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Effects of Misoprostol and Oxytocin Combined with Calcium Gluconate on Delivery Time of Parturient with High-risk Postpartum Hemorrhage and Neonatal Outcomes

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Abstract: ***Objective:*** To investigate the effect of misoprostol and oxytocin combined with calcium gluconate on parturient with high-risk postpartum hemorrhage. ***Methods:*** The clinical data of 80 parturient with high-risk postpartum hemorrhage who were treated in our hospital from July 2016 to July 2019 were retrospectively analyzed. According to different treatment methods, they were divided into control group (treated with misoprostol combined with oxytocin, 40 cases) and observation group (treated with misoprostol and oxytocin combined with calcium gluconate, 40 cases), compared the clinical efficacy, delivery time, postpartum hemorrhage 2 hour after delivery, postpartum hemorrhage 24 hours after delivery and Apgar score of the newborns at 1min after birth. ***Results:*** The total effective rate (95.00%) in the observation group was higher than that in the control group (77.50%), and the difference was statistically significant (P<0.05). The third delivery stage in the observation group was shorter than that in the control group, and the postpartum hemorrhage volume was less than that in the control group. The difference was statistically significant (P<0.05). There was no significant difference in Apgar score of the two groups of newborns (P>0.05). ***Conclusion:*** Misoprostol and oxytocin combined with calcium gluconate is effective in treating high-risk postpartum hemorrhage parturient, which not only can effectively reduce postpartum hemorrhage and shorten the delivery time, but also is beneficial for neonatal outcome and worthy of clinical application.

Keywords: High-risk postpartum hemorrhage; Misoprostol; Oxytocin; Calcium gluconate; Neonatal outcome

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Postpartum hemorrhage is one of the common dangers in clinical gynecology. It mainly refers to the total bleeding of more than 500ml within 24 hours after delivery of the fetus. Its incidence accounts for about 2%-3% of the total number of deliveries. If treatment is delayed or improperly, puerperal infections may occur, and severe cases will have hemorrhagic shock and even endanger life[1-2]. At present, the principle of clinical treatment is to take measures such as rapid hemostasis, replenishing blood volume, correcting shock, and preventing infection according to the cause. Most of the symptoms above are caused by uterine inertia of the parturient, and misoprostol and oxytocin are often used in clinical practice. However, some parturient are not sensitive to the drugs like oxytocin, which results in little effect[2]. Based on this, the purpose of this study was to investigate the therapeutic effects of misoprostol and oxytocin, combined with calcium gluconate on parturient with high-risk postpartum hemorrhage. It is reported as follows.

1 Information and methods

1.1 General Information

The clinical data of 80 parturient with high-

risk postpartum hemorrhage who were treated in our hospital from July 2016 to July 2019 were retrospectively analyzed. According to different treatment methods, they were divided into control group (treated with misoprostol combined with oxytocin, 40 cases) and observation group (treated with misoprostol and oxytocin combined with calcium gluconate, 40 cases). The age of the control group was 22-42, with an average age of (32.10±2.23); 37-39 weeks of gestation, with the average of (38.14±1.02) weeks; 1-4 times of pregnancy, with the average time of (2.43 ± 0.12); Among them, 21 were primiparas and 19 were multiparas. The age of observation group was 23-41 years old, with an average age of (32.19 ± 2.25); 37-38 weeks of gestation, with an average weeks of (38.13 ± 1.04); 1-3 times of pregnancy, with the average time of (2.43 ± 0.11). Among them, 21 were primiparas and 19 were multiparas. The data were statistically compared, and the difference was not statistically significant (P>0.05).

1.2 Inclusion criteria

(1) Inclusion criteria: parturient with high-risk postpartum hemorrhage confirmed by systemic examinations such as bone marrow examination, blood coagulation time measurement, and blood routine tests; clinical history and follow-up data are complete; the parturient and her family volunteered to sign the informed consent. (2) Exclusion criteria: parturient with a history of allergies to the drug in this study; coagulopathy; parturient with severe heart, brain, kidney and other diseases; parturient with severe diseases such as the blood system and the immune system; parturient with expression disorders or mental illness.

1.3 Method

1.3.1 Control group

Treated with misoprostol combined with oxytocin, intramuscular injection of 10U of oxytocin after delivery of fetal shoulder (SPH No.1 Biochemical & Pharmaceutical Co., Ltd., SFDA approval number H31020862), 400 μg of misoprostol (Hubei Gedian Humanwell Pharmaceutical Co., Ltd., SFDA approval number H20073696) was inserted close to the anterior rectum and into 5cm of the anus.

1.3.2 Observation group

Combined with calcium gluconate treatment on the basis of the control group, the usage and dosage of schmisoprostol and oxytocin were the same as those of the control group. After orifice of the uterius opened to the second stage of the delivery, 20mL of 10% calcium gluconate (Hebei Tiancheng Pharmaceutical Co., Ltd., SFDA approval number H13021759) was intravenously inject with no more than 5mL per minute.

1.4 Evaluation index

clinical efficacy: the efficacy was evaluated according to the standard of Guidelines for the Prevention and Management of Postpartum Hemorrhage (draft), which was divided into the following parts[3]. Cure: Within 10 minutes of one-time treatment, the frequency of uterine contraction is faster, the amplitude is larger, and the bleeding volume is significantly reduced; Significantly effective: within 20 minutes of one-time treatment, the uterine contraction is faster, and the bleeding volume is significantly reduced; Effective: within 30 minutes of two-time treatment, the uterine contraction improves and the bleeding volume reduces; Ineffective: after multiple treatments, the uterine contraction does not change and the bleeding volume does not reduce. Total effective rate = (cure + Significantly effective + effective) number of cases / total number of cases×100%; compare the time of the third delivery stage, 2h and 4h postpartum hemorrhage in the two groups; compare the newborn's Apgar score of 1min after birth in the two groups[4]; evaluate including skin color, heart rate, respiration, muscle tone and reflex, with a maximum score of 10. The higher the score, the better the outcome.

1.5 Statistical methods

SPSS24.0 software was used. $\bar{x} \pm s$ is used to represent measurement data. t test was used. Count data was expressed as percentage. χ^2 test was used, and P<0.05 was considered statistically significant.

2 Result

2.1 Clinical efficacy

The total effective rate of the observation group was higher than that of the control group, and the difference was statistically significant (P<0.05). See Table 1.

Table 1. Comparison of clinical efficacy between the two groups n (%)

groups	cure	significantly effective	effective	ineffective	total effective rate
control group(n=40)	18(45.00)	11(27.50)	2(5.00)	9(22.50)	31(77.50)
observation group(n=40)	21(52.50)	12(30.00)	5(12.50)	2(5.00)	38(95.00)
χ^2	-	-	-	-	5.165
P	-	-	-	-	0.023

2.2 Delivery time and bleeding volume

The third delivery time in the observation group was shorter than that in the control group, and the bleeding volume at 2 hours and 24 hours after delivery was less than that in the control group, and the difference was statistically significant (P<0.05). See Table 2.

Table 2. Comparison of delivery time and bleeding volume between two groups ($\overline{x} \pm s$)

groups	the third delivery time(min)	the bleeding volume at 2 hours after delivery(mL)	the bleeding volume at 24 hours after delivery(mL)
control group(n=40)	10.54±4.32	265.42±48.31	354.54±70.21
observation group(n=40)	7.31±4.24	195.33±35.43	237.46±68.73
t	3.375	7.399	7.537
P	0.001	0.000	0.000

2.3 Apgar score

The Apgar score of newborns in the control group at 1 min after birth was (9.23 ± 0.67) points, and the observation group was (9.36 ± 0.61). There was no significant difference between groups (t = 0.907, P = 0.367).

3 Discussion

Postpartum hemorrhage is a serious complication during delivery. Vaginal bleeding can be a short period of massive bleeding or a long period of sustained small amount of bleeding, which is one of the four major causes of maternal death[5]. The etiology is related to uterine weakness, lacerations of the soft birth canal, coagulation dysfunction, and placental factors, among which uterine weakness is the most common cause. Prolonged delivery, uterine dysplasia, and excessive postnatal use of anesthetics can cause uterine contractions weakness[6]. Currently, uterotonics such as misoprostol, oxytocin, carbprost are commonly used in clinical treatment, but for parturient with high risk of bleeding, the selection of a reasonable and effective treatment is of great significance.

According to the maternal characteristics of high-risk postpartum hemorrhage, this study compared and analyzed the treatment of misoprostol combined with oxytocin and the treatment of misoprostol and oxytocin combined with calcium gluconate. The results show that compared with the control group, the observation group has a higher total effective rate of treatment, a shorter third delivey stage, and a less bleeding volume at 2 hours and 24 hours after birth. The comparison of Apgar scores at 1 min after birth in the two groups has no significant difference. It can be seen that the effect of misoprostol and oxytocin combined with calcium gluconate is more significant. The reason for this is that misoprostol and oxytocin used in both groups both belong to drugs of uterotonics. Among them, oxytocin is a first-line drug for the prevention and treatment of postpartum hemorrhage. Its role is mainly to bind to receptors on uterine smooth muscle cells, increase the activity of decidual prostaglandin and the production of prostaglandin F2a, and indirectly stimulate the contraction of uterine smooth muscle. However, its half-life period is short, and it can cause hypotension and antidiuretic effect in parturient with high-risk bleeding when excessive used[7-8]. Misoprostol, a prostaglandin E1 derivative, has a good contractile effect on the pregnant uterus. It can cause local softening of the cervix, stimulate uterine contraction, increase uterine tension and intrauterine pressure, and

at the same time enhance oxytocin in clinical practice[8]. In the observation group, the combined use of calcium gluconate on the basis of the control group can rapidly increase the concentration of Ca^{2+} in the body and further enhance the sensitivity of uterine smooth muscle to drugs of uterotonics, thereby reducing bleeding on the attachment surface of the placenta and reducing the dosage of uterotonics[9]. Besides, Ca^{2+} can also maintain neuromuscular excitability. Therefore, misoprostol and oxytocin combined with calcium gluconate can enhance the therapeutic effect.

In summary, for parturients with high-risk postpartum hemorrhage, the use of misoprostol and oxytocin combined with calcium gluconate has a significant clinical effect, which can effectively reduce postpartum hemorrhage, shorten the delivery time, and have less impact on neonatal outcomes. Therefore, it is worthy of clinical promotion.

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