We report on the case of a 40-year-old patient with coagulopathic alcoholic cirrhosis who underwent ultrasound-directed pericardiocentesis and fine-needle aspiration biopsy of the pancreas after receiving recombinant human factor VIIa (rhFVIIa). The infusion of rhFVIIa rapidly corrected her coagulopathy and made it possible to perform both procedures. The marked changes produced in the prothrombin time and international normalized ratio as a result of the infusion of rhFVIIa are presented. As a result of these changes in coagulation status, both procedures were performed safely, and the patient’s clinical management and subsequent care plan were defined.

Key words: cirrhosis; coagulopathy; factor VIIa; pancreatic aspiration biopsy; pericardiocentesis

Abbreviations: INR = international normalized ratio; rhFVIIa = recombinant human factor VIIa

Invasive procedures, even critical ones, are often not performed because of safety issues.\(^1\)–\(^5\) Until recently, both coagulopathy and thrombocytopenia have markedly limited the willingness of the physicians to perform invasive procedures, particularly in critically ill cirrhotic patients with thrombocytopenia and a coagulopathy.\(^5\) The correction of the coagulopathy may require large volumes of fresh frozen plasma, which can contribute to volume overload and occasionally can produce overt pulmonary edema. Platelet transfusions are associated with the risks of blood transfusion, such as blood-borne infections, fever, chills, and other manifestations of a transfusion reaction. Herein, we report on the performance of an ultrasound-directed pericardiocentesis and a fine-needle aspiration biopsy of the pancreas in a patient with alcoholic cirrhosis, thrombocytopenia, and a coagulopathy.

CASE REPORT

This 40-year-old woman was transferred from a local hospital to Loyola University Medical Center because of progressive renal failure that was thought to be a result of the hepatorenal syndrome. She was known to have alcohol-associated cirrhosis, diabetes mellitus, and obesity. She had been drinking actively until her current hospital admission when she was hospitalized for right leg cellulitis, streptococcal bacteremia and sepsis, increasing jaundice, and cirrhosis.

She reported a medical history of hypertension, obesity, type II diabetes mellitus, depression, portal hypertension with endoscopically documented gastric and esophageal varices, hepatic encephalopathy, degenerative joint disease, and polycystic ovaries. She had undergone a total knee replacement (2 years previously), a cholecystectomy (10 years ago), and three cesarean sections. She was allergic to morphine. Her medications consisted of propranolol, insulin, venlafaxine, spironolactone, famotidine, and antibiotics. The marked changes produced in the prothrombin time and international normalized ratio as a result of these changes in coagulation status, both procedures were performed safely, and the patient’s clinical management and subsequent care plan were defined.

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REFERENCES


Pericardiocentesis and Pancreatic Aspiration Needle Biopsy in Coagulopathic and Thrombocytopenic Cirrhotic Patient*

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We report on the case of a 40-year-old patient with coagulopathic alcoholic cirrhosis who underwent ultrasound-directed pericardiocentesis and fine-needle aspiration biopsy of the pancreas after receiving recombinant human factor VIIa (rhFVIIa). The infusion of rhFVIIa rapidly corrected her coagulopathy and made it possible to perform both procedures. The marked changes produced in the prothrombin time and international normalized ratio as a result of the infusion of rhFVIIa are presented. As a result of these changes in coagulation status, both procedures were performed safely, and the patient’s clinical management and subsequent care plan were defined.

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of 84 beats/min, a respiratory rate of 28 breaths/min, and oxygen saturation of hemoglobin of 76% by pulse oximetry (which increased to 91% while she received 4 L/min nasal oxygen). The patient had produced only 50 mL urine in the preceding 24 h. She was markedly jaundiced (total bilirubin level, 3.4 mg/dL). She had small ulcers on her lips and hard palate. She had bilaterally reduced breath sounds with expiratory wheezes, basilar rales, and distant heart sounds without a gallop, murmur, or rub. She was obese and had a large nontender abdomen with obvious ascites. Her right leg was erythematous and swollen. She was oriented to person but not to time or place. She was too weak to assess motor strength. Table 1 documents her jaundice, hepatic dysfunction, and renal dysfunction, and it tracks these abnormalities through her hospital course. Imaging studies documented a large cardiac shadow that was strongly suggestive of a pericardial effusion, a pancreatic mass in the head of the pancreas, and a clotted portal vein.

She was given 90 μg/kg recombinant human factor VIIa (rhFVIIa) [NovoSeven; Novo Nordisk Pharmaceuticals Inc; Princeton, NJ] IV over 20 min and underwent a pericardiocentesis with the removal of 1,370 mL purulent material. Five hours later, she received a second dose of rhFVIIa, 90 μg/kg, and underwent a percutaneous, ultrasound-guided, fine-needle aspiration biopsy of a mass in the head of the pancreas.

Her international normalized ratio (INR) before and after the administration of rhFVIIa is shown in Figure 1. As a result of the administration of rhFVIIa, the prothrombin time fell from a value of 23.3 s (INR, 3.5) to 11.6 s (INR, 0.9), and the pericardiocentesis was accomplished without incident. Five hours later, a second dose of rhFVIIa was administered because of an apparent

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*ALT = alanine aminotransferase; AST = aspartate aminotransferase.

**Table 1—Laboratory Data Documenting the Patient’s Jaundice, Hepatic Dysfunction, and Renal Dysfunction**

**Figure 1.** Sequential changes in INR before and after the infusion of rhFVIIa (90 μg/kg) in the patient reported. The arrows denote when the infusions were given and when both procedures were performed. US = ultrasound.
increase in the INR (Fig 1), and the prothrombin time was maintained between 12.2 and 15 s (INR range, 1.0 to 1.4) for at least 6 additional hours, during which time the head of the pancreas was aspirated. The results of the testing of the pancreatic aspirate documented a diagnosis of pancreatic cancer. The purulent pericardial fluid tested positive for streptococcal group B antigen, using a highly specific rapid test for the presence of streptococcal group B antigen in body fluids that consisted of latex particles coated with anti-group B antigen, which agglutinates in the presence of streptococcal group B antigen (Wellco gen Strept B; Murex Biotech Limited; Dartford, Kent, UK). The patient was started on a regimen of ciprofloxacin IV for 7 days. After stabilization, because of her diagnosis of pancreatic cancer, she was transferred to home hospice care.

**Discussion**

This patient presented with several conditions that caused her physicians to avoid invasive procedures that were associated with the risk of bleeding. These conditions included cirrhosis with severe coagulopathy, portal hypertension with esophageal and gastric varices, renal failure, thrombocytopenia, and obesity. Moreover, her renal dysfunction made it impossible to give her an adequate volume of fresh frozen plasma with which to correct her coagulopathy in a timely manner without putting her into overt pulmonary edema. Her condition was deteriorating rapidly and demanded that critical decisions about her diseases and their management be made. This was not possible, however, without the patient undergoing a diagnostic/therapeutic pericardiocentesis and a biopsy of the pancreatic mass, procedures that required the correction of her severe coagulopathy.

The recent availability of rhFVIIa made it possible to rapidly correct her coagulopathy and to perform both procedures safely. Importantly, the coagulative effect of rhFVIIa was sustained for at least 5 h after the first infusion, and again after the second. Thus, both procedures could be accomplished safely. Moreover, the sustained correction of the coagulopathy guaranteed the long-term safety of the two procedures by reducing the risk of postprocedure bleeding.

Factor VIIa is the rate-limiting factor in the extrinsic coagulation cascade. It combines with tissue factor to activate factors X and IX. Factor Xa activates factor V, which in turn converts prothrombin to thrombin. Thrombin converts fibrinogen to fibrin, which undergoes autopolymerization and forms a homeostatic plug (clot). rhFVIIa is produced by baby hamster kidney cells and is purified by chromatography, which results in the conversion of secreted factor VII to factor VIIa. The resultant product, rhFVIIa, is collected and distributed as a lyophilized powder. Currently, rhFVIIa is approved by the US Food and Drug Administration for use in hemophiliac patients (those with both factor VIII and factor IX deficiencies) with antibodies to their respective coagulation factors. It also is approved for use in individuals who are congenitally deficient of factor VII. RhFVIIa works in hemophiliac patients by bypassing the deficient factor, allowing clot formation in the absence of the missing factor.

rhFVIIa has been used in a growing number of other circumstances, which include trauma, during operative procedures, prior to the performance of laparoscopic liver biopsies, and in patients with bleeding that occurs as a result of an overdose of low-molecular-weight heparin. The present report extends these off-label uses of rhFVIIa to patients with advanced liver disease with thrombocytopenia and a severe coagulopathy requiring invasive thoracic and abdominal procedures. Specifically, in the present case, >1 L purulent fluid was removed from the pericardium and an aspiration biopsy of the head of the pancreas was accomplished in a woman with cirrhosis, thrombocytopenia, renal dysfunction, and a severe coagulopathy. The ability to accomplish these procedures was possible with the use of rhFVIIa therapy.

The presence of renal dysfunction made it impossible to administer enough fresh frozen plasma in a timely manner to correct the patient’s coagulopathy safely without producing volume overload and overt pulmonary edema. Most importantly, the ability to rapidly identify and treat septic pericarditis and to document pancreatic cancer as components of her complex medical history would not have been possible without the use of rhFVIIa therapy. Finally, as a result of the data obtained from these two procedures, her hospital stay was dramatically shortened and an entirely new treatment plan was conceptualized and initiated. Thus, although the cost of the drug is considerable, the savings in terms of time in the ICU, the cost of the alternative diagnostic procedures, and the cost of medical treatment with the diagnoses made possible by these invasive procedures more than offset the high cost of the drug, which averages about $5,000 per dose.

**References**