<u>Original Research</u>

Analysis of Perinatal Outcome of Forceps Delivery and Risk Factors of Postpartum Hemorrhage

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ABSTRACT

Objective • Exploring the perinatal outcomes of forceps delivery and the risk factors of postpartum hemorrhage, laying a certain foundation for early identification of indications for forceps assisted delivery and suppressing the risk of bleeding during forceps assisted delivery, and improving delivery quality

Method • Retrospective analysis was made on the clinical information of 1520 parturients delivered by vagina in hospitals from December 2019 to December 2021. They were divided into normal vaginal delivery group (sample size=1454) and forceps assisted delivery group (sample size 66) according to whether forceps-assisted delivery occurred during the second stage of labor. They were divided into a postpartum hemorrhage group (sample size 9) and non-postpartum hemorrhage group (sample size 47) according to whether forceps-assisted delivery occurred, the risk factors of postpartum hemorrhage were analyzed by logistic regression.

Result • The incidence of perinatal infants in the forceps assisted delivery group compared to those in the normal vaginal delivery group who were transferred to the neonatal intensive care unit (25.76% vs 9.97%), neonatal asphyxia (4.55% vs 1.03%), shoulder dystocia (1.52% vs 0.69%), and facial scratches (40.91% vs 0.14%) was statistically significant (P < .05), except for shoulder

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INTRODUCTION

Forceps delivery is an important way of vaginal surgery delivery, which can help the parturient rapidly deliver the fetus in the second stage of labor, and has a very critical value in coping with the emergency in the clinical second stage of dystocia. Univariate analysis showed that abnormal coagulation function, fetal orientation during midwifery, soft birth canal laceration, perineum lateral incision, and neonatal birth weight were the single factors related to postpartum hemorrhage during forceps delivery (P < .05). Multivariate analysis showed that abnormal coagulation function, laceration of the soft birth canal, and lateral episiotomy were independent risk factors for postpartum hemorrhage during forceps-assisted delivery. The rate of postpartum hemorrhage under forceps-assisted delivery was relatively low when the fetal orientation was occipital transverse (P < .05).

Conclusion • The incidence of postpartum hemorrhage in the forceps assisted delivery group is higher, with occipital posterior position, abnormal coagulation function, soft birth canal tear, and lateral perineal incision being high-risk factors for postpartum hemorrhage in forceps assisted delivery. We need to strengthen prevention and control measures to improve the quality of the perinatal period. This study has guiding significance for early identification of high-risk factors for postpartum hemorrhage, strengthening pre pregnancy knowledge education, strengthening labor process monitoring, actively correcting fetal orientation, and improving midwifery techniques. (*Altern Ther Health Med.* 2024;30(4):102-107)

labor and improving the prognosis of the mother and baby.¹ The current research conclusion shows that the practice of forceps-assisted delivery can significantly increase the risk value of postpartum hemorrhage. Postpartum hemorrhage is a relatively serious complication of the maternal delivery period, and it is also the first major factor causing maternal death worldwide.² The indications for obstetric forceps are as follows: Complete opening of the uterine opening combined with prolonged second stage of labor, such as continuous occipital transverse position requiring the use of obstetric forceps. If pregnancy is accompanied by heart disease or complications, it is necessary to shorten the second stage of labor. The occurrence of fetal distress and hypoxia in the

uterus urgently requires termination of pregnancy. For example, if the fetal heart rate is only 50-60 times after the complete opening of the cervix, it is necessary to quickly use forceps to pull out the fetus, which can reduce adverse outcomes and asphyxia in newborns. Difficulty in delivering the fetal head in breech position, and the fetal head is delivered using forceps; Forceps assisted delivery is the most common and commonly used surgical method in obstetrics to solve difficult labor. It is used for the second stage of labor and is placed on both sides of the fetal head with forceps. After the forceps are closed, they are combined with uterine contractions for traction and traction. This is a relatively safe, mature, and effective delivery method for the fetal head. After using forceps to fully open the cervix for pregnant women, if the fetal position is relatively low, but the fetal head cannot be delivered smoothly or needs to be delivered smoothly in a short period of time, forceps may be used. Today, studies have shown that forceps-assisted delivery can significantly increase the risk of postpartum hemorrhage. Postpartum hemorrhage is not only a serious complication during delivery but also the leading cause of maternal death in the world. At present, the mortality rate of maternal bleeding in developed countries is 13% to 31%.³ However, in China, the mortality rate of postpartum hemorrhage is as high as 32%. How to prevent and reduce the incidence of postpartum hemorrhage has been the focus of obstetric research. There are many and complex influencing factors of postpartum hemorrhage. At present, most studies at home and abroad focus on the age of pregnant women, the number of pregnancies and births, obesity, macrosomia, pregnancyinduced hypertension, lateral perineum resection, extension of the second stage of labor, etc., while there is little research on the causes of postpartum hemorrhage caused by forceps assisted delivery.⁴ Therefore, exploring the perinatal outcomes of forceps assisted delivery and the possible high-risk factors for postpartum hemorrhage, early detection of high-risk factors in parturients, and taking active prevention and treatment measures play an important role in suppressing the incidence of postpartum hemorrhage and maternal mortality rate. For vaginal delivery mothers worldwide, it is beneficial to benefit from it, It has certain reference value for improving the outcomes of vaginal delivery worldwide and promoting the safety and health of mothers and infants. The content of this study is the perinatal outcomes of forceps delivery and the risk indicators of postpartum hemorrhage during prenatal delivery. As described below. The content of this study is the perinatal outcome of forceps delivery and the risk indicators of postpartum hemorrhage under prenatal delivery. As reported below.

MATERIALS AND METHODS

Research object

From December 2019 to December 2021, among 1520 pregnant women who were delivered through the vagina in the hospital, the normal vaginal delivery group (sample size 1454) and forceps-assisted delivery group (sample size 66)

were further divided into postpartum hemorrhage group (sample size 19) and non postpartum hemorrhage group (sample size 47). There was no significant difference between the postpartum hemorrhage group and the non-postpartum hemorrhage group in terms of age, gestational week, body mass index (BMI) at admission, uterine height, abdominal circumference, newborn gender, proportion of primipara, and delivery analgesia (P > .05). Before the study, the informed consent form was signed with all patients, and the study was approved by the hospital's ethics committee.

Inclusion criteria and exclusion criteria

Inclusion criteria: (1) all the parturients in the forceps midwifery group were singletons, which met the indications of forceps, had no contraindications related to forceps, and successfully performed forceps midwifery, (2) all parturients had vaginal spontaneous delivery, without serious basic diseases, major organ diseases such as liver and kidney, infectious diseases, immune system or blood coagulation, (3) normal cognitive expression ability.

Exclusion criteria: (1) severe internal and external diseases and coagulation disorders, placenta previa, placenta accrete, fetal malformation, cephalopelvic disproportion, birth canal obstruction, severe pregnancy complications and complications, (2) the compliance is obviously insufficient.

Diagnostic criteria

Postpartum hemorrhage: the total amount of blood loss in vaginal delivery within one day after the delivery of the fetus is not less than 500 ml, and the volume plus area method is used to measure the blood loss.

Indications of forceps midwifery: (1) the second stage of labor has been extended. According to the stipulation of the Chinese Medical Association in the New Standards⁵ and Treatment of Labor Process the time limit of the second stage of labor is "4-3-3-2", that is, 4 hours of labor analgesia for primiparas and 3 hours without labor analgesia, the parturient women who received labor analgesia for 3 hours, and the parturients who did not receive labor analgesia for 2 hours, (2) accompanied by fetal distress, (3) pregnant women who suffer from various complications and need to control the time of the second stage of labor and perform forceps delivery, (4) continuous maintenance of occipital transverse position and continuous maintenance of occipital posterior position. For the parturients exposed below S+2 first, the parturients who can accept forceps-assisted delivery will be evaluated.

Method

Forceps midwifery: low forceps or export forceps, simpson forceps midwifery, the requirements, and operating procedures refer to the Chinese obstetrics and gynecology (clinical Edition) (the first edition).⁶

The calculation method of postpartum hemorrhage: volume plus area method. Volumetric method: after the fetus is delivered, place the V-shaped capacity bag pad marked with ML scale under the maternal hip, collect the blood from the maternal vagina, and directly read the amount of bleeding from the V-shaped bag. Area method: take the area of 10 ml blood-impregnated dressing as the standard, and then calculate the amount of postpartum hemorrhage according to the number of dressings and the area of blood stains. The volume of postpartum hemorrhage was obtained by adding the volume method and the area method.

Observation indicators

Perinatal conditions of forceps assisted delivery group and normal vaginal delivery group: statistics and comparison were made on the neonatal transfer to the intensive care unit, neonatal asphyxia, shoulder dystocia, facial scratches and pinches of perinatal mothers.

Univariate analysis of postpartum hemorrhage: t-test was used for univariate analysis to collect possible univariate factors, such as age, number of births, number of pregnancies, abortion history, premature rupture of membranes, pregnancy-induced hypertension, pregnancy-induced diabetes, abnormal coagulation function, fetal orientation during midwifery, urinary retention, soft birth canal laceration, lateral perineum resection, midwifery experience, maternal BMI at admission, birth weight of newborns Length of newborn, etc.

Multivariate analysis of postpartum hemorrhage: the risk factors of postpartum hemorrhage were analyzed by logistic regression analysis.

Statistical methods

SPSS26.0 software was used to process the data. The measurement data that conform to the standard of normal distribution and homogeneous variance were expressed in the form of mean \pm standard deviation ($\overline{x} \pm s$), and the counting data were expressed in the form of (percentage). The data were compared with a *t* test and χ^2 test. Logistic regression analysis was used for multifactor analysis. *P* < .05 represents statistically significant differences between groups.

RESULTS

Statistical results of perinatal outcomes of forceps assisted delivery group and normal vaginal delivery group

The incidence of neonatal asphyxia, transfer to NICU, shoulder dystocia, and facial scratches and scratches in the forceps-assisted delivery group was much higher than that in the normal vaginal delivery group. Except that the shoulder dystocia index has no statistical significance, the comparison of other outcome indexes has a statistical value (P < .05). See Table 1.

Single factor analysis of postpartum hemorrhage during forceps delivery

Univariate analysis showed that abnormal coagulation function, fetal orientation during midwifery, soft birth canal laceration, perineum lateral incision, and neonatal birth weight were the single factors related to postpartum **Table 1.** Perinatal outcomes of forceps-assisted deliverygroup and normal vaginal delivery group [n (%)]

	Forceps midwifery	Normal vaginal delivery		
	group (n = 66)	group (n = 1454)	χ^2 value	P value
Transfer to NICU	17(25.76)	145(9.97)	16.521	<.001
Neonatal asphyxia	3(4.55)	15(1.03)	6.661	.010
Shoulder dystocia	1(1.52)	10(0.69)	0.602	.438
Facial scratch and pinch mark	27(40.91)	2(0.14)	560.777	<.001

 Table 2. Single-factor analysis of postpartum hemorrhage during forceps delivery

6 and an	Postpartum hemorrhage	Non postpartum hemorrhage	(1.2 - 1 - 1	p. 1.
ractor	group (n=19)	group $(n = 47)$	t/χ^2 value	P value
Age (years)	10		(70)	
<35	18	43	0.204	.652
≥35	1	4		
Parity				
Primipara	16	41	0.105	.746
Parturient women	3	6		
Pregnancy times (Times)				
<3	16	42	0.337	.562
≥3	3	5		
Abortion history				
None	5	14	0.080	.778
Yes	14	33		
Premature rupture of membranes				
None	14	31	0.372	.542
Yes	5	16		
Pregnancy induced hypertension				
None	17	43	0.067	.796
Yes	2	4]	
Gestational diabetes				.927
None	16	40	0.008	
Yes	3	7	1	
Abnormal coagulation function				
None	17	47	5.102	.024
Yes	2	0	1	
Fetal orientation during midwifery				
Occipital anterior position	14	33	1	
Occipital transverse position	1	13	4.061	.044
Occipital posterior position	4	1	1	
Urinary retention				
None	14	38	0.416	.519
Yes	5	9	1	
Laceration of soft birth canal	-	-		
None	13	42	4 272	.039
Yes	6	5	1.2/2	
Lateral episiotomy	0			
None	3	20	4 269	.039
Vec	16	20	4.209	
Midwifery experience (years)	10	21		
	11 20		2 720	053
>2	0	38	3.729	.055
Maternal PMI at admission (1-2/2)	26 70+2 10	26 50+2 75	0.259	707
Disth susight of p sub sup (a)	20./UID.10	20.30±2./5	0.258	./9/
birtin weight of newborn (g)	5420.00±345.00	5100.00±380.00	2.522	.014
Length of newborn (cm)	0.771	.444		

 Table 3. Multi-factor analysis of postpartum hemorrhage during forceps delivery

variable	B value	SE value	Wald value	OR (95%CI) value	P value
Abnormal coagulation function	0.204	0.030	3.720	0.815(0.560-1.122)	.024
Fetal orientation during Midwifery (occipital posterior position)	0.272	0.056	3.428	1.313(0.197-8.295)	.002
Laceration of soft birth canal	0.240	0.043	2.987	1.271(0.434-3.766)	.016
Lateral episiotomy	0.068	0.006	4.565	1.070(1.034-1.116)	.045

hemorrhage during forceps delivery (P < .05). Multivariate analysis showed that abnormal coagulation function, laceration of the soft birth canal, and lateral perineum were independent risk factors for postpartum hemorrhage during forceps-assisted delivery. The postpartum hemorrhage rate was lower when the fetus orientation was occipital transverse position (P < .05). See Table 2, table 3.

DISCUSSION

At present, the rate of cesarean section in China has continued to increase. Perioperative complications such as

incision infection, placenta hypoplaceration, placenta implantation, scar pregnancy, dangerous placenta previa, and other related complications have brought great challenges to clinical work. In order to control the cesarean section rate and ensure natural delivery as much as possible, it is necessary to inhibit the application of unnecessary obstetric interventions.7 The results of evidence-based medicine research show that the old labor process standard (Freidman labor process standard) can increase obstetric interventions such as artificial membrane rupture, oxytocin use, and forceps midwifery, and increase the proportion of newborns with 1-minute Apgar score <7. At present, it is important work for obstetrics to ensure the safety of delivery, reduce unnecessary obstetric manual intervention and improve the rate of vaginal delivery, so it is very important to correctly handle the labor process. After the implementation of the new labor process standard, the corresponding diagnostic criteria for the extension of the second labor process have also been adjusted. The forceps delivery method is the key strategy to deal with the problem of the extension of the second labor process and help women speed up delivery. So whether the new labor process standard will have a negative impact on the maternal and fetal outcomes after the second labor process is extended and assisted by forceps needs to be studied. Forceps delivery is one of the important means to deal with dystocia in the second stage of labor. Compared with emergency cesarean section, when fetal distress occurs in the second stage of labor, forceps-assisted delivery can significantly shorten the labor process, improve the situation of fetal intrauterine asphyxia, and reduce adverse perinatal outcomes such as postpartum hemorrhage and neonatal hypoxic-ischemic encephalopathy. Although forceps delivery is the most appropriate way to deal with dystocia in the second stage of labor, there is still a risk of maternal and fetal injury. It has been reported that the risk of severe perineal laceration in forceps assisted delivery is 10.10%. The results of this study showed that in the perinatal outcomes of the forceps-assisted delivery group, severe neonatal birth injuries caused by forceps-assisted delivery are rare at present, most of which are facial abrasions and pinch marks. Previous studies have found that the incidence of skin abrasion of newborns in forceps-assisted delivery was 2.96%, which was higher than that in the normal delivery group, while there was no significant difference in the incidence of neonatal asphyxia and intracranial hemorrhage between the two groups.8 In this study, the incidence of facial scratches and scratches in the forceps midwifery group was 40.91%, which was much higher than 0.14% in the normal vaginal delivery group. The difference was statistically valuable. The forceps midwifery was instrument midwifery, and the midwifery often left pinch marks, which could be completely recovered within 48 hours after birth, but there were few cases of skin scratches. The NICU conversion rate and neonatal asphyxia rate in the normal vaginal delivery group were lower than those in the forceps delivery group, which was different from previous studies. In this study, the indications of midwifery

are mainly caused by fetal distress and non-forceps operation, so forceps midwifery still has high safety from the perspective of perinatal infants, but it is necessary to further optimize midwifery instruments and skills to reduce neonatal skin damage.

Postpartum hemorrhage is a serious complication during childbirth and the first factor leading to maternal death. Among the various causes of postpartum hemorrhage, the most common causes are laceration of the soft birth canal, uterine atony, coagulation dysfunction, and placental factors. The most critical cause is uterine atony, accounting for 40.60%.9 Forceps midwifery is an important method of vaginal operation midwifery, which is of great significance in dealing with emergencies in the second stage of labor and improving the prognosis of mothers and infants; However, forceps delivery significantly increased the rate of postpartum hemorrhage. Some scholars found that the incidence of "uterine atony" and "soft birth canal laceration" increased significantly when full-term primiparas delivered forceps. The rate of postpartum hemorrhage was as high as 34.70%, significantly higher than 4.30% in the general population.¹⁰ Therefore, how to reduce the rate of postpartum hemorrhage to the greatest extent when implementing vaginal midwifery is a problem that clinicians should pay attention to.

In this study, the main complication of forceps midwifery group was postpartum hemorrhage, 19 cases in total, and the incidence rate was 28.79%, which was very close to the reported value of 29.03%.11 In the normal vaginal delivery group, there were 72 cases of postpartum hemorrhage, the incidence rate was 4.95%, the difference was statistically significant.¹² Postpartum hemorrhage is not only a serious complication during childbirth but also the primary cause of maternal mortality in China. The study shows that the postpartum hemorrhage rate of forceps-assisted delivery is 34.70%, which is higher than that of the general population. The more postpartum hemorrhage, the higher the incidence of postpartum urine retention and poor perineal incision healing, which is the same as the final result of this study. Therefore, studying the high-risk factors of postpartum hemorrhage in forceps-assisted delivery has a key clinical guiding effect for the prevention and treatment of postpartum hemorrhage and the optimization of perinatal prognosis.

There are many causes of postpartum hemorrhage. Domestic studies¹³⁻¹⁴ and this study have shown that soft birth canal laceration is a high-risk factor for postpartum hemorrhage during forceps-assisted delivery. There are often fetal distress in forceps-assisted delivery, edema, poor elasticity and insufficient expansion of perineum tissue in parturients, and prolonged incision tearing and complex laceration are easy to occur after lateral incision. Especially, the suture is difficult and takes a long time after a complex laceration, which increases the risk of bleeding. Ashwal E¹⁵ and other researchers believe that the combination of perineal lateral resection during forceps midwifery can reduce the incidence of perineal laceration, but there is no evidencebased medical support, and there are many tissue levels

damaged after perineal lateral resection, which increases the difficulty of suture. In recent years, domestic scholars began to try limited lateral perineum during forceps midwifery. The results showed that the incidence of perineal laceration and the amount of postpartum hemorrhage in patients without lateral perineum were significantly lower than those with perineum incision, but there was no significant difference in neonatal scores. Therefore, at present, limited perineum incision is advocated in China, and routine perineum incision is not recommended.¹⁶ Some foreign scholars have adopted the mode of two-person midwifery mainly to protect the perineum.¹⁷⁻¹⁸ The results show that there is no significant increase in the risk of postpartum hemorrhage and severe perineum laceration. The hospital in this study is also trying new midwifery methods to reduce the risk of perineal laceration and the incidence of postpartum hemorrhage.

Abnormality of blood coagulation function is more common in pregnancy with blood system diseases, such as anemia in pregnancy, thrombocytopenia in pregnancy, etc. Studies have shown that anemia during pregnancy is a highrisk factor for severe postpartum hemorrhage.¹⁹ The final results of this study also show that abnormal coagulation function is an independent factor affecting postpartum hemorrhage. Therefore, pregnant women with anemia or thrombocytopenia should be fully evaluated before pregnancy before pregnancy. During pregnancy, anemia should be actively corrected, coagulation function should be improved, and bleeding should be actively prevented during childbirth. If necessary, blood products such as fresh plasma, platelets, and coagulation factors can be transfused to control the risk of postpartum hemorrhage. If the coagulation function is seriously abnormal, pregnancy should be terminated in a timely manner.

The final results of this study showed that the fetal orientation index during midwifery was an influencing factor of postpartum hemorrhage, and the risk of postpartum hemorrhage of women who delivered in the occipital transverse position was lower than that of women who delivered in an occipital posterior position, with a significant difference. In most cases, the persistent occipital transverse position can be used to rotate the fetal head to the occipital anterior position for midwifery and delivery, while the persistent occipital posterior position is often accompanied by poor flexion of the fetal head. The continuous compression of the fetal occipital bone on the rectum causes the parturient to use abdominal pressure prematurely, which then leads to edema of the anterior lip of the cervix and the extension of the second stage of labor, which is prone to serious perineal laceration and even the formation of genital fistula, increasing the risk of postpartum hemorrhage and puerperal infection. Therefore, clinicians need to closely observe the progress of the labor process, identify and find the abnormal position of the fetal head at an early stage, correct it with posture intervention at the early stage of the labor process, and correct the position of the fetal head in a timely manner by rotating the fetal head manually at the active stage and the second stage of labor, so as to transform dystocia into spontaneous labor and reduce postpartum hemorrhage.²⁰

Different from previous studies, the factors in this study, such as the birth weight of the newborn, the advanced age of puerpera, and the second degree of pregnancy and childbirth, are not high-risk factors that affect postpartum hemorrhage but may be related to the active use of uterine contraction promoting agents in our hospital. Because the sample size of this study is small, it needs to be further verified by larger sample literature and multi-center research literature.

There is a limited amount of research on the relationship between forceps midwifery perineal lateral resection and postpartum hemorrhage. Gallagher A C²¹ research shows that both lateral episiotomy and soft birth canal laceration are high-risk factors for postpartum hemorrhage. Lateral episiotomy has many layers of cut tissue, large bleeding volume and difficult suturing. At the same time, it increases perineal pain, causes urination difficulties, leads to increased postpartum urine retention, and also increases the risk of postpartum hemorrhage. Therefore, it is recommended that for those with occipital anterior position, small fetus, fetal head bone part exposed first to S + 3, and better perineal expansion, Side cutting is not required during forceps operation. A randomized clinical study compared the maternal and fetal complications of routine perineotomy and selective perineotomy during vaginal delivery assisted by surgery.²² It was found that there was no statistically value difference in incontinence of stool, anal sphincter tear and neonatal birth injury among the parturients. Therefore, routine perineotomy during vaginal delivery assisted by surgery was not recommended. This study also finally found that the index of perineotomy is an independent risk factor for postpartum hemorrhage in forceps-assisted parturients. In addition, the absence of perineotomy does not increase the risk of severe perineal laceration. Therefore, we also believe that conventional perineotomy is not recommended during forceps-assisted parturition, and restrictive perineotomy is supported. For pregnant women with acute intrauterine fetal distress who need forceps delivery, most of them have just opened the uterine orifice, fetal presentation S+2, and poor perineum expansion. If the perineum is not cut, the risk of complex birth canal laceration will increase. If the perineum is cut too early, it will inevitably lead to a significant increase in the amount of bleeding at the wound of the perineum, for this part of patients, proper traction can be performed during uterine contraction, and lateral episiotomy can be performed when the fetal head is exposed, which can reduce the amount of bleeding to a certain extent. At the same time, suture technology should be strengthened. For patients with active bleeding of the soft birth canal, a careful examination should be carried out, and fast and effective suture should be performed to stop bleeding.

Forceps midwifery plays an irreplaceable role in reducing maternal and infant complications as long as it is used properly, but it is also an independent risk factor for postpartum hemorrhage. This paper discusses the high-risk factors of forceps midwifery hemorrhage, which can refer to reducing the postpartum hemorrhage caused by vaginal midwifery, the high-risk factors of postpartum hemorrhage were closely monitored.

To sum up, the incidence of postpartum hemorrhage in the normal vaginal delivery group is lower than that in the forceps-assisted delivery group, while soft birth canal laceration, occipitoposterior midwifery, lateral episiotomy, and abnormal coagulation function are some of the inducing factors for postpartum hemorrhage in the forceps assisted delivery group. The limitation of this article is that the sample sources included are relatively limited, as they are from the same hospital and the sample size is still limited. This study explores the perinatal outcomes of forceps delivery and the risk factors of postpartum hemorrhage, laying a foundation for early identification of indications for forceps assisted delivery, suppression of bleeding risks during forceps assisted delivery, and improvement of delivery quality.

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