

# Purpura Fulminans in the Setting of *Escherichia coli* Septicemia

Prince Adotama, MD; Stephanie Savory, MD; Arturo R. Dominguez, MD

To the Editor:

Purpura fulminans is a severe and rapidly fatal thrombotic disorder that can occur in association with either hereditary or acquired deficiencies of the natural anti-coagulants protein C and protein S.<sup>1</sup> It most commonly results from the acute inflammatory response and subsequent disseminated intravascular coagulation (DIC) seen in severe bacterial septicemia. Excessive bleeding, retiform purpura, and skin necrosis may develop as a result of the coagulopathies of typical DIC.<sup>1</sup> *Neisseria meningitidis*, *Streptococcus*, and *Staphylococcus* frequently are implicated as pathogens, but *Escherichia coli*-associated purpura fulminans in adults is rare.<sup>2,3</sup> We report a case of purpura fulminans in the setting of *E coli* septicemia.

A 62-year-old woman with a history of end-stage liver disease secondary to alcoholic liver cirrhosis diagnosed 13 years prior complicated by ascites and esophageal varices presented to a primary care clinic for evaluation of a recent-onset nontender lesion on the left buttock. She was hypotensive with a blood pressure of 62/48 mmHg. The patient was prescribed ciprofloxacin 250 mg twice daily and hydrocodone/acetaminophen 5 mg/325 mg twice daily as needed for pain management and was discharged. Six hours later, the patient presented to the emergency department with new onset symptoms of confusion and dark-colored spots on the abdomen and lower legs, which her family members noted had developed shortly after the patient took ciprofloxacin. In the emergency department, the patient was noted to be hypotensive and febrile with a severe metabolic acidosis. She was intubated for respiratory failure and received

intravenous fluid resuscitation, broad-spectrum antibiotics, and vasopressors. Blood cultures were obtained, and the dermatology department was consulted.

On physical examination, extensive purpuric, reticulated, and stellate plaques with central necrosis and hemorrhagic bullae were noted on the abdomen (Figure, A) and bilateral lower legs (Figure, B) extending onto the thighs. The patient was coagulopathic with persistent sanguineous oozing at intravenous sites and bilateral nares. A small erythematous ulcer with overlying black eschar was noted on the left medial buttock.

Laboratory test results showed new-onset thrombocytopenia, prolonged prothrombin time/international normalized ratio and partial thromboplastin time, and low fibrinogen levels, which confirmed a diagnosis of acute DIC. Blood cultures were positive for gram-negative rods in 4 out of 4 bottles within 12 hours of being drawn. Further testing identified the microorganism as *E coli*, and antibiotic susceptibility testing revealed it was sensitive to most antibiotics.

The patient was clinically diagnosed with purpura fulminans secondary to severe *E coli* septicemia and DIC. This life-threatening disorder is considered a medical emergency with a high mortality rate. Laboratory findings supporting DIC include the presence of schistocytes on a peripheral blood smear, thrombocytopenia, positive plasma protamine paracoagulation test, low fibrinogen levels, and positive fibrin degradation products. Reported cases of purpura fulminans in the setting of *E coli* septicemia are rare, and meningococemia is the most common presentation.<sup>2,3</sup> Bacterial components (eg, lipopolysaccharides found in the cell walls of gram-negative bacteria) may contribute to the progression of septicemia. Increased levels of endotoxin lipopolysaccharide can lead to septic shock and organ dysfunction.<sup>4</sup> However, the release of lipooligosaccharides is associated with the development of meningococcal septicemia, and the lipopolysaccharide levels are directly correlated with prognosis in patients without meningitis.<sup>5-7</sup>

Human activated protein C concentrate (and its precursor, protein C concentrate) replacement

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Dr. Adotama is from the Department of Internal Medicine, Baylor College of Medicine, Houston, Texas. Dr. Adotama was from and Drs. Savory and Dominguez are from the Department of Dermatology, University of Texas Southwestern Medical Center, Dallas.

Dr. Dominguez also is from the Department of Internal Medicine.

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Correspondence: Arturo Dominguez, MD, Department of Dermatology, University of Texas Southwestern Medical Center, 5323 Harry Hines Blvd, Dallas, TX 75390-9069 (arturo.dominguez@utsouthwestern.edu).



Extensive purpuric, reticulated plaques with central necrosis and hemorrhagic bullae on the abdomen (A) and lower left leg extending onto the thigh (B).

therapy has been shown to improve outcomes in patients with meningococemia-associated purpura fulminans and severe sepsis, respectively.<sup>8</sup> Heparin may be considered in the treatment of patients with purpura fulminans in addition to the replacement of any missing clotting factors or blood products.<sup>9</sup> The international guidelines for the management of severe sepsis and septic shock include early quantitative resuscitation of the patient during the first 6 hours after recognition of sepsis, performing blood cultures before antibiotic therapy, and administering broad-spectrum antimicrobial therapy within 1 hour of recognition of septic shock.<sup>10</sup> The elapsed time from triage to the actual administration of appropriate antimicrobials are primary determinants of patient mortality.<sup>11</sup> Therefore, physicians must act quickly to stabilize the patient.

Gram-positive bacteria and gram-negative diplococci are common infectious agents implicated in purpura fulminans. *Escherichia coli* rarely

has been identified as the inciting agent for purpura fulminans in adults. The increasing frequency of *E coli* strains that produce extended-spectrum  $\beta$ -lactamases—enzymes that mediate resistance to extended-spectrum (third generation) cephalosporins (eg, ceftazidime, cefotaxime, ceftriaxone) and monobactams (eg, aztreonam)—complicates matters further when deciding on appropriate antibiotics. Patients who have infections from extended-spectrum  $\beta$ -lactamase strains will require more potent carbapenems (eg, meropenem, imipenem) for treatment of infections. Despite undergoing treatment for septicemia, our patient went into cardiac arrest within 24 hours of presentation to the emergency department and died a few hours later. Physicians should consider *E coli* as an inciting agent of purpura fulminans and consider appropriate empiric antibiotics with gram-negative coverage to include *E coli*.

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