UNIVERSITY of WASHINGTON

Management of the Second Stage of Labor

Obstetric Consensus Conference

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November 2018
(Updated from initial publication February 2018)

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CITATION

Sienas L, Delaney S, Hitti J. Management of the second stage of labor. University of Washington Obstetric Consensus Conference, November 2018.
Available at http://providerresource.uwmedicine.org/women-s-health

INTRODUCTION

The second stage of labor is defined as the time from complete dilation to delivery of the infant. Modifiers that affect the second stage length include factors such as parity, epidural anesthesia, delayed pushing, fetal station at complete dilation, maternal body mass index, fetal weight and occiput posterior (OP) position[1]. Optimization of the second stage of labor is essential to ensure safe maternal and fetal outcomes.

In the United States, cesarean section rates are on the rise. The most common indication for cesarean section is labor arrest, accounting for 34% of all primary cesarean deliveries[1]. Active management of labor throughout the first and second stage can help early identification of problems to guide practitioners in adjusting modifiable factors.

The Healthy People project, by the Department of Health and Human Services, identified a goal national cesarean section rate of 23.9% for nulliparous term singleton vertex (NTSV) patients by 2020. Currently at UWMC the NTSV rate is 39.4%, and for UW Medicine is 28.3%. Reviewing UWMC data, most of the NTSV cesarean sections occur either after spontaneous or induced labor, implying that most are not scheduled primary cesarean sections. The most common reason for cesarean section at UWMC is failure to progress or failure of descent. When reviewing compliance with the current second stage management duration guidelines as determined by ACOG, SMFM and NICHD[1,2], UWMC is 100% at goal for time allowance prior to cesarean section. Thus, we are not moving towards cesarean delivery too early without giving the patient adequate time to progress to vaginal birth. At the same time, the UWMC rate of severe neonatal morbidity is 1%, which is below the state average of 1.4%.

Within UW Medicine, we hope to optimize second stage management and thereby improve overall vaginal delivery rates without increasing adverse maternal or neonatal outcomes. In this document we will establish University of Washington guidelines regarding the following 4 second stage of labor issues: 1) length of second stage, 2) delayed pushing, 3) rotational maneuvers, and 4) optimal pushing techniques. Beyond the scope of this discussion are operative vaginal deliveries (OVD), rotational forceps, episiotomy, regional anesthesia and nursing maneuvers such as changing maternal position to facilitate descent.

BACKGROUND

SECOND STAGE LENGTH

In 2012 ACOG, SMFM, and the NICHD published a workshop summary of guidelines to prevent primary cesarean section[2]. They used data from the Consortium of Safe Labor[3], a database of 62,145 women delivered vaginally with normal neonatal outcomes. Second stage of labor duration was defined from complete dilation to delivery, which included any delay prior to pushing. In each subgroup, the 95th percentile of time was observed. The consortium recommended the following 2nd stage durations to avoid premature cesarean delivery: nulliparous with epidural up to 4 hours, nulliparous without epidural 3 hours, multiparous with epidural 3 hours, and multiparous without epidural 2 hours (The "4-3-3-2 rule"). Importantly, excluded from this data were women who were ultimately delivered by cesarean as well as neonates with adverse outcomes. Using logistic regression to correct for mode of delivery, deliveries after >3 hours in the 2nd stage showed no adverse neonatal outcomes[4]. If left uncorrected, there was an increased risk of neonatal death, cord pH <7, infant trauma and NICU admission.

In 2014, ACOG and SMFM created a taskforce for prevention of the primary cesarean section[1]. It was concluded there is no optimal length for the second stage. Duration of the second stage was defined as active pushing rather than from time of achieving 10 centimeters cervical dilation. They concluded that prolonged second stage should be defined as >3 hours for nulliparas and >2 hours for multiparas. These guidelines were reaffirmed in 2016.

Researchers have called into question the clinical safety of extending the suggested guidelines without adequate knowledge of the impact on perinatal outcomes. An observational study by the MFMU network included 53,285 patients at 25 hospitals[5]. Second stage was defined as duration from start of pushing to either vaginal delivery or decision for cesarean section. Increasing the length of the second stage increased the risk of cesarean delivery [OR 2.9 from 60-119 minutes (95% CI 2.5-3.3) to OR 14.7 for >240 minutes (95% CI 11.2-19.3)] and composite adverse neonatal outcomes [from OR 1.3 at 60-119 minutes (95% CI 0.98-1.7) to OR 2.2 for >240 minutes (95% CI 1.2-4.2)] for both nulliparous and multiparous women.

In favor of shortening the second stage, Laughon et al[6] performed a retrospective chart review at 19 hospitals, including 43,810 nulliparous and 59,605 multiparous deliveries. Second stage was calculated as time from first cervical exam of 10cm dilation to time of delivery (included delayed push if applicable). Prolonged second stage was defined in a "3-2-2-1" rule. Women with prolonged second stage had an overall decreased rate of spontaneous vaginal delivery (SVD) (79.9% for nulliparous with epidural if >3 hours vs. 97.9% if <3 hours, P=0.001). Prolonged second stage was also associated with increased rates of chorioamnionitis, 3rd and 4th degree lacerations, NICU admissions, and perinatal mortality (0.14%).

In contrast to Laughon et al, Gimovsky et al[7] performed a randomized control trial (RCT) of the second stage that was favorable towards increasing second stage length. At the end of 3 hours for women with epidurals and after 2 hours for women without epidurals, women were randomized to 1 additional hour of "extended care" vs. expedited delivery. The incidence of cesarean delivery decreased from 43.2% to 19.5% (RR 0.45, 95% CI 0.22-0.93) in the extended labor group. There was no increase in maternal or neonatal morbidity. The number needed-to-treat to prevent 1 cesarean delivery was 4.2. Importantly the study was not powered to detect a change neonatal or maternal morbidity.

DELAYED PUSHING

A recent well-designed 2018 pragmatic randomized controlled trial by Cahill et al[8] re-ignited discussion and society recommendations regarding delayed pushing in the second stage of labor. Prior to the Cahill et al trial, in Committee Opinion 687 from February 2017, ACOG allowed for providers to offer a period of delayed pushing for "1-2 hours (unless the woman has an urge to bear down sooner) at the onset of the 2nd stage of labor", especially in nulliparous women with epidural anesthesia[9]. The Washington State Hospital Association (WSHA) currently recommends delaying pushing if no urge, for up to 2 hours in nulliparous women and up to 1 hour in multiparous women[10].

The Cahill et al trial included 2404 nulliparous women with neuraxial anesthesia who were randomly assigned to begin pushing at complete dilation or delay pushing for 60 minutes unless they had an urge to push or were instructed to do so by their health care provider. The trial found no significant difference in the rate of spontaneous vaginal delivery between groups (immediate group 85.9% vs. delayed group 86.5%, RR 0.99, 95% CI 0.96 – 1.03, *p*=0.67). Women in the immediate group had a shorter mean second stage duration compared to delayed (102.4 vs. 134.2 minutes, respectively, *p*<0.001), and longer mean duration of pushing (83.7 vs. 74.5 minutes, respectively, *p*=0.005). In addition, the study found that women in the immediate pushing group had lower rates of chorioamnionitis (6.7% vs. 9.1%, RR 0.7, 95% CI 0.6 – 0.9, *p*=0.005) and postpartum hemorrhage (2.3% vs. 4.0%, RR 0.6, 95% CI 0.3 – 0.9, *p*=0.03) compared to those in the delayed group. There was no difference in the rates on the composite neonatal morbidity between the groups (7.3% vs. 8.9%, RR 0.8, 95% CI 0.6 – 1.1, *p*=0.16) or any perineal lacerations (45.9% vs. 46.4%, RR 0.99, 95% CI 0.95 – 1.04, *p*=0.69). However, women in the immediate pushing group delivered neonates with a lower rate of acidemia (0.8% vs. 1.2%, RR 0.7, 95% CI 0.6 – 0.9, *p*=0.01), but had higher rates of third-degree perineal lacerations (5.3% vs. 4.3%, RR 1.2, 95% CI 1.0 – 1.4, *p*=0.02).

Additional literature on delayed pushing published prior to the Cahill et al RCT includes a secondary analysis of over 21,000 nulliparous patients, including 3870 women with delayed pushing (≥60 minutes)[11], was unfavorable towards delayed pushing. With delayed pushing, there was a longer mean duration of the second stage (191 minutes vs. 84 minutes, p<.001) and longer active pushing (86 minutes vs. 76 minutes, p<.001). Delayed pushing was associated with increased rates of cesarean delivery (OR 2.33, p<.001), OVD (OR 1.53, p<.001), postpartum hemorrhage (PPH) (OR 1.25, p=.02) and need for blood transfusion (OR 1.2, p=.03). There was no change in neonatal outcomes.

Highlighting the importance of well-designed studies, Tuuli et al[12] performed a meta-analysis of 12 RCTs, dividing the trials into high and low quality. Overall delayed pushing was associated with a small increased rate of SVD [61.5% vs. 56.9% (RR 1.09, 95% CI 1.03–1.15)]. When divided between high and low quality studies, there was no significant difference in SVD rate when including only high quality studies [59% vs. 54.9%, (RR 1.07, 95% CI 0.98–1.26)] compared to a significant difference in SVD rate when including only low quality studies [81% vs. 71%, (RR 1.13, 95% CI 1.02–1.24)]. There was no difference in the rate of cesarean delivery in the 9 trials that included cesarean section as an outcome. Delayed pushing increased the overall second stage by 1 hour, but decreased active pushing by 20 minutes.

A Cochrane review of 12 trials including 2879 women evaluated delayed pushing of 1-3 hours vs. immediate pushing that showed minimal benefit of delayed pushing[13]. With delayed pushing, there was an increase of 56 minutes total duration of the second stage with a 19-minute decrease in duration of active pushing. There was an overall small increase in the SVD rate (RR 1.07, 95% CI 1.02 to 1.11). There was no clear effect on 3rd and 4th

degree lacerations, NICU admission rates or 5-minute APGAR scores. There was an increased risk of lower cord pH (RR 2.34, 95% CI 1.37 to 3.68) with delayed pushing.

In October 2018, ACOG published a Practice Advisory[14] updating their recommendations on delayed pushing in the second stage. ACOG currently states "When considering the newly available evidence from Cahill 2018 with the existing body of literature that demonstrates no increase in the rate of a spontaneous vaginal delivery but an increase in morbidity in the delayed pushing group, it is reasonable to choose immediate over delayed pushing in nulliparous patients with neuraxial anesthesia. Together, these data suggest that delayed pushing should not be performed in nulliparous patients with neuraxial anesthesia for the intent to increase their chance of a spontaneous vaginal delivery. For women who are considering delayed pushing, obstetrician-gynecologists and other obstetric providers should inform them of potential risks associated with delayed pushing."

FETAL MALPOSITION

Persistent OP and occiput transverse (OT) positions have been associated with adverse obstetrical outcomes. The incidence of OP position is between 10-20% at the start of labor[15]. Around 90% spontaneously rotate, therefore persistent OP accounts for only 2-5% of births. Risk factors for persistence of OP position are nulliparity, African American ethnicity, artificial rupture of membranes, epidural analgesia and birth weight >4400g[16]. In a retrospective cohort[16], second stage >3 hours was 2.3-times more likely to occur with OP vs. occiput anterior (OA) presentation. The median second stage length for nulliparas was 2.9 hours in OP presentation and 1.2 hours in OA position. For multiparas, mean second stage length was 0.8 hours in OP and 0.3 hours in OA position. Other associations with OP position were increased OVD (OR 4.14, 95% CI 3.57-3.81), 3rd/4th degree laceration (OR 2.38, 95% CI 2.03-2.79), PPH (OR 1.03, 95% CI 0.98-1.16), chorioamnionitis (OR 2.1, 95% CI 1.81-2.44) and endometritis (OR 1.05, 95% CI 0.84-1.31).

Shaffer et al[17] performed a retrospective cohort study reviewing patients in the second stage with occiput posterior or transverse position, which favored manual rotation. The groups were divided into expectant management vs. manual rotation to OA position (with intention to treat analysis). There was a 74% success rate in the manual rotation group. Manual rotation was associated with a decreased cesarean section rate (8.6% vs. 41.4%, p<.001), shorter second stage (90 minutes vs. 111 minutes, p<.001), and less PPH (22.3% vs. 33.1%, p<.001). The number of manual rotations needed to prevent one cesarean section was 4.

Reichman et al[15] used a prospective time series of 2 groups of patients with OP position at the start of the second stage: 30 patients without rotation and followed by 31 patients with attempted rotation. Manual rotation was associated with increased SVD rate (77.4% vs. 26.4%, p=.0001), decreased cesarean section rate (0% vs. 23.3%, p=.0001), decreased OVD (22.6% vs. 50%, p=.0001), and decreased length of the second stage (117 minutes vs. 156 minutes, p=.0003).

In a French hospital where manual rotations are performed frequently, a retrospective case control study evaluated failed manual rotation vs. successful rotation[18]. The overall rate of failure was 9.7% in 796 cases. Failed rotation was associated with older age, rotation prior to 10 cm and rotation for failure to progress.

ACOG endorses attempted manual rotation in patients with a 1B recommendation grade[1]. "Manual rotation of the fetal occiput in the setting of fetal malposition in the second stage of labor is a reasonable intervention to consider before moving to operative vaginal delivery or cesarean delivery. In order to safely prevent cesarean deliveries in the setting of malposition, it is important to assess the fetal position in the second stage of labor, particularly in the setting of abnormal fetal descent."

OPTIMAL PUSHING TECHNIQUES

ACOG recommends that although there is insufficient data given the challenges of isolating its effect, changes in maternal positioning during pushing should occur in order to improve maternal comfort and fetal well-being[9]. A Cochrane review[19] of 32 studies reviewed upright vs. supine pushing and found upright positioning to have decreased associations with abnormal fetal heart rate patterns (RR 0.46, 95% CI 0.22–0.93), episiotomy rate (RR 0.79, 95% CI 0.70–0.90), and OVD (RR 0.78, 95% CI 0.68–0.90), in contrast to increased associations with second-degree lacerations (RR 1.35, 95% CI 1.20–1.51) and EBL>500cc (RR 1.65, 95% CI 1.32–2.60).

ACOG also recommends that each woman should use whichever pushing technique feels right to her and is most effective[9]. WSHA discourages against Valsalva pushing given decreased uterine perfusion potentially leading to increased risk of a neurologically depressed infant[10]. A Cochrane review of 8 trials comparing open vs. closed glottis pushing found there was no difference in the length of the second stage, no improvement in SVD rates, no change in 3rd/4th degree laceration risk, and decreased active pushing with valsalva pushing by 5.2 minutes (95% CI –7.78 to –2.62). There was no change in NICU admission rates or APGAR scores.

Prins et. al.[20] performed a meta-analysis of the 4 RCTs comparing types of pushing in nulliparous patients without epidural. There was no change in OVD, but a decreased length of the second stage (18 minutes, 95% CI 0.46-36.73) with valsalva pushing. Maternal urodynamics were performed 3 months postpartum and valsalva pushing was associated with decreased first urge to void (-41 mL, p=.01) and decreased total bladder capacity (-54.6 mL, p=.01).

Lastly, Bloom et al performed an RCT including nulliparous patients without epidurals, where one group received closed glottis coached pushing vs. undirected pushing[21]. The mean duration of the second stage of labor was 46 minutes in coached women, compared with 59 minutes in those unguided (p=.014). However, the proportion of women with second stages of labor exceeding 2 hours (p=.498) or 3 hours (p=.383) was similar. There were no differences in route of delivery or neonatal outcomes.

DISCUSSION AND RECOMMENDATIONS

SECOND STAGE LENGTH & DELAYED PUSHING

Lengthening the second stage has not clearly been demonstrated to increase the rate of successful vaginal delivery rate, and may increase maternal and neonatal adverse events. Balancing the goals of optimizing chance for vaginal delivery while also minimizing maternal and neonatal adverse outcomes is essential. Knowing that each situation should be individualized, this can provide a checkpoint for providers to assess progress and optimize outcomes. By creating a more hands on approach to the second stage with identified decision points, problems can be addressed and modifiable factors adjusted. Data regarding delayed pushing demonstrate no increase in spontaneous vaginal delivery, with a potential increase in adverse maternal and neonatal outcomes. If delayed pushing is pursued, we recommend that delayed pushing time should be included in the total length of the second stage.

- At complete dilation, a senior provider should assess station and fetal position
- We recommend proceeding with pushing immediately at time of complete dilation for all patients, regardless of neuraxial anesthesia use, fetal station, fetal position or urge to push
- In accordance with ACOG, women considering delayed pushing should be counseled regarding the potential increase in adverse maternal and neonatal outcomes associated with delayed pushing
- At UW teaching Labor & Delivery unit, the R1 should stay in the room during the majority of pushing, and a senior provider should assess progress every hour with documentation in chart
- We support continued collaboration with labor nurses regarding contraction strength, pushing effectiveness and techniques
- We support the existing NICHD guidelines for upper time limit of the second stage:
  - 4 hours for nulliparous women with epidural
  - 3 hours for nulliparous women without epidural
  - 3 hours for multiparous women with epidural
  - 2 hours for multiparous women without epidural

FETAL MALPOSITION & MANUAL ROTATION

There is robust data that manual rotation can decrease cesarean delivery as well as improve maternal and neonatal outcomes. Assessment of fetal position should occur at the beginning of the second stage. After allowing a time period for spontaneous rotation, we encourage providers to attempt manual rotation if there is persistent OP or OT position. As a teaching institution, it is imperative that learners gain confidence in this skill prior to graduation.

- Assessment of fetal position should occur at complete dilation by a senior provider
- If uncertain about position, we encourage use of ultrasound and Leopold's for correct identification
- If occiput posterior or occiput transverse position is identified, wait for at least 1 hour of second stage (including both delayed or active pushing) before attempting manual rotation to allow for spontaneous rotation to OA
- If persistent OP/OT position, we strongly encourage attempt at manual rotation. Do not attempt prior to complete dilation
- At UW teaching Labor & Delivery unit, senior residents should complete manual rotation with OB attending present in the room. OB anesthesia is to be notified prior to procedure
- A procedure note should be completed after manual rotation attempt

OPTIMAL PUSHING TECHNIQUES

The data appear mixed that there is a superior technique for pushing. Therefore, an individualized approach including the patient and all team members should occur. Attention to details should include maternal position, fetal status, coaching vs. unguided pushing, and open vs. closed glottis pushing. If pushing appears ineffective, multiple approaches should be combined to optimize technique.

- There is no established pushing technique that shows superiority over others
- Establish which type of "coaching" a patient wants, either guided directed valsalva pushing or gentle encouragement
- Encourage positional changes during pushing
- Continue to engage patient and encourage collaboration and input from all team members

SUMMARY

It is important to assess each clinical situation individually and understand that these general guidelines to improve second stage management may not be appropriate for all patients. Management and duration of the second stage should take both maternal and fetal status into account. Optimal patient outcomes require close collaboration between all members of the team: nursing, OB/Family Medicine and Anesthesia providers. Patient engagement through shared decision-making is imperative to ensure best outcomes.

DISCLAIMER

This consensus document is to be used as a guideline for practice management. It is generated by expert review from the Department of Obstetrics and Gynecology, Division of OB Anesthesia, and Labor & Delivery Nursing. I

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