

The importance of ambulatory blood pressure on pregnancy with hypertension

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Abstract

Ambulatory blood pressure (ABPM) is an important tool in the following of pregnant women, specially those with hypertension and those who develop pre-eclampsia. It can diagnosis arterial hypertension better than casual blood pressure (BPc). ABPM analyze periods of the day that BPc don't, ex: night period, allowing to define nocturnal hypertension and also different types of arterial hypertension like white coat hypertension and masked hypertension that BPc per se can't. ABPM seems also to be an important tool in terms of prognosis in relation to outcomes of the pregnant women and the fetus related with hypertension in pregnancy.

Keywords: ambulatory blood pressure, hypertension in pregnancy, pre-eclampsia, nocturnal hypertension, blood pressure dipping

In Western developed countries, pregnancy can suffer complications due to cardiovascular diseases which have a prevalence of 0.2-4% [1]. These include hypertensive disorders which have a prevalence of 6-10% in all pregnancies [1]. Hypertension In Pregnancy (HIP) can be classified as: gestational hypertension, chronic hypertension, preeclampsia or preeclampsia superimposed on chronic hypertension. As a consequence, HIP is the leading cause of morbidity and mortality of pregnant women and the fetus in the developing and developed countries [1]. The complications in pregnancy

induced by HIP can be any of the following: a greater risk of abruption placentae, organ failure, disseminated intravascular coagulation and cerebrovascular events. Furthermore, fetuses of these pregnant women (PW) are at greater risk of premature, intrauterine growth retardation, and intrauterine death [2]. Therefore, it is of the utmost importance to diagnose arterial hypertension in pregnancy.

The diagnosis of arterial hypertension in pregnancy can be obtained by measuring the blood pressure. This can be done in different ways. Can be achieved by measuring the blood pressure, in two separate moments, with an interval of at least for four hours (except in emergency scenarios), mostly determined by office blood pressure (BPc) [1]. Outside the office, blood pressure can be also measured in an ambulatory way. We

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distinguish two methods: 1) at home where the patients itself does the measurements, called home blood pressure (HBPM) or 2) using a blood pressure measuring device for a period of at least 24 hours, called ambulatory blood pressure method (ABPM) [3]. In the later method, the device should be validated for the usage on pregnant women. This is can be verified by the list of devices approved by www.dableducational.org. or www.pressionearteriosa.net. It has been shown that the ambulatory values obtained by both methods, APBM and HBPM, provide more diagnostic information than BPc [4].

Remark that one measurement with BPc represents 1/1400 of all possible measurements during a 24 hour period [5]. On the contrary, ABPM blood pressure allows for multiple measurements during the same 24 hour period. Usually, for ABPM, during the day, a measurement is made every 15-20 min, and during the night every 20-30 min. Thus ABPM allows the study of the profile of the circadian blood pressure during the 24 hour period [3]. Physiologically, blood pressure is higher in the morning and minimal during the rest period [3]. In the rest period, i.e. during sleep, there is a decrease of blood pressure by at least 10 % in systolic blood pressure and/or diastolic blood pressure, the nocturnal dipping of blood pressure that matches the sleep period [3]. However, we must account for the fact that the quality of the sleep is very important. If the patient does not sleep well because he is awoken by every measuring attempt of the device, the obtained measurement curve does not reflect realistically the night dipping curve expected from a normal sleep period of the patient and consequently, the normal dipping. Therefore it is of importance, when evaluating the night period of the circadian of the blood pressure, that the sleep quality is good, otherwise it is very difficult to make any conclusions from this period.

The circadian rhythm can also be characterized in normotensive pregnant women, pregnant women with essential hypertension and pre-eclamptic pregnant women [4]. It seems however that there are significant differences in the circadian profile among them [6]. Several studies suggest that there is indirect evidence that the disruption of the circadian clockwork of the blood pressure affects the role of the clock in preeclampsia [6]. In normotensive pregnancies, blood pressure decreases from the first trimester to the second trimester [6]. With respect to preeclampsia, there is a

study suggesting that blood pressure does not increase in the first trimester [7].

Further the physiological dipping of blood pressure during the night period is very frequently blunted in pre-eclamptic pregnant women and so expressed as a non dipping pattern [8, 6] or even presenting a raising of the blood pressure values instead of a dipping, the reversed dipping profile [7]. Of course, this conclusion can only be defined if the quality of sleep is good. Also, we must not exclude the problem of reproducibility of the circadian profile. Several studies show that, in terms of mean values, ABPM has high reproducibility, although, not true with respect to circadian profiles [8,9], mostly the non dipping profile [8,9]. Studies show a reproducibility of 55% for the ND and D patterns [8].

ABPM also excludes the "alert reaction". When we measure office blood pressure with the BPc we can sometimes observe an "alert reaction" also name by some authors as the "white coat effect". It means the raise of blood pressure in doctor environment not accounting for daytime blood pressure values and the use or not of anti-hypertensive medication [3]. The "alert reaction" is positive if the value blood pressure is higher than the daytime ambulatory blood pressure. However, this effect should not be mistaken with white coat hypertension (WCH), which remarks the situation of persistently raised clinic BP together with a normal BP outside of the clinic [3]. The actual meaning of the white coat effect is still matter of discussion amongst some authors [10,11]. The fact is that if we only observe the white coat effect then it can induce false hypertensive diagnosis. Furthermore ABPM excludes the placebo effect, demonstrates arterial hypotension episodes, diagnosis, as mentioned, white coat hypertension and also Masked Hypertension, persons with normal values in office but with higher values outside the office [3].

The diagnosis of the HIP with ABPM can detect false HIP in case they have an "alert reaction" and/or WCH. WCH can be observed in almost one third of pregnant women [3]. In practice, using ABPM instead of BPc to diagnosis arterial hypertension avoids the prescription of unnecessary anti-hypertensive medication. Some research suggests that pregnancy with WCH is not a completely benign situation [12,13]. It was found that the risk of developing preeclampsia was higher in pregnant women with WCH, 8%, compared to the

same risk observed in normal pregnant women, 4% [12, 13]. Nevertheless, pregnant women with WCH do not require antihypertensive medication and have a much better prognosis than HIP [12].

ABPM also permits the study of pregnant women that exhibit Masked Hypertension, for which the prognosis remains unknown [12]. Studies have shown that in HIP and preeclampsia women there is a significant high prevalence of nocturnal hypertension [3,12,14], another period of the circadian pattern that BPC does not cover and that has clinical implications since it implies anti-hypertensive treatment and its prevalence can be as high as 60% [3] in all pregnancies, being higher in women with preeclampsia than in HIP [3].

ABPM in the general population, has an important tool in CV prognosis [15–17]. In pregnant women, mostly in hypertensive pregnant women (HIP) and in preeclampsia women, it seems that this is also the case. There is some prognostic evidence between ABPM and the occurrence of complications in pregnancy induced by HIP and preeclampsia pregnancy [3,12–14,18–20], as well as with the mother after delivery [3].

It seems that ABPM is more predictive than BPC [12,19,20]. Brown MA et al. [21] studied 186 hypertensive pregnant women, and found that women with HIP, and women with pre-eclampsia, have a higher prevalence of hypertensive sleep HIP (which includes those who are also hypertensive during the day). They exhibited at the same time a higher prevalence of adverse pregnancy outcomes. However Brown et al support that this data, is not cause effective, but could be explained by the high prevalence of pre-eclampsia on the sleep hypertensive HIP [21]. Bastos J et al. [19] studied the prognostic values of ABPM in 139 pregnant women with HIP and found that nocturnal blood pressure values, mainly diastolic blood pressure values, and the absence of diastolic blood pressure dipping, the non dipping pattern, were associated with more adverse maternal-fetal events during pregnancy [19]. Salazar M et al. [12] studied 87 normotensive pregnant women diagnosed by BPC with a high course risk. They were then after subject to ABPM, where they found a high incidence of masked hypertension and nocturnal hypertension. Nocturnal hypertension after adjusted for confounding variables was associated with the development of pre-eclampsia / eclampsia [12]. They claim [12] that ABPM in normotensive pregnant women with high risk is very important since it can help to find

those among pregnant women who may develop pre-eclampsia / eclampsia [4,12]. This claim is also supported by Parati et al. [4] in the editorial comment to Salazar M article. Furthermore, there are other prognostic aspects of ABPM that been analyzed, such as heart rate variability [22], morning surge [14] but for which the results have not yet been confirmed by other research.

In conclusion, we can state that ABPM, in terms of diagnostic, is not yet seen as an indispensable tool for HIP and for normotensive pregnant women with high risk, including those false normotensive that are really nocturnal hypertensive or masked hypertensive [12]. However, in HIP diagnosis, ABPM is of importance to exclude those pregnant women who have an “alert reaction” or have indeed exhibit white coat hypertension, and thus do not need anti-hypertensive treatment. Furthermore, ABPM is able to diagnose Masked Hypertension, a pattern that must concern us as requiring anti-hypertensive treatment, and which is not diagnosable via BPC. All in all, we believe that in terms of prognosis ABPM seems to be a very promising and essential tool in the future, if not already for nowadays.

Conflicts of interest

The author confirms that there are no conflicts of interest.

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