Am J Transl Res 2021;13(12):14168-14175
www.ajtr.org /ISSN:1943-8141/AJTR0134060

Original Article

Application of natural shoulder delivery combined with free position delivery in maternal delivery

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Received April 8, 2021; Accepted October 12, 2021; Epub December 15, 2021; Published December 30, 2021

Abstract: Objective: This research was designed to probe into the influences of natural shoulder delivery combined with free position delivery on pregnant outcome and genital tract of puerperants. Methods: Totally 128 puerperants who gave birth in our hospital from May 2018 to November 2019 were selected as the research objects. Among them, 66 in traditional position combined with traditional shoulder delivery were assigned to a conventional group (CG), and 62 in free position combined with natural shoulder delivery were assigned to a research group (RG). Their psychological mood, pain degree, pregnancy outcome, labor time, postpartum recovery and genital tract injury were compared. Results: Compared with the CG, the scores of visual analogue scale (VAS) pain, postpartum self-rating depression scale (SDS) and self-rating anxiety scale (SAS) in the RG during delivery were lower (P<0.05); the first, second, third and total labor stages in the RG were shorter (P<0.05). What's more, in the RG, the incidences of lateral episiotomy, urinary retention, stress urinary incontinence, transit cesarean section, shoulder dystocia and neonatal asphyxia were lower, while the perineum integrity and natural delivery rates were higher (P<0.05); the postpartum height of uterus, lochia discharge and blood loss were lower, while milk yield was higher (P<0.05). Conclusion: Natural shoulder delivery combined with free position delivery can effectively improve the pregnancy outcome, benefit the postpartum recovery, shorten the labor process and reduce the degree of genital tract injury. Hence, it is worthy of clinical application.

Keywords: Natural shoulder delivery, free position delivery, pregnancy outcome, genital tract

Introduction

Cesarean section (CS) is a surgical operation to deliver a child by cutting the mother's abdomen and uterine wall. It was originally used as a surgical solution to solve the problems related to dystocia [1, 2]. There are many adverse consequences. For instance, it restricts children's physical and mental health development, increases hospitalization and recovery time and economic burden, and damages mother-infant relationship; it also causes higher risk of complications such as infection, hysterectomy and organ damage [3-5]. Because of fear, pain etc., many women hope to take CS without medical indications [6]. However, under the condition of good health, natural childbirth is preferred by clinicians. Therefore, seeking effective measures to reduce CS rate and promote natural delivery has become the research goal and direction of obstetricians and gynecologists.

Supine delivery is a commonly used position. Although it is convenient for medical staff to observe the progress of maternal labor and carry out related examinations, there are still many drawbacks. For one thing, it reduces the pelvic outlet diameter, thereby increasing the resistance of fetal descent and prolonging the labor process. For another, it reduces the effect of uterine contraction, thus decreasing uterine blood flow and increasing maternal discomfort, etc. [7, 8]. Free position delivery refers to the method that a woman can freely choose squatting, kneeling, lying, sitting, standing, lying and other positions to give birth in view of her own situation during the labor process. Past clinical experience shows that taking free position to deliver has many benefits, such as relieving

pain during childbirth, shortening labor process, improving uterine contraction and reducing maternal genital tract injury [9-11]. In the process of delivery, after the fetal head is delivered, the anterior shoulder of some fetuses is embedded with the pubic bone of the puerperants, which makes it difficult to give birth to both shoulders, resulting in shoulder dystocia [12]. Shoulder dystocia usually occurs suddenly and cannot be effectively prevented and controlled. Once it occurs, it may lead to incalculable consequences and even neonatal death [13]. Thus, how to prevent shoulder dystocia is one of the difficulties in childbirth. Previously, a research has shown that natural shoulder delivery after waiting for contractions can adapt to the frequency, speed and interval of contractions, thus preventing shoulder dystocia to the utmost extent [14]. At the moment, although there are many researches on free position delivery and natural shoulder delivery, the research data of combining these two methods are still rare.

This research explored the effects of free position delivery combined with natural shoulder delivery on pregnancy outcome and postpartum recovery of puerperants, aiming at finding an optimal delivery mode. It manifested that compared with the traditional delivery mode, this combination therapy has better benefits for patients. For example, it reduces pain during delivery, relieves adverse psychological emotions, and decreases the incidence of genital tract injury and postpartum complications; it also improves pregnancy outcome, promotes postpartum recovery, and enhances service satisfaction.

Data and methods

Recruitment of subjects

Totally 128 puerperants who gave birth in the First People's Hospital of Taizhou City from May 2018 to November 2019 were selected as the research objects. Thereinto, 66 in traditional position combined with traditional shoulder delivery were assigned to a conventional group (CG), and 62 in free position combined with natural shoulder delivery were assigned to the research group (RG).

Inclusion criteria: Singleton and full-term delivery; physical examination signified that the uterus developed normally, the fetus developed well, and the pelvis was normal in size and shape, which were suitable for vaginal delivery; complete clinical data; age ≥20 years. Exclusion criteria: Those with mental illness or communication disorder; those complicated with major organ dysfunction such as heart, liver and kidney; those complicated with high risk factors and complications during pregnancy; those who had a history of induced labor, repeated urinary system infection, genitourinary system abnormality and pelvic floor injury. With the consent of the medical ethics committee of our hospital (TZ (2019) Lunxue (125 preparation)), all the subjects understood the purpose and method of the research and sign the informed consent form.

Mode of delivery

In the CG, puerperants gave birth in supine position. After the fetal head was delivered, the traditional method of shoulder delivery was adopted.

In the RG, they gave birth in free position. After the fetal head was delivered, the natural shoulder delivery method was adopted. The specific methods are as follows: In view of the comfort and individuation of puerperants, puerperants choose standing position (they stand against the wall and grasp the handrails with both hands), sitting position (they sit on the delivery ball, grasp the handrails, and step on the bracket, shaking left and right or bouncing up and down), kneeling position (they kneel on the soft cushion, leaning forward, holding the delivery ball with both hands and shaking around the delivery ball), squatting position (the head of the bed is raised to 90°, and they lie with their back against the head of the bed), or supine position (the delivery ball is put on the bed, and they lies on the ball with the waist shaking back and forth). Based on the individual situation and the needs at that time, the body position was randomized and changed. Under different body positions, when the cervix is fully open and the mother can exert her own strength, a lateral position with a supine position or a semi-sitting position should be considered. After the fetal head is delivered, the puerperants are instructed not to rush to deliver the fetal shoulder but wait for the next contraction, and guided to force the fetal head to perform natural

reduction and external rotation. The shoulder of the fetus can be rotated in different directions to assist the delivery. After the delivery of the shoulders, a lateral position can be considered to assist the delivery of the fetal body and lower limbs.

Note: According to the perineum condition of the puerperants and the size of the fetus, the doctors consider whether to perform perineum incision or not. If necessary, they choose the appropriate incision method, and local or perineum nerve block anesthesia.

Outcome measures

Professional medical staff should record the first, second and third stages and the total time of labor.

The degree of perineum injury between both groups was compared: The first degree perineal laceration is the tearing of perineal skin and vaginal entrance mucosa, and there is not much bleeding; the second has reached the fascia and muscle layer of perineum, involving the mucosa of posterior vaginal wall and bleeding more; the third is that the laceration extends to the deep perineum, the external anal sphincter has broken, and the rectal mucosa is still intact; the fourth is complete penetration of anus, rectum and vagina, exposure of rectal cavity and serious tissue damage.

The value of the most severe pain in the process of uterus dilation was observed by visual analogue scale pain score (VAS) [15]. The score can be divided into 11 values, and the patient chooses the corresponding one according to the pain situation; 10 indicate the most severe pain and 0 indicates no pain. The anxiety and depression of patients after delivery were evaluated by self-rating anxiety scale (SAS) [16] and self-rating depression scale (SDS) [17]. The total score is 100 points; the higher the score, the more serious the anxiety is.

The incidences of postpartum complications, including urinary retention, stress urinary incontinence, anemia, constipation and metritis, were recorded in the two groups. The amount of postpartum hemorrhage was measured by weighing method 2 h after delivery. The height of uterine fundus, lochia discharge and lactation volume were recorded. The pregnancy outcomes were recorded, including natural delivery, transit cesarean section, shoulder dystocia, neonatal asphyxia and forceps delivery.

One day after delivery, patients' satisfaction with the mode of delivery was evaluated by the self-made Delivery Mode Satisfaction Questionnaire in our hospital. There are 20 questions, each of which scores 5 points; score <70 denotes dissatisfied, 70-89 denotes basically satisfied, and ≥90 denotes satisfied. Satisfaction = (satisfaction + basic satisfaction)/total cases × 100%.

Statistical analysis

SPSS 21.0 was employed for statistical analysis, and the pictures were drawn by GraphPad Prism 7. The counting data were compared by Chi-square test, marked as χ^2. The measurement data were assessed by t test. Independent-samples t test was used for comparison between groups, and paired t test was used for comparison within groups. $P<0.05$ means the difference was statistically remarkable.

Results

Comparison of general data

There was no marked difference between the two groups in general data, such as maternal age, BMI before pregnancy, gestational age, dietary preference, working, marital status, history of smoking and drinking, painless delivery, educational level and parity ($P>0.05$) (**Table 1**).

Comparison of labor pain and postpartum psychological emotion between the two groups

After evaluating the pain during childbirth and postpartum psychological emotion, we found that compared with the CG, the VAS score in the RG during childbirth was lower, and the SDS and SAS scores after childbirth were also lower ($P<0.05$) (**Figure 1**).

Comparison of labor time between the two groups

The first, second, third and total labor time in the RG were shorter than those in the CG, with statistically significant differences ($P<0.05$) (**Figure 2**).

Table 1. Comparison of general data ([n (%)], means ± sd)

Group	Conventional group (n=66)	Research group (n=62)	χ^2/t	P
Age (years)	27.26±3.15	28.11±3.63	1.417	0.159
BMI before pregnancy (kg/m^2)	22.24±2.67	22.76±2.89	1.058	0.292
Gestational age (weeks)	39.16±0.71	39.22±0.83	0.440	0.660
Dietary preference			0.205	0.651
Light	43 (65.15)	38 (61.29)		
Greasy	23 (34.85)	24 (38.71)		
Working			1.030	0.310
Yes	39 (59.09)	42 (67.74)		
No	27 (40.91)	20 (32.26)		
Marital status			0.068	0.794
Married	52 (78.79)	50 (80.65)		
Unmarried	14 (21.21)	12 (19.35)		
History of smoking			0.212	0.645
Yes	23 (34.85)	19 (30.65)		
No	43 (65.15)	43 (69.35)		
History of drinking			0.182	0.670
Yes	19 (28.79)	20 (32.26)		
No	47 (71.21)	42 (67.74)		
Education level			0.019	0.889
≤high school	29 (43.94)	28 (45.16)		
>high school	37 (56.06)	34 (54.84)		
Parity			0.469	0.494
Primiparity	42 (63.64)	43 (69.35)		
Multiparity	24 (36.36)	19 (30.65)		
Parity			0.239	0.625
Primipara	42 (63.64)	42 (67.74)		
Multipara	24 (36.36)	20 (32.25)		
Painless delivery			0.226	1.462
Yes	15 (22.73)	20 (32.25)		
No	51 (77.27)	42 (67.74)		

Comparison of perineum injury between the two groups

After comparing the perineum of both groups, we found that the lateral episiotomy rate of the RG was lower than that of the CG (9.68% vs. 25.76%), and the perineum integrity rate of the former was higher than that of the latter (24.19% vs. 7.58%), with statistical significance (P<0.05). There was no obvious difference in perineal laceration between them (P>0.05) (**Table 2**).

Comparison of postpartum complications and blood loss in both groups

The incidence of postpartum complications was recorded. It was found that the incidence of urinary retention and stress urinary incontinence in the RG was remarkably lower than that in the CG, and the postpartum blood loss in 2 h of the former group was obviously less (P>0.05), while the incidence of anemia, constipation and metritis showed no remarkable difference between the two groups (P<0.05) (**Table 3**).

Comparison of postpartum height of uterine fundus, lochia discharge and lactation

Compared with the CG, the postpartum height of uterine fundus and amount of lochia in the RG were lower, while the lactation was higher, and the differences were statistically significant (P<0.05) (**Figure 3**).

Comparison of pregnancy outcomes between the two groups

Compared with the CG, the natural delivery rate in the RG increased, while the transit cesarean section rate, shoulder dystocia and neonatal asphyxia rates decreased (P<0.05). However, there was no marked difference in the incidence of forceps delivery between the two groups (P>0.05) (**Table 4**).

Comparison of satisfaction of delivery mode between the two groups

After evaluating the satisfaction of both groups on delivery mode, we discovered that the total satisfaction rate of the RG was markedly higher than that of the CG (79.03% vs. 60.61%), and the difference was statistically significant (P< 0.05). In addition, we found that many of the puerperants in the CG experienced severe pain during delivery, uncomfortable posture and poor experience (**Table 5**).

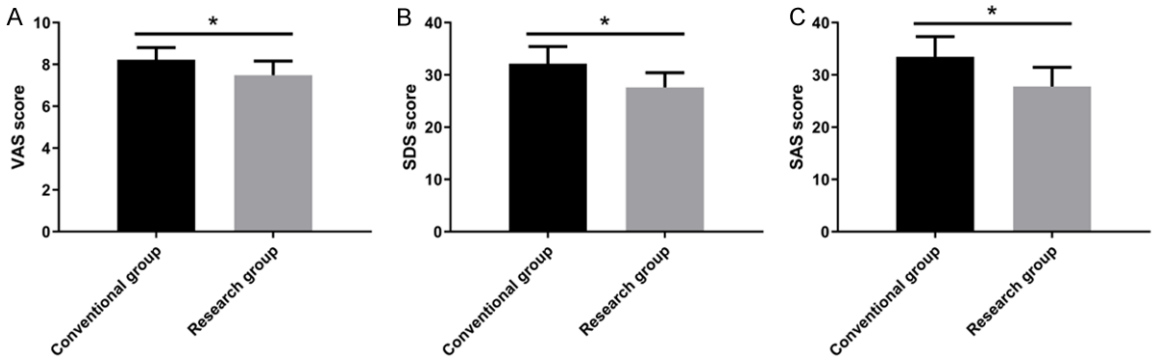

Figure 1. Comparison of pain during childbirth and postpartum psychological mood. A: Comparison of pain scores during labor. B: Comparison of postpartum SDS scores. C: Comparison of postpartum SAS scores. Note: *P<0.05.

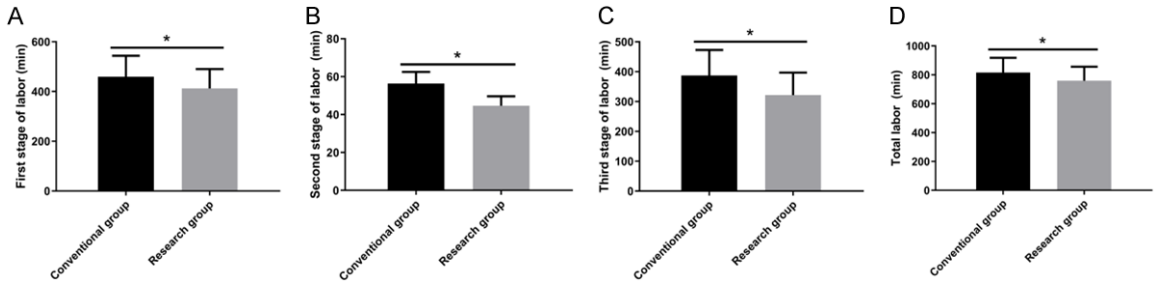

Figure 2. Comparison of labor time. A: Comparison of time of the first stage of labor. B: Comparison of time of the second stage of labor. C: Comparison of time of the third stage of labor. D: Comparison of total labor time. Note: *P<0.05.

Table 2. Comparison of perineum between the two groups [n (%)]

Group	Conventional group (n=66)	Research group (n=62)	χ^2	P
Lateral episiotomy	17 (25.76)	6 (9.68)	5.608	0.018
Complete perineum	5 (7.58)	15 (24.19)	6.696	0.010
First degree laceration	37 (56.06)	29 (46.77)	2.462	0.293
Second degree laceration	5 (7.58)	3 (4.84)	0.409	0.523

Table 3. Comparison of postpartum complications between the two groups ([n (%)], means ± sd)

Group	Conventional group (n=66)	Research group (n=62)	χ^2	P
Urinary retention	14 (21.21)	4 (6.45)	5.763	0.016
Stress urinary incontinence	23 (34.85)	11 (17.74)	4.796	0.029
Anemia	7 (10.61)	4 (6.45)	0.702	0.402
Constipation	9 (13.64)	6 (9.68)	0.484	0.487
Metritis	3 (4.55)	1 (1.61)	0.908	0.341
Blood loss in 2 h	229.82±89.46	174.68±78.69	3.693	<0.001

Discussion

Childbirth is a natural physiological process. Natural childbirth is the best choice beneficial to both mothers and babies. How to effectively avoid and reduce the occurrence of birth injury is a problem that obstetricians and gynecologists have been discussing. This research analyzed the application value of natural shoulder delivery combined with free position delivery in natural delivery.

Positive delivery experience can improve maternal health and promote the connection between mothers and infants, while negative experience may lead to psychological distress and serious diseases, such as depression, post-traumatic stress disorder, impaired mother-infant bond and fear of the next birth [18, 19]. There are many factors that affect the normal delivery,

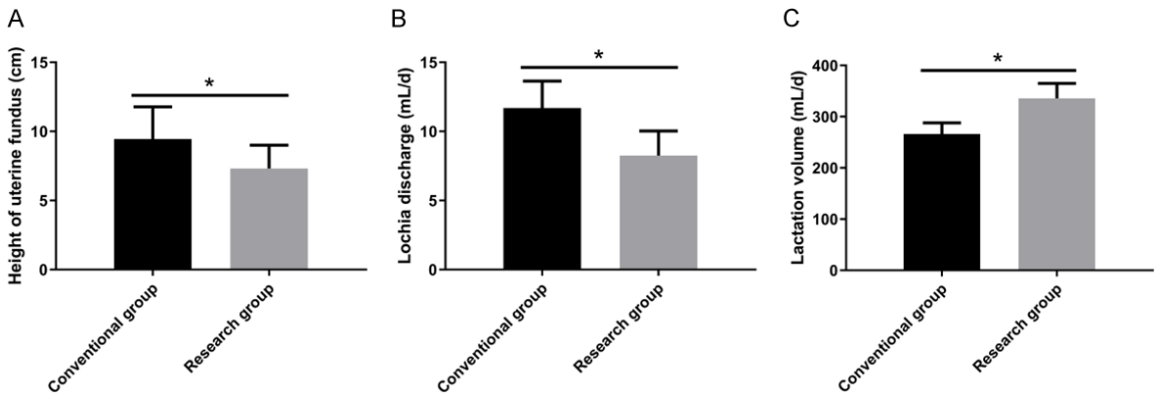

Figure 3. Comparison of postpartum height of uterine fundus, lochia discharge and lactation. A: Comparison of postpartum height of uterine fundus. B: Comparison of postpartum lochia discharge. C: Comparison of postpartum lactation. Note: *P<0.05.

Table 4. Comparison of pregnancy outcomes between the two groups [n (%)]

Group	Conventional group (n=66)	Research group (n=62)	χ^2	P
Forceps delivery	5 (7.58)	1 (1.61)	2.544	0.111
Transit cesarean section	18 (27.27)	6 (9.68)	6.497	0.011
Natural childbirth	43 (65.15)	55 (88.71)	9.887	0.002
Shoulder dystocia	5 (7.58)	0 (0.00)	4.888	0.027
Neonatal asphyxia	12 (18.18)	3 (4.84)	5.502	0.019

Table 5. Comparison of satisfaction of delivery mode between the two groups [n (%)]

Group	Conventional group (n=66)	Research group (n=62)	χ^2	P
Very satisfied	10 (15.15)	23 (37.10)	-	-
Basically satisfied	30 (45.45)	30 (48.39)	-	-
Dissatisfied	26 (39.39)	13 (20.97)	-	-
Total number of satisfied people	40 (60.61)	53 (79.03)	5.123	0.024

among which pain and its related negative emotions are crucial [20, 21]. In the process of delivery in traditional position, puerperants need to keep a posture, which not only increases their fatigue, but also may affect their psychological state, thereby bringing poor cooperation and ultimately affecting the smooth delivery. The puerperants can not only distract their attention and relieve their nervousness, but also enhance the quality of uterine contraction and relieve the pain of childbirth by adjusting their body position, thus improving the treatment compliance and the confidence of successful childbirth [22, 23]. It revealed that the VAS score of the RG during delivery was lower than that of the CG, and the SDS and SAS scores of the former after delivery were also lower. This showed that free position could relieve the pain and negative emotions of puerperants, which is beneficial to the delivery.

A recent research has suggested that prolonged labor process is a crucial reason for the obviously increased postpartum disease rate of puerperants and newborns [24]. During delivery, uterine inertia and abnormal fetal position are vital reasons for prolonging the second stage of labor [25]. In the process of delivery in traditional posture, the direction of the fetal axis is inconsistent with that of the pelvis of puerperants, so gravity cannot be used, which increases the difficulty and time of delivery [26]. When they change from lying position to upright position, sitting position or squatting position, the pressure in the uterine cavity is increased and the uterine contractility is strengthened, thus speeding up the delivery process by making full use of gravity [27, 28]. What's more, free body delivery can slowly and fully expand the perineum, so as to reduce the damage to it. Shoulder dystocia is a serious obstetric emergency. If it can't be treated promptly and effectively, it can lead to seri-

ous complications of mothers and children. Some studies have shown that natural shoulder delivery after waiting for contraction can prevent shoulder dystocia to a certain extent [29]. This study signified that the first, second, third and total labor time in the RG were shorter than those in the CG; the incidences of lateral episiotomy, urinary retention, stress urinary incontinence, transit cesarean section, shoulder dystocia and neonatal asphyxia in the RG were lower than those in the CG, and the blood loss in 2 h after delivery was markedly lower. Besides, the perineum integrity and natural delivery rates in the RG were higher than those in the CG. Compared with the CG, the height of uterine fundus and lochia amount in the RG were lower, while the lactation output was higher. And this is consistent with the results of previous studies [30]. This shows that natural shoulder delivery combined with free position delivery can reduce the incidence of maternal genital tract injury and postpartum complications, and improve pregnancy outcome and postpartum recovery.

Women's satisfaction with delivery is a crucial indicator to measure the quality of maternal reproductive health services. At the end of this study, the satisfaction of both groups on delivery mode was evaluated; it was found that the total satisfaction rate of the RG was markedly higher than that of the CG, and many puerperants in the latter group had severe pain during delivery, uncomfortable posture, poor experience, and wanted a more comfortable mode. This shows that the traditional body position can no longer meet the needs of the puerperants nowadays. Hence, it's necessary to find a more comfortable mode of production, which will be beneficial to the popularization of natural shoulder delivery combined with free body position delivery.

Nevertheless, this study still has certain limitations. First of all, as a retrospective study, we did not conduct a randomized controlled experiment, and the results we obtained may be biased. Secondly, our sample size is relatively small. Therefore, we hope to increase our sample size in subsequent studies and carry out forward-looking studies to improve the conclusions we have obtained.

To sum up, natural shoulder delivery combined with free position delivery can effectively improve maternal pregnancy outcome, facilitate postpartum recovery, shorten the labor process and reduce the degree of genital tract injury, and thus is worthy of clinical application.

Disclosure of conflict of interest

None.

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