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Dural Puncture Epidural in Obese Parturients: Comment

To the Editor:

We are writing to raise some concerns about the study conducted by Tan *et al.*[1] Their article "Quality of Labor Analgesia with Dural Puncture Epidural *versus* Standard Epidural Technique in Obese Parturients: A Double-blind Randomized Controlled Study" demonstrated that dural puncture epidural did not provide additional benefits in improving labor analgesia in obese parturients.

In their study, labor analgesia was maintained with programed intermittent epidural boluses of 6 ml of 0.1% ropivacaine with 2 μg/mL fentanyl every 45 min. With such small bolus volumes, the analgesic improvement resulting from drug translocation through the dural conduit with the dural puncture epidural technique may be obscured. Moreover, the delivery rate of programed bolus dose administration was not reported in this study. Generally, high-rate epidural boluses increase injectate pressure and might facilitate drug translocation. We speculated that the inadequate bolus volume and/or the low delivery rate failed to generate sufficient pressure gradient and made the drug hard to "press" from the epidural space into the subarachnoid space.

We noticed another study conducted in the same institution using the same programed intermittent epidural bolus protocol (6 ml every 45 min) that failed to find improved outcomes compared to conventional epidural continuous infusion (8 mL/h),[2] although the attempts of patient-controlled epidural analgesia were significantly higher with programed intermittent boluses compared to that with continuous infusion. The increasing analgesia demands for pain control of patient-controlled epidural analgesia might be a surrogate for inadequate pain relief. Since there are many variables in the programed intermittent epidural bolus settings, Wong *et al.*[3] believe that the programed intermittent bolus volume and interval time might influence the quality of analgesia during the maintenance of epidural labor analgesia. In our randomized controlled study, we used relatively larger programed intermittent volumes and longer intervals (8 ml every 60 min) compared to the current study and found improved analgesia quality and drug-sparing effect with dural puncture epidural compared to standard epidural technique.[4]

For the mechanism, Tan *et al.*[1] explained that the small drug mass might fail to generate the required pressure to drive ropivacaine molecules across dural hole. However, in our study,[4] with the same concentration of ropivacaine, the results were not consistent, possibly indicating that the major reason for the failure of primary outcome of the current study might be the inadequate volume of the programed intermittent bolus rather than the drug mass.

Competing Interests

The authors declare no competing interests.

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Dural Puncture Epidural in Obese Parturients: Reply

In Reply:

We thank Du and Liu[1] for their comments regarding our study assessing the quality of labor analgesia with the dural puncture epidural *versus* the standard epidural technique in obese parturients.[2] They raise concerns that 6 ml·h^{-1} of 0.1% ropivacaine with 2 μg·ml^{-1} fentanyl administered as a programed intermittent bolus every 45 min may not generate sufficient pressure for drug translocation through the dural puncture, thereby explaining the absence of a significant difference in the quality of labor analgesia with the dural puncture epidural compared with the standard epidural technique in our study. To support their hypothesis, Du and Liu referenced their randomized controlled study comparing dural puncture epidural + continuous infusion, dural puncture epidural + programed intermittent boluses, and standard epidural + continuous infusion techniques.[3] Using 8 ml·h^{-1} of 0.1% ropivacaine with 0.3 μg·ml^{-1} sufentanil given as a continuous infusion or as programed intermittent boluses every 60 min, they showed that both dural puncture epidural groups achieved adequate analgesia (pain score less than or equal to 30 mm during two consecutive contractions) significantly quicker than the standard epidural group, with dural puncture epidural + programed intermittent boluses technique associated with the lowest medication consumption and patient-controlled epidural boluses.[3]

However, the study of Song *et al.*[3] was limited by the fact that it did not include a group that received standard epidural + programed intermittent epidural boluses; therefore, it is not possible to draw any conclusions from that study regarding the comparison between standard epidural and dural puncture epidural techniques when using programed intermittent epidural boluses, which we investigated in our study. In fact, it is impossible to know from their study whether the lower epidural medication consumption and patient-controlled epidural boluses in the dural puncture epidural + programed intermittent boluses group compared to the standard epidural + continuous infusion group was due to the dural puncture epidural technique or the use of programed intermittent epidural boluses. Additionally, the body mass index of parturients enrolled in their study (mean, 26 kg·m^{-2}) was significantly lower than ours (median, 41 to 42 kg·m^{-2}), which is particularly relevant given that obesity is associated with lower epidural local anesthetic requirements, likely due to higher intra-abdominal and epidural pressures.[4] We note, however, that the volume delivered over time is identical in both studies; for instance, over 3 h, parturients in both studies would have received 24 ml of 0.1% ropivacaine through the programed intermittent boluses. Furthermore, the patient-controlled epidural analgesia regimen in our study was different from that in the study by Song et al.,[3] with larger volumes and more frequent boluses allowed in our study compared to Song's study. Finally, the definition of onset of analgesia was different in the two studies, again making it impossible to make a comparison between the findings of both studies.

The epidural pumps used in our practice administer intermittent boluses at 250 ml·h^{-1}.[5] Based on previous data, this rate generates higher peak pressures compared to lower rates, which would likely be even higher in the presence of obesity. Of note, however, although higher infusion rates generally achieve greater injectate pressures,[6] improved analgesic outcomes have not been demonstrated with higher (300 ml·h^{-1}) compared to lower (100 ml·h^{-1}) infusion rates in the setting of programed intermittent boluses.[7] Finally, a multitude of variables can be manipulated with programed intermittent bolus regimens, therefore limiting comparisons between the regimens used in different studies. For instance, in another study by the same authors,[8] they reported an optimal interval between boluses of 8 ml of 0.1% ropivacaine with 0.3 μg·ml^{-1} sufentanil of 41 min, which is comparable to the interval of 45 min used in our study.

To summarize, the heterogeneity in parturient characteristics, study methodology, outcomes, and programed intermittent bolus/patient-controlled epidural analgesia regimens warrant caution when attempting to make comparisons between the findings of different studies.

Competing Interests

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