

Managing the second stage of labor: An evidence-based approach

Continuously assessing and monitoring maternal, fetal, and modifiable factors in the second stage of labor may aid clinicians in weighing the appropriateness of expectant management against operative delivery

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CASE Woman in second stage with prolonged pushing

Ms. J. is an 18-year-old woman (G1P0) at 39 weeks' gestation whose cervix is completely dilated; she has been actively pushing for 60 minutes. The estimated fetal weight is 8 lb, and electronic fetal monitoring shows a Category I fetal heart rate (FHR) tracing. The presenting part remains at 0 station and occiput transverse despite great pushing effort.

After another hour of active pushing, the FHR becomes Category II with repetitive variable decelerations. During the third hour of the second stage, Ms. J. is diagnosed with chorioamnionitis and the fetus remains at 0 station. She undergoes a primary cesarean delivery (CD) complicated by bilateral lower uterine

extensions and postpartum hemorrhage. The birth weight was 4,100 g, and 5- and 10-minute Apgar scores were 4 and 8, respectively. The umbilical cord arterial pH was 7.03.

Ms. J. and her baby were discharged home on postoperative day 4.

In 2014, the American College of Obstetricians and Gynecologists and the Society for Maternal-Fetal Medicine jointly released a document, "Safe prevention of the primary cesarean delivery," in response to the sharp rise in cesarean births from 1996 to 2011.¹ It described management strategies to safely reduce the most common indications for a primary CD in nulliparous women. Specifically, it recommended that the second stage of labor—defined as the interval from complete cervical dilation through delivery of the neonate—may be prolonged, as "longer durations may be appropriate on an individualized basis (eg, with the use of epidural analgesia or with fetal malposition) as long as progress is being documented."¹

A prolonged second stage was defined as 3 hours of pushing in nulliparous women and 2 hours in multiparous women, with 1 additional hour (or longer) in those receiving epidural analgesia. Indeed, the primary CD rate decreased slightly to 21.7% in 2018, down from 21.9% in 2017.² More recent evidence, however, has shown an increase in maternal and neonatal morbidity with prolonged second stage.³⁻⁸



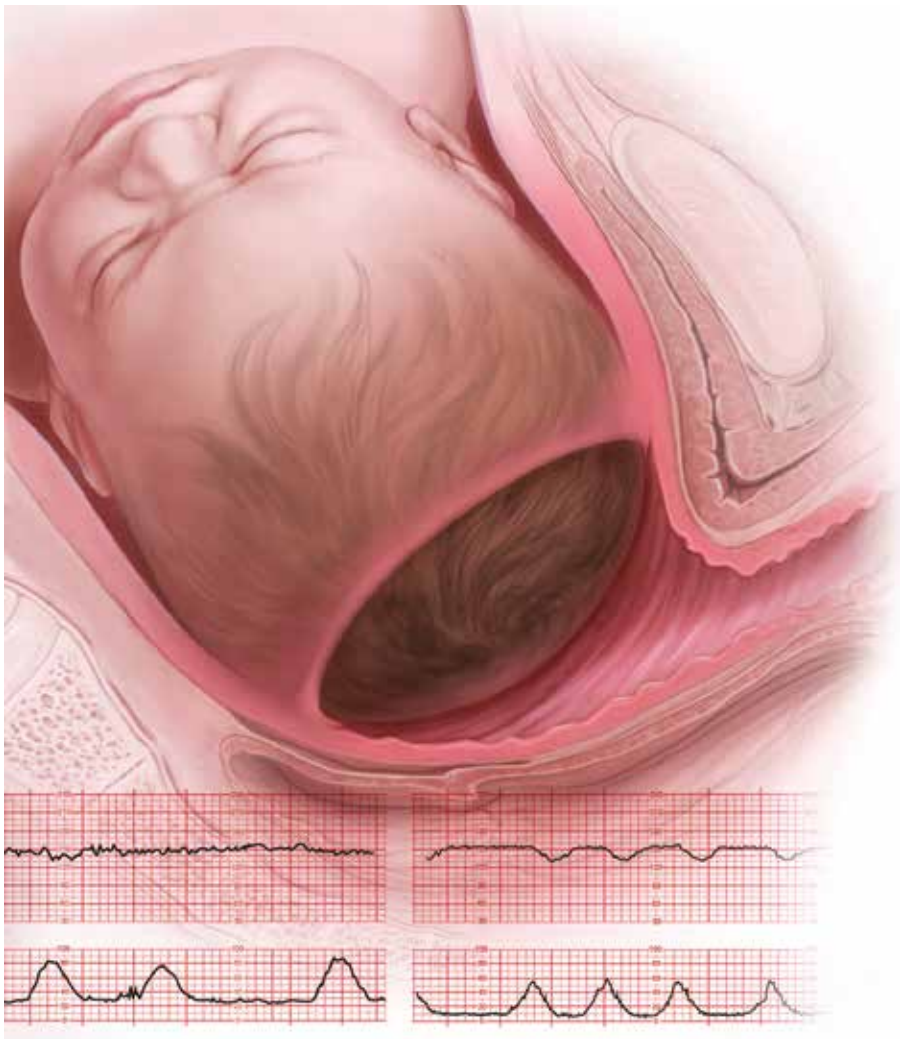
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Efforts to manage the second stage from an evidence-based perspective are critical to balance the desired outcome of a safe vaginal delivery against the risks of prolonged second stage and operative vaginal delivery or CD.

Perspectives on the “ideal” labor duration

It is important to consider the historical context that led to the 2014 change in recommendations for duration of the second stage.⁹ In 1955, Dr. Emanuel Friedman published a prospective observational study of 622 consecutive primigravid parturients at term, of which 500 were included in the analysis that led to the graphicostatistical labor curve, or the well-known “Friedman’s curve.”¹⁰ The mean duration of the second stage was 0.95 hour. The statistical maximum for “ideal labor” for the second stage was set at 2 hours, with an

additional hour allotted for patients receiving epidural analgesia.

In 2010, Zhang and colleagues published contemporary labor curves using data from the Consortium on Safe Labor, a multicenter retrospective observational study of 62,415 parturients.¹¹ Among more than 25,000 nulliparous women, the median duration (95th percentile) of the second stage in hours was 1.1 (3.6), respectively. Notably, this analysis included only women with a spontaneous vaginal delivery and normal neonatal outcome.

Prior to the publication of the “Safe prevention of primary cesarean delivery,” multiple investigations examined the relationship between the duration of the second stage and adverse maternal and neonatal outcomes, and the findings have been inconsistent.¹²⁻¹⁵

For example, Cheng and colleagues noted increased maternal complications that

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Second stage management requires a critical balance between the desired outcome of a safe vaginal delivery and the risk of prolonged second stage and operative vaginal delivery or CD

included postpartum hemorrhage, third- and fourth-degree perineal lacerations, and chorioamnionitis, but not neonatal morbidity, with each increasing hour within the second stage.¹² By contrast, a large, population-based cohort study among low-risk women showed an increase in low 5-minute Apgar scores, admission to the neonatal intensive care unit (NICU), and composite perinatal morbidity with prolonged second stage.¹⁵ Furthermore, a secondary analysis of the Pushing Early or Pushing Late with Epidural (PEOPLE) trial showed that the chances of a vaginal delivery with a newborn without signs of asphyxia decreased significantly every hour after the first hour, and the risk of postpartum hemorrhage and intrapartum fever increased significantly after 2 hours of pushing.¹⁴

While these findings may represent the risks inherent with the intervention of operative delivery and not the duration of second stage of labor per se, one could posit that if the intervention were initiated earlier, could it prevent or at least reduce maternal and neonatal morbidity?

pushing, and prevention of perineal tears.²²⁻³² Interestingly, epidural analgesia, parity, birth weight, and station at complete dilation predicted second stage duration but accounted for only 25% of the variability in second stage length, leaving 75% of the variance unexplained.¹⁶

A specific absolute maximum length of time spent in the second stage of labor beyond which all women should undergo operative delivery has not been identified.¹ Therefore, maternal, fetal/neonatal, and modifiable factors need to be critically assessed and continually monitored to determine whether a prolonged second stage or an operative delivery is warranted to prevent or minimize adverse maternal and neonatal outcomes.

Maternal factors

Maternal age correlates directly with the length of the second stage. That is, the length of the second stage increases with increasing age.¹⁷

Multiparous women have a shorter length of the second stage, regardless of epidural analgesia, compared with nulliparous women.¹¹ In the Consortium for Safe Labor, multiparous women had a significantly shorter median second stage compared with nulliparous women.¹¹

In adjusted analyses, maternal obesity was associated with an increased risk for CD, with the risk of CD more than 3 times greater in women with a BMI higher than 40 kg/m² compared with those who had a BMI less than 25 kg/m².¹⁸ There were no significant differences in the length of the second stage of labor by BMI categories.¹⁹

Fetal factors

Birth weight greater than 4,000 g was associated with an increased risk for arrest of descent during the second stage.³³

Persistent fetal occiput posterior or transverse position may impact the duration of the second stage. A retrospective cohort study in women who underwent a trial of manual rotation compared with expectant management during the second stage of labor

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Maternal factors that influence the second stage include parity, BMI, age, and clinical pelvimetry

Factors to assess and monitor in the second stage

When assessing progress in the second stage of labor, consider:

- maternal factors
- fetal/neonatal factors, and
- modifiable factors.

Maternal factors that influence the second stage of labor include parity, body mass index (BMI), age, and clinical pelvimetry.^{11,16-19} Fetal/neonatal factors that impact the second stage include the estimated fetal weight, fetal presentation (cephalic, face, and so on), position, and station, as well as the FHR Category.^{20, 21} Factors that can be modified in the second stage include the effect of epidural analgesia (turning it down to reduce motor blockade while maintaining sensory pain relief so that patients feel the “urge” to push), maternal pushing position and technique, the presence of maternal support person(s), manual rotation for a fetal position that is not optimal, immediate versus delayed

with the fetus in occiput posterior or occiput transverse position found that women with manual rotation were less likely to have a CD, severe perineal laceration, postpartum hemorrhage, and chorioamnionitis. However, an increased risk of cervical laceration was associated with manual rotation.²⁰

Regarding FHR status, FHR abnormalities occurred in 91% of second stage labor patterns, with Category II being the most common.²¹ The fetal status should remain reassuring to allow for continuation of the second stage.

Epidural analgesia

About 60% of women receive neuraxial analgesia in the United States,²² although rates vary widely across different populations. A Cochrane review showed no difference in the duration of the second stage among women who had early versus late initiation of epidural analgesia in labor.²³ Epidural analgesia has no impact on the risk of CD; however, women with epidural analgesia experienced more hypotension, motor blockade, fever, and urinary retention.²⁴

One management practice has been to discontinue epidural analgesia to allow resumption of sensory and motor nerve function. Another Cochrane systematic review found no difference in mode of delivery or neonatal outcomes.²⁵ Rather than discontinuing epidural analgesia, which results in a profound increase in inadequate pain relief, one may consider titrating the dose with joint patient decision-making to allow for greater motor capability while maintaining adequate analgesia.³⁴

Immediate vs delayed pushing

The 2 most common approaches to managing the second stage were either to initiate pushing with contractions once complete dilation occurred (immediate pushing) or to allow for a rest period in which the fetus passively rotated and descended while conserving a woman's energy for pushing efforts (delayed pushing, laboring down, or passive descent). Since the publication of "Safe prevention of primary cesarean delivery," however, studies have shown a concerning association

between maternal and neonatal complications and prolonged second stage (which may occur with delayed pushing).^{3-8,35} An observational study of nearly 44,000 nulliparous women without epidural analgesia found that prolonged second stage was associated with increased chorioamnionitis, third- and fourth-degree lacerations, neonatal sepsis, neonatal asphyxia, and perinatal mortality.³⁵

A pragmatic multicenter randomized clinical trial on the optimal management of second stage of labor across the United States recently was conducted.⁷ More than 2,000 nulliparous women at term in spontaneous or induced labor with epidural analgesia were randomly assigned at complete dilation to immediate pushing or delayed pushing (1 hour after complete dilation). There was no difference in the rate of vaginal delivery. The rate of postpartum hemorrhage was significantly lower among women in the immediate-pushing group compared with the delayed-pushing group (2.3% vs 4.0%, respectively; relative risk [RR], 0.6; 95% confidence interval [CI], 0.3–0.9; $P = .03$). Furthermore, rates of chorioamnionitis were significantly lower among women in the immediate-pushing group compared with the delayed-pushing group (6.7% vs 9.1%, respectively; RR, 0.70; 95% CI, 0.66–0.90; $P = .005$). No significant difference occurred in the composite outcome of neonatal morbidity between the groups. However neonatal acidemia (umbilical cord arterial pH <7.1) and confirmed or suspected sepsis were significantly increased in the delayed-pushing group.

The evidence supports active pushing at the start of the second stage. Women who consider delayed pushing should be informed that delayed pushing has not been shown to increase the likelihood of vaginal birth and that it is associated with increased risks of infection, hemorrhage, and neonatal acidemia.³⁶

Maternal pushing position and technique

Spontaneous pushing (in which women are free to follow their instincts and generally push 3 to 5 times per contraction) versus directed pushing (women are encouraged to

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Key points for an evidence-based approach to the management of the second stage of labor

- At the start of the second stage (complete dilation), patients should be encouraged to actively push.
- Reassessment should occur at regular intervals to assess for progress, after ensuring maternal and fetal well-being.
- An attempt at manual rotation or titration of epidural analgesia should be considered if there has been no advancement in fetal station.
- Additional considerations:
 - Consider warm compresses or perineal massage to prevent third- and fourth-degree tears.
 - The presence of a continuous support person may reduce the risk of an operative delivery.
- Delivery should be expected within 2 hours for multiparous women and 3 hours for nulliparous women in the second stage.
- Prolonging the second stage beyond these thresholds should be individualized and occur only in the setting of assured maternal and fetal well-being.

take a deep breath at the beginning of a contraction then hold it and bear down throughout the contraction) demonstrated no clear difference in duration of the second stage, perineal laceration, episiotomy, time spent pushing, or number of women with spontaneous vaginal birth. There was no difference in 5-minute Apgar score less than 7 or admission to the NICU.²⁶

With regard to maternal positioning during the second stage, a Cochrane systematic review found benefits for upright posture, including a very small reduction in the duration of the second stage, reduction in episiotomy rates, and reduction in assisted deliveries.³⁷ There was an increased risk of blood loss greater than 500 mL and possibly an increased risk in second-degree tears.³⁷ Compared with women allocated to lying down, women in the upright position during the second stage with epidural analgesia had significantly fewer spontaneous vaginal births. There was no difference in operative vaginal delivery, obstetric anal sphincter injury (OASI), infant Apgar score of less than 4 at 5 minutes, and maternal fecal incontinence at 1 year.²⁸

Maternal support person

Continuous support during labor may

improve outcomes for women and infants, including increased spontaneous vaginal birth, shorter duration of labor, and decreased cesarean birth.²⁹ In a randomized trial of 412 healthy nulliparous women, women in labor were assigned to either a support group that received continuous support from a doula or an observed group that was monitored by an inconspicuous observer. Continuous labor support significantly reduced the rate of CDs and forceps deliveries.^{30,36} Indeed, during the COVID-19 pandemic, doulas have found innovative ways to continue to provide this essential support through virtual health.³⁸

Prevention of perineal tears

Evidence suggests that warm compresses, and massage, may reduce third- and fourth-degree perineal tears.³¹ A meta-analysis of observational studies showed a significant reduction in the risk of OASI.³²

Second stage steps: Recap

Throughout the second stage of labor, the decision to continue with expectant management or intervene with either an operative vaginal delivery or a CD is complex and requires consistent assessment and integration of multiple factors. An evidence-based approach to second stage labor management includes active pushing that is either Valsalva pushing or spontaneous, coached or uncoached, but most importantly, at the start of the second stage when a patient reaches complete dilation. Reassessment should occur at regular intervals to determine progress, after ensuring maternal and fetal well-being.

If there has been no advancement in station, an attempt at manual rotation or titration of epidural analgesia should be considered. Importantly, fetal descent with adequate pushing should be demonstrated throughout the second stage.

Additional considerations that improve outcomes include warm compresses or perineal massage to prevent third- and fourth-degree tears and the presence of a continuous support person to reduce the risk for an operative delivery.

Delivery should be expected within 2 hours for multiparous women and 3 hours for nulliparous women in the second stage. Prolonging the second stage beyond these thresholds should be individualized and occur only in the setting of assured maternal and fetal well-being.

CASE An alternative management strategy

Despite Ms. J.'s great active pushing effort for 60 minutes, the presenting part remains at 0 station and occiput transverse. Ms. J. is counseled regarding the risks and benefits of an attempt at manual rotation of the fetal head, and she wishes to proceed. The fetal position remains occiput transverse.

After another hour of active pushing, the FHR becomes Category II with repetitive variable decelerations. At this time, Ms. J. is informed that there has been no descent, and she is counseled on the risks and benefits of continued pushing versus CD. Through shared decision-making, she consents to a CD. She undergoes a primary CD without complication. The birth weight was 4,100 g, and 5- and 10-minute Apgar scores were 8 and 9, respectively. The umbilical cord arterial pH was 7.13.

Ms. J. and her baby were discharged home on postoperative day 4. ●

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