Optimizing the length of the second stage and management of pushing

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Although the optimal length of the second stage of labor to minimize maternal and neonatal morbidities and optimize spontaneous vaginal delivery is not known, available evidence suggests that increasing length of the second stage is associated with increasing maternal and neonatal morbidity. Thus, evidence-based strategies to safely shorten the second stage, such as initiating pushing when complete dilation is reached among those with neuraxial anesthesia, is prudent. Many aspects of optimal management of the second stage of labor require future study to continue to guide clinical second-stage management.

Key words: labor, second stage, second stage duration, second stage management

Introduction

The second stage of labor, defined as the interval from complete cervical dilation through the delivery of the infant, is a physiologically challenging time for both the pregnant woman and the fetus. The normal second stage is characterized by increasing contraction frequency, duration, intensity, and discomfort, fetal descent, and maternal expulsive efforts. There are several considerations for optimizing the clinical management of the second stage of labor.

Epidemiology of epidural use and impact

Neuraxial anesthesia is an effective method of pain management during labor. The National Vital Statistics System in the United States reported a rate of 61.0% use in 2008.[1] Several studies ever since have demonstrated rates of >80%.[2]

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Early concerns regarding the impact of regional anesthesia on labor progress prompted several investigators to explore whether receiving neuraxial anesthesia, or its timing of initiation, negatively affected labor progress. A Cochrane meta-analysis of 20 trials comparing neuraxial anesthesia with other alternatives for managing labor pain found no difference in the rate of cesarean delivery between groups.[3] Another Cochrane meta-analysis of 9 studies comparing early with late initiation of regional anesthesia found no difference in rates of cesarean delivery, operative vaginal delivery, or length of the second stage of labor.[4] These data and others led the American College of Obstetricians and Gynecologists to support the initiation of neuraxial anesthesia for pain in labor at the time of patient request.[5] However, despite being highly effective for pain management, the use of neuraxial anesthesia is associated with an increase in length of the second stage of labor.[2] But importantly, since the advent of labor neuraxial anesthesia, there have been significant advancements to maximize pain relief while having minimal unwanted effects such as reduced motor control and impediment of labor progress.[6]

Second stage duration

The expected length of the second stage of labor has typically been up to 3 hours among nulliparous women with an epidural and up to 2 hours among multiparous women with an epidural.[2,7,8] Furthermore, despite emerging evidence suggesting differences in the expected length of normal first stage of labor, the average length of the second stage has remained fairly constant, with Friedman reporting a mean of 0.95 hours for nulliparas and Zhang et al reporting a median of 1.1 hours for nulliparas with an epidural.[2,7] However, in the Consortium on Safe Labor study, a retrospective multicenter cohort study of 62,415 patients, whereas the median length of the second stage among women with neuraxial anesthesia was 1.1 hours and 0.4 hours for nulliparas and multiparas, respectively, the 95th percentile of the second stage of labor in nulliparas with and without epidural analgesia was 3.6 and 2.8 hours, respectively, longer than the 3-hour and 2-hour—limits might suggest.[2]

Several studies have suggested that increasing the allowed length of the second stage may increase the chance of a spontaneous vaginal delivery. A secondary analysis of an observational study of 53,285 singleton pregnancies that reached complete dilation reported that the probability of vaginal delivery decreased as the duration of second stage increased. However, even at >4 hours of pushing the chance of vaginal delivery for a nulliparous woman was 78%.[9] Similarly, in a secondary analysis of the Consortium on Safe Labor study including 3810 nulliparous and 59,605 multiparous singleton pregnancies reaching complete dilation, the chance of vaginal delivery after prolonged second stage among those with epidurals was 79.9% for nulliparas (>3 hours) and 88.7% for multiparas (>2 hours).[10] However, a prolonged second stage was associated with increased chorioamnionitis, third- or fourth-degree lacerations,

and neonatal morbidity including sepsis and asphyxia.[10] These findings suggest that although extending the length of the second stage may reduce rates of cesarean delivery, there may be a trade-off with maternal and neonatal morbidity risks.

Several studies have similarly demonstrated the relationship between extending the length of the second stage of labor and maternal and neonatal morbidities.[10−13] A retrospective cohort study of more than 19,000 patients comparing the length of extension of the second stage in those with an epidural, for 1 hour, >3 hours for nulliparas, and 2 hours for multiparas, found that the extended group had a lower cesarean delivery rate but an increase in neonatal acidemia, neonatal intensive care unit admission, and third- and fourth-degree perineal lacerations.[14] In a retrospective cohort study examining the impact of duration of pushing on vaginal delivery and maternal and neonatal risks, Grobman et al found that increased length of pushing was associated with a high likelihood of vaginal delivery (78% among nulliparas) but an increased odds of postpartum hemorrhage, cesarean delivery, operative vaginal delivery, third- or fourth-degree lacerations, and neonatal morbidity.[9] Unfortunately, the data for other aspects of the second stage that likely affect duration, including ongoing fetal descent, fetal head position, uterine contractility, and characteristics of the pelvis, were missing.

In summary, the optimal length of the second stage is not known and differs by parity. However, the cumulative evidence suggests that traditional limits of the second stage, particularly among those with an epidural, are reasonable typical thresholds. Although some individuals may have an extended second stage to achieve vaginal delivery, this is associated with established maternal and neonatal risks and should be considered when extending the second stage.

Timing of initiation of pushing

Because the instinctive urge to initiate pushing when the second stage of labor is reached, is blunted in the setting of regional anesthesia, the optimal timing to initiate maternal pushing has been questioned. Initiating maternal pushing at the point of reaching complete dilation has been thought to mimic second stage management in the absence of regional anesthesia and could shorten the second stage of labor. Delaying pushing after the point of reaching complete dilation, sometimes referred to as "laboring down," was hypothesized to allow the uterine expulsive efforts to affect fetal descent in the absence of maternal efforts, perhaps preventing maternal exhaustion and improving clinical outcomes and patient satisfaction.

Early randomized trials of immediate compared with delayed pushing yielded mixed results with respect to impact on clinical outcomes. To follow, Fraser et al randomized 1863 women to push when completely dilated or delay, and found that delayed pushing was associated with a longer length of the second stage but a decrease in "difficult delivery," with the largest effect on midpelvic procedures (relative risk, 0.72; 95% confidence interval [CI], 0.55−0.93).[15] A meta-analysis by Tuuli et al included the trial by Fraser et al and some others carried out till date, and stratified the results by study quality.[16] Twelve randomized controlled trials comparing immediate with delayed pushing were included. They found that overall, delayed pushing was associated with an increased chance of spontaneous vaginal delivery, but that finding was not applicable when only studies of high-quality were included. However, delayed pushing was consistently associated with an increase in the length of the second stage of labor (weighted mean difference, 56.92 minutes; 95% CI, 42.19−71.64).

With varying study quality and mixed results to guide best practice, and midpelvic procedures falling out of favor in the United States, a multicenter pragmatic trial across centers in the United States aimed to test the hypothesis that immediate pushing was associated with an increase in spontaneous vaginal delivery and decreased maternal and neonatal morbidity.[17] A total of 2404 nulliparous women with neuraxial anesthesia were randomized to immediate compared with delayed pushing. Consistent with previous work, the study found that delayed pushing was associated with a longer second stage of labor, but there was no impact on the rate of spontaneous vaginal delivery. There was also an increased risk of postpartum hemorrhage, chorioamnionitis, neonatal acidemia, and evaluation for sepsis with delayed pushing. Following the publication of that trial, the American College of Obstetricians and Gynecologists changed its clinical guidance to direct providers to have patients initiate pushing when complete cervical dilation is reached.[18]

Future directions

There are many questions that remain regarding the optimal management of the second stage, including optimal positioning, oxytocin dosing, and coached vs uncoached pushing, to name a few. In addition, other questions remain regarding the long-term impact of second stage management on maternal and neonatal health. Future research in these and other areas will allow continued refinement of optimal management of the second stage of labor to achieve spontaneous vaginal delivery and reduce morbidity. ■

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