

CONTINUING MEDICAL EDUCATION ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

Hematology Quiz – Case 65

A 73-year-old woman was transferred from a nursing home to the emergency department with fever, rigors, and hypotension. The nursing staff reported that the previous days she had not been eating, as well as she had previously, and the day before attendance she had complained of frequency and urine incontinence. Her past medical history included long-term therapy with prednisone for underlying rheumatoid arthritis, mild cognitive disorder, and insulin-dependent diabetes mellitus. On presentation, blood pressure was 90/50 mmHg, temperature 39.5 °C, pulse 120 bpm, and pulse oxymetry 95%. Physical examination revealed mild abdominal tenderness. Routine laboratory examinations revealed leukocytosis (white blood cell count 19,000/ μ L, 93% neutrophils), hemoglobin 11.3 g/dL, platelets 90,000/ μ L, glucose 384 mg/dL, and C-reactive protein 20 mg/dL (normal, <1 mg/dL). Urinalysis revealed significant pyuria and abdominal computed tomography (CT) showed findings consistent with pyelonephritis of the left kidney. Empirical therapy with ceftazidime and ciprofloxacin was started for suspected urosepsis.

A peripheral-blood film was examined and revealed 20% band forms, toxic granulation, and vacuolated neutrophils, some of which contained intracytoplasmic blue-staining inclusions (figures 1–3).

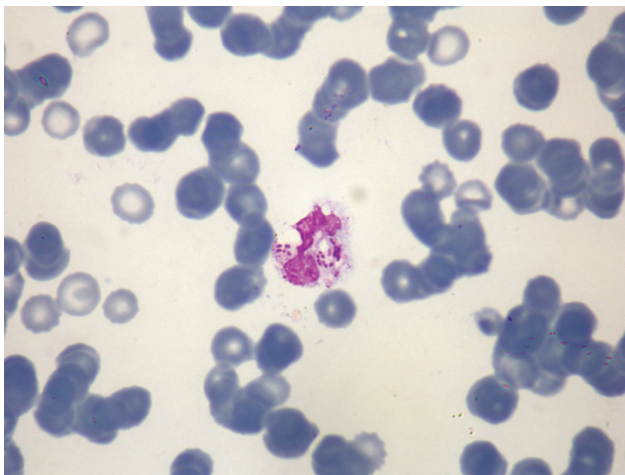


Figure 1.

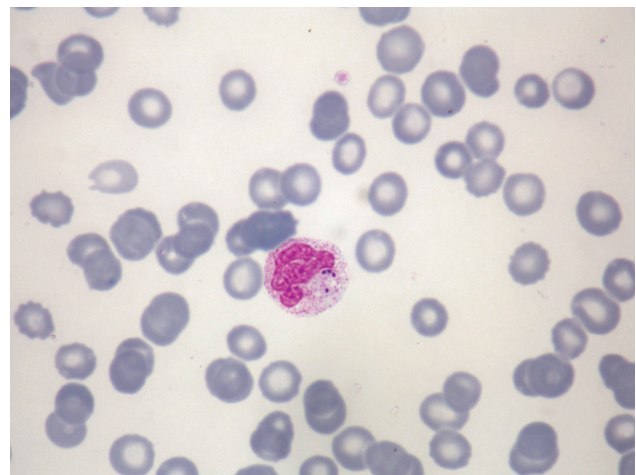


Figure 2.

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ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2023, 40(6):862–863

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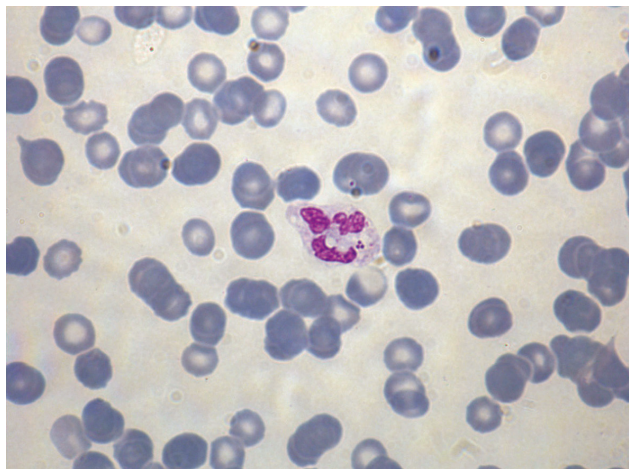


Figure 3.

Comment

Examination of the peripheral-blood film revealed intracellular bacteria visible within neutrophils. The bacteria displayed the morphological features of cocci, and subsequent Gram staining identified Gram-positive organisms. Based on the blood film findings, vancomycin was added to the antibiotic regimen. Two days later, a set of blood cultures obtained at admission revealed *Enterococcus faecalis*, whereas *Escherichia coli* and *E. faecalis* grew on urine culture. The fever resolved on antibiotics and the patient eventually recovered.

Systemic bacterial infection is usually reflected in the blood. Patients present a neutrophil leukocytosis and reactive morphological changes: The neutrophils are often immature (left shift), exhibit prominent (toxic) granulation, and may contain cytoplasmic vacuoles or Döhle bodies (persistent rough endoplasmic reticulum). The occurrence of visible bacteria within neutrophils in routine blood films is rare; however, this finding is significant because it is highly specific for bacteremia. Bacteria are most often seen in hyposplenic or immunocompromised subjects, and in those with indwelling intravenous catheters or overwhelming infections. In such patients, blood films should be screened carefully for visible bacteria. Overwhelming postsplenectomy pneumococcal sepsis, meningococemia, and *Capnocytophaga canimorsus* septicemia have been diagnosed by examination of blood smears. Other bacteria that have been observed within neutrophils include staphylococci, *Clostridium perfringens*, *Klebsiella* species, *Bacteroides distasonis*, *Yersinia pestis*, *Pseudomonas aeruginosa*, and *Corynebacterium* species.

Bacteria in peripheral-blood films may have characteristic fea-

tures that give a clue to their identity. The initial morphology and staining characteristics of organisms seen in the peripheral-blood film of septicemic patients may be useful for provisional identification and in the choice of initial treatment. They can be identified as cocci or bacilli, and following a Gram stain, as Gram negative or Gram positive. Intraleukocytic spore formation by *Clostridia* has also been observed. Bacteria from central venous lines may appear filamentous and resemble fungal elements as a result of antibiotic exposure. The appearances of blood film bacteria, however, must be interpreted with caution. If the organisms are intracellular, it is definite evidence of bacteremia, but if found only extracellularly, microbial contamination of staining reagents, slide, or full blood count container should be considered. If blood samples are left at room temperature and delay occurs in delivery to the laboratory, it is not uncommon to see bacteria in stained films.

Although it is quite uncommon for bacteria to be noted in peripheral-blood films, their detection permits an early diagnosis of septicemia and the preliminary identification of the causative bacterium, before the results of blood cultures become available. As illustrated in this case, the peripheral-blood film remains a valuable diagnostic tool.

References

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