Study on the Influence of Changes of Coagulation System on Pregnancy Outcome and Relationship between Changes of Coagulation System and Premature Delivery for Parturients with Gestational Hypertension before Labor

Zhu Peijing

No.1 Maternal and Child Health Centre in Dongcheng District in Beijing, Beijing 100000

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Abstract: The objective of this paper is to explore the influence of changes of coagulation system on pregnancy outcome and relationship between changes of coagulation system and premature delivery for parturients with hypertension of pregnancy before labor. The method of this paper is that 51 pregnant women with hypertension from July 2017 to July 2019 are selected as the observation group and 51 healthy pregnant women as the control group, and then they are researched.The results of this paper are that there was no significant change of coagulation function in 28 weeks of pregnancy and before parturition in control group ($p>0.05$) . Fg and D-D levels in the observation group were significantly higher than those in the control group at 28th week of pregnancy ($p<0.05$) , and were significantly much more higher than those in the control group from the 28th week of pregnancy to before birth ($p<0.05$). The levels of them in PT, APTT and TT-III in the observation group were lower than those in the control group ($p<0.05$). At the 28th week of pregnancy, there was a significant decline in the levels of them ($p<0.05$) , and the difference was statistically significant. The neonatal weight of the observation group was significantly lower than that of the control group, and the neonatal asphyxia rate, fetal distress rate and perinatal mortality rate were significantly higher than those of the control group ($p < 0.05$) . The Cesarean section rate and preterm birth rate in the observation group were significantly higher than those in the control group ($p<0.05$). The conclusion of this paper is that for pregnant women with hypertension, abnormal changes of coagulation system before delivery can lead to adverse pregnancy outcome and increase cesarean section rate and premature delivery rate.

Gestational hypertension is a common disease in obstetrics. It usually occurs after 6 months of pregnancy and after 7 ~ 8 months of pregnancy, accounting for 5% ~ 10% of the total number of pregnancy. The main clinical symptoms of parturients with gestational hypertension are hypertension, proteinuria, edema and so on, which may be caused by various dysfunction due to the pregnancy burden exceeding the tolerance of the mother[1]. Parturients with gestational hypertension is often accompanied by abnormal changes of coagulation system, which has certain influence on pregnancy outcome, and the possibility of inducing premature delivery is higher. In recent years, the changes of coagulation system in parturients with gestational hypertension were studied, and the pregnancy outcome and preterm delivery were discussed and analyzed. The report is as follows.

1. Information and methods

1.1 The general information

From July 2017 to July 2019, a total of 51 parturients with gestational hypertension were selected as the observation group during antenatal care and delivery in our hospital, and 51 healthy pregnant women were selected as the control group during the same period. The age of pregnant women in the control group was 19 ~ 33 years old (the average age is 25.9 ± 2.2 years old), the pregnancy weight is 60 ~ 71kg (the average weight is 64.4 ± 3.1kg); the age of the pregnant women in the study group was 20 ~ 35 years old (the average age is 27.4 ± 0.9 years old), the pregnancy

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weight is 57 ~ 71kg (the average weight is 63.5 ± 2.5kg). The pregnant frequency is 1 ~ 3 times (the average pregnant frequency is 1.6 ± 0.2 times). There was no significant difference between the general conditions of pregnant women in two groups (p＞0.05) .

1.2 Detection method

From the 28th week of pregnancy to before birth, three milliliters (3 ml) of venous blood were extracted from two groups of pregnant women with empty stomach in the morning. The levels of Fibrinogen (FG), Prothrombin III (III) Prothrombin time (PT), Thrombin time (TT), D-dimer (D-D) and Activated partial thrombin time (APTT) in the coagulation function indexes were measured by automatic blood analyzer.

1.3 Observation indicators

The changes of above-mentioned coagulation function indicator were observed at the 28th week of pregnancy and before delivery, and the Cesarean section and preterm delivery were compared between two groups. Preterm birth is defined as delivery that occurs from the 28th week to the 37th week of pregnancy[2].

1.4 Statistical method

SPSS23.0 software was used for statistical analysis. The measurement data were expressed by mean number ± standard deviation, the comparison between two independent samples was conducted by t-test, and the repeated measurement data were compared by one-way analysis of variance; The counting data were compared by χ2-test or Fisher exact probability method, P < 0.05 was statistically significant.

2. Results

There was no significant change of coagulation function at the 28th week of pregnancy and before parturition in the control group (p＞0.05) . Fg and D-D levels in the observation group were significantly higher than those in the control group at the 28th week of pregnancy (p＜0.05) , and were significantly much more higher than those in the control group from the 28th week of pregnancy to before birth (p＜0.05). The levels of PT, APTT and TT-III in the observation group were lower than those in the control group (p＜0.05). At the 28th week of pregnancy, there was a significant decline, the difference was statistically significant (p＜0.05). See Table 1.

It can be seen from the following table that the birth weight of the Observation Group is obviously lower than that of the control group, the rate of Asphyxia Neonatorum, fetal distress and perinatal mortality of the Observation Group are obviously higher than that of the Control Group, the difference is statistically significant (p < 0.05) . See Table 2.

Table 2 Comparison of pregnancy results between two groups

Group	n	Newborn weight (g)	Asphyxia neonatorum [Case(%))]	Fetal distress [Case(%))]	Perinatal death [Case(%))]
Observation Group	51	2926.1±598.3	6(11.76)	4(7.84)	3(5.88)
Control Group	51	3253.6±774.5	2(3.92)	0	0
t / χ2 value		3．356	7.104	4.982	5．341
P value		＜ 0． 05	＜ 0． 05	＜ 0． 05	＜ 0． 05

It can be seen from the following table that the Cesarean section rate and premature delivery rate of the observation group were significantly higher than that of the control group, the differences were statistically significant (p < 0.05). See Table 3.

Table 3

Group	Number of cases	Rate of Cesarean section	Rate of premature delivery
Control Group	51	16(31.37)	3(5.88)
Observation Group	51	26(50.98)	11(21.57)
$\chi 2$ value		8.562	6.467
P value		< 0.05	< 0.05

3. Discussion

In recent years, with the great improvement of people's living standard and the change of eating habits, the incidence of gestational hypertension has been increasing year by year, and there is a very high incidence rate in clinic. It can be secondary to more severe cerebrovascular disease, liver and kidney dysfunction, and in severe cases it can even affect the safety of pregnant women and fetuses, raising the physiological and psychological burden of pregnant women. The study found that[3] parturients with gestational hypertension are more likely to suffer from abnormal coagulation, which often results in a hypercoagulable state. Such changes in the blood under normal circumstances will have a negative impact during the normal pregnancy and childbirth process. However, in the third trimester of normal pregnancy, physiological hypercoagulability also occurs, which is a normal phenomenon. At this time, the clotting factors and fibrinogen levels were significantly higher in pregnant women's than in non-pregnant women, and the fibrinolytic system was more active, but both remained in dynamic equilibrium and had no effect on the body[4]. If parturients with gestational hypertension develop endothelial damage, they will release large amounts of inflammatory cytokines, activate neutrophil, produce large amounts of Elastase, cause Vasospasm, damage vascular endothelial, and increase the activity of the coagulation system. It disrupts dynamic equilibrium of the clotting and fibrinolysis systems, so that the body is in an abnormally high state of dynamic equilibrium. However, the persistent hypercoagulability of the body and the blood will lead to high blood coagulation, increased peripheral circulation resistance, high blood pressure, further aggravation of gestational hypertension, thus forming the vicious circle[5].

The coagulation test measures Fg, D-D, PT, APTT, TT, AT-III. Fg is a glycoprotein that can be converted to fibrin in the body by Hydrolysis, and the conversion of fibrinolysis is extremely difficult. So it has a significant hemostatic effect, but as the content increases, it can cause blood clots; D-D is an early sensitive indicator of coagulopathy. The study found that high levels of Fg and D-D in pregnant women were more likely to lead to prolonged hypercoagulability. AT-III is a very important antithrombin in the body, reducing the body's content of things in the hypercoagulable state, which can lead to premature rupture of the Placenta. In this study, there was no significant change in each coagulation index in the control group before the 28th week of pregnancy, and Fg and D-D levels in the observation group were significantly higher than those in the control group, and the levels of PT, APTT, TT, AT-III was significantly lower than that of the control group. Compared to the 28th week of pregnancy, the levels of Fg and D-D were significantly increased, the levels of PT, Aptt, TT and AT-III were significantly decreased in the observation group before delivery. The results showed that the abnormal expression of blood coagulation was more obvious with the increase of gestational age, which led to the hypercoagulable state in pregnancy. The frequency of Cesarean section and premature delivery in the observation group was significantly higher than that in the control group, because gestational hypertension is an important index and main mechanism of Cesarean section. The increased risk of preterm birth may be due to the fact that the only way to achieve preterm birth is to ensure the safety of the mother and the fetus in high-risk gestational hypertension. Gestational hypertension with intrauterine growth retardation , fetal asphyxia and so on need to be delivered as soon as possible. The incidence of gestational hypertension is also very high in pregnant women with spontaneous preterm birth whose cause is unknown.

Abnormal changes in coagulation in parturients with gestational hypertension can give rise to adverse pregnancy outcomes and increase the risk of preterm delivery. Hence, It is of great clinical significance to regularly check the coagulation function of pregnant women and take intervention measures to reduce the adverse pregnancy outcome and premature delivery.

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Table 1 Comparison of coagulation function between two groups of pregnant women at the 28th week of pregnancy and before delivery

Group	n	Fg(g/L)				PT(s)				APTT(s)			
		At the 28th week of pregnancy	Before birth	T value	P value	At the 28th week of pregnancy	Before birth	T value	P value	At the 28th week of pregnancy	Before birth	T value	P value
Control Group	49	3.81±0.21	3.59±0.42	0.145	2.974	9.56±1.98	11.25±1.98	0.221	1.515	30.16±8.87	28.54±8.84	0.742	1.352
Observation Group	49	4.81±0.19	5.46±0.18	4.261	< 0.05	8.76±1.74	7.74±1.53	6.134	< 0.05	26.85±5.63	25.12±5.78	4.326	< 0.05
T value		3.347	4.267			3.28	4.163			2.986	3.995		
P value		< 0.05	< 0.05			< 0.05	< 0.05			< 0.05	< 0.05		

Continuation Table 1 Comparison of coagulation function between two groups of pregnant women at the 28th week of pregnancy and before delivery

Group	n	TT(s)				D − D(g/L)				AT − (g/L)			
		At the 28th week of pregnancy	Before birth	T value	P value	At the 28th week of pregnancy	Before birth	T value	P value	At the 28th week of pregnancy	Before birth	T value	P value
Control Group	51	20.01±2.65	18.82±2.19	0.109	1.852	250.39±30.11	231.64±25.74	0.221	1.863	118.64±8.12	119.52±9.34	0.762	1.874
Observation Group	51	18.12±3.11	15.84±2.18	3.785	< 0.05	423.19±30.22	631.23±35.71	4.311	< 0.05	110.11±8.75	97.43±8.64	4.321	< 0.05
T value		3.153	4.285			3.261	3.885			2.987	4.156		
P value		< 0.05	< 0.05			< 0.05	< 0.05			< 0.05	< 0.05		