Alteplase Versus Urokinase for Occluded Hemodialysis Catheters

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BACKGROUND: The use of central venous catheters as a source of vascular access in patients undergoing hemodialysis may be complicated by thrombosis. Frequently, thrombolytics are used in an attempt to reestablish blood flow through partially or completely occluded catheters.

OBJECTIVE: To compare the efficacy of alteplase (recombinant tissue plasminogen activator) versus urokinase in reestablishing adequate blood flow through partially or completely occluded vascular catheters.

METHODS: Part 1 of the study prospectively investigated the effect of alteplase in reestablishing adequate blood flow through partially or completely occluded vascular catheters in 30 hemodialysis patients. Part 2 of the trial compared the efficacy of alteplase with that of urokinase in 14 of 30 patients who had also previously received urokinase. A 30-minute push-protocol was used to administer thrombolytics in both parts of the study. The primary endpoint was the proportion of patients with partially or completely occluded catheters achieving post-thrombolytic blood flow of ≥200 mL/min.

RESULTS: Part 1 showed a large proportion of partially or completely occluded catheters achieving post-alteplase blood flows ≥200 mL/min (70/76, 92.1% vs. 34/40, 85%, respectively). In Part 2 of the study, the proportion of partially occluded catheters achieving post-thrombolytic blood flows ≥200 mL/min was not significantly different between the alteplase and urokinase groups, (36/41, 87.8% vs. 21/28, 75%, respectively; p = 0.205). The proportion of completely occluded catheters achieving post-thrombolytic blood flows ≥200 mL/min was significantly better with alteplase compared with urokinase (15/17, 88.2% vs. 6/14, 42.8%, respectively; p = .018).

CONCLUSIONS: Alteplase, administered via the 30-minute push-protocol, is an effective thrombolytic for restoring hemodialysis catheter patency. In our study sample, alteplase was generally more effective than urokinase in restoring blood flow through catheters, especially those that were completely occluded.

KEY WORDS: alteplase, hemodialysis, urokinase.

Ann Pharmacother 2003;37:27-33.

Central venous catheters (CVCs) are used in up to 15–20% of patients undergoing hemodialysis as a source of vascular access.[1,2] However, hemodialysis via CVCs is commonly associated with complications such as infection or thrombosis, causing inadequate blood flow for dialysis. The reported[3-5] incidence of catheter occlusion due to thrombosis ranges from 5% to 80% in the hemodialysis population. This variability may result because of differing definitions of the degree of occlusion, choice of study populations, variable techniques of catheter insertion, duration of catheterization, and catheter material used. When hemodialysis catheters become occluded and dysfunctional, potential complications may include a delay of dialysis treatment, development of bacterial infections, risk of pulmonary embolism, pneumothorax, limitations on future vascular access, and increased costs.[5,6]

Thrombolytic agents are commonly used as first-line treatment for occluded hemodialysis catheters. Urokinase 5000 IU/mL was routinely used at our institution, according to a push-protocol. However, in January 1999, a warning from the Food and Drug Administration (FDA) indi-

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Presented as an abstract at the American Society of Nephrology 33rd Annual Meeting, Toronto, Ontario, October 10–16, 2000.

cated that numerous significant deviations from the current Good Manufacturing Practice regulations designed to help ensure product safety had been identified. Therefore, use of urokinase in our institution was immediately replaced with another thrombolytic, alteplase (recombinant tissue plasminogen activator).[7] With the switch from 1 thrombolytic to another and the planned reintroduction of human urokinase onto the North American market, we were interested in investigating the efficacy of urokinase versus alteplase for recanalization of occluded CVCs.

Methods

DESIGN

The study was designed in 2 parts. Part 1 was a prospective analysis of alteplase use in patients with partially or completely occluded hemodialysis catheters from February 15, 1999, to November 30, 1999. Data were collected prospectively for each patient receiving alteplase for a catheter occlusion. Part 2 of the study was a retrospective comparison of alteplase results with patients who had also received urokinase prior to February 15, 1999. Both thrombolytics were administered via the same protocol described below (in Definitions). A single investigator (CW) collected the retrospective data in part 2.

ENDPOINTS

Primary

The primary endpoint was the proportion of patients with partially or completely occluded catheters achieving a post-thrombolytic blood flow of ≥200 mL/min.

Secondary

The secondary endpoint was defined as the change in pre- to post-thrombolytic blood flow through the CVCs. We reported post-thrombolytic blood flow as the highest sustainable blood flow (mL/min) achieved in the dialysis session after the thrombolytic was administered. The post-thrombolytic dialysis session had to be successfully completed (i.e., achieved the planned dialysis duration) before the highest blood flow was recorded. This was done to avoid recording high initial post-thrombolytic blood flow that was short-lived and insufficient to complete the dialysis session.

We also investigated survival of the catheters after thrombolytic administration. We defined catheter survival as the time from thrombolytic administration to the next catheter event requiring intervention (e.g., treatment for thrombosis, infection).

INCLUSION CRITERIA

Inclusion criteria were defined as adults (>18 y old) receiving hemodialysis at the Central or Sherbrook Centre Dialysis Units, Health Sciences Centre, Winnipeg, Manitoba, Canada; patients dialyzing through either a temporary or permanent catheter at 1 of the following sites: internal jugular, femoral, or subclavian veins; and patients receiving alteplase via the push-protocol between February 15, 1999, and November 30, 1999, for an occluded or partially occluded catheter. Inclusion criteria for Part 2 of the study also required that patients had received urokinase (Abbokinase Open-Cath, Abbott) via the push-protocol prior to February 15, 1999.

EXCLUSION CRITERIA

Exclusion criteria included all patients with contraindications to the use of urokinase or alteplase, including known allergies and intolerance to either drug or any components of their formulation. No pediatric patients were included.

DEFINITIONS

Complete catheter occlusion was defined as predialysis blood flow equal to zero. In these instances, there was almost complete inability to withdraw or insert solution through the catheter; however, the thrombolytic was able to be infused into the lumen. Partial catheter occlusion was defined as a pre-blood flow greater than zero but insufficient to perform dialysis. These catheters were typically described as sluggish or causing frequent alarms. A blood flow of 200 mL/min was considered the minimum amount for performing hemodialysis, as described in previous studies.[4,8] Therefore, a successful thrombolytic treatment was defined as sustained post-thrombolytic blood flow ≥200 mL/min.

DRUG ADMINISTRATION PROTOCOL

The push-protocol for instillation of thrombolytics into the CVC was done as follows: Slowly inject a sufficient volume of alteplase 1-mg/mL solution (or urokinase 5000 IU/mL) to fill the lumen of the catheter; wait 10 minutes, then instill 0.3 mL of NaCl 0.9%; wait 10 minutes and instill another 0.3 mL of NaCl 0.9%; wait 10 more minutes and attempt to aspirate. Theoretically, this procedure should push fresh thrombolytic to the site of action at the tip of the catheter where clots typically form. A procedure with some similarities to the push-protocol has been successfully used by Meers and Toffelmire.[9]

DATA ANALYSIS

Statistical analysis of the results included use of the paired Student's *t*-test to compare normally distributed data and the χ^2 statistic and Fisher's exact test to compare proportions. Although the study was not specifically designed to investigate catheter survival, Cox proportional hazards regression was used to describe survival of catheters from the first thrombolytic instillation to the next catheter event requiring treatment (e.g., thrombosis or infection). This was done to investigate whether the use of alteplase or urokinase was associated with a longer catheter survival time after thrombolytic instillation.

Results were reported for all events, including multiple thrombolytic instillations per catheter and potentially multiple catheters per patient. In order to eliminate the possibility that multiple occlusions in the same catheter were not truly independent events, we also analyzed the data considering only the patients' first occlusion in the first catheter for each part of the study. An observed probability of $p < 0.05$ was considered a statistically significant difference.

Results

PART 1

Demographic Results

Demographic data are shown in Table 1. Primary and secondary endpoint data were available for 71% of the 164 events. Of the 48 events that were eliminated, 43 did not have prethrombolytic blood flow measurements recorded by the staff and 5 were missing post-thrombolytic blood flow data. On data analysis, we eliminated events that did not have both pre- and post-blood flow data recorded. The most frequently documented indications for alteplase, as recorded by the nursing staff, were sluggish catheter (47%), followed by low blood flow (32%), frequent alarms (32%), not working (1.8%), and not documented in the chart (8.5%). For the 116 cases where primary and secondary endpoint data were available, the documented indications were sluggish catheter (49%), followed by low blood flow (37%), frequent alarms (34%), not working (2.6%), and not documented in the chart (1.7%). Some catheters had >1 documented reason for needing alteplase.

Table 1. Demographic Data on Hemodialysis Patients with Occluded CVCs

Parameters	Part 1 Alteplase	Part 2 Alteplase	Part 2 Urokinase
Patients (n)	30 (11 men, 19 women)	14 (7 men, 7 women)	14 (7 men, 7 women)
Age (y)[a]	56.2 (27–89)	57.1 (29–89)	57.1 (29–89)
Catheters (n)	66 (49 temp, 17 perm)	33 (23 temp, 10 perm)	26 (15 temp, 11 perm)
Events (n)	164	79	67
Events per catheter[a]	2.48 (1–20)	2.39 (1–15)	2.58 (1–14)
Events with pre- and post-Qb data available (n)	116	58	42

CVCs = central venous catheters; perm = tunneled, cuffed, permanent catheters; Qb = blood flow (mL/min); temp = nontunneled, noncuffed, temporary catheters.
[a]Mean (range).

Primary and Secondary Outcomes

All catheter occlusions. The proportion of partially and completely occluded catheters achieving post-alteplase blood flows ≥200 mL/min was 92.1% and 85%, respectively (Figure 1). Analysis of the secondary outcome for all occlusions showed a significant increase in the pre- to post-alteplase blood flows, whether the catheters were partially or completely occluded (Figure 2). In partially occluded catheters, blood flows increased significantly after alteplase instillation (from 200.8 ± 37.2 to 260.3 ± 57.4 mL/min, mean ± SD; $p < 0.001$). In completely occluded catheters, blood flow also increased significantly post-alteplase instillation (0 mL/min increased to 246.5 ± 104.0 mL/min, $p < 0.001$).

First occlusions only. Data were also analyzed considering only the patients' first occlusion in the first catheter for each part of the study. In this group (n = 28), the proportion of partially and completely occluded catheters achieving post-alteplase blood flows ≥200 mL/min was (100%) and (90%), respectively.

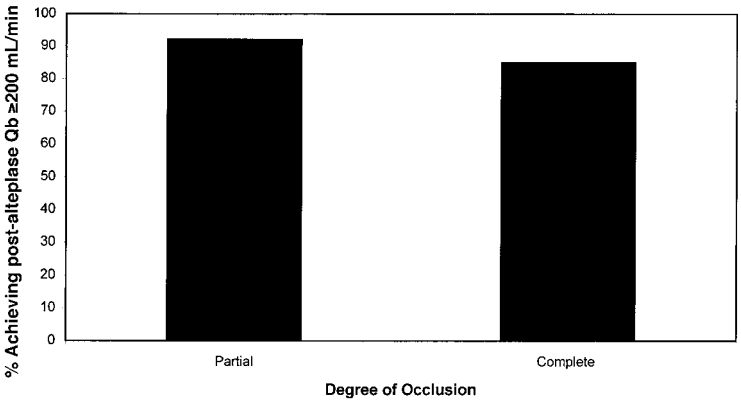

Figure 1. Study part 1: proportion of occluded catheters achieving post alteplase Qb ≥200 mL/min. Qb = blood flow.

In partially occluded catheters, blood flow increased significantly after alteplase instillation (from 188.9 ± 40.3 to 279.4 ± 32.3 mL/min; $p < 0.001$). In completely occluded catheters, blood flows also increased significantly (from 0 to 270.0 ± 107.2 mL/min; $p < 0.001$).

PART 2

Demographic Results

Fourteen of the 30 patients followed in Part 1 of the study had received urokinase via the push-protocol prior to February 15, 1999. Due to the retrospective design in part 2, complete pre- and post-blood flow data were only available in 42 cases. The indications for urokinase, as recorded by the nursing staff, were low blood flow (40%), sluggish catheter (27%), inability to withdraw or insert solution (19%), and frequent alarms (13%). For the 42 cases where primary and secondary endpoint data were available, the documented indications were low blood flow (52%), sluggish catheter (26%), inability to withdraw or insert solution (31%), and frequent alarms (12%). Some catheters had >1 documented reason for needing urokinase.

Primary and Secondary Outcomes

All catheter occlusions. The proportion of partially occluded catheters achieving post-thrombolytic blood flows ≥200 mL/min was not significantly different for alteplase versus urokinase (87.8% and 75%, respectively; $p = 0.205$). However, although the partially occluded catheters were not sufficiently patent to successfully complete a dialysis session before thrombolytic instillation (i.e., frequent alarms, sluggish catheters), there were 14 of 41 cases in the alteplase group and 8 of 28 cases in the urokinase group that had pre-thrombolytic blood flows ≥200 mL/min. The proportion of completely occluded catheters achieving post-thrombolytic blood flows ≥200 mL/min was significantly greater with alteplase compared with urokinase (15/17, 88.2% and 6/14, 42.8%, respectively; $p = 0.018$). Results are shown in Figure 3.

Analysis of the secondary outcome showed a significant increase in the pre- to post-alteplase blood flow, whether the catheters were partially or completely occluded (Figure 4). In partially occluded catheters, blood flow increased significantly after alteplase instillation (from 198.8 ± 41.5 to 251.7 ± 61.6 mL/min; $p < 0.001$). In completely occluded catheters, blood flow also increased significantly (from 0 to 264.1 ± 110.8 mL/min; $p < 0.001$).

Results varied somewhat for the urokinase group. In partially occluded catheters, blood flow did not increase significantly after urokinase instillation (from 196.8 ± 26.8 to 207.5 ± 71.0 mL/min). In completely occluded catheters, blood flow increased, but not sufficiently to perform dialysis (from 0 to 113.6 ± 32.5 mL/min, $p < 0.004$).

Alteplase produced larger increases in blood flow compared with urokinase. For partially occluded catheters, the pre- to post-alteplase blood flow increased by 52.9 mL/min compared with 10.7 mL/min in the urokinase group ($p = 0.017$). For completely occluded catheters, the pre- to post-alteplase blood flow increased by 264.1 mL/min compared with 113.6 mL/min in the urokinase group ($p = 0.001$).

First occlusions only. Data were also analyzed considering only the patients' first occlusion in the first catheter for each part of the study. The proportion of partially occluded catheters achieving post-thrombolytic blood flows ≥200 mL/min was similar for both alteplase and urokinase (7 of 7 and 10 of 10, respectively). The proportion of completely occluded catheters achieving post-thrombolytic blood flows ≥200 mL/min was greater for alteplase (4 of 5 and 1 of 2, respectively). The small number of observations in each of these groups limits generalizability.

Secondary outcome data were analyzed considering only the patients' first occlusion in the first catheter for each part of the study. In partially occluded catheters, blood flow increased significantly after alteplase instillation (from 192.9 ± 44.6 to 277.1 ± 22.9 mL/min; $p < 0.003$). Blood flow also increased significantly in completely occluded catheters (from 0 to 268.1 ± 153.9 mL/min; $p < 0.001$).

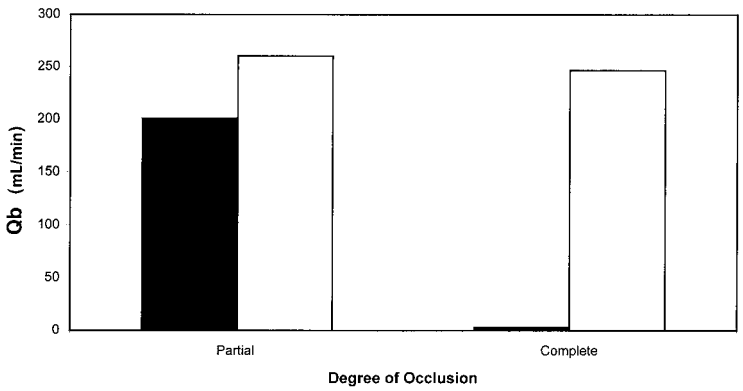

Figure 2. Study part 1: pre- ■ and post- □ alteplase Qb. Both differences significant ($p < 0.005$). Qb = blood flow.

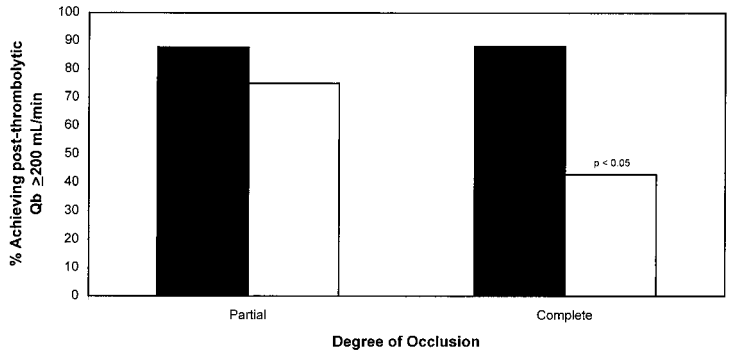

Figure 3. Study part 2: proportion of occluded catheters achieving post-thrombolytic Qb ≥200 mL/min. Qb = blood flow; ■ = alteplase; □ = urokinase.

In partially occluded catheters, blood flow increased significantly after urokinase instillation (from 206.0 ± 28.4 to 250.0 ± 41.4 mL/min; $p = 0.006$). This result differed from the data analyzing all events where there was no significant increase. In completely occluded catheters, blood flow increased significantly post-urokinase instillation; however, the increase was not sufficient to allow dialysis (from 0 to 150 mL/min).

CATHETER SURVIVAL

Catheter survival was compared between the treatment groups from the time of thrombolytic instillation to the next catheter event requiring treatment (e.g. thrombosis, infection). Data on catheters still in use, removed for alternative access, or pulled out by the patient were not included. A stratified Cox's proportional hazard model was used, matching by patient. The hazard ratio and 95% confidence interval were estimated. The lack of random assignment, with alteplase used in the later time frame, imposes a limitation on the study. However, the results shown in Figure 5 indicate that the 2 treatments are not statistically significantly different.

Discussion

Poor blood flow as a result of partial or complete catheter occlusion is a frequently encountered problem in the hemodialysis population. Use of thrombolytics offers an opportunity to restore the patency of CVCs without surgical intervention. Our results in part 1 of the study showed that alteplase is an effective thrombolytic whether the catheter is partially or completely occluded. We used a 30 minute push-protocol, which provides a convenient alternative to longer dwelling times.

To compare alteplase with urokinase results in part 2 of the study, we were able to identify 14 patients who had previously received urokinase. Although a retrospective comparison is not as robust as a prospective, randomized, controlled trial, the matched design allowed each individual to serve as his/her own control, thus limiting variability. We acknowledge that the sample size is small.

Part 2 of the study showed clinically and statistically significant differences in favor of alteplase compared with urokinase in restoring the patency of completely occluded CVCs. There was no statistically significant difference when comparing the proportion of partially occluded catheters that achieved post-thromboly-tic blood flows ≥200 mL/min. However, as some partially occluded catheters had blood flow >200 mL/min prior to thrombolytic administration, the proportion achieving a post-thrombolytic blood flow ≥ 200

mL/min is somewhat inflated. For catheters that were partially occluded, alteplase was superior to urokinase in increasing pre- to post-blood flow through the catheters.

Overall, the results did not vary when only first occlusions in each part of the study were considered. One exception was noted in partially occluded catheters treated with urokinase. When considering all occlusions, there was no statistically significant improvement from pre- to post-blood flow. When considering only the patients' first occlusion in the first catheter of each part of the study, post-urokinase blood flow increased to a statistically significant degree.

Our results are supported by those from a previous study.[8] In this investigation, alteplase 2 mg was instilled into each catheter port in 56 nonfunctioning hemodialysis catheters. Alteplase was effective in 87.5% of the cases. Paulsen et al.[4] conducted a study using alteplase 2 mg/2 cm^3 that was left in CVCs of patients until the next dialysis session (range 30 min–4 d) and found that blood flow increased to >200 mL/min in 15 of 18 treatments. In 2 of the 3 failures, the mean dwell time was <60 minutes. One catheter was removed due to infection and the other due to recurrent occlusions. Success rates of up to 98% using 1 mg/mL of alteplase have been reported.[9] Some of the catheters in that study received an instillation of alteplase before dialysis and a second instillation after dialysis, which remained in the catheter until the next dialysis treatment.

Thrombolytics have also been used successfully to restore catheter patency in other patient populations. Results from a double-blind, randomized trial in cancer patients showed that alteplase 2 mg restored catheter function more reliably and dissolved thrombi faster than urokinase 5000 units, both instilled for 2 hours. Total thrombus resolution of the catheter was defined as the unimpeded flow of contrast material from the catheter tip into the central venous circulation. Catheter function was restored in 46% of patients receiving alteplase versus 22% of those using urokinase.[10] A second instillation in catheters that were not patent after initial treatment increased success rates to 89% and 59%, respectively. Atkinson et al.[11] reported on the use of alteplase 2 mg over 4 hours in restoring patency to catheters in patients requiring parenteral nutrition. Six patients who failed a 4-hour dwell-time with 10 000 units of urokinase were subsequently treated with alteplase. Catheter patency was restored in 5 out of those patients.

The reported efficacy of urokinase for restoring patency of occluded hemodialysis catheters has ranged from 14% to 100%.[3,12-16] Contributing to this wide range are the use of varying doses and protocols for administering urokinase, as well as the variable definitions used to define both occlusion and successful treatment. Partially occluded catheters in our study were successfully recanalized in 75% of the cases, which is similar to the figure in other reports.[3,17,18] However, completely occluded catheters were recanalized in only 42.8% of the cases after urokinase administration.

Confounding factors to explain our results were also considered. Not all poorly functioning catheters are due to an occlusion. The catheter could be kinked or malpositioned. We consider our dialysis nurses to be highly skilled in identifying and resolving mechanical catheter problems. Every effort is taken to rule out mechanical problems before thrombolytics or surgical intervention is considered.

Results of the Cox proportional hazards regression analysis showed no statistically significant difference between alteplase and urokinase on the duration of time from the first thrombolytic use to subsequent catheter intervention required. Failure to demonstrate a difference may have been due to an insufficient sample size, as the study was not designed specifically to measure this endpoint. In addition, urokinase and alteplase are thrombolytic agents, which act on existing clots, and are not preventive agents per se. Further investigation in larger trials is required to determine whether alteplase or uroki-

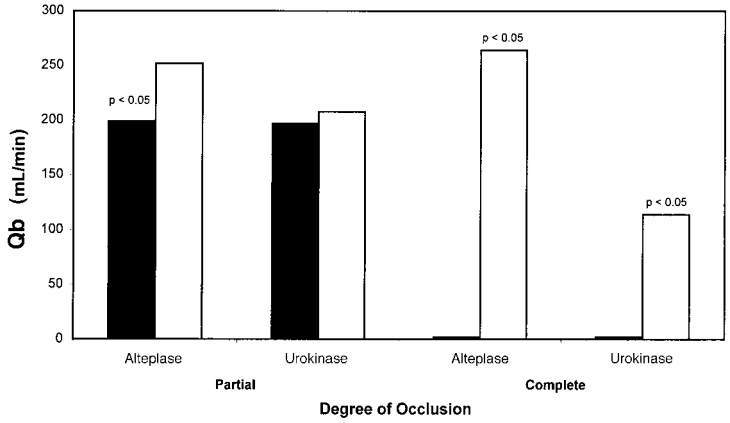

Figure 4. Study part 2: pre- ■ and post- □ thrombolytic blood flow.

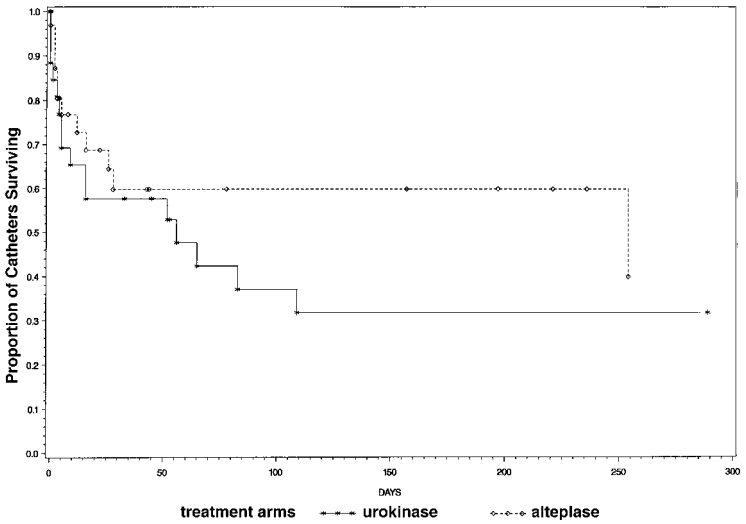

Figure 5. Proportion of catheters surviving.

nase produce differences in the duration of time to subsequent occlusion requiring thrombolytics or catheter removal.

We also collected data regarding the number of patients receiving aspirin, ticlopidine, and warfarin. Four patients were taking aspirin, 1 was taking ticlopidine, and 3 were taking warfarin (2 with an international normalized ratio [INR] goal of 1.5–2; 1 with an INR goal of 2–3). As patients were taking the same anticoagulant regimens upon receiving alteplase or urokinase (acting as their own controls), it is unlikely that these regimens biased the results in favor of alteplase.

This study has also raised issues regarding the optimal use of thrombolytic therapy. On occasion, our patients received urokinase or alteplase >10 times for the same catheter. Among the alteplase patients, 48.5% received alteplase only once prior to catheter removal compared with 42.3% of patients in the urokinase group. Further study is required to determine the optimal frequency of thrombolytic use versus changing the hemodialysis catheter.

Cost could also become an issue with the choice of thrombolytic. The cost of 1 vial of urokinase 5000 IU/mL (reconstituted to 1.8 mL) was $41.85 (CAN) when our institution stopped using it in 1999. Alteplase is now purchased in our institution in 2 mg/2 mL cathflo vials at a price of $68 (CAN). To conserve costs, we prefill and freeze 2-mL syringes (1 mg/mL) to a minimum of –20 °C.[19] One 100-mg vial is sufficient to prepare fifty 2-mL syringes. Thus, 2 mLs of alteplase 1-mg/mL solution costs approximately $54 compared with 1.8 mL of urokinase 5000 IU/mL at $41.85.

Summary

Our results show that alteplase 1 mg/mL, administered using a convenient push-protocol over 30 minutes, is an effective thrombolytic agent in restoring catheter patency. In our study sample, alteplase was generally more effective than urokinase in restoring blood flow in catheters, especially those that were completely occluded.

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We thank the Central and Sherbrook dialysis nurses for their assistance with data collection and the Winnipeg Regional Health Authority Pharmacy Residency Program for their support.

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EXTRACTO

PUNTOS GENERALES: El uso de catéteres venosos centrales como fuente de acceso vascular en pacientes recibiendo hemodiálisis puede complicarse con el desarrollo de trombosis. Se usan con frecuencia agentes trombolíticos para restablecer el flujo sanguíneo a través de los catéteres ocluídos parcial o totalmente.

OBJETIVO: Comparar la eficacia del activador de plasminógeno tisular recombinante con la de la urokinasa en el restablecimiento del flujo sanguíneo a través de catéteres vasculares ocluídos parcial o totalmente.

MÉTODOS: La primera parte del estudio incluyó 30 pacientes en hemodiálisis que recibieron el activador de plasminógeno tisular recombinante para restablecer el flujo sanguíneo a través de catéteres vasculares ocluídos parcial o totalmente. La segunda parte del estudio comparó la eficacia del activador de plasminógeno tisular recombinante con la de la urokinasa en 14 de los 30 pacientes que habían recibido urokinasa previamente. Se usó un protocol de "empuje" de 30 minutos para administrar los agentes trombolíticos en ambas partes del estudio. El punto final primario de evaluación fue la determinación de la

proporción de pacientes con catéteres ocluídos parcial o totalmente que alcanzaron un flujo sanguíneo ≥200 mL/min después de la trombolisis.

RESULTADOS: Los resultados de la primera parte del estudio mostraron una gran proporción de catéteres ocluídos parcial o totalmente que alcanzaron flujos sanguíneos ≥200 mL/min después de la administración del activador de plasminógeno tisular recombinante (70/76, 92.1% y 34/40, 85%, respectivamente). En la segunda parte del estudio, la proporción de catéteres parcialmente ocluídos que alcanzaron flujos sanguíneos ≥200 mL/min después de la administración de agentes trombolíticos no fue estatísticamente diferente entre el grupo que recibió el activador de plasminógeno tisular recombinante y el que recibió urokinasa (36/41, 87.8% vs. 21/28, 75%, respectivamente; p = 0.2050). La proporción de catéteres ocluídos completamente que alcanzaron flujos sanguíneos ≥200 mL/min después de la administración de agentes trombolíticos fue significativamente mayor en el grupo que recibió el activador de plasminógeno tisular recombinante que en el que recibió urokinasa (15/17, 88.2% vs. 6/14, 42.8%, respectivamente; p = 0.0181).

CONCLUSIONES: El activador de plasminógeno tisular recombinante, administrado mediante el protocol de "empuje" de 30 minutos, es un agente trombolítico efectivo para restaurar la apertura del catéter. En la muestra de estudio, el activador de plasminógeno tisular recombinante fue por lo general más efectivo que la urokinasa para restaurar el flujo sanguíneo a través del catéteres, especialmente aquellos totalmente ocluídos.

Encarnación C Suárez

RÉSUMÉ

HISTORIQUE: L'utilisation de cathéters vénaux centraux comme sources d'accès vasculaire chez des patients hémodialysés peuvent se compliquer de thromboses. Fréquemment, des thrombolytiques sont utilisés pour tenter de rétablir un flot sanguin dans des cathéters partiellement ou complètement obstrués.

OBJECTIF: Comparer l'efficacité de l'activateur recombinant du plasminogène tissulaire (rtPA) versus l'urokinase pour rétablir un flot sanguin adéquat à travers des cathéters vasculaires partiellement ou complètement obstrués.

MÉTHODE: La première partie de l'étude investigue prospectivement l'effet du rtPA pour rétablir un flot sanguin adéquat à travers des cathéters vasculaires partiellement ou complètement obstrués chez 30 patients hémodialysés. La deuxième partie de l'étude compare l'efficacité du rtPA versus l'urokinase chez 14 des 30 patients ayant déjà recu de l'urokinase précédemment. Un protocole d'injection rapide en 30 minutes fut utilisé pour administrer les thrombolytiques dans les deux parties de l'étude. Le but principal était de déterminer la proportion des patients avec des cathéters partiellement ou complètement obstrués qui ont obtenu un flot sanguin ≥200 mL/min suite à l'administration du thrombolytique.

RÉSULTATS: Les résultats de la partie 1 démontrent une large proportion des cathéters partiellement ou complètement obstrués ayant réussi à obtenir un flot sanguin ≥200 mL/min suite au rtPA (70/76, 92.1% et 34/40, 85%, respectivement). Dans la partie 2, la proportion des cathéters partiellement obstrués ayant réussi à obtenir un flot sanguin ≥200 mL/min suite aux thrombolytiques n'était pas statistiquement différente entre les groupes rtPA et urokinase (36/41, 87.8% vs. 21/28, 75%, respectivement; p = 0.2050). La proportion des cathéters complètement obstrués ayant réussi à obtenir un flot sanguin ≥200 mL/min suite aux thrombolytiques était significativement meilleure dans le groupe rtPA que dans le groupe urokinase (15/17, 88.2% vs. 6/14, 42.8%, respectivement; p = 0.0181).

CONCLUSIONS: L'activateur recombinant du plasminogène tissulaire administré selon le protocole d'administration rapide en 30 minutes, est un thrombolytique efficace pour rétablir la perméabilité des cathéters utilisés en hémodialyse. Dans notre étude, le rtPA était généralement plus efficace que l'urokinase pour rétablir le flot sanguin à travers des cathéters, surtout chez ceux qui sont complètement obstrués.

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