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Lateral recumbent position versus kneeling prone position combined with unprotected perineal delivery in natural childbirth: implication for clinical care

Xiuli Dai[1] and Nan Jin[1*]

Abstract

Background Posture management significantly influences the natural childbirth process and the maternal experience. The aim of this study is to analyze the effects of the lateral recumbent position versus the kneeling prone position combined with unprotected perineal delivery in natural childbirth, providing evidence-based support for clinical maternal care and posture management.

Methods This research constitutes a retrospective cohort investigation, encompassing a period from January 2022 to December 2023, and focusing on women in labor who experienced childbirth at our medical facility. The study meticulously assessed and compared the characteristics and clinical outcomes of those who adopted the lateral recumbent position with those who utilized the kneeling prone position during the process of natural childbirth.

Results A total of 168 women in labor were included, 86 women in labor underwent lateral recumbent position and 82 women in labor underwent kneeling prone position for natural childbirth. There were no statistical differences in first, second, third and total stage of labor between lateral recumbent position group and kneeling prone position group were found (all $P > 0.05$). Visual Analogue Scale (VAS) and Self-Rating Anxiety Scale (SAS) score after labor in lateral recumbent position group were statistically lower than that of kneeling prone position group(all $P < 0.05$). The lateral recumbent position reduced the likelihood of episiotomy and perineal edema, the severity of perineal lacerations compared with kneeling prone position for natural childbirth (all $P < 0.05$).

Conclusion Lateral recumbent position in natural childbirth offers the advantage of reducing perineal trauma, alleviating maternal pain and anxiety, and may be therefore deemed worthy of utilization in clinical maternal care.

Keywords Position, Delivery, Childbirth, Clinical, Nursing, Care

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Introduction

Childbirth, defined as the egress of the fetus from the maternal womb, is an inherently unique experience for the women in labor. Despite this, a subset of women in labor, due to a lack of confidence in the natural childbirth process or heightened sensitivity to pain, may prefer cesarean delivery as an alternative [1, 2]. However, cesarean section is not without risks, as it may lead to a range of maternal complications, such as intestinal adhesions and increased pain feelings. These complications have the potential to adversely affect the mother's physical and psychological well-being [3]. It has been reported that women in labor who opt for natural childbirth exhibit a lower rate of complications and their neonates tend to have more favorable outcomes compared to those born via cesarean Sect. [4]. Given the potential risks associated with cesarean delivery, there is a growing consensus within the obstetric community to advocate for natural childbirth whenever clinically appropriate. This approach is supported by international guidelines and aims to reduce the incidence of cesarean sections, thereby optimizing health outcomes for both the mother and the newborn [5]. Consequently, enhancing the comfort of woman in labor during childbirth and mitigating the associated pain have emerged as key objectives for obstetricians in facilitating the natural childbirth process.

Unprotected perineal delivery, a method increasingly adopted in contemporary obstetric practice, facilitates controlled fetal descent by guiding the women in labor to modulate the rate of delivery. This approach has been shown to mitigate the risk of severe perineal and vaginal injuries, thereby promoting better obstetric outcomes [6, 7]. The selection of a safe and scientific mode of delivery has become a hot topic in current research. The woman in labor has a variety of positions to choose from during childbirth, including the kneeling-prone and lateral recumbent positions, among others. The optimal position for unprotected perineal delivery is still a subject of debate within the academic community. In light of this, the present study conducted a retrospective analysis of the data from our hospital on the use of the kneeling-prone and lateral recumbent positions in unprotected perineal delivery during natural childbirth. The aim is to provide robust evidence to support clinical delivery treatment and nursing, with the expectation of optimizing delivery practices and nursing care.

Methods

This study employed a retrospective cohort design, and its protocol was reviewed and approved by the Ethics Committee of First Affiliated Hospital of Soochow University (Approval Number: 2024506). During the research process, we ensured that each participant provided informed consent and strictly adhered to the principles of personal privacy protection. All research data collected were exclusively utilized for the analysis and reporting of this study. Additionally, all personal information was subjected to rigorous anonymization procedures to ensure data security and participant confidentiality.

This study is a retrospective cohort study that included women in labor who delivered at our hospital from January 2022 to December 2023. During the study period, from January to December 2022, the women in labor at our hospital commonly adopted the kneeling-prone position for natural childbirth; subsequently, from January to December 2023, the lateral recumbent position was commonly used. The inclusion criteria were as follows: cephalic presentation, singleton pregnancy, and full-term delivery; with vaginal delivery as the mode of birth. The exclusion criteria excluded those women in labor with severe pregnancy complications (such as pregnancy-related hypertension, diabetes, etc.), those with mental disorders or substance (alcohol and drug) dependencies, and those unwilling to participate in this study.

Upon admission to the hospital, all women in labor had received standardized care procedures. Prior to delivery, midwives provided continuous companionship and knowledge explanation to establish the trust of the woman in labor, effectively alleviating their fear and anxiety. Concurrently, a thorough prenatal preparation was conducted, including a scientific assessment of the birth canal, fetal position, fetal presentation, fetal size, perineal development, and soft tissue condition to ensure that the delivery instruments were ready and routine disinfection was completed.

Before the onset of the second stage of labor, women in labor in both groups could choose their posture based on personal comfort. As the second stage commenced, women in labor in the kneeling prone position group received unassisted perineal delivery in this position, while those in the lateral recumbent position group underwent unassisted perineal delivery in the lateral recumbent position. During the unassisted perineal delivery process, the midwife instructed the women in labor to breathe as the fetal head emerged, using the huffing action to coordinate abdominal muscle strength, promoting gradual dilation of the vagina, and moderately controlling the strength of vaginal dilation during contractions to prevent perineal laceration or injury. When the fetal head was crowning, the midwife gently pressed the occiput of the fetal head with the left index and ring fingers to control the speed of the fetal head's delivery and prevent vaginal injury caused by the rapid delivery of the fetus.

After the delivery of the fetus, inquiries were immediately made about the feelings, her vital signs were monitored, the condition of uterine contractions, vaginal

bleeding, and perineal wound were observed, ensuring the safety of both mother and child.

We conducted a comprehensive collection of basic information from the included women in labor, including age, weight, body mass index (BMI), gestational age, number of births, and whether they were primiparous. In addition, we meticulously documented the clinical indicators of the two groups of women in labor during the childbirth process, including the duration of each stage of labor—the first, second, and third stages, as well as the total labor time. We also provided a detailed assessment of episiotomy, perineal laceration degree, and perineal edema. The assessment criteria for perineal laceration [8] are as follows: Intact perineum: No damage to the perineal skin or vaginal mucosa; I-degree laceration: Tears in the perineal skin and vaginal mucosa; II-degree laceration: Laceration extending to the ischiocavernosus muscle, involving the posterior vaginal mucosa; III-degree laceration: Rupture of the external anal sphincter. The assessment criteria for perineal edema [9]a are categorized as: No perineal edema: No edema in the perineal area; Mild perineal edema: Tissue shows slight depression after finger pressure; Moderate perineal edema: Tissue shows significant depression after finger pressure, with slow recovery; Severe perineal edema: Skin is tight and shiny, with possible seepage of fluid in severe cases.

Upon the entry and exit from the delivery room, we also assessed their pain and anxiety conditions. Pain intensity was evaluated using the Visual Analogue Scale (VAS) [10]. The VAS is a unidimensional tool for measuring pain intensity, consisting of a 10-centimeter line marked from "0" (no pain) to "10" (most severe pain). Women in labor marked the point on the line that represents their level of pain, and the VAS score was determined by measuring the distance from "0" to the marked point. The VAS score ranges from 0 to 10, with higher scores indicating more severe pain in the women in labor. Many studies [11, 12] have confirmed the good reliability and validity of VAS in assessing the pain levels of women in labor. The anxiety levels in woman in labor were assessed using the Self-Rating Anxiety Scale (SAS) [13]. The SAS includes 20 items scored on a 4-point scale, with higher scores indicating more severe anxiety. Many previous studies [14, 15] have confirmed the high reliability and validity of the SAS in assessing the anxiety levels of women in labor.

Data analysis was conducted using the SPSS 25.0 software package. For continuous variables, data are presented as mean ± standard deviation and group comparisons were made using the independent samples t-test. Categorical data were expressed as rates and compared between groups using the chi-square test. Ordinal data were analyzed using the rank sum test (Mann-Whitney U test). The significance level for all statistical tests

Table 1 The characteristics of included women in labor (*n* = 168)

Characteristic	Lateral recumbent position group(*n* = 86)	Kneeling prone position group(*n* = 82)	t/F	P
Age(y)	29.85 ± 5.22	28.90 ± 5.61	4.282	0.109
Weight(kg)	60.64 ± 4.77	60.03 ± 5.12	6.329	0.087
BMI (Kg/m^2)	23.18 ± 2.91	23.11 ± 2.76	2.194	0.113
Gestational age(weeks)	39.04 ± 0.73	39.06 ± 0.89	4.408	0.215
Number of births	1.56 ± 0.56	1.52 ± 0.53	1.848	0.160
Primipara	52(60.47%)	49(59.76%)	1.311	0.079

Table 2 Comparison of labor time between the two groups

Labor stage	Lateral recumbent position group(*n* = 86)	Kneeling prone position group(*n* = 82)	t	P
The first stage of labor (h)	10.58 ± 1.30	10.54 ± 1.25	2.041	0.136
The second stage of labor (min)	67.20 ± 15.44	69.16 ± 14.91	8.125	0.104
The third stage of labor (min)	7.78 ± 3.52	7.72 ± 3.38	2.003	0.096
Total stage of labor (h)	12.47 ± 2.27	12.59 ± 2.73	2.823	0.117

Table 3 Comparison of VAS score between the two groups

	Lateral recumbent position group(*n* = 86)	Kneeling prone position group(*n* = 82)	t	P
Before labor	8.64 ± 1.15	8.38 ± 1.50	1.231	0.172
After labor	2.56 ± 0.95	3.60 ± 1.21	1.005	0.041

was set at $P < 0.05$ to determine whether the observed differences were statistically significant.

Results

A total of 168 women in labor were included in this study. 86 women in labor underwent lateral recumbent position for natural childbirth, 82 women in labor underwent kneeling prone position for natural childbirth. As shown in Table 1, no statistical differences in the age, weight, BMI, gestational age, number of births and primipara between lateral recumbent position group and kneeling prone position group were found (all $P > 0.05$).

As presented in Table 2, there were no statistical differences in first, second, third and total stage of labor between lateral recumbent position group and kneeling prone position group were found (all $P > 0.05$).

As indicated in Table 3, there was no statistical difference in the VAS score before labor between two groups, but the VAS score after labor in lateral recumbent position group was statistically lower than that of kneeling prone position group($P = 0.041$), showing that lateral recumbent position is beneficial to reduce the pain level of women in labor.

As presented in Table 4, no statistically significant difference was observed in the SAS between the two groups prior to labor. However, a significant reduction in the SAS score was noted postpartum in the lateral recumbent position group compared to the kneeling prone position group (*P* = 0.015). This finding suggests that the lateral recumbent position may be advantageous in mitigating the anxiety levels experienced by women in labor.

As delineated in Table 5, significant differences were observed in the rates of episiotomy, the severity of perineal laceration, and the incidence of perineal edema between the lateral recumbent position group and the kneeling prone position group (all *P* < 0.05). These results indicate that the lateral recumbent position may confer benefits in reducing the likelihood of episiotomy, mitigating the severity of perineal lacerations, and decreasing the occurrence of perineal edema in women in labor.

Discussions

Vaginal childbirth is a process that allows the women in labor to actively engage in the birthing process, aligning more closely with physiological norms and avoiding the surgical trauma associated with cesarean Sect. [16]. This approach is advantageous for postpartum recovery and facilitates neonatal feeding. However, most parturient lack prior childbirth experience and often struggle to master the correct techniques for exerting force during labor [17]. The high levels of stress experienced during labor further complicate the accurate timing of contractions, thereby increasing the risk of perineal laceration. With the improvement of living standards, the pursuit of a high-quality childbirth experience has become a mainstream trend in obstetrics. In this context, lateral position childbirth combined with unprotected perineal delivery has emerged as a promising approach. By emphasizing a reduction in medical intervention, this method can significantly enhance postpartum quality of life, decrease the incidence of perineal complications, and accelerate the recovery of the perineal area [18, 19]. Further research should consider exploring the comparative benefits of "hands off" versus "hands on" techniques to further elucidate optimal practices in childbirth. The results of this study indicate that lateral position childbirth combined with unprotected perineal delivery effectively reduces the rate of perineal injury and helps alleviate the pain and anxiety of women in labor. The analysis suggests that the application of the lateral position in primary hospitals has reduced the rate of perineal laceration and perineal complications during childbirth, promoting rapid recovery for the woman in labor. Moreover, the lateral position is conducive to the rest of women in labor and increases the comfort of childbirth, while unprotected perineal delivery enhances the extensibility and elasticity

Table 4 Comparison of SAS score between the two groups

	Lateral recumbent position group(*n* = 86)	Kneeling prone position group(*n* = 82)	t	*P*
Before labor	56.66 ± 15.29	56.70 ± 16.02	5.322	0.113
After labor	34.14 ± 10.03	42.62 ± 12.77	4.964	0.015

Table 5 Comparison of episiotomy, perineal laceration severity, and perineal edema between two groups of women in labor

		Lateral recumbent position group(*n* = 86)	Kneeling prone position group(*n* = 82)	F	*P*
Episiotomy		2(2.33%)	5(6.10%)	1.286	0.008
Perineal laceration severity	Intact perineum	50(58.14%)	27(32.93%)	1.776	0.023
	Laceration I	17(19.77%)	20(24.39%)		
	Laceration II	18(20.93%)	31(37.80%)		
	Laceration III	1(1.16%)	4(4.88%)		
Perineal edema	No edema	52(60.47%)	45(54.88%)	1.503	0.014
	Mild edema	21(24.42%)	15(18.29%)		
	Moderate edema	12(13.95%)	19(23.17%)		
	Severe edema	1(1.16%)	3(3.66%)		

of the perineum, providing support for the women in labor during the childbirth process [20–22].

The findings of this study reveal that lateral position childbirth combined with unassisted perineal delivery can effectively reduce the incidence of perineal complications in women in labor and enhance the comfort during the childbirth process. The analysis of the reasons suggests that the combination of lateral position childbirth and unprotected perineal delivery ensures the smooth delivery of the fetal head, effectively controls perineal laceration, alleviates the pain of women in labor, and promotes rapid recovery in the short term postpartum [23]. Moreover, this method of childbirth allows for the slow and natural delivery of the fetus from the birth canal, closely approximating the state of natural childbirth [24]. In the kneeling-lying position, the pelvis is able to expand in all directions, and the pelvic floor muscles are relaxed, which aids in the progression of childbirth [25]. However, this position has poor adaptability and is more physically demanding for the women in labor, potentially leading to a perceived prolongation of the second stage of labor [26]. In contrast, during lateral position childbirth, the back of woman in labor forms a C-shape, increasing the anteroposterior diameter of the pelvis and bringing the uterus closer to the abdominal wall, thereby facilitating childbirth [27, 28]. Additionally, this position can reduce the compression of the pelvic floor nerves by the

enlarged uterus, further alleviating the pain experienced by the woman in labor during the childbirth process [29].

Changes in maternal position during childbirth have a positive impact on the success rate of delivery, with the traditional supine position being prone to causing complications such as perineal laceration [30]. When woman in labor are in the lateral position, the uterus tends towards the abdominal wall, aligning the fetal axis with the birth axis [31]. Uterine contractions push the fetus towards the posterior pelvis, facilitating a better fit between the fetus and the pelvic inlet, promoting fetal descent, engagement, and expulsion, thereby shortening the duration of labor [32]. Additionally, the lateral position can effectively reduce the pressure on the perineum during fetal descent, lowering the incidence of symptoms such as perineal laceration [33]. During the late stages of pregnancy, influenced by hormonal levels, the connective tissue becomes softer, exhibiting greater extensibility [34]. Midwives adopting unassisted perineal delivery can intervene in the speed of fetal head descent during the delivery process, assisting in the slow and smooth expulsion of the fetus [35, 36]. This approach brings childbirth closer to the natural state, which is conducive to improving the outcomes of delivery.

This study has several limitations that should be carefully considered when interpreting the results. Firstly, the study employed a retrospective cohort design, which may be subject to inaccuracies in record-keeping or the presence of uncontrolled confounding factors that could affect the accuracy of the results. Hence, the findings should be interpreted with caution. Secondly, the study was conducted as a single-center design with a small sample size, which may have resulted in insufficient statistical power, limiting the generalizability and reliability of the findings. Given the limitations identified, future research should prioritize larger sample sizes and adopt prospective study designs to comprehensively evaluate the efficacy and safety of the lateral position compared to the kneeling position in unassisted perineal delivery. Such an approach would provide more robust evidence to guide clinical practice and optimize obstetric management strategies.

Conclusion

In summary, the findings of this study indicate that the lateral recumbent position does not prolong the duration of labor. Moreover, it is advantageous in reducing the pain and anxiety levels of woman in labor, decreasing the incidence of episiotomy, alleviating the severity of perineal lacerations, and diminishing the occurrence of perineal edema. The lateral recumbent position emerges as a valuable addition to the clinical practices of maternal management and care. It is imperative that healthcare providers and institutions consider the integration of this position into their standard protocols, thereby enhancing the quality of care and the overall well-being of women in labor.

Declarations

Ethics approval and consent to participate
In this study, all methods were performed in accordance with the relevant guidelines and regulations. Our study adhered to the Declaration of Helsinki. The study has been reviewed and approved by the Ethics Committee of First Affiliated Hospital of Soochow University (Approval Number: 2024506). And written informed consents had been obtained from all the included patients.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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