IMAGES

Howell-Jolly Body-Like Inclusions in Neutrophils and Monocytes of a Transplant Recipient

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A 34-year-old male in first remission of early T-cell precursor acute lymphoblastic leukemia underwent a 10/10 HLA-matched unrelated donor stem cell transplant. On day +86, he developed adenovirus PCR-positive hemorrhagic cystitis managed with hydration, ribavirin, intravenous immunoglobulin and tapering of immunosuppression. Chimerism analysis showed 100% donor engraftment. Hemoglobin was 78 g/L, total leukocytes $1.1 \times 10^9/\text{L}$ and platelets $86 \times 10^9/\text{L}$. ~2–3% neutrophils contained 1–3 small, round, discrete, deeply basophilic, hyperchromatic cytoplasmic inclusions reminiscent of erythrocytic Howell-Jolly bodies (Fig. 1). Rare monocytes too contained similar inclusions. Exceptional ones displayed engulfed erythrocytes (Fig. 1, inset). Ferritin was 3200 ng/mL. Triglycerides and fibrinogen were normal. Hemophagocytic lymphohistiocytosis was considered in view of persistent fever, splenomegaly, hyperferritinemia and pancytopenia. Bone marrow was markedly hypocellular without prominent hemophagocytosis or increased blasts. Hemorrhagic cystitis improved with continued therapy. Fever resolved by

Fig. 1 Peripheral blood smear showing Howell-Jolly body-like inclusions in the neutrophil (Leishman $\times 1000$). *Inset* similar inclusion in a monocyte (*arrow*) which also shows erythrophagocytosis (Leishman $\times 1000$)

day +94, urine became clear and inclusions undetectable. However, adenovirus PCR (urine) remained positive.

Howell-Jolly body-like karyopyknotic cytoplasmic inclusions in neutrophils and rarely lymphocytes, monocytes and other myeloid cells occur in settings of HIV, post-transplant immunosuppression and chemo/antiviral therapy [1, 2]. We previously described them in pediatric autoimmune hepatitis after azathioprine therapy [3]. Potential mimics of actual or pseudo-Chediak-Higashi granules, intra-cellular parasites/rickettsiae and Barr-bodies, awareness or prior experience of these entities by the morphologist and clinical correlation can prevent misdiagnoses.

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Compliance with Ethical Standards

Conflict of interest None for all authors.

Ethical Approval All procedures performed in this report involving a human participant were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This is a purely observational report and no research procedure was done.

Informed Consent Informed consent has been obtained for this manuscript.

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