Hemodialysis with a Permcath Kept Open with Streptokinase and Later Citrate in a Heparin-Sensitive Patient

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Dear Sir,

A 74-year-old 56 kg blind woman developed dialysis-dependent acute on chronic renal failure following coronary angiography in February 1989. She had gross lymphoedema of the left arm following radical mastectomy 5 years before and multiple-thrombosed vessels in the right arm. She was considered unsuitable for standard arteriovenous graft or fistula, or for continuous ambulatory peritoneal dialysis.

Soon after dialysis was started with a subclavian catheter using heparin in the catheter between dialyses and for anticoagulation during dialysis, her platelet count fell to 20,000 and she developed deep-vein thrombosis in her left leg. Platelets returned quickly to normal when all heparin was discontinued. Warfarin therapy was commenced and prothrombin time was kept on average 15% of control. A test for platelet heparin sensitivity was positive [1].

A Permcath (Quinton Instrument Co., Seattle, Wash.) was introduced through the right internal jugular vein into the superior vena cava. Starting March 15, patency was maintained between dialyses with 20,000 units streptokinase (Hoechst, Montreal, Que.) in a volume of 1.5 l saline in both arterial and venous compartments.

For 9 months, dialysis for 4 h was performed twice weekly with saline flushes as needed, but without an anticoagulant other than warfarin. There was no clotting of the catheter and rarely clotting of the dialyzers. Blood flow was estimated at 275–400 ml/min during dialysis. The dialyzer was a Filtral 16 and the delivery system a Monitrol S, both from Hospal Ltd., Montreal, Que. Dialyzer reuse averaged 3.5 times. Activated clotting times (HemoTek Inc., Englewood, Colo.) remained at 100–110 s at the start of dialysis. Hemoglobin was maintained > 80 g/l by transfusion when needed.

On November 6th, treatment of a bacteremia due to infection related to the Permcath with *Staphylococcus epidermidis* was commenced with vancomycin and later with rifampin 600 mg daily. The latter drug induced a fall in the prothrombin time and then there was recurrent clotting of the Permcath and dialyzers. Predialysis values for activated clotting times fell to 60–70 s and prothrombin time to 110% of control. On January 4, 1990, the old catheter was removed and a new Permcath was inserted on the right into the atrium over a guide wire, but in a new tunnel, and an arteriovenous fistula was fashioned in the right arm. It was not considered possible to insert a graft without heparin. Then rifampin was discontinued. The large amount of streptokinase infused around that time (1 million units) probably led to the worsening anaphylactoid reactions which were associated with hypotension, erythema, edema and a hot sensation

especially of the face. This occurred even when amounts of 75,000 U streptokinase were placed in the catheter lumens.

On January 16, 1990, there was a recurrence of severe angina at rest. Sodium citrate (Crystal Labs, Braintree, Mass.) was tried in the new Permcath and also during dialysis into the afferent blood line. The arterial side of the catheter remained nonfunctional and a combination of flow from a femoral vein catheter with return to the Permcath was then used for dialysis. The femoral catheter and the Permcath were kept open between dialyses with sodium citrate using 1.5 ml of 46.7% in each compartment. Anticoagulation of the CA 150 dialyzer (Baxter Corp., Toronto, Ont.) during dialysis was maintained using 25 ml of 46.7% per hour of sodium citrate [2]. The dialysate contained 1.75 mmol calcium and ionized calcium was monitored every 30–60 min during dialysis. After 5 days, the venous channel in the Permcath opened and this catheter could then be used by itself for dialysis. We continued to maintain the prothrombin time at 150%

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of normal with warfarin. Dialysis was performed twice weekly without incident for 6 weeks and ionized calcium remained between 1.10 and 1.38 during dialysis. When at home, 1.5 ml 46.7% citrate was injected into each side of the Permcath daily. Unfortunately, she developed unstable angina and arrested on February 27, 1990, 24 h after the last dialysis and 1 year after she started dialysis. The fistula had not yet matured.

Dialysis in heparin-sensitive patients without conventional long-term vascular access may be successful for many months using a thrombolytic agent, or sodium citrate, to keep a Permcath open between dialyses.

References

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