

Gram Negative Bacteremia Diagnosed on Peripheral Blood Smear Examination

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To the Editor

Septicemia is a severe clinical syndrome characterized by systemic signs of infection, shock and systemic organ failure. Hence a rapid and definitive diagnosis is mandatory for proper management. Diagnosis of sepsis is routinely confirmed by presence of organisms in blood or at the site of infection which is usually done through culture which is a time consuming method and hence does not play much role in the initial treatment decision. In such scenario microscopic examination of peripheral blood can be of great help to hasten the confirmation of septicaemia, thereby enabling doctors to immediately select a more specific therapy [1-3]. Although several species of bacteria have been described on examination of peripheral blood smears but bacteremia due to gram negative rods has rarely been reported [1, 4-6].

We describe an interesting case of a 28-year-old female who presented with high grade fever which was associated with chills, vomiting, and loss of appetite and generalized weakness. Hematological examination revealed presence of anemia (hemoglobin 9.0 g/dL), leucocytosis (total leucocyte count $26.7 \times 10^3/\mu\text{L}$) and thrombocytopenia ($62 \times 10^3/\mu\text{L}$). Peripheral blood smear (PBS) examination showed neutrophilia (absolute neutrophil count of $21.89 \times 10^3/\mu\text{L}$) and presence of shift leucocytes. Apart from these features, toxic vacuolizations were seen in the neutrophils along with frequent presence of intracellular structures which were uniform and rod shaped, suggestive of phagocytised bacilli. Similar bacilli were also seen lying extracellular in small and large clusters (Fig. 1). Gram stain of peripheral blood affirmed the presence of gram negative bacteremia. Later the blood culture confirmed the blood smear findings and revealed presence of *Pseudomonas aureginosa*. The patient's condition kept on deteriorating and 2 days after admission, the female developed multi-organ failure and succumbed to her disease in spite of intensive medical treatment.

PBS has never been a popular diagnostic tool for septic-

emia due to certain limitations. Firstly, it is less sensitive technique as detection of microorganism requires a concentration of 10^5 CFU/mL or greater which is unusual [7, 8]. And secondly, it is the inability to identify the species of microorganism. For these reasons, this method is mainly limited for identification of parasitic organisms in diseases like malaria and filaria. Nevertheless this limitation can be overcome to certain extent. Sensitivity could be increased by using buffy coat along with increasing experience and sufficient training of laboratory observers [9]. Also typical gram reaction, morphologies and arrangements of the observed organisms may help in presumptive identification of certain etiological bacteria [10].

During PBS examination for bacteria certain points should be kept in mind. The organism should be intracellular and the cells containing them must be leucocytes. Associated finding like toxic granules, vacuoles and Dhole inclusion bodies in neutrophils are also very predictive of systemic infection. Presence of only extracellular microorganism should be reported with special care as it may represent contamination [11].

Thus to conclude, simple, inexpensive and safe PBS examination should be more widely used especially when overwhelming bacteremia is suspected in conditions like hypoplenism, AIDS neonatal sepsis, etc. In such scenario, it can prove to be an important tool to provide rapid preliminary diagnosis, thereby allowing clinicians to strengthen the empirical anti-microbial regimen.

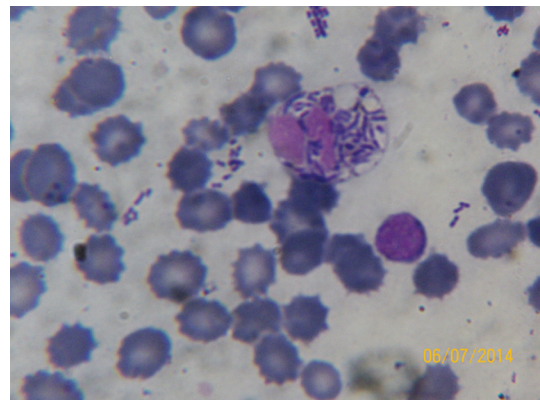


Figure 1. Leishman stained PBS ($\times 100$; oil immersion) showing presence of intracellular (inside neutrophil) and extracellular rod shaped bacilli. Toxic vacuolizations are also seen inside the neutrophil.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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