Not Too Little, Not Too Much

Finding the Goldilocks Zone for Spinal Anesthesia to Facilitate External Cephalic Version

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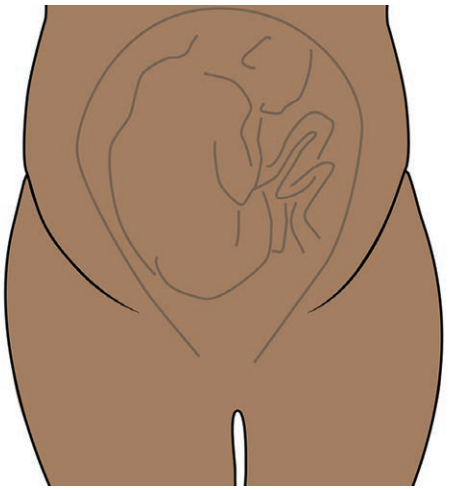
APPROXIMATELY one third of all births in the United States are by cesarean delivery, and in most high-income countries the cesarean delivery rate also exceeds that recommended by the World Health Organization for optimal maternal and neonatal outcomes.[1] This is concerning, because cesarean delivery, and particularly high-order repeat cesarean delivery, is associated with an increase in maternal morbidity and cost compared with vaginal delivery. Consequently, there is considerable interest in the obstetric community in identifying and applying strategies to reduce the need for cesarean delivery. Particular attention has been given to preventing the first cesarean delivery, because if a woman undergoes a primary cesarean delivery, there is a 91% likelihood of cesarean delivery in subsequent pregnancies.[2] One strategy that has been the focus of renewed interest in this regard is the use of external cephalic version, which is a procedure to rotate a breech presentation fetus to a vertex position before the onset of labor to facilitate vaginal delivery. Breech vaginal delivery is no longer generally offered based on data showing that this technique is associated with poorer neonatal outcomes compared with cesarean delivery.[3] Thus external cephalic version, when successful, can reduce the need for cesarean delivery, and its use in appropriate patients is encouraged by obstetric professional organizations.[3]



"What dose of intrathecal bupivacaine is necessary to optimize the probability of external cephalic version success?"

Neuraxial (spinal, combined spinal–epidural, and epidural) analgesia and/or anesthesia increases the likelihood of successful version. In this edition of ANESTHESIOLOGY, Chalifoux *et al.*[4] take up the question, "What dose of intrathecal bupivacaine is necessary to optimize the probability of external cephalic version success?" Neuraxial analgesia–anesthesia reduces maternal pain associated with external cephalic version and causes abdominal muscle relaxation, which may allow the obstetrician to more effectively rotate the fetus and thereby improve the probability of successful version. Numerous studies and several systematic reviews and meta-analyses suggest that neuraxial analgesia–anesthesia increases external cephalic version success and thus reduces the need for subsequent cesarean delivery.[5–7] The most recent meta-analysis found a significantly higher incidence of successful external cephalic version (58% *vs.* 43%; relative risk = 1.44; 95% CI, 1.27 to 1.64) and lower rate of cesarean delivery (46% *vs.* 55%; relative risk = 0.83; 95% CI, 0.71 to 0.97) in women receiving neuraxial analgesia–anesthesia compared with control subjects.[6]

Although the role of neuraxial analgesia–anesthesia to facilitate external cephalic version is well established, the optimal spinal or epidural dosing protocol has not been fully elucidated. Subgroup analysis from a meta-analysis suggested that anesthetic rather than analgesic neuraxial dosing strategies may be needed to optimize external cephalic version success[5] (relative risk of success = 1.95; 95% CI, 1.46 to 2.60; $P < 0.001$ with an anesthetic dose of local anesthetic, and relative risk = 1.18; 95% CI, 0.94 to 1.49; $P = 0.15$ in studies that used an analgesic doses). However, this is based on an indirect comparison of studies, and CIs substantially overlap. Neuraxial dosing regimens have never been directly compared within a study, nor have dose–response studies been conducted to evaluate the optimal neuraxial dose required to facilitate external cephalic version. Therefore, the study by Chalifoux *et al.*[4] is a welcome addition to the obstetric anesthesia literature because it is the first study to examine the optimal degree of neuraxial blockade required to facilitate successful external cephalic version.

Image: J. P. Rathmell.

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The authors need to be commended for presenting a superb study that is particularly difficult to conduct and execute effectively. In a randomized fashion, the investigators assessed the effect of four intrathecal bupivacaine doses (2.5, 5.0, 7.5, and 10.0 mg) combined with fentanyl 15 μg as part of a combined spinal–epidural anesthetic technique to facilitate external cephalic version. Overall, external cephalic version was successful in 123 (52%) of the 239 patients participating in the study. Doses of intrathecal bupivacaine greater than 2.5 mg did not increase external cephalic version success (P = 0.99) or reduce cesarean delivery rates (P = 0.76).[4] Relative to bupivacaine 2.5 mg, the odds (99% CIs) for a successful external cephalic version were 1.0 (0.4 to 2.6), 1.0 (0.4 to 2.7), and 0.9 (0.4 to 2.4) for bupivacaine 5.0, 7.5, and 10.0 mg, respectively (P = 0.99).[4]

These findings will come as a surprise to the obstetric anesthesia community, where the assumption has been that denser blocks are associated with a higher likelihood of external cephalic version success. So, why were the authors unable to find improved rates of version with doses greater than 2.5 mg bupivacaine with fentanyl 15 μg? The most likely explanation is that 2.5 mg is already on the flat part of the dose–response curve. Their reported median sensory blockade level in the 2.5-mg bupivacaine group of T6 was at the level defined by Lavoie and Guay[5] for neuraxial anesthesia *versus* analgesia and similar to the sensory levels of the 5.0-, 7.5-, and 10-mg dosing groups (T5 to T6, T4, and T4, respectively). In addition, there was no difference in the obstetrician rating of abdominal relaxation, a key mechanism proposed for neuraxial anesthesia facilitating external cephalic version success. Pain during the external cephalic version procedure was greater in the 2.5-mg bupivacaine group (12/100 *vs*. 4 to 5/100 in the 5- to 10-mg dosing groups),[4] but these small differences likely would not have contributed to improved conditions for external cephalic version in the higher-dose groups.

Because the trial did not have a control group that did not receive neuraxial anesthesia, it does not directly assess the impact of using neuraxial anesthesia to improve external cephalic version success rates. Chalifoux *et al.*[4] do, however, report an overall external cephalic version success rate of 52% that is in keeping with previously reported external cephalic version success rates using neuraxial analgesia–anesthesia (56%) compared with no neuraxial analgesia–anesthesia (36%)[8] and higher than their institution average of 40%. Therefore, this study indirectly provides additional support for the role of neuraxial analgesia–anesthesia in facilitating successful external cephalic version.

Given the findings of Chalifoux *et al.*,[4] what is the optimal neuraxial spinal dosing regimen to facilitate external cephalic version? The answer is probably clinical context specific. If the plan is for timely discharge irrespective of the external cephalic version being successful, a lower dosing regimen (*e.g.*, 2.5 mg bupivacaine plus 15 μg fentanyl) may be prudent. The authors found that discharge time was increased by 60 min (range, 16 to 116 min) with greater than 7.5 mg bupivacaine as compared with 2.5 mg (P = 0.004).[4] However, if the plan is either cesarean delivery (if unsuccessful external cephalic version) or immediate admission for induction of labor (if successful external cephalic version), then a larger dose may be warranted, especially given the rare event of an emergent cesarean delivery during external cephalic version. The incidence of emergent delivery in the current study by Chalifoux *et al.*[4] was 3.30% and surprisingly higher than the previously reported risk of emergency cesarean delivery during external cephalic version of 0.43%.[9] Larger spinal doses (*e.g.*, 10 mg bupivacaine) would facilitate emergency cesarean delivery under neuraxial anesthesia.

The study by Chalifoux *et al.*[4] is an important addition to the evidence base regarding the use of neuraxial analgesia–anesthesia to facilitate external cephalic version. The study demonstrates that various neuraxial dosing regimens can be used to help facilitate external cephalic version and improve the likelihood of successful version. It is encouraging to realize that anesthesiologists can carry the evidence presented in this and other studies on the use of neuraxial analgesia–anesthesia to facilitate external cephalic version into their daily practice to address the important public health issue of high cesarean delivery rates. To do this successfully, anesthesia providers need to inform their obstetrician colleagues of the role of anesthesia for external cephalic version, because this knowledge has not been adequately disseminated,[10] and to remove potential barriers to offering the service. Neuraxial anesthesia for external cephalic version has been shown not to increase complications (transient bradycardia, nonreassuring fetal heart rates, or placental abruption) or the incidence of emergency cesarean delivery.[6,7] External cephalic version attempted with neuraxial analgesia–anesthesia compared with external cephalic version without neuraxial analgesia–anesthesia is also likely cost-effective, with increased external cephalic version success and the subsequent reduction in cesarean delivery rates with neuraxial anesthesia offsetting the costs of providing anesthesia to facilitate external cephalic version.[11] Future studies still need to determine the optimal technique (spinal, combined spinal–epidural, or epidural), the ideal gestational age to offer neuraxial anesthesia, the optimal local anesthetic plus opioid combination, and which patients with breech presentation undergoing external cephalic version will benefit most from neuraxial analgesia–anesthesia.

Competing Interests

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