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Comparison of the effects of water and traditional delivery on birthing women and newborns

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Abstract. – OBJECTIVE: The objective our study was to compare the respective effects of water and traditional delivery on birthing women and newborns.

PATIENTS AND METHODS: 120 primiparas with singlet pregnancy, head-down foetus position, and term delivery were randomly divided into two groups. Sixty birthing women were included in traditional delivery group, while other sixty women underwent water delivery. The duration of labour and the volume of blood lost within 24 hours were compared between both groups. Furthermore, perineum condition, degree of delivery pain, and Apgar scores (1st and 5th minute) were also compared.

RESULTS: The total duration of labour and the volume of lost blood were comparable between both delivery methods. The perineum integrity and episiotomy rates were significantly ($p < 0.05$ for both comparisons) better in water delivery group (respectively, 25.00% vs. 8.33% and 1.67% vs. 20% in traditional delivery group). Furthermore, the degree of delivery pain was also more favourable in water delivery group. The Apgar scores were comparable between both delivery methods.

CONCLUSIONS: Water delivery can reduce delivery pain without increasing the risk to birthing women and newborns.

Key Words:
Traditional delivery, Water delivery, Birthing women, Newborns.

Introduction

Delivery is a physical process that most women come to experience in life and is a crucial step in human reproduction[1-4]. Natural delivery is often complicated with severe pain. Also, birthing women experience strong loneliness and sense of fear, which affects the progress of the labour[5-8]. Prolonged pain in natural delivery is the cause of many women choosing cesarean delivery. Studies show that the foetuses delivered by cesarean section are different from those born by natural delivery; furthermore, cesarean section also causes substantial injury to the mothers[3]. Thus, reducing the duration and intensity of pain during natural delivery is of immediate interest.

Water delivery is a delivery mode that can decrease the pain associated with delivery, shorten the duration of the delivery, and be beneficial for newborn's adaptation to the new environment[7,8]. In our Hospital, water delivery has been successfully applied and achieved good clinical results.

Patients and Methods

Study Individuals

One hundred and twenty birthing women admitted between June 2012 and July 2013 were randomly divided into two groups. Sixty women undergoing traditional delivery were assigned to control group, while other 60 women were selected for water delivery group. Women in the traditional delivery group had an average age of [mean ± SD] 27.42 ± 2.48 (range 22-35) years. Their gestational week at delivery ranged from 37 to 42 weeks (39.43 ± 2.10) weeks. Women's age in water delivery group was 27.49 ± 2.51 (21-35) years and their gestational week at delivery was 39.47 ± 2.22 (37-42) weeks. All birthing women were primiparas with singlet pregnancy, head-down foetus position, and term delivery. The age, gestational week and parity were not statistically different between both study groups.

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Delivery

In traditional delivery group, predelivery preparations included enema, shaving, artificial rupture, foetus monitoring and parenteral nutrition. Women were taught breathing and pushing methods to deliver the foetus. In water delivery group, the women were asked to do enema and take shower before their cervixes opened by 3 cm. When their cervixes opened to 4 cm, vagina examinations were applied to confirm cervix expansion, as well as presentation and height of the foetuses. The characteristics of amniotic fluid were observed to control for membrane rupture. Then, women entered the water bath whose temperature was maintained at 35-37º C. The women assumed free position, and foetal heart monitoring was done every 15 minutes until newborn delivery.

Delivery Conditions

The duration of the delivery and the volume of blood lost within 24 hours were recorded in all women. The perineum condition was evaluated as follows: a tear of perineum skin and mucosa of vaginal opening was defined as a degree I laceration, while a tear up to the muscular layer of perineum, involving mucosa of the posterior wall of vagina, was defined as a degree II laceration[9].

Intensity of Pain

Absent or slight pain was ranked as degree I, tolerable pain (women could cooperate with the doctor) was ranked as degree II, moderate pain and inability to cooperate with the doctor was ranked as degree III, and unendurable severe pain was defined as degree IV pain[10].

Apgar score

The Apgar score was used to assess the physical condition of newborns at 1 and 5 minutes after the delivery, and included muscular tension, pulse, reaction to stimulus, complexion, and respiration[11].

Statistical Analysis

SPSS13.0 (SPSS Inc., Chicago, IL, USA) was used for analysis. Quantitative data were analyzed by the *t* test. Qualitative data were analyzed by the chi-square test. The p value of < 0.05 was considered statistically significant.

Results

Delivery

Average durations of labour were 5.27 ± 2.03 and 6.11 ± 2.42 hours in, respectively, water and traditional delivery groups (Table I). Blood losses within 24 hours were respectively, 184.38 ± 21.26 and 190.47 ± 20.52 ml (Table I). Neither duration of labour nor blood losses were significantly different between study groups. In contrast, both perineal integrity (25.00% vs. 8.33%) and episiotomy rates (1.67% vs. 20.00%) were significantly ($p < 0.05$) more favourable in water delivery group (Table I).

Delivery Pain

As demonstrated in Table II, the degree of pain was significantly ($p < 0.05$) lower in water delivery group.

Apgar Scores

The Apgar scores were comparable between both study groups at the 1st and 5th minute after the birth (Table III).

Table I. Delivery conditions in study groups.

Groups	Total duration of labour, hours	Blood loss with in 24 hours, ml	Perineum condition, absolute number (%)			
			Complete	Degree I laceration	Degree II laceration	Episiotomy
Traditional delivery (n = 60)	6.11 ± 2.42	190.47 ± 20.52	5 (8.33)	27 (45.00)	16 (26.67)	12 (20.00)
Water delivery (n = 60)	5.27 ± 2.03	184.38 ± 21.26	15 (25.00)	39 (65.00)	5 (8.33)	1 (1.67)
p	0.032	N.S.	0.024	0.026	0.018	0.021

Footnote: Data are presented as mean ± SD or as absolute number (%). N.S.: not significant.

Table II. Delivery conditions in study groups.

Groups	Delivery pain		
	Degree I	Degree II	Degree III
Traditional delivery (n = 60)	12 (20.00)	34 (56.67)	14 (23.33)
Water delivery (n = 60)	50 (83.33)	8 (13.33)	2 (3.33)
p	0.008	0.014	0.020

Footnote: Data are presented as mean ± SD or as absolute number (%). N.S.: not significant.

Discussion

During delivery, birthing women often suffer from severe pain, which markedly prolongs the duration of labour and decreases the quality of the delivery. Not surprisingly, many women choose cesarean delivery[12-14]. As humane concepts of modern medicine are spreading more widely, natural delivery has attracted more attention[15,16].

In water delivery, birthing women receive professional guidance. Women have natural delivery supported by the buoyancy of the water and comfortable water temperature[17,18]. Because this non-medical method can decrease the pain of natural labour, it is gradually becoming popular among birthing women[19,20]. In contrast to an obstetric table, water provides better support and relaxes muscle tension[21]. Furthermore, in the water, women can move more freely and assume different positions (e.g., squat, sit or kneel), which helps to relax the muscles of the pelvic floor and expand the cervix more rapidly[22]. In addition, water delivery can alleviate the nervousness and anxiety, and improve the tolerance to pain. At a sitting or semi-reclined position, the uterus is away from the spine and close to the abdominal wall; thus, the vertical axis is more similar to the birth axis, which is beneficial for descending of the foetus[23]. Also, appropriate water temperature decreases body release of algogenic substances (e.g., catecholamines), relaxes the muscles, calms the mood, and eliminates the cervix resistance. The latter helps to attenuate the pain. Blood perfusion of the uterus is increased and expansion speed of the cervix is accelerated, which both facilitate the labour and shorten delivery time[24]. In warm water, the pressure difference between outside and inside of the vagina is small, and the perineum and birth canal can be sufficiently expanded. After being immersed in the water, the elasticity of the pelvic floor tissue is increased to some extent. In addition, water provides buoyancy to the foetus, which reduces the pressure to the perineum, thereby significantly decreasing the rate of vagina laceration. With the diminished rate of perineum tissue injury, birthing women can recover more rapidly[25].

As water delivery can accelerate the progress of labour stage and shorten the delivery time, the rate of neonatal hypoxia may be decreased. Water environment is similar to amniotic fluid, thus the foetus has a smoother transitional process. Newborn's blood is cleaned in the water, and the contact between the mother and the baby can be applied early, which provides a beneficial condition for lactation and recovery[26].

Water delivery is also called water birth, while traditional delivery – dry birth. Traditional delivery is associated with a lack of lubrication in the birth canal, which increases resistance to the foetus during its descending, thus, contributing to laceration[17].

Table III. Apgar scores (points) in study groups.

Groups	1st minute	5th minute
Traditional delivery (n = 60)	9.28 ± 0.47	9.32 ± 0.52
Water delivery (n = 60)	9.26 ± 0.51	9.34 ± 0.49
p	N.S.	N.S.

Footnote: Data are presented as mean ± SD. N.S.: not significant.

Indications of water delivery should be strictly controlled and some necessary measure should be taken to guarantee the safety of the mother and the baby. Compared with traditional delivery, water delivery can only be applied in women with a gestational week of more than 38 weeks, normal foetal heart sounds, head-down delivery, and good physical health (without pregnancy complications or infectious diseases). Birthing women with multiple pregnancy, foetus malposition, foetal macrosomia, or amniotic fluid contamination should be excluded from water delivery.

The used water should be circularly processed, with water temperature kept at 36-38º C and room temperature at 26-28º C[17]. Although women can freely adjust the position, the abdomen must be kept above the water to ensure that foetal heart sound can be detected at any time. Episiotomy is not practical during water delivery; therefore, proper control of abdominal pressure is very important. High abdominal pressure can cause fast labour and force episiotomy, while low abdominal pressure can cause neonatal asphyxia[27].

In our study, the duration of labour in women undergoing water delivery group was significantly shorter than in those with traditional delivery. Perineum laceration was less frequent, and degree of pain degree was markedly reduced. Importantly, blood loss and Apgar scores were comparable between water and traditional delivery groups.

Conclusions

Water delivery can effectively shorten the duration of labour and reduce maternal pain without increasing the risk to birthing women and newborns. With appropriate conditions, water delivery can be used as a routine birth delivery method.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

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