Successful Peritoneal Dialysis Catheter Placement in a New End-Stage Renal Disease Patient with Combined Antiphospholipid Syndrome and Factor XI Deficiency

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Coagulopathies and bleeding disorders can affect dialysis outcomes by increasing the thrombosis risk at the arteriovenous access or by causing prolonged bleeding at access or catheter sites. We present the case of a 68-year-old woman with combined antiphospholipid syndrome and factor XI deficiency, with chronic prolongation of activated partial thromboplastin time that was not correctable with fresh-frozen plasma (FFP).

The patient had a history of stroke, but was not on antiplatelet therapy because of mucocutaneous bleeding events. She had progressive renal failure attributed to her autoimmune disease, and a decision was made to pursue peritoneal dialysis (PD) when she reached end-stage kidney disease. She was admitted to the hospital the day before her planned PD catheter placement and was transfused with FFP and platelets before placement of a temporary hemodialysis catheter. One session of hemodialysis was performed to minimize uremic platelet dysfunction. The patient was given additional FFP and platelets at the time of PD catheter placement; desmopressin was not used. No thrombotic or bleeding complications occurred, and at 8 months out, the patient has been doing well on PD.

In summary, careful perioperative planning led to successful PD initiation in a patient with combined bleeding and clotting disorders.

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Key words
Coagulopathy, factor XI deficiency, antiphospholipid syndrome

Introduction

Coagulopathies and bleeding disorders often affect surgical morbidity and the dialysis modalities potentially available to new end-stage renal disease patients. Here, we describe an individual with both thrombotic and bleeding tendencies (Figure 1), and we discuss the decision-making process with respect to the choice of dialysis modality and the perioperative precautions that were taken at the time of peritoneal dialysis (PD) catheter placement.

The patient has antiphospholipid syndrome (APS), an autoimmune disease characterized by arterial or venous thrombosis (or both), fetal loss and other obstetric manifestations, and neurologic disorders attributable to autoantibodies such as anticardiolipin, anti-β_2-glycoprotein I, or lupus anticoagulant (1,2). The associated hypercoagulable state can promote recurrent thrombosis of hemodialysis (HD) catheters and arteriovenous (AV) fistulas or grafts; therapy with warfarin or other anticoagulants might be needed to maintain HD access patency (3,4).

Concurrently, the patient has a rare factor XI deficiency that can be associated with bleeding tendencies; severity of bleeding does not correlate with serum factor XI, and replacement with factor XI concentrates (available in Europe) can be associated with thrombosis (5,6). One report in the literature describes successful HD initiation by AV fistula in a

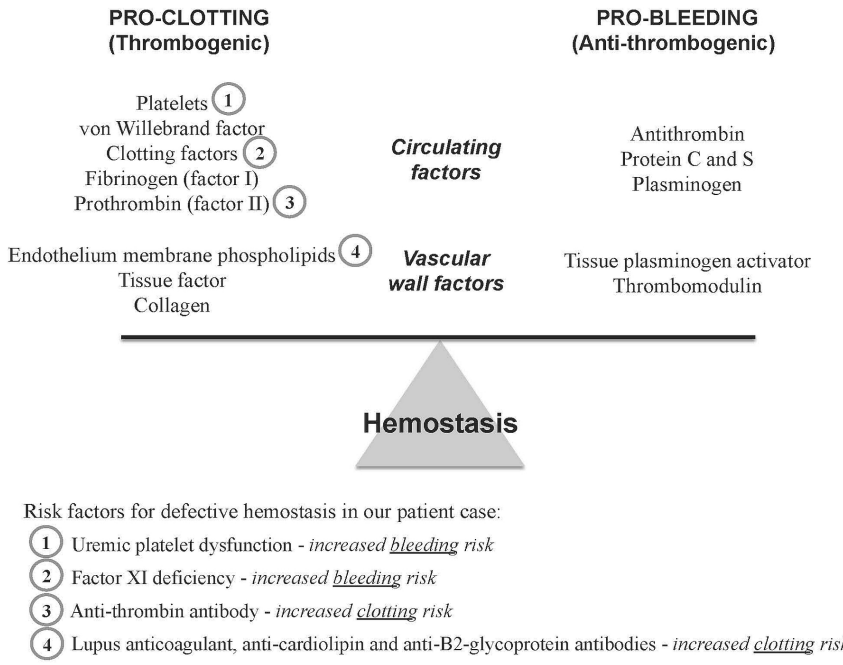

FIGURE 1 A balance of pro-clotting and pro-bleeding factors is required for normal hemostasis. Our patient had hematologic abnormalities that increased both the bleeding risk (uremic platelet dysfunction and factor XI deficiency) and the clotting risk (antiphospholipid syndrome with antithrombin, lupus anticoagulant, and anticardiolipin antibodies).

59-year-old man with factor XI deficiency; he did not require heparin anticoagulation during HD treatments because of a prolonged activated partial thromboplastin time (PTT) at baseline (7). No bleeding or clotting adverse events were noted in that individual.

The effect of APS or clotting factor deficiencies (or a combination) on PD catheter outcomes has not been described. To our knowledge, our case is the first successful PD catheter placement to be reported in a patient with combined bleeding and clotting disorders.

Case presentation

Our patient is a 68-year-old woman of Ashkenazi Jewish ancestry, with a history of autoimmune hepatitis, APS, and factor XI deficiency. For autoimmune hepatitis, she has, since her early 20s, been taking steroids and azathioprine. Because of her autoimmune disease, she avoided pregnancy per the advice of her physicians.

At age 51, the patient underwent bilateral mastectomy and chemotherapy for breast cancer (*BRCA*-negative), with subsequent breast reconstruction. No bleeding complications arose during those surgeries. Later, after a work-up for recurrent transient ischemic attacks (TIAs) and a right-sided lacunar cerebrovascular accident, she was diagnosed with APS when positivity for lupus anticoagulant, anticardiolipin, β_2-glycoprotein, and antithrombin antibodies was revealed. She was not given antiplatelet therapy because of mucocutaneous bleeding tendencies as described next.

During the 10 years preceding PD start, she had developed primarily mucocutaneous bleeding with ecchymoses and with bleeding longer in duration than expected and out of proportion to degree of injury (typically, accidental cuts during food preparation). In the 2 years preceding PD start, she had developed bouts of seasonal epistaxis.

Examination was significant for chronic-appearing senile purpura and very thin skin (attributable to a lifetime of steroid use) involving the extensor surfaces of the forearms and the anterior shins. Detailed evaluation of the recurrent bleeding revealed moderately low serum factor XI activity (42%) in the face of normal levels of factors VIII and IX. The patient has a chronic isolated prolongation of PTT in the 42 – 52 s range,

attributed to the combination of factor XI deficiency and lupus anticoagulant.

Over the 7 years preceding PD start, the patient experienced a gradual decline in estimated glomerular filtration rate and was noted to have nephrotic-range proteinuria. A renal biopsy was considered, but was not performed because the risks outweighed the potential benefits. In the setting of APS, a prolonged PTT could not be corrected despite multiple infusions of fresh-frozen plasma (FFP).

Serum creatinine ranged from 1.9 mg/dL to 2.2 mg/dL in 2013 and rose to 3.5 – 4.5 mg/dL in early 2016. The progression of the chronic kidney disease was thought to be attributable to APS-related renal manifestations, which can range from thrombotic microangiopathy to chronic arteriosclerosis and fibrous intimal hyperplasia (1). When the patient reached end-stage renal disease, the decision was made to pursue PD because of the multiple risks associated with HD in the setting of her complex hematologic disorders, including bleeding with repetitive needle sticks and likely thrombosis of the AV fistula.

Lab work at time of admission for PD catheter placement revealed serum sodium 137 mEq/L, potassium 3.7 mEq/L, chloride 102 mEq/L, bicarbonate 22 mEq/L, glucose 108 mg/dL, blood urea nitrogen 125 mg/dL, and creatinine 4.5 mg/dL. Hemoglobin was 10.5 g/dL, with a platelet count of $156\times10^3/\mu L$. The PTT was prolonged at 56.4 s, with a normal 1.03 international normalized ratio and a prothrombin time of 13.1 s. Platelet function analysis showed a prolonged collagen/epinephrine closure time exceeding 300 s (reference range: <169 s) and a collagen/ADP closure time of 204 s (reference range: <112 s).

Before placement of a temporary HD catheter, FFP 10 mL/kg and platelets were administered to the patient. Before surgery, a HD session was used to decrease uremic platelet dysfunction. The following day, additional FFP and platelets were infused. Successful laparoscopic placement of a PD catheter followed. Desmopressin was not used because of its potential for a thrombosis side effect (8–10), given the patient's history of TIAs and cerebrovascular accident. The patient underwent an additional session of HD before the temporary HD catheter was removed.

Low-volume recumbent exchanges were started 1 week after catheter placement, with the PD prescription subsequently being gradually increased. For 8 months, the patient has been doing well on PD.

Discussion

Altered levels of procoagulant factors, including factor XI, have been reported in PD and HD patients (11–13), but the clinical significance of such alterations remains unclear. Overall, compared with PD, HD is associated with a reduction in serum coagulation inhibitors (antithrombin III and protein S), which might contribute to increased thrombotic and cardiovascular complications in the HD population (12,13). Our patient had a further increased risk of thrombotic complications because of her APS, which has been associated with recurrent thrombosis of AV fistulas or grafts, potentially requiring therapy with warfarin or other anticoagulants to maintain HD access patency (3,4). However, the concurrent factor XI deficiency presented a contraindication to anticoagulation therapy, and thus our patient was not on antiplatelet agents despite her history of stroke and TIAs. Further, the factor XI deficiency raised concerns for prolonged bleeding from needle access to AV sites. Given the uncertainties surrounding the successful creation and maintenance of a functioning AV access, the patient and medical team decided on PD as the more appropriate and safer dialysis modality.

Perioperative planning for the PD catheter placement was complex given the patient's advanced uremia (with platelet dysfunction) and the combined thrombotic (APS) and bleeding (factor XI deficiency) risks. Hemostasis could not be assessed using PTT given that both lupus anticoagulant and factor XI deficiency cause PTT prolongation (14). When two inhibitors of the PTT assay with opposite hematologic effects coexist, the clinical manifestation can be thrombosis or bleeding (15), and thus the assay has no utility in guiding management.

Three steps were taken to optimize for a successful PD catheter placement:

- FFP and platelets were administered before placement of a temporary HD catheter.
- The patient received HD before surgery to decrease uremic platelet dysfunction.
- Additional FFP and platelets were infused before the laparoscopic placement of a PD catheter.

Desmopressin was not used because of prothrombotic concerns (8–10) in this patient with a history of TIAs and cerebrovascular accident and no prior major bleeding diathesis. Thus, overaggressive

use of hemostatic products was avoided, and the hematology service recommended cryoprecipitate instead of desmopressin if bleeding were to develop during surgery.

Summary

To our knowledge, the present report is the first of a successful PD catheter placement and initiation of PD in a patient with APS counterbalanced by factor XI deficiency and uremic platelet adhesion defect (Figure 1). Careful individualization of perioperative planning can avoid adverse thrombotic or bleeding events in patients with concurrent thrombotic and bleeding risk factors.

Disclosures

We understand that *Advances in Peritoneal Dialysis* requires disclosure of any conflicts of interest, and we declare that we have no conflicts to disclose. No funding support was received for this case report.

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