

Brief Communication

A rare morphological gem in fulminant meningococcal sepsis

Martin P. Dieterle ^a , Stefano Malvestiti ^b , Barbara Zieger ^b,
Hans Fuchs ^a, Daniel Matheisl ^{a,*} 

^a University of Freiburg, Faculty of Medicine, Medical Center, Division of Neonatology and Paediatric Intensive Care Medicine, Department of Pediatrics and Adolescent Medicine, Freiburg, Germany

^b University of Freiburg, Faculty of Medicine, Medical Center, Division of Pediatric Hematology and Oncology, Department of Pediatrics and Adolescent Medicine, Freiburg, Germany



ARTICLE INFO

Edited by: Dr. Luciano Goldani

A 4-month-old girl presented to our pediatric emergency department with septic shock requiring fluid resuscitation and vasoactive support. Laboratory findings suggested severe bacterial infection with a procalcitonin level of 249.5 ng/mL (reference < 0.05 ng/mL). Empirical antimicrobial treatment with piperacillin/tazobactam was instantly initiated.

The patient exhibited progressively enlarging ecchymoses consistent with purpura fulminans. Cefotaxime and vancomycin were therefore immediately added, given the suspicion of meningococcal sepsis. Markedly elevated D-dimers (>35 mg/L), thrombocytopenia (nadir 37 G/L) and severely reduced protein-C activity (14%) confirmed the presence of Disseminated Intravascular Coagulation (DIC), further supporting the suspected diagnosis. Following transfusions of platelets, fresh frozen plasma and protein-C concentrate, coagulation parameters eventually normalized.

At presentation, a peripheral blood smear was prepared for morphological evaluation of leukocytes and revealed the findings shown in Fig. 1. Intraleukocytic and peri-/intraerythrocytic cocci and diplococci were identified. Further microbiological PCR-diagnostics confirmed invasive *Neisseria meningitidis* (serogroup W). The patient recovered completely.

Intraleukocytic detection of meningococci in peripheral blood smears remains a rare finding.¹ A direct correlation between clinical severity/bacterial load and the detectability of meningococci in peripheral blood smears has not been established yet.² However, if present, this finding may precede definitive microbiological results by days.

Neisseria meningitidis can bind to erythrocyte Complement Receptor 1 (CR1) on the surface of red blood cells, facilitating evasion of phagocytosis by leukocytes and favoring meningococcal survival within the bloodstream. Visualization of meningococci adjacent to or within

* Corresponding author.

E-mail address: Daniel.Matheisl@uniklinik-freiburg.de (D. Matheisl).

<https://doi.org/10.1016/j.bjid.2026.105822>

Received 26 March 2026; Accepted 14 April 2026

Available online 2 May 2026

1413-8670/© 2026 Sociedade Brasileira de Infecologia. Published by Elsevier España, S.L.U. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

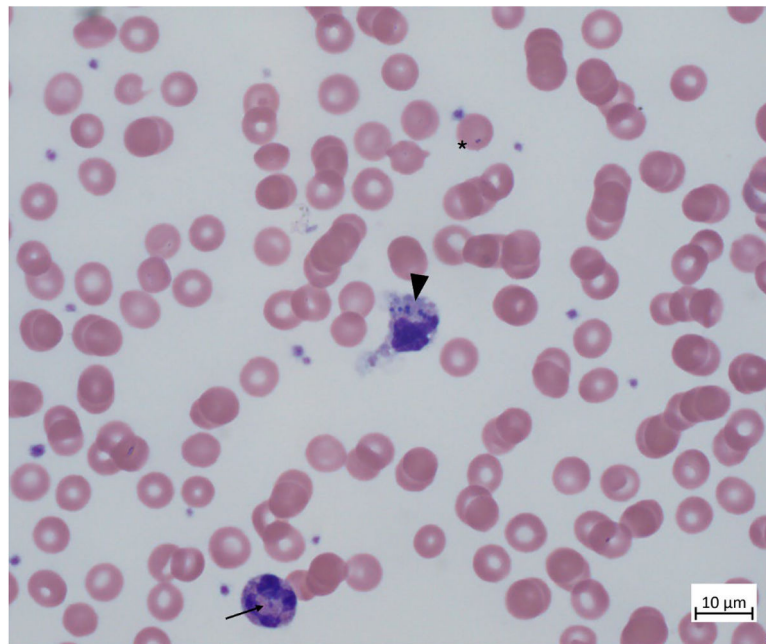


Fig. 1. Peripheral blood smear of a 4-month-old girl (black arrow probably indicating the inactivated X-chromosome [“Barr body”]) with meningococcal sepsis. The exceedingly rare findings of intraleukocytic cocci and diplococci (black arrowhead) and peri-/intraerythrocytic diplococci (black asterisk) are depicted. Microbiological PCR-diagnostics confirmed invasive infection with *Neisseria meningitidis* serogroup W.

erythrocytes is exceedingly rare.³ Mechanistically, CR1 acts as an inhibitor of the classical complement cascade by serving as a co-factor for factor I, which cleaves C3b and C4b into inactive forms, thus preventing formation of the membrane attack complex and subsequent bacterial lysis.⁴

In ambiguous cases, a cost-effective peripheral blood smear can complement clinical findings in septic shock and guide therapeutic decisions.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of interest

The authors declare no conflicts of interest.

References

1. Young EJ, Cardella TA. Meningococcemia diagnosed by peripheral blood smear. *JAMA*. 1988;260:992.
2. Darton T, Guiver M, Naylor S, et al. Severity of meningococcal disease associated with genomic bacterial load. *Clin Infect Dis*. 2009;48:587–594.
3. Smith H, Rogers SL, Smith HV, Gillis D, Siskind V, Smith JA. Virus-associated apoptosis of blood neutrophils as a risk factor for invasive meningococcal disease. *J Clin Pathol*. 2013;66:976–981.
4. Brekke OL, Hellerud BC, Christiansen D, et al. *Neisseria meningitidis* and *Escherichia coli* are protected from leukocyte phagocytosis by binding to erythrocyte complement receptor 1 in human blood. *Mol Immunol*. 2011;48:2159–2169.