Effect of Ambulatory Blood Pressure Monitoring on Prevention of Preeclampsia and Changes of Renal Function in Pregnant Women with Stage 1 Hypertension

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Abstract: Objective: To observe the effect of ambulatory blood pressure monitoring on the prevention of preeclampsia and renal function in pregnant women with stage 1 hypertension. Method: Select 50 pregnant women with stage 1 hypertension treated in our hospital from April 2020 to April 2021 (group A) and 50 normal pregnant women in the same period (group B). One day ambulatory blood pressure monitoring was conducted to monitor the blood pressure of pregnant women in the two groups, and the situation of pregnant women was monitored according to the rhythm of blood pressure fluctuation at night and during the day. The changes of blood pressure and renal function were observed simultaneously. Results: The incidence of preeclampsia in pregnant women with stage 1 hypertension (group A) was significantly higher than that in normal pregnant women (group B), the difference was statistically significant ($P < 0.05$); In the comparison of renal function between the two groups, the renal function indexes of pregnant women in group A were higher than those in group B ($P < 0.05$). Conclusion: Ambulatory blood pressure monitoring plays a positive role in the changes of preeclampsia and renal function in pregnant women with stage 1 hypertension and early onset pregnancy. It is suggested that patients should make full use of 1d ambulatory blood pressure monitoring to prevent preeclampsia and renal function diseases in pregnant women with stage 1 hypertension. Close observation is needed and pregnancy needs to be terminated in severe cases, so as to ensure the safety of pregnant women and perinatal infants.

1. Introduction

Preeclampsia is a common disease in hypertensive disorder complicating pregnancy. According to statistics from relevant departments, the incidence rate is 3~9%. Severe symptoms of the disease will lead to placental abruption, premature delivery and other situations, which will have an inestimable risk for perinatal results. In particular, it is necessary to monitor preeclampsia in pregnant women with stage 1 hypertension. The focus is to observe that pregnant women may have slow heart rate response and significant increase of myocardial oxygen consumption during exercise, resulting in insufficient blood supply to some organs [1]. And the blood pressure of hypertensive pregnant women fluctuates greatly during the perinatal period, which is inevitable for the impact on renal function. In this process, we also need to pay more attention to the changes of renal function. Otherwise, it may cause nephropathy. The 1d dynamic monitoring can provide timely diagnosis, treatment and nursing for pregnant women who fluctuate day and night. The key point was to observe the night mean systolic blood pressure, diastolic blood pressure and the abnormal rate of circadian rhythm of blood pressure. Therefore, this paper uses 1d ambulatory blood pressure to monitor preeclampsia and renal function during pregnancy. It is reported as follows.

2. Data and Method

2.1 General Data

We selected 50 pregnant women with stage 1 hypertension treated in our hospital from April

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2020 to April 2021 (group A) and 50 normal pregnant women in the same period (group B). The average age of group A was (25.8 ± 1.6) years and the average gestational weeks were (38.5 ± 1.6) weeks. The average age of group B was (27.7 ± 2.2) years and the average gestational weeks were (37.5 ± 1.5) weeks. There was no significant difference in age and gestational weeks between the two groups. According to the requirements of 1d ambulatory blood pressure monitoring in preeclampsia, 100 pregnant women were monitored according to the rhythm of blood pressure fluctuation at night and day. 1d ambulatory blood pressure monitoring was carried out 30 days before delivery.

2.2 Method

2.2.1 Ambulatory Blood Pressure Monitoring Method

Quansheng medical non-invasive portable ambulatory blood pressure detector was used for blood pressure monitoring, recording and storage. The general monitoring time point was from 07 a.m. to 07 a.m. the next day. The blood pressure cuff was worn 2cm above the left upper arm elbow of the pregnant woman, with moderate tightness and dynamic monitoring for 1d. From 22:10 at night to 06:50 the next day, automatic measurement shall be conducted once every 2h, and automatic measurement shall be conducted once every 30min in other times. It was qualified if the effective reading was greater than 90. Observation parameters: 1d mean systolic blood pressure (1dSBP), 1d diastolic blood pressure (1dDBP), daytime systolic blood pressure (dSBP), daytime diastolic blood pressure (dDBP), nocturnal systolic blood pressure (nSBP), nocturnal diastolic blood pressure (nDBP), renal function of pregnant women [2].

2.2.2 Renal Function Test

Fasting venous blood was collected to check relevant test indexes, including blood urea nitrogen (BUN), creatinine (SCR) and uric acid (SUA). Take urine for random urine microalbumin to creatinine ratio (ACR) examination at the first time: the urine sample intercepts the middle urine. If the perineal secretion was too large before retention, the urine should be intercepted after cleaning. For pregnant women with severe preeclampsia, the urine can be collected directly through urinary catheter for examination. The equipment submitted for inspection after this collection was HCG automatic analyzer produced by Siemens in Germany [3].

2.3 Statistical Method

SPSS 26 statistical software was used for statistical analysis, and the measurement data were expressed as mean ± standard deviation. The observation indexes of the two groups were compared by t-test, $P < 0.05$, the difference was statistically significant.

2.4 Observation Indicators

By observing the fluctuation range of routine systolic blood pressure (SBP) and diastolic blood pressure (DBP) and diurnal observation parameters of pregnant women: 1d mean systolic blood pressure (1dSBP), 1d diastolic blood pressure (1dDBP), daytime systolic blood pressure (dSBP), nighttime systolic blood pressure (nSBP), nighttime diastolic blood pressure (nDBP), renal function of pregnant women [4].

3. Results

The indexes of 1d ambulatory blood pressure of pregnant women in group A were significantly higher than those of pregnant women in the same period (group B), the difference was statistically significant ($P < 0.05$). The indexes of group A (1dSBP, 24hDBP, dSBP, nSBP, nDBP, DMAP and nMAP) were significantly higher than those of group B ($P < 0.05$). See Table 1 for the difference.

Table 1 Comparison of 1d Ambulatory Blood Pressure Indexes between Two Groups of Pregnant Women (d = 1 Day)

Group	SBP	DBP	1dDBP	1dSBP	nSBP	nDBP

A group	145.44±3.26	102±2.89	98.34±3.12	142.41±3.18	127.41±3.25	93.41±3.25
B group	127.14±2.35	92±1.88	90.34±1.72	125.21±2.26	117.11±1.15	85.46±1.22
P value	>0.05	>0.05	>0.05	>0.05	>0.05	>0.05

Note: P < 0.05; Compared with the control group, P < 0.01;

The incidence of preeclampsia in hypertensive pregnant women in group A was significantly higher than that in group B. at the same time, BNU, SCR, SUA and ACR were higher than those in group B (P < 0.05); See Table 2.

Table 2 Comparison of Renal Function Indexes and Acr between Two Groups of Pregnant Women [Cases (%)]

Group（n=100）	BUN（mmoI/L)	SCR（pmol/L)	SUA（m01 / L）	ACR（mg/mmol)
Hypertension group A(n=50)	5.15±0.89	68.12±6.81	291.25±10.86	443.45±25.78
Normal pregnancy group B(n=50)	4.45±0.79	63.41±6.15	283.43±10.79	23.45±2.79
X^2 value				
6.25				
P value				
<0.05				

Note: P < 0.05; Compared with the control group, P < 0.01;

4. Discussion

For patients with stage 1 hypertension, they belong to mild hypertension. They are usually well controlled and will not have too many symptoms. However, it is common for pregnant women with stage 1 hypertension to cause preeclampsia and renal function diseases in the perinatal period. Therefore, it is necessary to carry out 1d continuous ambulatory blood pressure monitoring for pregnant women in the perinatal period. The purpose is to better understand the impact of diurnal blood pressure changes on pregnant women, so as to help better find potential risks. It is of great significance for the safety of pregnant women and fetuses.

Preeclampsia in pregnant women is mainly characterized by vasospasm, and its typical symptom is the increase of blood pressure. From this study, the blood pressure of pregnant women with stage 1 hypertension is much higher than that of perinatal pregnant women in the same period, which also means that the possibility of preeclampsia during pregnancy is greatly increased. It is particularly important to monitor the ambulatory blood pressure of pregnant women for one day. It is very necessary to do a good job in prevention and nursing by comprehensively mastering the blood pressure and rhythm fluctuation of pregnant women all day during perinatal period. In addition, gestational hypertension is easy to cause complications. From this point of view, it is necessary to reduce the incidence of complications of gestational hypertension. From the practical application, the safety of pregnant women and perinatal infants is guaranteed. Ambulatory blood pressure monitoring does not interfere with the rest of pregnant women at the same time. It is a convenient, noninvasive and safe ambulatory blood pressure monitoring method, which can truly and effectively reflect the circadian changes of pregnant women's blood pressure. Compared with the conventional blood pressure monitoring method, it has more clinical effect and value [5].

In conclusion, the use of ambulatory blood pressure monitoring is very important for pregnant women. It can early detect the occurrence of eclampsia. If pregnant women are already in preeclampsia, they can effectively master the dynamic situation of blood pressure and understand the changes of renal function. At the same time, it is also an important measure to predict the situation of fetus, which is worthy of clinical attention [6].

References

[1] Guo Xiaomeng, Zhang Ye, Wang Juan, Gu Jinghong, Huang Yajuan, Teng Yincheng, Tao Minfang, Jiang Rongzhen. Predictive value of BMI combined with blood lipid on pregnancy

induced hypertension and preeclampsia [J]. Chinese Journal of Obstetrics and Gynecology, no.03, 2019.

[2] Guidelines for Prevention and Treatment of Hypertension in China (revised in 2018) [J]. Writing Group of 2018 Chinese Guidelines for the Management of Hypertension, Chinese Hypertension League, Chinese Society of Cardiology, Chinese Medical Doctor Association Hypertension Committee, Hypertension Branch of China International Exchange and Promotive Association for Medical and Health Care, Hypertension Branch of Chinese Geriatric Medical Association;. Chinese Journal of Cardiology, no.01, 2019.

[3] Deng Xiaoyan, Li Yanchuan. Changes of left ventricular structure in patients with gestational hypertension and its correlation with neonatal growth and development [J]. Journal of Practical Cardio Cerebrovascular Diseases, no.11, 2019.

[4] Liu Li, Wang Zhanyun, Qu Yanjun, Huang Mingli, Han Yanyan. Evaluation of fetal cardiac function in pregnancy induced hypertension by Doppler ultrasound [J]. Journal of Harbin Medical University, no.05, 2019.

[5] Tian Haiyan, Zhang Xiaoshan, Hu Yanhua, Duan Shasha, Zhang Caixia, Guo Jiandong. Role of Tei index in evaluating fetal cardiac function in pregnant women with gestational hypertension [J]. Chinese Journal of Ultrasound Medicine, no.01, 2018.

[6] Yihua. Effects of gestational hypertension on fetal cardiac function, growth and development [J]. Clinical Medical Research and Practice, no.01, 2018.