Safe platelet count for lumbar puncture: are we being overcautious?

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Received: February 26, 2025.
Accepted: March 5, 2025.
Early view: March 13, 2025.

https://doi.org/10.3324/haematol.2025.287359

Lumbar puncture (LP) to perform cerebrospinal fluid (CSF) analysis followed by intrathecal chemotherapy is critical for the management of hematologic and oncologic malignancies with central nervous system (CNS) involvement. In this issue of *Haematologica*, Corrao *et al.*[1] raised a critical issue of "safe platelet count" for LP in patients with hematologic/oncologic malignancies who often have cytopenia secondary to their disease or myelosuppressive chemotherapy.

Hematologic malignancies, such as leukemia, lymphoma, and myeloma, as well as solid tumors can present with CNS disease at diagnosis or at relapse.[2-5] Accurate diagnosis and effective treatment strategies are vital to improve outcome. LP is the standard for CSF analysis and to evaluate for CNS disease. The blood-brain barrier prevents systemic chemotherapy from reaching therapeutic levels in the CNS; however, intrathecal chemotherapy bypasses the blood-brain barrier, delivering treatment directly to the CNS to improve therapeutic outcome. By delivering chemotherapy directly to the CSF, intrathecal administration allows for localized treatment, minimizing systemic adverse events, such as cytopenia and organ dysfunction. While intrathecal chemotherapy is effective, it can lead to adverse events, such as spinal cord damage, post-LP headache, increased intracranial pressure, and bleeding, especially with low platelet count.[6] The recommended minimum platelet count for LP varies depending on the organization. The American Association of Blood Banks recommends a minimum platelet count of 50×10^3/μL, whereas in UK and Germany minimum platelet counts for LP are 40×10^3/μL and 20×10^3/μL, respectively. Often based on expert opinion, evidence-based guidelines are crucial to use blood banks and institutional resources appropriately, since patients with hematologic malignancies requiring LP and intrathecal chemotherapy are often cytopenic from the disease itself or have hematotoxicity from chemotherapy. On this background, Corrao *et al*. conducted a retrospective analysis, examining the incidence of bleeding events among 345 adult (≥18 years old) oncology patients undergoing LP with a minimum platelet count of 40×10^3/μL to 50×10^3/μL. More than 90% of these patients had hematologic malignancies (e.g., acute myeloid leukemia, acute lymphoblastic leukemia, and lymphoma) followed by solid tumors. Overall, the incidence of hemorrhagic adverse events was too low to determine whether preprocedural platelet count was significantly associated with bleeding events. The rate of hemorrhagic adverse events was low at 0.3% (N=4/1,251); two events occurred at a platelet count of 100×10^3/μL or greater, one occurred at a platelet count of 40×10^3/μL, and one occurred at a platelet count less than 40×10^3/μL. Interestingly, two patients who had bleeding events after LP with platelet counts less than 40×10^3/μL were on *BCR::ABL1* targeting tyrosine kinase inhibitors, dasatinib and ponatinib, which are known to affect platelet aggregation.[7,8] Data suggest that bleeding events were infrequent, not significantly correlated with platelet counts, and concurrent therapy with potential for a bleeding diathesis might be a contributing factor.

It is worth noting that with a lower minimum platelet count limit (40×10^3/μL *vs*. 50×10^3/μL), the number of units of platelets transfused for LP was significantly reduced from 0.6% to 0.4%. This is highly meaningful in high-volume comprehensive cancer centers, in which a sizable number of LP are being performed for oncology patients. Data suggest that lowering minimum platelet counts for LP is safe and will significantly improve use of blood banks and health care resources, which are always under pressure.

Similarly, in another retrospective analysis conducted at the Moffit Cancer Center, no significant differences in post-LP adverse events (e.g., headache, back pain, nausea, or vomiting) were observed with a platelet threshold for LP of 50×10^3/μL or more *versus* less than 50×10^3/μL.[9] In that study of 224 adult patients who underwent 900 LP, only two patients had hemorrhagic adverse events; one had subarachnoid hemorrhage and one had subdural hemor-

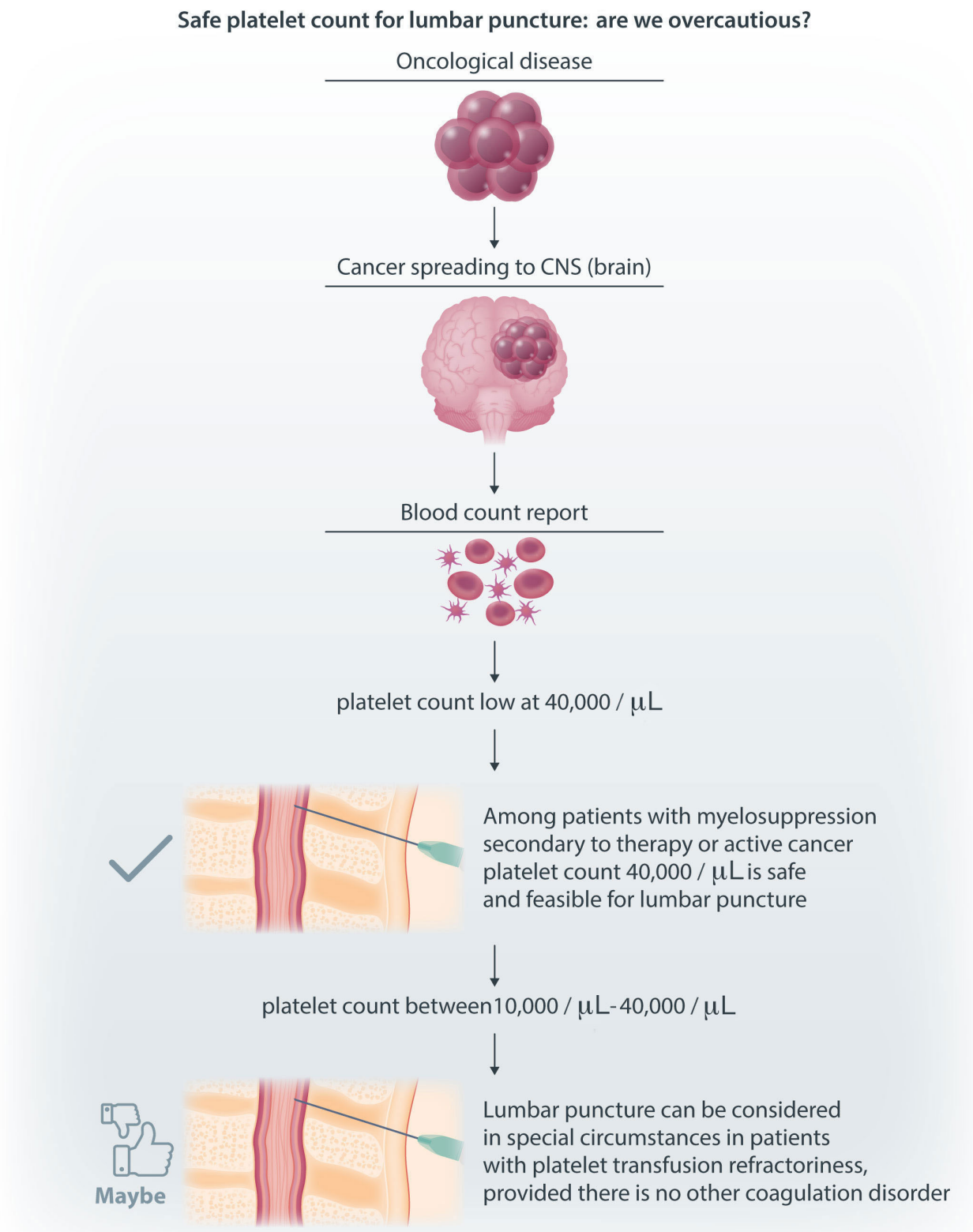

Figure 1. Diagrammatic illustration on lowering the threshold of platelet counts required in order to perform a lumbar puncture. CNS: central nervous system.

rhage, but these events were not found to be directly linked to the procedure as they happened several days after it. Another study evaluated the safety of LP in children with acute lymphoblastic leukemia and thrombocytopenia.[10] The main purpose of the study was to report serious adverse events related to LP, including neurological, infectious, and hemorrhagic events. Among 5,223 LP, 29 (0.5%) were performed at platelet counts of $10\times10^3/\mu L$, 170 (3.25%) at platelet counts of 11 to $20\times10^3/\mu L$, and 742 (14%) at platelet counts of 21 to $50\times10^3/\mu L$. Interestingly, no serious adverse events were observed, regardless of the platelet count. The authors concluded that prophylactic platelet transfusion is not necessary in children with platelet counts higher than $10\times10^3/\mu L$.

In conclusion, it is time to move the needle (Figure 1). While the afore-mentioned studies are retrospective in nature, randomized controlled trials are difficult to conduct on this subject. There is enough evidence to suggest that serious hemorrhagic adverse events are uncommon after LP, regardless of platelet count. Thus, lowering minimum platelet counts to $40\times10^3/\mu L$ for LP is a feasible and safe strategy.

Disclosures

TB has received honoraria and research funding from Takeda.

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