



Central Line Sepsis

Kimberly K. Peterson, RN, BSN, OCN®

Case Study 1

Mr. Johnson is a 59-year-old man with a diagnosis of M4 acute, nonlymphocytic leukemia in remission. His medical history is significant for noninsulin-dependent diabetes mellitus (NIDDM), a supraventricular arrhythmia, and an allergy to penicillin. Fifteen days ago, he received a second cycle of consolidation chemotherapy that consisted of high-dose cytarabine given via IV on days one, three, and five. Today, Mr. Johnson's wife contacted a nurse at the oncology clinic and reported that her husband had developed a fever with shaking chills. He also had complaints of a dry cough and discomfort with swallowing. The nurse asked Mrs. Johnson to bring her spouse into the office to be examined.

A physical examination revealed an awake, alert, and anxious patient with rigors. Breath sounds were decreased in the lower lobes bilaterally with rales in the right lung base. Oxygen saturation was 98% on room air, and his heart rate was irregular. His oral cavity was without erythema or lesions. His dual-lumen Groshong® (Bard, Inc., Murray Hill, NJ) central venous catheter exit site was covered by a transparent dressing and was without redness or drainage; however, Mr. Johnson did complain of slight tenderness to the area above the catheter site. His vital signs were temperature 102°F, pulse 96 beats per minute, respiratory rate 16 breaths per minute, and blood pressure 126/84 mm/Hg. The results of his diagnostic studies were white blood cell count without differential 100/mm³, hemoglobin 8 g/dl, platelets 18,000/mm³, sodium 134 mEq/l, potassium 3.3 mEq/l, blood urea nitrogen 12 mg/dl, creatinine 0.9 mg/dl, and glucose 201 mg/dl.

Mr. Johnson was admitted directly to a positive airflow room in the hospital and placed on neutropenic precautions. A por-

table chest x-ray, urinalysis, and sputum for culture and sensitivity were ordered, and the results were unremarkable. Cultures of the peripheral blood and central lines were drawn with results pending. Antibiotic therapy was initiated with ceftazidime 2,000 mg via IV every eight hours and vancomycin 1,000 mg via IV every 12 hours. Blood glucose was monitored twice daily, and results were from 130–190 mg/dl. The patient was compliant with a diabetic diet and received NPH insulin every morning.

Mr. Johnson had fevers of 103.3°F on day one, 100.4°F on day two, and 101°F on day three of his hospital admission. On day four of his stay, *streptococcus viridans* was isolated in the culture obtained from the patient's central venous catheter. The peripheral blood cultures were negative for aerobic and anaerobic growth.

After receiving susceptibility results, the ceftazidime was discontinued, and levofloxacin 500 mg IV was begun daily. However, Mr. Johnson remained febrile for the next four days with persistent tenderness along the Groshong catheter tunnel. The decision was made to remove his catheter and culture the tip. For the next three consecutive days following the catheter removal, he continued to be afebrile and his white blood cell count rose to 400/mm³, 600/mm³, and 1,100/mm³. On day three, a manual differential revealed 92% neutrophils, 4.4% monocytes, 3.2% lymphocytes, and 0.4% basophils. Mr. Johnson was discharged with a prescription for levofloxacin 500 mg tablets daily for seven days, and a return visit was scheduled for placement of a new Groshong catheter.

1. What was Mr. Johnson's greatest risk factor for the development of central line sepsis?
 - a. The presence of a multilumen Groshong catheter

- b. The use of a transparent, semipermeable polyurethane dressing
 - c. Granulocytopenia
 - d. A history of NIDDM
2. Although the decision was difficult to make, Mr. Johnson's catheter was removed. Most clinicians agree to remove a central line catheter under all of the following circumstances except when
 - a. The patient fails to improve after 48–72 hours.
 - b. Reinfection by the same organism occurs after the patient has undergone antibiotic treatment.
 - c. The source of the infection is a fungal species.
 - d. Venous access device-related septicemia has not been confirmed.

Discussion

Question 1: The correct answer is choice c, granulocytopenia. Granulocytes, especially polymorphonuclear neutrophils (PMNs), are short-lived white blood cells with a life span of six to eight hours after entering the bloodstream. They are the body's main defense against bacterial invasion and infection. Their primary function is to destroy and eliminate microorganisms through phagocytosis. A direct relationship exists between incidence of

Kimberly K. Peterson, RN, BSN, OCN®, is an oncology staff nurse at Deaconess Billings Clinic in Billings, MT. (Mention of specific products and opinions related to those products do not indicate or imply endorsement by the Clinical Journal of Oncology Nursing or the Oncology Nursing Society.)

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