Venous thromboembolism

To The Editor: We read with great interest the single-center, retrospective chart review by Khaldi et al. (Khaldi A, Helo N, Schneck MJ, et al: Venous thromboembolism: deep venous thrombosis and pulmonary embolism in a neurosurgical population. Clinical article. J Neurosurg 114:40–46, January 2011) focused on the incidence of venous thromboembolism (VTE) in the postoperative neurosurgical patient. The authors should be commended for designing an important clinical inquiry seeking to clarify the impact of prophylactic subcutaneous heparin in the postoperative neurosurgical patient. We would like to add several salient points to the discussion.

First, although an impressive number of patients were included in this study—more than 2600 operative patients over approximately 3 years—the heterogeneity of the patient population may limit the extent to which results can be generalized. Whereas previous work investigating VTE in the neurosurgical literature has often focused on very specific patient subpopulations—for instance, patients with intracranial glioma1 or scoliosis2—the inclusion of patients with vascular damage; traumatic injury; tumor; and simple, complex, or metastatic spine injury all within this study makes it difficult to adjust for the impact of inherent physiological differences among these patients on thromboembolic outcomes. Additionally, nearly 30% of patients underwent unspecified neurosurgical procedures, again making full interpretation of the results limited.

Second, the study may have been strengthened by the stringent standardized use of subcutaneous heparin. While the authors noted that some patients were given heparin preoperatively, it is unclear how many patients received this preoperative therapy as well as when such therapy was halted. Additionally, while there was an attempt to standardize postoperative heparin therapy, it appears that the initiation of therapy varied from 24 to 48 hours postoperatively, depending on a change in protocol at some point over the 3-year study. The impact of expediting the date of heparin initiation postoperatively by 1 day on patient outcomes remains unclear. Stratifying the analysis by date of heparin initiation or only including patients who were uniformly initiated on a particular postoperative day may have reduced potential heterogeneity in the data set analyzed.

Finally, the authors noted that all patients were treated with mechanical VTE prophylaxis. However, VTE prophylaxis may consist of a wide range of therapies, including compression stockings, below-knee sequential compression devices (SCDs), above-knee SCDs, physical therapy, and general mobility. As evidenced by the CLOTS (Clots in Legs or Stockings After Stroke) Trial 2, a prospective trial demonstrating the greater efficacy of above-knee SCDs over below-knee devices in preventing VTE, not all modes of mechanical VTE prophylaxis are equivalent.2 Clarity regarding the types of mechanical VTE prophylaxis used in the heparin and nonheparin groups may help place results of these series in greater context.

As we look toward the future, well-designed prospective trials focusing on particular neurosurgical patient subpopulations undergoing specific procedures with well-defined pre- and postoperative VTE prophylaxis regimens may help shed even further light on how best to prevent unnecessary deep vein thromboses and pulmonary emboli in our patients.

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Disclosure

The authors report no conflict of interest.

References


Response: We thank the group from Cedars-Sinai for their critical review of our paper. We agree that in an era in which quality outcomes measurement will drive everything from referral to reimbursement, it is important for neurological surgery to set the benchmarks via cooperative multicenter studies.

Two groups were evaluated in our study. The first
group consisted of the 2638 neurosurgical patients who were admitted to our institution between January 2006 and December 2008 and were reviewed for the occurrence of VTE (that is, deep venous thrombosis [DVT] and/or pulmonary embolism). A subgroup consisted of 34% (555) of the first group, which included patients who had at least one lower-extremity duplex venous study. In this second group the distribution of patients was as shown in Table 1. Note, however, that there was no correlation between the category of pathology and the risk of developing DVT. Keep in mind that some categories were not well represented, such as cranial (vascular).

The number of patients who received intraoperative heparin was low (25). The change in the heparin protocol did influence the rate of compliance in administrating subcutaneous heparin initially at 48 hours postoperatively and then at 24 hours postoperatively. However, as the data show (Fig. 1), the use of subcutaneous heparin at 24 hours did not increase the rate of complication, while it significantly reduced the rate of DVT development.

All patients received mechanical prophylaxis, which included both SCDs and T.E.D. stockings (Kendall) initially. A small group of patients received only SCDs toward the latter part of the study, but there was no change in the rate of DVT.

Please include this information when citing this paper: published online July 27, 2012; DOI: 10.3171/2011.2.JNS1151.

### TABLE 1: Summary of disorders in patients with VTE and a lower-extremity duplex venous study

<table>
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<tr>
<th>Category Code</th>
<th>Category</th>
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</tr>
<tr>
<td>8</td>
<td>others</td>
<td>10</td>
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Fig. 1. Graph showing the rate of compliance in using pharmacological DVT prophylaxis in neurosurgery patients. The rate was calculated at 24 and 48 hours postsurgery. The implementation of order set started in February 2007.