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EDITORIAL

Neuraxial labor analgesia, obstetrical outcomes, and the Robson 10-Group Classification

Neuraxial labor analgesia provides the most effective and safe pain relief for laboring women worldwide. Because neuraxial techniques (combined spinal-epidural or standard epidural), drug dosing (high or low local anesthetic concentration and volume), drug delivery modality (continuous infusion or programmed intermittent epidural bolus administration) have evolved and anesthesia and obstetrical practices vary between institutions and countries, it remains challenging to determine whether intrapartum neuraxial analgesia affects any obstetric outcome.

Current research evidence supports that intrapartum neuraxial analgesia (1) may prolong the second stage of labor but not the first stage (2) is not associated with an increased risk of cesarean delivery, and (3) may or may not increase the risk for instrumental (i.e. vacuum or forceps) vaginal delivery, with conflicting evidence from observational, randomized, and before-after studies.[1,2] Numerous factors may have been responsible for diverse findings in individual studies, including the quality of analgesia and how it was defined, the intensity of motor blockade and how it was scored, and the specific circumstances and indications for instrumental vaginal delivery. Therefore, in order to compare "apples with apples", it is suggested that a better definition of obstetric and labor characteristics, along with specified outcome measures, is crucial in clinical studies that evaluate labor and delivery outcomes.

The Robson 10-Group Classification system, first proposed in 2001[3] and further refined in 2015,[4] is based on six easily ascertainable prepartum obstetric and labor characteristics, namely parity (nulliparous versus multiparous); plurality (singleton versus multiple gestation); fetal presentation (cephalic or breech) or lie (transverse or oblique); gestational age (≥37 versus <37 weeks' gestation); type of labor (spontaneous, induced, or not in labor); and history of previous cesarean delivery (Fig. 1).[5] The Robson 10-Group Classification was specifically designed to allow comparison of cesarean delivery rates between hospitals or countries, and over time, by obstetric scenario. Although somewhat critiqued,[6] the World Health Organization (WHO),[7,8] and others,[9–19] have adopted the Robson 10-Group Classification in order to track cesarean delivery patterns across the last decade, and to apply the classification to tackle the cesarean delivery 'epidemic' in high-income countries.[20]

It was recently proposed that this classification may be 'a new way of thinking' that goes beyond classification of cesarean deliveries or a tool to reduce cesarean delivery rates, by allowing further analyses of all labor and delivery events and outcomes.[21] Recently it was used by Hehir et al. to describe and compare cesarean deliveries patterns in the United States from 2005 to 2014, using national birth data available in the National Vital Statistics System.[22] As expected, multiparous women with a previous cesarean delivery, at ≥37 weeks, and with a single cephalic fetus (Robson Group 5), represented the largest single contributor to cesarean deliveries, with a third of all cesarean deliveries performed in this group alone.[22]

We agree with such an approach. In the field of anesthesiology, the American Society of Anesthesiologists (ASA) physical status classification, described in the 1940s,[23] goes beyond a classification for risk stratification (from 1 to 5), and aims to predict postoperative mortality according to preoperative parameters. It allows anesthesiologists to tailor management based on each patient's identified risk score. Therefore, it is novel to see the Robson 10-Group Classification applied to obstetric anesthesia-related outcomes in a study published by Lucovnik et al. in the May 2018 issue of this Journal.[24] We value the opportunity to provide our commentary on this study examining the association between intrapartum labor analgesia and cesarean and instrumental vaginal delivery rates in each of the 10 Robson Groups. Lucovnik et al. analyzed national administrative data in Slovenia between 2007 and 2014.[24] The authors reported that within each of the 10 groups, women who had received intrapartum neuraxial analgesia had higher instrumental vaginal delivery rates (when numbers were sufficient to conduct comparisons). In contrast, the likelihood of cesarean delivery among women receiving intrapartum neuraxial analgesia was lower for most of the groups (when a comparison was possible). This exploratory study may be viewed as an important step in examining the association between intrapartum neuraxial analgesia and obstetric outcomes according to groups of women sharing common pregnancy and labor characteristics. The

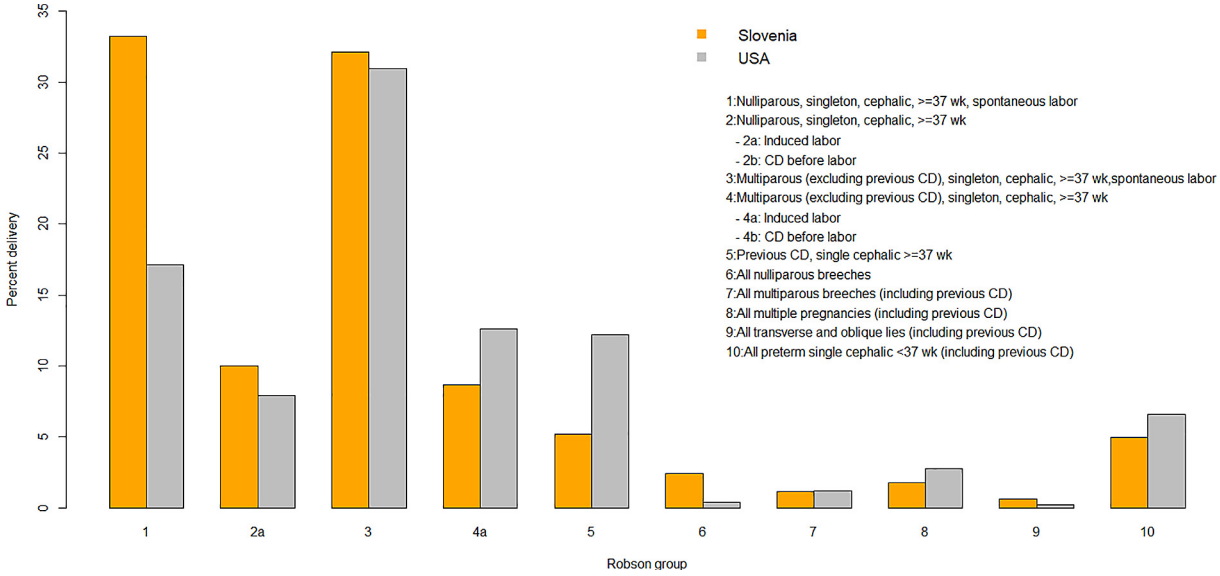

Fig. 1 Contribution of each one of the 10 Robson Groups to the total number of deliveries in Slovenia between 2007 and 2014 (N=207 143 vaginal and cesarean deliveries),[24] and in the United States between 2013 and 2014 (N=7 156 597 vaginal and cesarean deliveries).[22] CD: cesarean delivery; wk: week.

authors should be lauded for their efforts to apply, for the first time, this classification to examine obstetric anesthesia outcomes. In addition, it provides information on obstetric and obstetric anesthesia care that may guide initiatives aiming at improving the quality of care in Slovenia and other settings. However, this study demonstrates the major obstacles when using administrative data to compare outcomes, particularly with regards to intrapartum neuraxial analgesia, highlighting the need for novel data systems.

One of the striking results is that the intrapartum neuraxial analgesia rate in Slovenia, not reported by the authors but calculated to be 9.2% (19 061 of 207 143 cases) was remarkably low compared to current use in high-resource setting countries.[24] Indeed, in a recent study reporting on intrapartum neuraxial analgesia utilization in 2015 in the United States, 73% of women delivered with intrapartum neuraxial analgesia (epidural or combined spinal-epidural analgesia).[25] It is likely that both cultural and societal beliefs and availability of dedicated obstetric anesthesia teams are major factors in between-country intrapartum neuraxial analgesia rate variation.

We note several marked differences in anesthesia utilization and obstetric practice in the Slovenian cohort,[24] compared with the publication applying the Robson 10-Group Classification in a United States cohort by Hehir et al. in the July issue of the American Journal of Obstetrics and Gynecology,[22] that impact the generalizability of the findings. With an overall labor neuraxial analgesia rate in Slovenia as low as 9.2%, it was even lower, at 3.5% (763 with neuraxial analgesia of 21 731 cases) among women in Robson Groups 5–8, which combine women with a previous cesarean delivery, a fetal breech presentation, or a multiple pregnancy. Of clinical relevance, these women would typically be deemed at higher risk for intrapartum cesarean delivery and might be expected to receive counselling about early neuraxial analgesia, in an attempt to avoid the risks associated with general anesthesia in obstetric patients.[26,27] Indeed, the 2017 American College of Obstetricians and Gynecologists (ACOG) bulletin on vaginal birth after cesarean delivery indicates that epidural analgesia for labor may be used as part of a trial of labor and that it is not expected to mask signs or symptoms of uterine rupture, particularly because the most common sign of rupture is fetal heart tracing abnormalities.[28] Labor epidural analgesia details were not reported in the study by Hehir et al.[22] although it is possible that the intrapartum epidural rate was highest amongst these women.

Furthermore, in the Slovenian cohort the overall cesarean delivery rate was remarkably low, at 18.2% (37 764 of 207 143 cases).[24] When examining the contribution of each one of the 10 groups to the total of cesarean deliveries in Slovenia, cesarean deliveries rates were highest at 36.1% (13 646 of 37 764 cases) in Robson Groups 1 and 2a (the nulliparous women) and in Robson Group 5 (women with a previous cesarean delivery), at 21.4% (8067 of 37 764 cases) (Fig. 2). In stark contrast, the overall contemporary cesarean delivery rate in the study by Hehir et al. was 31.6% in 2014,[22] and when examining the contribution of each one of the 10 groups to the total of cesarean deliveries, cesareans were predominantly performed in women in Robson Group 5 (those with a previous cesarean delivery), these women having a 34.5% rate (401 495 of 1 164 954 cases). The nulliparous women of Robson Groups 1 and 2a

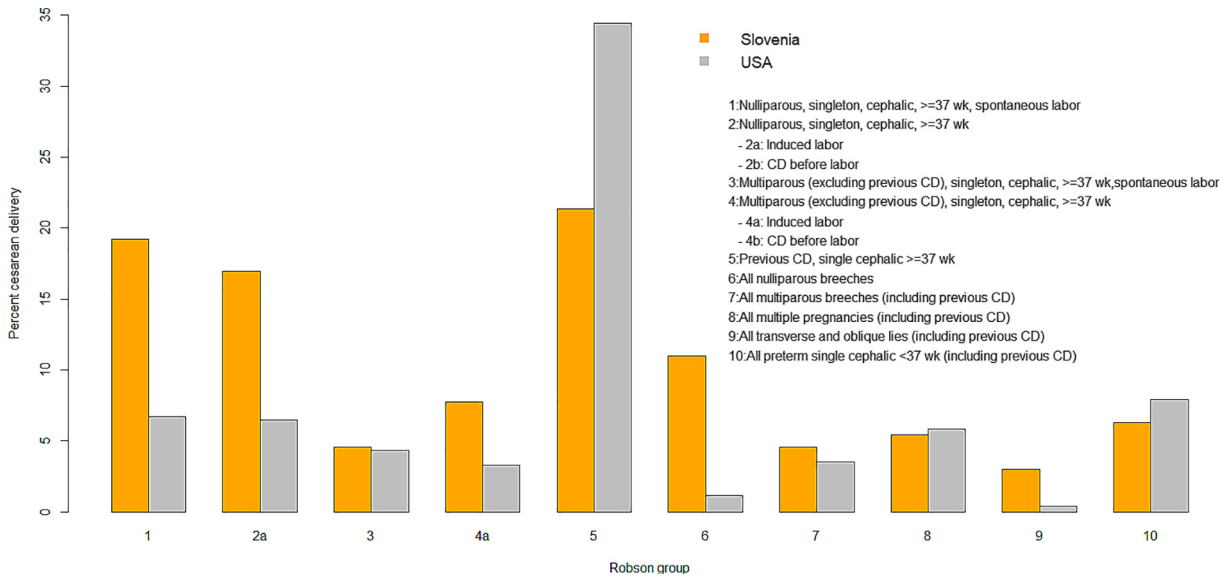

Fig. 2 Contribution of each one of the 10 Robson Groups to the total number of cesarean deliveries in Slovenia between 2007 and 2014 (N=37 764 cesarean deliveries)[24] and in the United States in 2014 (N=1 164 954 cesarean deliveries).[22] CD: cesarean delivery; wk: week.

accounted for only 13.2% of cesarean deliveries (15 340 of 1 164 954 cases) (Fig. 2). Such differences substantiate contrasting obstetric practices, and suggest that more women in Slovenia are successfully achieving a trial of labor after prior cesarean delivery, while comparatively fewer nulliparous women are successfully delivering vaginally. The authors did not provide any explanation for these findings.

Consequently, the small study sample and the low neuraxial analgesia rate in the Slovenian cohort limit the interpretation of the analysis beyond the description of cesarean and instrumental vaginal delivery rates in women with and without neuraxial labor analgesia. In fact, from a statistical standpoint, this study is underpowered to provide statistical confidence, overall and within each of the 10 groups. A sample size calculation suggests that at least 400 000 parturients would need to be included in a study aiming to demonstrate a 10% increase in the instrumental vaginal delivery rate with intrapartum neuraxial analgesia, when the baseline rate for instrumentation is 2.5% and the intrapartum neuraxial analgesia rate is only 9% (alpha error risk = 5%, power = 80%). In their analysis, Lukovnic et al. included a total of 207 143 women.[24]

Lastly, several factors associated with an increased odds for instrumental vaginal delivery are not reported (and probably not available in the Slovenian database), hampering the interpretation of the results. As with any database data, the study lacks detail on key physician- or hospital-level factors, and no information about institutional indications and practice in relation to instrumental vaginal delivery is provided. Furthermore, important characteristics related to neuraxial analgesia use, only labelled by the authors as 'epidural analgesia', with a dichotomous outcome of received or not received, are critically missing. Indeed, we have no information about (1) the timing of initiation of neuraxial analgesia, 'early' versus 'late epidural' (according to cervical dilatation and labor progression), (2) the anesthetic drugs given or their concentration and mode of administration. These parameters could potentially result in some motor blockade and seem to have contributed to the increase in instrumental delivery rate noted in early studies (conducted before 2005) using high-concentrations or doses for epidural analgesia.[2]

These numerous limitations when using a database for analyses of labor and delivery events and outcomes[21] raise the question of the most suitable methodology to use if evaluating the effect of contemporary neuraxial labor analgesia on instrumental vaginal delivery rates. A randomized, controlled trial allocating women to neuraxial labor analgesia versus no neuraxial labor analgesia would not be feasible or ethical nowadays. An observational study would be a more realistic approach but would require access to detailed information on the hospital characteristics, obstetric and anesthetic practices; and a sufficiently large cohort to examine the association between intrapartum neuraxial analgesia and instrumental vaginal delivery rate, overall and within each of the 10 Robson Groups. To date, hospital discharges records (i.e. administrative data) used for billing purposes are the only data system providing sufficiently large cohorts of patients for a study with adequate statistical power. However, they do not contain the required information about obstetric providers' practice (preference and experience with instrumental deliveries) and anesthesia practice, and even the most robust statistical approaches will not yield results in the setting of critically missing data.

Therefore, we believe this study underscores the need for new data systems in anesthesia outcome research. The development of electronic health records (EHR) providing detailed information about obstetric practice and anesthesia care is key. We are aware of several initiatives under way to create registries using EHR; the Maternal Quality Improvement Program (MQIP) is one example of an initiative supported by the ACOG and the ASA to create a national outcomes registry for maternity care, centered around labor and delivery, using data extracted from EHR.[29] Such a registry will likely provide important results on the interaction between neuraxial labor analgesia and obstetric or neonatal outcomes in the United States, nonetheless, international registries for continued quality and safety improvement of obstetric anesthesia care are also needed – and we still have a long way to go.

R. Landau, A. Friedman, J. Guglielminotti
Department of Anesthesiology and Division of Maternal Fetal Medicine, Department of Obstetrics and Gynecology, Columbia University College of Physicians and Surgeons, New York, USA
E-mail address: rl262@cumc.columbia.edu

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