Association of lumbar puncture with spinal hematoma in patients with and without coagulopathy

SUMMARY:
- Lumbar puncture (LP) is a commonly performed procedure in emergency medicine for indications ranging from subarachnoid hemorrhage to central nervous system infections. Minor complications such as post-lumbar-puncture headache are not unusual, but more significant complications, such as spinal hematomas, are very rare.
- In this nationwide population-based medical-registry study from Denmark, the authors aim to determine the risk of spinal hematoma after LP in patients with and without coagulopathy.
- The primary outcome was the 30-day risk of first-time spinal hematoma in patients with and without coagulopathy, stratified by different levels of thrombocytopenia, high international normalized ratio (INR) levels, and prolonged activated partial thromboplastin time (aPTT).
- The authors accessed the laboratory database to identify all LPs between 2008 and 2018 with cerebrospinal fluid collected.
- A traumatic tap was defined as >300 red blood cells/L cerebrospinal fluid, after exclusion of patients with subarachnoid hemorrhage.
- Spinal hematoma events were defined by first-time diagnosis codes for inferior paraparesis, medullary compression, or surgical removal of spinal hematoma after each LP.
- Coagulopathy was defined as platelets <150 × 10^9/L, INR >1.4, or aPTT >39 seconds.
- All patients were observed from the index date (date of LP) until the date of death, spinal hematoma, loss to follow-up, emigration, or October 30, 2019, whichever came first.
- The authors identified 83,711 LPs among 64,730 patients; follow-up was complete for >99% of cases.
- Spinal hematoma was diagnosed in 0.20% of patients without coagulopathy vs 0.23% of patients with coagulopathy.
- Independent risk factors for spinal hematoma were male sex (adjusted hazard ratio [aHR] of 1.72), and older patients (patients 41-60 years of age [aHR of 1.96] and those 61-80 years of age [aHR of 2.20])
- The risk of hematoma did not increase significantly according to the overall severity of coagulopathy.
- The chance of having a traumatic tap did increase with more significant coagulopathy, according to the INR (normal INR, 28.2%; INR 1.5-2.0, 36.8%; INR 2.1-2.5, 43.7%; and INR 2.6-3.0, 41.9%) and by increasing aPTT (normal aPTT, 21.3%; aPTT 40-60 seconds, 26.3%) but not the degree of thrombocytopenia.
- Some limitations of this study include the possibility of misclassification bias, because this is a registry study relying on diagnostic codes for identifying the primary outcome; the absence of information obtained on anticoagulant medications, particularly those that do not affect the INR or aPTT, or any treatments that might have been administered, such as platelets or fresh frozen plasma; and a study design in which complications from multiple failed attempts would not be included.
One important caveat is that the results of this study cannot be applied to all patients with coagulopathy, because only patients on whom the provider felt comfortable performing the procedure were included (inclusion bias); patients at high risk or with very abnormal laboratory findings were unlikely to be tapped.

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**EDITOR’S COMMENTARY:** In this nationwide registry study from Denmark, the authors did not find a significant difference in the risk of spinal hematoma after LP among patients with and without laboratory evidence of coagulopathy. However, high-risk patients very likely not to be included, and we don’t know if any therapies were administered prior to the tap. The authors did find a higher rate of traumatic tap with worsening coagulopathy, which may inform your clinical practice. Although not definitive, this is the best and largest study to date, and it can be used to inform shared decision-making.