

look at their data demonstrates that left uterine displacement does have a positive effect on maternal hemodynamics, that a significant subset of patients are adversely affected when not tilted, and that we cannot predict which patients can safely be positioned supine. We, therefore, would strongly advocate for the continued use of left uterine displacement during cesarean delivery. The use of left uterine displacement should be considered for any pregnant woman in whom the uterus is palpable above the umbilicus.<sup>4</sup> Left uterine displacement is a simple, cost-free intervention with proven efficacy, and the data from Lee *et al.*<sup>1</sup> demonstrates the utility of this practice. If left uterine displacement distorts the anatomy enough to make surgery difficult, it can be reduced immediately prior to surgery, as most of the hemodynamic benefit of left uterine displacement is realized in the early post-spinal anesthesia period while surgical preparations are being made.

### Competing Interests

The authors declare no competing interests.

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## Neonatal Outcome after Maternal Supine Position for Elective Cesarean Delivery under Spinal Anesthesia: Was the Umbilical Cord Blood Sampling Procedure Reliable?

To the Editor:

I read with interest the article by Lee *et al.*<sup>1</sup> and the accompanying editorial by Farber and Bateman<sup>2</sup> regarding the

effects of maternal supine position during planned cesarean delivery with spinal anesthesia on neonatal acid-base status as well as on maternal blood pressure and cardiac output. I congratulate Lee *et al.*<sup>1</sup> for their hard work in producing this demanding study to test the noninferiority of supine position during contemporary clinical use of a crystalloid coload and phenylephrine infusion. I have several points, however, that I wish to address regarding this study by Lee *et al.*

First, although the primary outcome of the study was mean umbilical artery base excess and the secondary outcomes were mean umbilical artery pH and umbilical vein base excess and pH, the authors did not describe their umbilical cord blood sampling procedure. It was not mentioned whether a segment of the umbilical cord was double-clamped. If only a single clamp was applied, the umbilical cord blood would remain in continuity with the placenta. The ongoing placental metabolism and gas exchange could result in changes in umbilical base excess and pH. Base excess significantly decreases (becomes more negative) after 20 min onward if the umbilical cord was not double-clamped and after 40 min onward if the umbilical cord was double-clamped. The pH steadily decreases after 60 s of delivery onward if the umbilical cord was not double-clamped; a difference of approximately 0.20 pH units may be reached by 60 min after delivery.<sup>3</sup> In their protocol registered on www.ClinicalTrials.gov (NCT02243423), Lee *et al.* state that the time frame for their sample is within 2 h. Absence of data regarding the umbilical cord blood sampling procedure may make the results unreliable.

Second, it was mentioned in the Results section<sup>1</sup> that the baseline cardiac output was 8.4 l/min in the tilted position versus 8.1 l/min in the supine position, resulting in a difference of 0.3 l/min and giving a *P* value of 0.002 using the paired *t* test. From figure 4,<sup>1</sup> it seems that 8.4 l/min and 8.1 l/min are the mean cardiac output over the first 15 min after spinal anesthesia in the tilted and in the supine position respectively and not the baseline cardiac outputs as stated. From the same figure, it seems that baseline cardiac outputs are around 9.25 l/min. In addition, the correct test to be done is the unpaired *t* test. The explanation is that the paired *t* tests consider the differences between each paired observation when computing the *P* values while the unpaired *t* tests consider the differences in group means.<sup>4</sup>

Third, some variables that may influence the neonatal or maternal outcomes were not included in the study. Such confounding variables include induction-to-delivery interval and uterine incision-to-delivery interval for neonatal outcomes and include block height for maternal outcomes.

Fourth, a strange pharmacologic response occurred during treatment of the patient who had an acute drop in blood pressure to 44/22 mmHg with a heart rate of 130/min at 6 min after spinal anesthesia. The minute after receiving a single dose of ephedrine 10 mg intravenously, the patient's blood pressure rebounded to 198/104 mmHg with a heart rate of 61/min. Ephedrine causes increase in the heart rate

unlike what happened in the current incident. Is this due to a drug error wherein phenylephrine was given instead of ephedrine or due to a writing error?

Finally, the added examples to the American Society of Anesthesiologists (ASA) Physical Status Classification System approved by the ASA House of Delegates on October 15, 2014 considered pregnancy to be ASA II. The current study by Lee *et al.* stratified some pregnant patients as ASA I, which does not comply with the latest updates of the ASA Physical Status Classification System.<sup>5</sup>

## Competing Interests

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## Left Lateral Table Tilt for Elective Cesarean Delivery under Spinal Anesthesia Should Not Be Abandoned

To the Editor:

We have read with interest an article by Lee *et al.* published in the August 2017 issue of *ANESTHESIOLOGY*.<sup>1</sup> We wish to congratulate the authors for evaluating the effects of supine positioning compared with a 15° left uterine displacement tilt on neonatal acid-base status in healthy, nonlaboring, term women scheduled for elective cesarean delivery under spinal anesthesia when systolic blood pressure was maintained using a crystalloid preemptive bolus and a phenylephrine infusion.

The authors found no effect of maternal positioning on neonatal acid-base status and concluded that the supine position

was not *inferior* to the tilted left uterine displacement position. Because the study was conducted on nonlaboring healthy women, however, as stated in its limitations, we suggest that the tilted left uterine displacement position should not be abandoned despite the findings of this study. Even though there were no changes in neonatal acid-base status, the study's results actually indicate the *superiority* of a 15° tilted left uterine displacement position as compared with the supine position. Patients who were in the supine position had statistically significant lower systolic blood pressures and cardiac outputs, and required significantly higher mean doses of phenylephrine during the first 15 min after placement of spinal anesthesia to maintain their blood pressure, as compared with the tilted left uterine displacement group. We believe that based on this study the supine position may serve as a safe alternative to the left uterine displacement position in above-mentioned patients only when 15° tilt is not feasible, which realistically should be extremely rare under elective conditions.

Furthermore, the authors emphasize the “disadvantage” of using base excess values because they are a “calculated value.” A clarification between estimated/approximated values *versus* calculated values should be addressed. A calculated value is deemed accurate, like any measured value, but estimated/approximated values may not be. The calculated value for bicarbonate/base excess concentration is derived from the Henderson-Hasselbalch equation using measured values for both the carbon dioxide pressure and hydrogen ion concentration. It is not an estimate, which could be inaccurate. Therefore, the calculated value for bicarbonate/base excess would only be inaccurate if the measured value for either the carbon dioxide pressure or the hydrogen ion concentration is incorrect, and thus there is no disadvantage to using a calculated value, despite this being incorrectly asserted by the authors.

Lastly, we wish to address some clerical/typographic errors. Among the study participants, the authors included parturients with American Society of Anesthesiologists Physical Status I and II and excluded patients with autonomic neuropathy (*e.g.*, diabetes mellitus for greater than 10 yr). Generally, a healthy term pregnant patient is classified as no less than American Society of Anesthesiologists Physical Status II. The extent of time needed for a diabetic patient to become neuropathic is unknown and highly variable depending on many factors. We also believe the authors meant “LUD [left uterine displacement] placement is intended to reduce/prevent supine hypotensive syndrome in the pregnant patient”<sup>2</sup> and not to prevent spinal-induced maternal hypotension, as the authors stated in their discussion. These two physiologic factors (sympathetic block induced by neuraxial anesthesia and aortocaval compression by the gravid uterus) are not synonymous, one with the other, and should not be confused as being related to each other. Neuraxial block causes hypotension by blocking preganglionic sympathetic fibers of which there are 14 pairs (T1–L2); the degree of hypotension is directly related to the number of segments blocked. In basic physiology, it has been known equally as long that reducing