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

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

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Lumbar puncture (LP) to perform cerebrospinal fluid (CSF) analysis followed by intrathecal chemotherapy is critical for 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 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 criterion standard for CSF analysis and to evaluate for CNS disease. The blood brain barrier prevents systemic chemotherapy from reaching therapeutic levels in the CNS; intrathecal chemotherapy bypasses the blood brain barrier, directly delivering treatment 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, bleeding, post-LP headache, and increase in intracranial pressure, especially with low platelet count.(6) Recommended minimum platelet count for LP varies by organization. The American Association of Blood Banks recommend 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 appropriately use blood banks and institutional resources, since patients with hematologic malignancies requiring LP and intrathecal chemotherapy are often cytopenic from the disease itself or have hematotoxicity from chemotherapy.

In this context, Corrao et al conducted a retrospective analysis, examining incidence of bleeding events among 345 adult (≥18 years old) oncology patients receiving LP with 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 if preprocedural platelet count was significantly associated with bleeding events. The rate of hemorrhagic adverse events was low at 0.3% (n=4/1,251); 2 events occurring at a platelet count of 100×10^3/μL or greater, 1 occurring at a platelet count of 40×10^3/μL, and 1 occurring at a platelet count less than 40×10^3/μL. Interestingly, 2 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 impact platelet aggregation.(7, 8) Data suggest that bleeding events were infrequent, not significantly correlated with platelet counts, and concurrent therapy with potential for bleeding diathesis might be a contributing factor.

It is worth noting that with lower minimum platelet count limit (40×10^3/μL vs 50×10^3/μL), the number of units of platelet transfused for LP was significantly reduced from 0.6% to 0.4%. This is highly meaningful in high-volume comprehensive cancer centers, where a sizable number of LPs 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 Moffit Cancer Center, no significant difference 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 vs less than 50×10^3/μL.(9) In that study of 224 adult patients undergoing 900 LPs, only 2 patients had hemorrhagic adverse

events; 1 had subarachnoid hemorrhage and 1 had subdural hemorrhage, but these events were not found to be directly linked to the procedure as they happened several days after the procedure. 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 LPs, 29 (0.5%) were performed at platelet counts of 10×10^3/μL, 170 (3.25%) at platelet counts of 11 to 20×10^3/μL, and 742 (14%) at platelet counts of 21 to 50×10^3/μL. 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 10×10^3/μL.

In conclusion, it is time to move the needle (Figure 1). While the above-mentioned studies are retrospective in nature, randomized controlled trial 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 40×10^3/μL for LP is a feasible and safe strategy.

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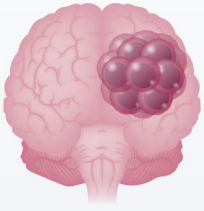
Figure legend

Figure 1. Diagrammatic illustration on lowering threshold for platelet counts requirement for lumbar puncture.

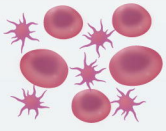
Safe platelet count for lumbar puncture: Are we overcautious?

Oncological disease

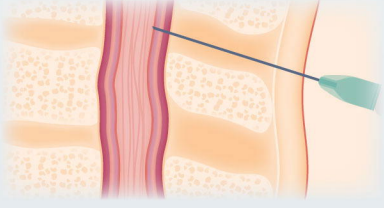
Cancer spreading to CNS (brain)



Blood count report

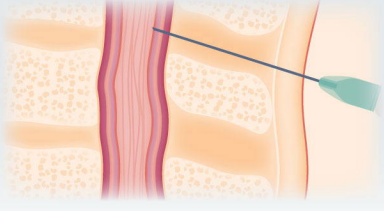


platelet count low at 40,000 / ml



Among patients with myelosuppression secondary to therapy or active cancer platelet count 40,000 / ml is safe and feasible for lumbar puncture

platelet count between10,000 / ml - 40,000 / ml



Maybe

Lumbar puncture can be considered in special circumstances in patients with platelet transfusion refractoriness, provided there is no other coagulation disorder