JAOA ORIGINAL CONTRIBUTION

Postpartum Outcomes in Supine Delivery by Physicians vs Nonsupine Delivery by Midwives

Richard R. Terry, DO; Jeanne Westcott, CNM, PhD; Laura O'Shea, RD, CNM, MSN; and Frank Kelly, MD, MPH

Context: Clinically preferred maternal position during childbirth has varied between supine and nonsupine over time and from patient to patient. Preferred maternal birthing position is coming under increasing scrutiny.

Objective: To compare postpartum maternal and infant outcomes resulting from supine and nonsupine positions maintained during the second stage of labor.

Design and Methods: Nonrandomized clinical trial comparing low-risk women (N=198) in two separate obstetrics practices. In one practice, parturients (n=100) used only the supine position as their birthing position. In the other practice, parturients (n=98) used any or all of three nonsupine positions (sitting, squatting, or kneeling/hands-and-knees). Data collection took place immediately after birth by provider survey and included: Apgar scores, demographics, estimated blood loss, neonatal weight, perineal integrity, position during second-stage labor and birth, and vulvar edema.

Results: Infants born to mothers in nonsupine positions were delivered with significantly less tearing of the perineum ($P<.001$) and less vulvar edema ($P<.001$). Although the length of second-stage labor was shorter among the women who were nonsupine, this result lacked statistical significance. There did not appear to be increased risk to the infant from the mother's nonsupine posture.

Conclusion: Nonsupine positions during labor and delivery were found to have clinical advantages without risk to mother or infant. Enhanced maternal outcomes included improved perineal integrity, less vulvar edema, and less blood loss.

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Maternal birthing position is an aspect of obstetrics that has come under increased scrutiny.[1] Birth attendants,[2–8] historical precedent,[2] and cultural norms[7] all influence positioning choice in second-stage labor. These factors often determine what birthing position is chosen for the parturient.

Many previous studies on maternal birthing positions have focused on perineal trauma.[2,5–13] Based on these studies, there appears to be an association between parturients' nonsupine positions and decreased risk of perineal trauma.[6,7,11–13] However, confounding factors make interpretation of this data challenging. These factors include parity,[6–8,10,11] infant birth weight,[6,8,10] and use of anesthesia and analgesia.[6,10,11] It has been suggested that maternal nonsupine position renders the perineum less accessible to the provider, thereby influencing the ability to perform episiotomy, which is associated with perineal trauma.[9]

Maternal birthing position appears to be an important factor in postpartum outcomes. Renfrew et al[9] conducted a systematic review of the English-language literature to identify and assess clinical procedures that reduce morbidity associated with trauma to the genital tract during birth. They identified maternal position as a factor warranting further study.[9] Yet, there have been few scientific investigations involving the relative merits of maternal positions.[12]

Maternal positioning may affect the physiological health of the mother and infant, as well as the psychological well-being of the mother. Many women choose to work through second-stage labor by assuming a variety of body positions rather than a single unchanging one. Satisfaction with the birth experience may be enhanced if a woman is given the option of choosing her birthing position.

The main purpose of the present study is to compare the effects of nonsupine and supine positions during second-stage labor and delivery on perineal integrity, vulvar edema, and blood loss.

Methods

The institutional review boards of Wilson Memorial Regional Medical Center in Johnson City, NY, and Mary Imogene Bassett Hospital in Cooperstown, NY, approved all aspects of the present study. The study is a nonrandomized controlled trail of 198 births that took place at these two hospitals between June 1997 and October 1998. Potential participants were given the option of taking part in the study and were told they could

From the Wilson Family Practice Residency Program in Johnson City, NY (Terry) and Bassett Healthcare in Cooperstown, NY (Westcott, O'Shea). Dr Kelly is a former resident at the Wilson Family Practice who now practices in Warsaw, NY.

Address correspondence to Richard R. Terry, DO, United Health Services, Family Practice Residency, 33–57 Harrison St, Johnson City, NY 13790-2174.

E-mail: Richard_Terry@uhs.org

Clinical Term	Definition
■ **Supine Position**	Patient on her back with knees slightly bent.
■ **Nonsupine Position**	
□ Kneeling/hands-and-knees	Patient's weight chiefly on her knees, possibly also on her arms, hands, or upper chest. Torso bent at hips.
□ Sitting	Patient's weight supported by her buttocks and thighs; knees bent; feet flat on bed or floor.
□ Squatting	Patient's weight rests on her feet; knees bent.
■ **Perineal Integrity**	
□ Episiotomy	Surgical incision made in perineal body.
□ Laceration	Noncontrolled tear in perineal body. Graded as first to fourth degree.[16]
■ **Other Terms**	
□ Second-stage labor	Stage of labor from full dilation to birth.
□ Vulvar edema	Postpartum edema of vulva. Graded as first to fourth degree.

Figure. *Definitions of maternal positions, perineal integrity, and other clinical terms agreed upon by all providers prior to collection of data by Terry et al. Definitions are based on descriptions by Roberts and Kriz.*[8]

choose either supine or nonsupine delivery. Participants were entered into the study in a nonconsecutive manner at each of the two hospitals during a 15-month period.

The criteria for inclusion in the study were 37 completed weeks of gestation, spontaneous or induced singleton pregnancy, spontaneous vaginal delivery, and cephalic presentation. Patients with evidence of congenital malformation, diabetes mellitus, pregnancy-induced hypertension, or use of epidural anesthesia were excluded from the study.

At Wilson Memorial Regional Medical Center, the parturients (n=100) experienced second-stage labor and birth in the supine position. All patients were from a white, urban/suburban population. Obstetricians or family practitioners attended these births.

At Mary Imogene Bassett Hospital, the parturients (n=98) experienced second-stage labor and birth in nonsupine positions, which included squatting, sitting, or kneeling/hands-and-knees. The definitions of these birthing positions and other clinical aspects of the present study were derived from Roberts and Kriz.[8] See *Figure* for a list of these definitions. Women in this group were free to assume any or all of these nonsupine positions while laboring. All patients were from a white, rural population. Nurse midwives, whose education and training included the use of episiotomy when clinically indicated, attended these births.

Electronic fetal monitoring was performed for all women in both the supine and nonsupine groups.

Data on the following variables were collected: Apgar score; estimated blood loss; fetal position at delivery; gravida number; infant birth weight; length of first, second, and third stage of labor; maternal postpartum hematocrit; maternal height and weight; number of children previously born to the mother; perineal integrity; and vulvar edema.

Data were collected from summary sheets completed by the practitioners following each birth. Data were analyzed using correlation coefficient, unpaired *t* tests, and the χ^2 test for frequencies. Neither provider nor parturient could be identified in the data analysis.

Results

Description of Sample

No differences were noted between the supine (n=100) and nonsupine (n=98) groups in maternal height or weight. Both groups included similar numbers of primiparous and multiparous patients. We did not detect outcome differences between the variables we measured in the primiparous patients vs the multiparous patients in either the supine or nonsupine group.

Perineal Trauma

A χ^2 test of independence determined that there was a significant difference in perineal integrity between the supine and nonsupine groups (χ^2_4=48.9, $P<.001$). Outcomes of perineal trauma are shown in *Table*. Almost three times as many women delivering in the nonsupine positions (59 [60%]) were left with an intact perineum compared with the women in the supine group (22 [22%]). Perineal lacerations in the nonsupine group

Table
Postpartum Outcomes of Perineal Trauma in Women Who Used Supine Birthing Position vs Nonsupine Positions (N=198)

Condition of Perineum	Birthing Position, No. (%)	
	Supine (n=100)	Nonsupine* (n=98)
■ Intact	22 (22)	59 (60)
■ Lacerated		
□ First degree	11 (11)	29 (30)
□ Second degree	52 (52)	8 (8)
□ Third degree	13 (13)	2 (2)
□ Fourth degree	2 (2)	0 (0)

* Nonsupine positions included, for any one patient, kneeling/hands-and-knees, sitting, and/or squatting.

were primarily limited to first-degree tears (29 [30%]), whereas women in the supine group sustained more severe lacerations (67 [67%]). Women delivering in the nonsupine positions experienced fewer second- and third-degree perineal lacerations (and no fourth-degree lacerations) compared with women who delivered in the supine position (*Table*).

Birth Weight

Infants born to women in the nonsupine group had a mean weight of 10 ounces greater than infants born to women in the supine group. Although there was not a statistically significant difference, it is a clinically important finding because the larger babies were born to women who also sustained fewer and less severe perineal lacerations (*Table*).

Vulvar Edema

Vulvar edema, while not life-threatening, is an uncomfortable postpartum condition. Providers reported no clinically significant vulvar edema among the women in the nonsupine group. By contrast, women who delivered in the supine position developed first-degree to fourth-degree cases of vulvar edema. These data reveal a statistically significant relationship between birth position and the occurrence of postpartum vulvar edema (χ^2_4=153.1, P<.001).

Estimated Blood Loss

Estimating blood loss at birth is a subjective measurement, but one that is commonly used to evaluate outcomes of the birthing process. In the present study, the birth attendant estimated the degree of blood loss. The average estimate of blood loss for women delivering in the supine position was 358 cm^3, compared with 295 cm^3 for women who delivered in nonsupine positions. Given that these are only estimated numbers, a valid statistical comparison between them was not possible.

Apgar Scores

At each of the hospitals participating in the present study, an Apgar score was assigned for each birth by nursing staff trained in making such evaluations. The scores evaluated such indicators of infant health as heart rate, respiratory effort, and muscle tone. Neither the 1-minute mean Apgar score (supine, 8.1; nonsupine, 8.4) nor the 5-minute mean Apgar score (supine, 8.9; nonsupine, 9.2) was statistically significantly different from one group to the other, supporting the equivalent safety of supine and nonsupine positions regarding infant outcome.

Comment

The association between birth position and birth outcomes among women in two separate obstetrics practices was studied. One practice used only the supine position for birth, and physicians performed the deliveries. The other practice allowed women to assume a variety of nonsupine positions, and nurse midwives performed the deliveries.

Perineal trauma in relation to birth has been the subject of a number of analyses, as described in the systematic review by Renfrew et al.[9] Wide variations in rates of perineal trauma have been reported by different practitioners, with the highest rates of trauma reported by obstetricians in urban hospitals and the lowest rates reported by midwives, both inside and outside hospital settings.[9] The findings of the present study agree with these observations.[9]

Women who gave birth in nonsupine positions were more likely to retain an intact perineum than were women who delivered in the supine position. Women in the nonsupine group of the present study had more first-degree perineal lacerations than women in the supine group, but women in the supine groups had more severe lacerations. Thus, this study reinforces previous findings[9,12,13] associating supine maternal position with perineal trauma, and nonsupine maternal positions with less severe perineal lacerations and fewer episiotomies.

We found that, despite infants being larger in the nonsupine group, there was still less perineal trauma in this group than in the supine group. Our finding of less severe perineal trauma associated with nonsupine positions cannot simply be

attributed to shortening the second stage of labor, because, unlike previous studies,[1] our data do not show a significant decrease in the time women assuming an upright posture spent in second-stage labor. It is possible that nonsupine positions may have an inherent protective effect on the perineum, mediating such factors as primiparous status and large infant birth weight, which have the potential to damage the perineum.

In addition to delivering larger babies with less perineal trauma, the women who delivered in nonsupine positions also experienced less vulvar edema that did the women who gave birth in the supine position.

The safety of the mothers in the present study is reflected in the insignificant difference in estimated blood loss between the supine and nonsupine groups. Blood-loss estimations established safety for mothers who used either supine or nonsupine birthing positions. Safety for the infants in both the supine and nonsupine groups was demonstrated by the lack of difference in 1-minute and 5-minute Apgar scores between the groups.

Limitations

The relatively small sample size (N=198) is a limiting factor in the present study. In general, a greater number of subjects would have strengthened our reported findings.

Our study has other limiting factors. Parturients were not randomly assigned to experimental and control groups. Some of the nurse midwives involved in the present study admitted that they considered it unethical to control a woman's positioning during labor and delivery unless required for safety. Midwives' obstetrics practices tend to be less invasive than physicians' deliveries, so the midwives in our study may have been less inclined to perform episiotomies. This factor may have influenced why women in the nonsupine group experienced less severe perineal lacerations that women in the supine group.[9] Another limitation was that our data collection practices could not ensure interobserver reliability, because each group used a different type of practitioner.

One might argue that, although the supine and nonsupine groups were demographically similar, components of care for the two groups differed in ways that were not measured. Individual practitioners who care for women in labor have reported differences in rates of perineal trauma.[9] Although many factors could influence variations in rates of perineal trauma,[9] maternal position alone was controlled for in the present study (though our analysis did not differentiate between the various nonsupine positions). Factors other than maternal position that are likely to be under the control of clinicians and could be associated with rates of perineal trauma include style of pushing, techniques to relax the perineum, use of episiotomy, and hand maneuvers for perineal management and birth.[9]

Dissimilar components of care delivery by practitioners in the two hospital settings may have affected our findings. To what extent a practitioner's training influences delivery outcome is difficult to quantify. Despite this limitation, all observed aspects of care—except for birth position—were the same in the supine and nonsupine groups during the second stage of labor. Therefore, we believe the influence of the practitioner's training (ie, physician vs midwife) on birth outcome was negligible.

Other variables not examined in the present study include the rate of descent, infant position, and maternal skin integrity.

Conclusion

Permitting or encouraging women to assume nonsupine positions during labor and delivery was not found to increase risk to mother or infant. Indeed, nonsupine positions may be used safely as a preventive strategy to reduce perineal trauma during childbirth. Providers may be wise to encourage women to choose nonsupine positions to achieve the benefits of fewer and less severe perineal lacerations, less vulvar edema, and less blood loss.

Additional research to refine tools for evaluating maternal birth positions would assist in defining optimum practices for labor and birth and in determining to what extent practitioners' training (ie, physician vs midwife) influences delivery outcomes.

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