hospital was 6.8 days (SD ± 8.9) and median LOS was 4.0 days [25th/75th percentiles (2.0, 8.0)] (Table 3). The mean LOS was longest for infection-, cardiovascular- and other related hospitalizations, 8.0 (±8.8), 7.6 (±10) and 7.7 (±9.6) days, respectively, and was shortest for VA-related events [4.2 days (±6.2)]. A similar, though less pronounced, pattern was evident for the median LOS. The VA type in place immediately preceding a hospitalization event did not appear to influence LOS. Similarly, there were no material differences in LOS across VA type when each cause-specific hospitalization event was evaluated separately.

Discussion

The morbidity and mortality burden experienced during the first 6 months on dialysis is considerable, and the type of VA used in the dialysis process may be an important contributor. In this subset of incident HD patients who had evidence of predialysis nephrologist care at least 1 month prior to dialysis initiation, those dialyzing with a catheter during the first 6 months after dialysis initiation experienced more hospitalizations and a higher risk of infection- and VA-related events compared to patients with a graft or fistula. Grafts were to a lesser extent associated with VA-related hospitalizations, though only when evaluated over time. When hospitalization risks accounting for VA changes occurring over the 6-month follow-up period were evaluated, the risks related to catheter use, particularly for infection- and VA-related hospitalizations, increased substantively over the risks observed at the baseline VA assessment. By allowing VA to change over time, a potentially more accurate assessment of the morbidity burden attributable to catheter use was possible. These results did not appear to be influenced by the competing events of death and transplantation. Finally, VA type did not influence the length of time a patient spent in the hospital, and this was consistent across the various cause-specific hospitalization events examined.

The transition from late-stage chronic kidney disease onto dialysis is a turbulent time and marked by a substantially elevated morbidity and mortality burden [2–5]. Studies have consistently shown that nephrologist care before dialysis initiation is associated with improved survival during the first year on dialysis [3, 4, 7, 8]. That may be because patients managed by nephrologists prior to the transition are more likely to initiate dialysis with a permanent VA in place. Conversely, patients who initiate dialysis emergently or who were never referred to a nephrologist most often begin dialysis with a catheter in use, and it is these patients who have been shown in previous studies to experience the most hospitalizations and have the lowest first-year survival [3, 7, 13, 20]. It is therefore possible that the risks previously attributed to catheter use may partially reflect the underlying comorbidity burden and poor prognosis of patients who initiate dialysis emergently and
require immediate catheter placement [20, 22]. In an effort to minimize the influence of this type of selection bias in this study, we restricted our population to those patients who reported receiving nephrologist care more than a month before initiating dialysis. Despite this restriction, 60% of our study population was dialyzing with a catheter at initiation, which is not materially different from what has been observed in the general incident dialysis population [3, 23, 24], and hospitalization events were common (at least one during the study period, on average) with an ~70% higher rate among patients dialyzing with a catheter.

The higher hospitalization rates observed among patients dialyzing with a catheter as compared to fistulas or grafts was largely attributable to differences in patient case-mix. In fact, the RR estimates for all-cause hospitalization and cardiovascular-related hospitalization were substantially attenuated once case-mix differences were adjusted for in the analysis, highlighting the high prevalence of catheter access use among incident dialysis patients with a poor prognosis. On the other hand, adjustment for case-mix had little impact on the substantially elevated RR estimates relating catheter use to hospitalization for infection- and VA-related events. This was consistent in the analyses that evaluated VA use at dialysis initiation and in the time-varying analyses, which assessed the VA type in use immediately preceding the hospitalization events. Previous studies have shown that catheters are prone to bacterial colonization, which can lead to serious Staphylococcus infections resulting in

![Fig. 2. Cause-specific hospitalization rates and 95% CI according to VA type among patients: (A) at baseline and (B) accounting for conversions occurring within the first 6 months (time-varying).](attachment:fig2.png)
Other GI bleeding VA Infection Cardiovascular All-cause mix differences further demonstrating the strong correla-

tion between the use of catheters and poor prognosis in patients initiating dialysis. Only for those analyses examining infection- and VA-related events was this not the case. Third, in our time-varying analyses that evaluated all events during the follow-up period (not limited to the first), we did not account for clinical status changes that may have occurred as a consequence of being hospitalized. Thus, it is possible that the elevated RR estimates related to catheter use that we observed are due to residual confounding introduced by allowing patients to experience multiple events. We did conduct a sensitivity analysis where we only included the first hospitalization event and observed similar results (data not shown), which argues against this as a possible explanation for our findings.

Lastly, it is possible that the infection- and VA-related RR estimates related to catheter use could have been artificially inflated by permanent access failures requiring temporary catheter placement occurring in the days immediately preceding the hospitalization. In our analysis, these events would have been attributed to the catheter since we attributed all hospitalizations to the access in use the day before the event. To address this concern, we reanalyzed the data and attributed the hospitalization event to the access in place 7 days prior. For the analyses evaluating the access in use 7 days prior, there were no material changes in any of our results. For the analyses examining the access in use 30 days prior, with the exception of VA-related hospitalization events, we did not observe any material changes in our results. For VA-related events, we did not account for clinical status changes that may have occurred as a consequence of being hospitalized. Thus, it is possible that the elevated RR estimates related to catheter use that we observed are due to residual confounding introduced by allowing patients to experience multiple events. We did conduct a sensitivity analysis where we only included the first hospitalization event and observed similar results (data not shown), which argues against this as a possible explanation for our findings.

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hospitalization events, we did observe a moderate attenuation in the RR for patients dialyzing with a catheter versus a fistulae (RR = 3.1–1.9). These findings do suggest that permanent access failure resulting in catheter use may account for some, but not all, of the excess risk of VA-related hospitalization attributed to catheters but does not explain the risk of infection associated with catheter use.

In conclusion, our results highlight the marked differences between patients who initiate HD with a fistula compared to a fistulae or graft, even among patients with some evidence of nephrology care at least 1 month prior to dialysis initiation. In the first 6 months on dialysis, patients with catheters experience significantly higher hospitalization events, we did observe a moderate attenuation in the RR for patients dialyzing with a catheter versus a fistulae (RR = 3.1–1.9). These findings do suggest that permanent access failure resulting in catheter use may account for some, but not all, of the excess risk of VA-related hospitalization attributed to catheters but does not explain the risk of infection associated with catheter use.

In conclusion, our results highlight the marked differences between patients who initiate HD with a fistula compared to a fistulae or graft, even among patients with some evidence of nephrology care at least 1 month prior to dialysis initiation. In the first 6 months on dialysis, patients with catheters experience significantly higher hospitalization rates than patients dialyzing with a fistula or graft, and these differences were most pronounced for infection- and VA-related hospitalization events. VA type did not, however, influence the length of time that patients spend in the hospital. Our findings provide further support for current clinical practice recommendations to minimize catheter use in dialysis patients.

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Conflict of interest statement. Dr L.J.N., Dr B.D.B. and Mrs F.C. are employees at Amgen Inc. Dr M.K. is an employee at DaVita Clinical Research and during the period of manuscript development was an employee at Amgen Inc.

References


Pre-emptive angioaccess for haemodialysis in the elderly

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Abstract

Background. The fastest growing population group in the UK is the elderly, particularly those aged ≥80 years. The primary aim of this study was to assess if age was a determining factor for successful first dialysis through a pre-emptive angioaccess. The secondary aim was to investigate what risk factors are associated with angioaccess failure and to assess their patency and complications in three different age groups of patients who had pre-emptive angioaccess.

Methods. The study was carried out retrospectively on prospectively collected data for the period January 2006–December 2007. The study population included all patients who had pre-emptive angioaccess for haemodialysis during the time frame of the study. They were divided into three age groups including a control group (A) with age <70 years, a young old group (B) (70–79 years) and an old group (C) (>80 years). Primary failure and primary, assisted primary and secondary patency rates were ascertained and compared using the Kaplan–Meier curves and log-rank testing.

Results. Of 243 patients who had a pre-emptive vascular access, 110 (45%), 82 (35%) and 51 (21%) patients were in Groups A, B and C, respectively. The rates of successful first dialysis through the angioaccess, excluding patients not in end-stage renal disease yet, or those who received pre-emptive kidney transplant were 88, 71 and 87% for Groups A, B and C, respectively (P > 0.05). There were six deaths before dialysis could be commenced. The primary, assisted primary and secondary patency rates after 12, 24 and 36 months did not show any significant difference between the groups (P > 0.05).

Conclusions. Elderly patients should be considered for angioaccess as first line of venous access. Our study showed a successful first dialysis with angioaccess with failure and patency rates comparable to other age groups. However, we still recommend that patients >80 years old be assessed on a case-by-case basis.

Keywords: angioaccess; elderly; haemodialysis; patency; pre-emptive

Introduction

The National Kidney Foundation Dialysis Outcomes Quality Improvement (NFK-KDOQI) [1] suggests that primary angioaccess remains the best type of access for haemodialysis. Angioaccesses have the advantage of good patency rates, lower complication risks and lower morbidity compared to central venous catheters [2]. In addition, central venous catheters inserted for dialysis are associated with an increased risk of thrombosis, infection, risk of central stenosis and shorter life expectancy when compared to other types of access [3].

NFK-KDOQI recommends that primary angioaccess should be constructed in 50% of all new patients electing to have haemodialysis and that 40% should have autogenous angioaccess (radiocephalic or brachiocephalic). However, if an autogenous option is not possible then an arteriovenous graft of synthetic material or transposed brachial or basilic vein should be considered. In the US, campaigns have been launched to attain a pre-emptive angioaccess rate of 66% nationwide by 2009 [4, 5].