

Bicytopenia (Thrombocytopenia and Anemia) Secondary to Human Respiratory Syncytial Virus Pneumonia

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Background

The human respiratory syncytial virus (RSV) is a major cause of lower respiratory infection especially in the elderly, infants and young children. RSV causes bronchiolitis, tracheobronchitis, and otitis media and in more severe cases can lead to pneumonia^[1,2]. The virus can also have extra-pulmonary manifestations like cardiovascular failure, arrhythmias, seizures, and hepatitis, and in rare cases it has been reported to be the cause of abnormal blood counts^[3,4,5].

A previous case report from 2016 describes transient thrombocytopenia occurring with RSV infection. The authors hypothesized that RSV-related cytogenetic changes in bone marrow hematopoietic cells caused the drop in platelet count^[4]. Follow-up revealed improvement in platelet count and no chromosomes abnormalities after recovery from RSV. Here we report a case of RSV induced bicytopenia.

Clinical Case

An 81-year-old male with a past medical history of dementia, hypertension, arthritis, and Stage 3 chronic kidney disease presented with chief complaint of dry cough of 3 days durations. He was sent to the JHMC ED from a skilled nursing facility due to severe thrombocytopenia. Upon presentation, he was found to be RSV positive with a bilateral pneumonia confirmed with imaging. Laboratory values were significant for hemoglobin and hematocrit of 7.9 and 23.6 and platelet count of 17,000, which showed a severe decrease from hospital admission a month prior with values of 11.6, 34.2 and 200,000. Further testing for other possible causes of acute thrombocytopenia and anemia such as heparin-induced thrombocytopenia (HIT) and hemolytic anemia were negative. Note that other sources of infection were also ruled out by viral and bacterial cultures and further laboratory tests. Meropenem and doxycycline were given empirically for 5 days.

Bone marrow biopsy was done and described in Figure 1. By day 7 of admission, hemoglobin/hematocrit had not improved and remained at 7.6/22.7. Platelet count had only increased to 49. The patient had no signs of active bleeding. At this point, Hematology/Oncology recommended that we begin 50 mg prednisone orally for 1 week.

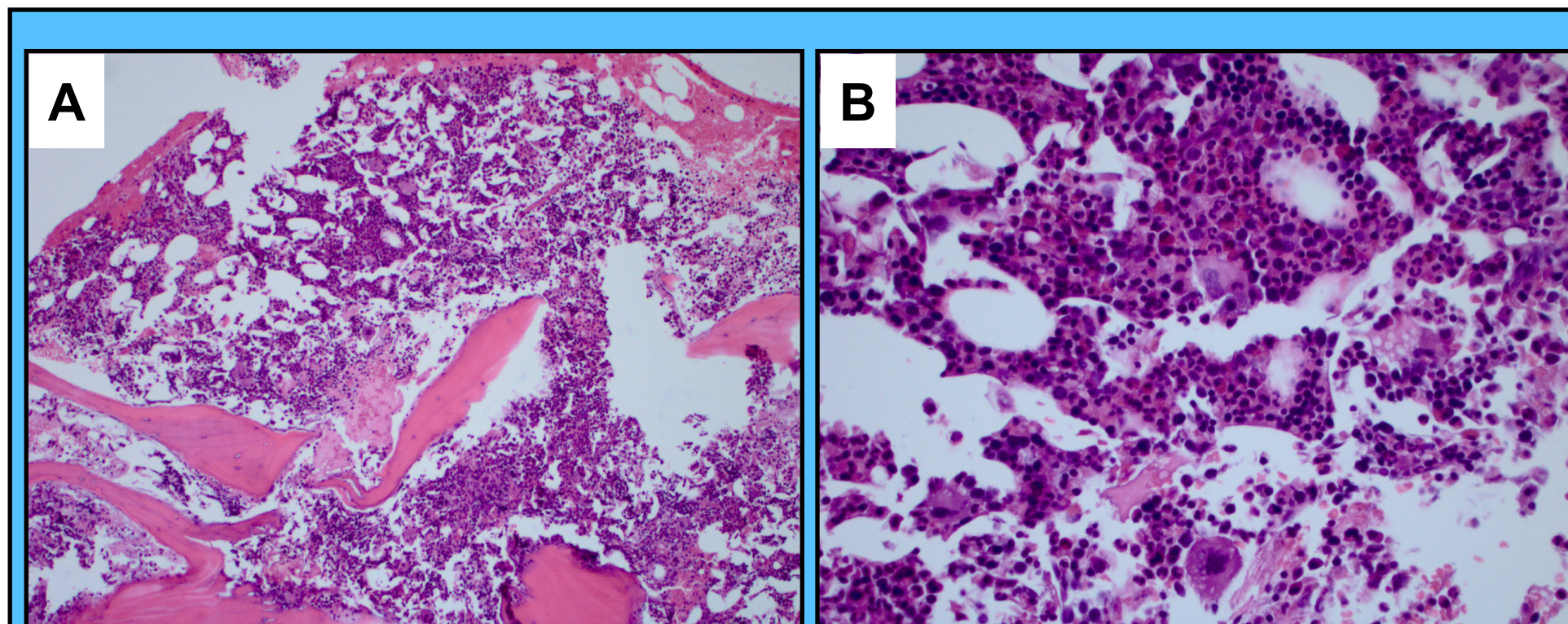


Figure 1: (A) Low magnification of bone marrow biopsy showing slight hypercellularity and decreased estimated M:E ratio. (B) Higher magnification shows slightly increased number of megakaryocytes. The classic paradox of peripheral thrombocytopenia and anemia despite the presence of a hypercellular bone marrow reflects premature cell loss via intramedullary cell death (apoptosis).

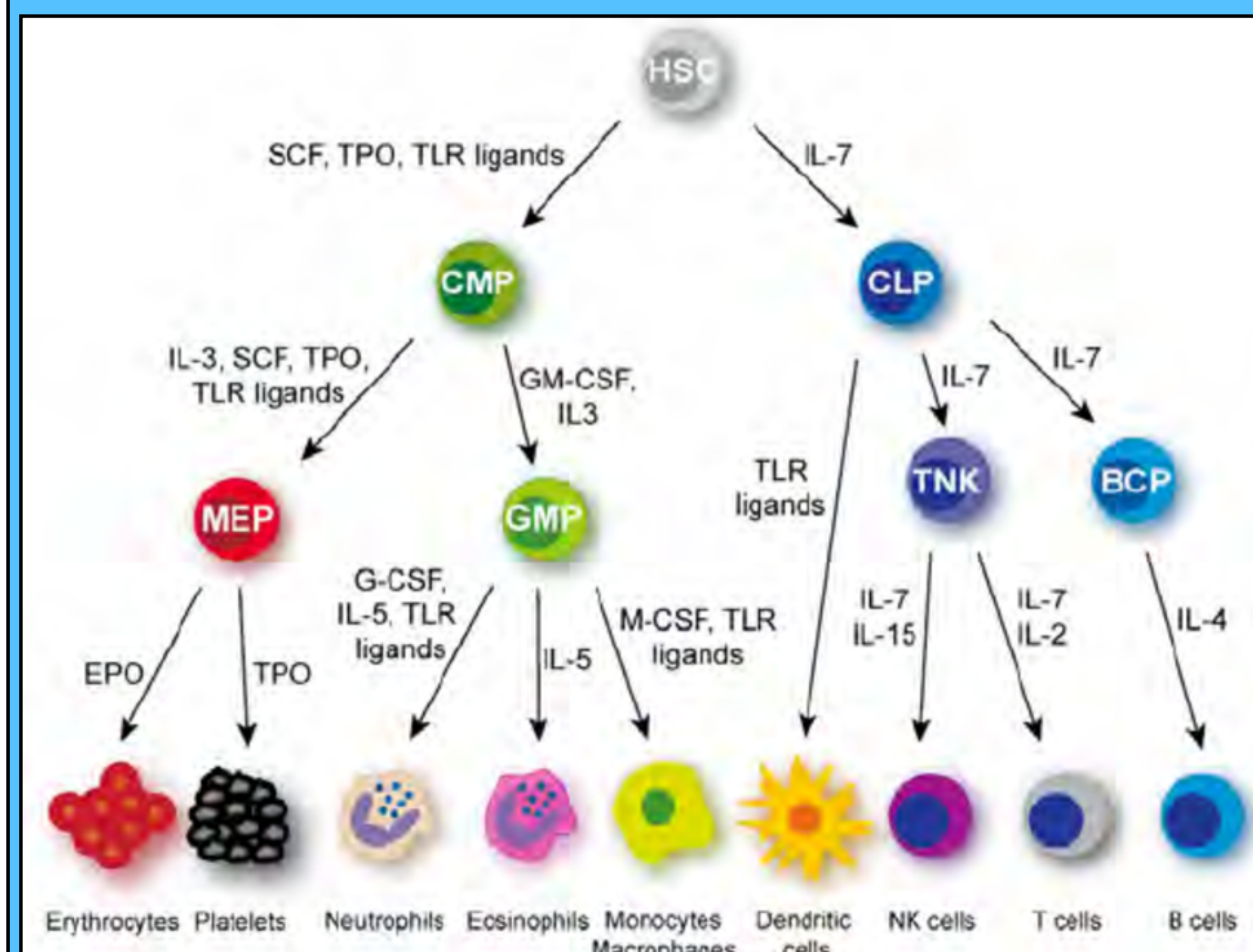


Figure 2: The role of cytokines in hematopoiesis

Discussion

Because of the findings of bicytopenia (anemia and thrombocytopenia) in our patient, we hypothesize that RSV infection infiltrated bone marrow cells, affecting the megakaryocyte-erythroid progenitor cell (MEP). The common myeloid progenitor cell (CMP) differentiates into either the MEP or the granulocyte-monocyte progenitor (GMP) line.

RSV is able to infect cells of non-epithelial origin, including dendritic cells, macrophages, and neutrophils that are able to return to bone marrow^[3]. RSV has also been shown to replicate within bone marrow stromal cells (BMSC) *in vitro*^[5]. Cheung et al. have been able to show modulation of cytokine and interferon expression by RSV-infected hematopoietic and stromal cell lines^[3]. This interruption of the normal hematopoietic cellular signaling between stem cells and stroma may provide context for this patient's sudden thrombocytopenia and anemia during contraction of RSV^[6]. Figure 2 shows cytokine induction of hemopoiesis,

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