Finally, Szmuk et al. note the vigor of response to intramuscular injection of rocuronium in our lightly anesthetized patients and attribute it to local irritation specific to rocuronium. However, the magnitude of response that we observed does not differ from that observed by the senior author in patients enrolled in MAC studies. Although rocuronium may be a local irritant, our study provides no support for the conjecture by Szmuk et al.

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Injection Volume of Saline with Loss of Resistance Method May Affect the Spread of Epidural Anesthesia

To the Editor — This is a report on the effect of injection volume of saline on the spread of epidural anesthesia. After institutional approval, 30 adult patients (American Society of Anesthesiologists physical status 1-2) who provided informed consent and received elective surgery during epidural anesthesia were assigned randomly into two groups of 15 patients each. There were no statistically significant differences between both groups with regard to age (45 ± 20 vs. 50 ± 17 yr), weight (56 ± 9 vs. 55 ± 9 kg) and height (156 ± 10 vs. 157 ± 9 cm) using the Mann-Whitney U test (values are mean ± SD).

With patients in the lateral position, an 18-gauge Tuohy needle was inserted into the 4th - 5th lumbar interspace and into the epidural space using loss of resistance method and saline. The injection volume of saline into the epidural space was 2 ml in group 1 and 10 ml in group 2. Immediately after the injection, an epidural catheter was directed 5 cm cephalad through the Tuohy needle. The patient was positioned supine. Five minutes after injection of saline, 12 ml of 2% mepivacaine was administered for 1 min through the epidural catheter. Lactated Ringer’s solution was administered intravenously at 10 ml/kg/h during and after these procedures. Mean blood pressure, heart rate, and the ranges of hyposthesia and analgesia were measured before anesthesia and 15 min after injection of mepivacaine into the epidural space. The extents of hyposthesia and analgesia were tested by a blinded individual, and assessed with an alcohol swab and a pinprick, respectively. The hemodynamic data are expressed as mean ± SD and the number of anesthetized spinal segments are expressed as median ± range.

There were no statistically significant differences between pre-values of both groups in mean blood pressure and heart rate (Mann-Whitney U test). Although mean blood pressure and heart rate did not change significantly 15 min later in group 1, in group 2, mean blood pressure and heart rate significantly decreased (P < 0.05, Wilcoxon signed-rank test). All patients in group 1 obtained hyposthesia and analgesia. In group 2, all patients also obtained hyposthesia, and 13 of 15 patients experienced significant analgesia. Therefore, the statistical analysis of analgesia in group 2 was done with 13 patients. The number of anesthetized spinal segments (above the 2nd sacral dermatome) with regard to hyposthesia were 9 ± 7 and 14 ± 11 segments in groups 1 and 2, respectively. The number of anesthetized spinal segments with analgesia in groups 1 and 2 were 5 ± 11 and 10 ± 11 (n = 13), respectively. There were significant differences between both groups (P < 0.05, Mann-Whitney U test) (table 1).

These data suggest that injection volume of saline before epidural anesthesia with loss of resistance method may affect the extent of anesthesia (i.e., the greater the volume of saline, the greater the extent of anesthesia). Conversely, in two patients in the current study who received 10 ml saline, analgesia was not obtained. Because the two patients did demonstrate satisfactory hyposthesia, the epidural catheter was thought to be in the epi-

Table 1. Mean Blood Pressure, Heart Rate, and Anesthetized Spinal Segments

<table>
<thead>
<tr>
<th>Group 1 (2 ml saline)</th>
<th>Group 2 (10 ml saline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre 15 min</td>
<td>Pre 15 min</td>
</tr>
<tr>
<td>MBP (mmHg)</td>
<td>94 ± 16  93 ± 15</td>
</tr>
<tr>
<td>HR (bpm)</td>
<td>89 ± 12  90 ± 13</td>
</tr>
<tr>
<td>Hyposthesia</td>
<td>9 ± 7     14 ± 11</td>
</tr>
<tr>
<td>Analgesia</td>
<td>5 ± 11    10 ± 11</td>
</tr>
</tbody>
</table>

Anesthetized spinal segments were calculated above the 2nd sacral dermatome. Values are mean ± SD with the hemodynamic data and median ± range with the anesthetized spinal segments.

HR = heart rate; bpm = beats/min; MBP = mean blood pressure.

* P < 0.05 versus pre-values.

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dural space. I speculate that the lack of analgesia may be attributed to the dilution of local anesthetic with the prior injected saline. In other words, greater volume of saline may decrease the anesthetic effect in spite of increasing the spread of anesthesia. Further study concerning a relation among injection volume of saline, spread of anesthesia, and anesthetic effect will be needed.

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Max Kappis and the Celiac Plexus Block

To the Editor — In the literature, including a recent article by Ina et al., 1-4 Max Kappis has repeatedly been described as the one who developed the technique of transcutaneous celiac plexus block. This is incorrect, although we do think that he has earned a place in the history of anesthesia as the developer of the transcutaneous splanchnic nerve block. In studies using dogs, he was able to show that pain from the upper abdominal organs is conducted through the splanchnic nerves, and that the upper abdomen could be operated on after previous infiltration with procaine to the splanchnic nerves from the back. His intention was so clearly illustrated in the accompanying figure. 5 This is a very clear illustration of his block. It shows that he had the same image when he performed the block as we are able to do with computed tomographic scan guidance now. Therefore, this was not the celiac plexus block but splanchnic nerve block. 6 In addition, he never used the word celiac (solar) plexus block in any of his publications. His technique was, therefore, relatively safe, despite the absence of x-ray or computed tomography control, as compared with actual celiac plexus block, which requires penetration of the diaphragmatic crus. We think this was one reason why his technique gained popularity for upper abdominal surgery at that time.

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