

ABPM (Ambulatory blood pressure monitoring)

Teresa Rodrigues*, Rogéria Matos*, Ana Gameiro*, João Maldonado**, Célia Gonçalves***, Alberto Pinguinha****

Abstract

The authors present some considerations on the ambulatory blood pressure monitoring including methodology, classification, clinical applications, indications, interpretations of results, day night difference and organ damage. The authors comment on the importance of this method in diagnosis and follow-up of hypertension.

Key words: ambulatory blood, pressure measurement, hypertension, methodology, classification, diagnosis, follow up of hypertension.

Introduction

Casual pressure measurement with a sphygmomanometer in a medical setting is the first option for diagnosing and monitoring patients with high blood pressure. However, it is a casual measurement taken occasionally, and subject to several sources of errors. In 1992, the American Hypertension Association established guidelines for the measurement of blood pressure to prevent the most common errors:

Posture: initially, particularly in patients over 65 years, with diabetes or receiving antihypertension medications, it is necessary to check postural changes, taking the blood pressure after five minutes in the supine position. As a routine follow-up, it is recommended that blood pressure be taken with the patient sitting calmly, with the back supported, for at least five minutes, and with the arms supported at heart level. **Circumstances:** the patient should not drink caffeine one hour before the measurement. Neither should they smoke for fifteen minutes before the measurement. Exogenous adrenergic stimulants (phenylephrine) should not be taken prior to the measurement. It should be carried out in a calm place.

Equipment: the cuff must wrap around and cover two-thirds of the arm; very small cuffs can result in incorrectly high measurements.

Procedure: two separate measurements should be taken each time; if the readings vary by more than 5 mmHg, additional measurements should be taken until both results are practically the same. For the diagnosis, additional measurements should be taken until both readings are practically the same. For the diagnosis, three separate sets of measurements should over be taken, at least one week apart. Initially, the blood pressure in both arms should be determined; if the readings differ, take the pressure only on one arm, i.e. the arm in which blood pressure is higher. If the difference is significant, the pressure should also be measured in the legs (particularly in patients under 30 years).

Performance: inflate the cuff quickly at a pressure of 20 mm over the systolic pressure, which is identified by the disappearance of the radial pulse. Release inflation at around 3 mm per second. Record the disappearance of heart beats. If the Korotkoff sounds are weak, the patient must open and close the hands 5/10 times, followed by rapid inflation of the cuff.

Record: the position of the patient and the arm, and the size of the cuff must be noted. Even under ideal conditions, casual measurement of blood pressure does not allow assessment of the patient's blood pressure load, i.e. reproducibility of average blood pressure is poor. For this reason, in the 1960s, the first Ambulatory Blood Pressure Monitoring (ABPM) was performed.

The objective of ABPM is to assess the average blood pressure and define its variability over 24 hours of daily routine activity. The aim is to clearly show

*Internal Medicine Hospital Assistant at Santarem Hospital

**Hospital Assistant in Cardiology at the Cardiology Service of Coimbra University Hospitals

***Resident to the Internal Medicine Supplementary Internship of Santarem Hospital

****Head of the Internal Medicine Service

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any blood pressure load that may lead to organic lesions, i.e. to determine cardiovascular prognosis and the possibility of it affecting the target organs. The ABPM shows the variability of blood pressure in relation to the circadian rhythm. The BP is lower at night, peaking in the morning and again in the afternoon. Two groups of hypertensive patients are defined: dippers and non-dippers, based on whether the blood pressure dips at night, by more than 10% in relation to the average daytime values; non-dippers have a poorer cardiovascular prognosis. With this technique, the variability of BP with debit and heart rate, respiratory rate, position, physical activities, and stimuli (coffee, alcohol, tobacco, stress, etc.) can also be observed.

Methodology: ABPM is performed with a monitoring device that is adjusted to the patient, and is based on automatic repeated measurements at regular intervals, usually over a 24-hour period.

The Monitors: These have improved a lot over the years in relation to several parameters: their weight has decreased from 1 to 2 kg to a few hundred grams. From semi-automatic devices controlled by the patient, we now have devices with automatic inflation and release. Initially, the readings were recorded on magnetic tape, but the incorporation of solid memory sources enabled its widening to computer database. At our Department, ABPM is performed with a device whose main characteristics are: weight - 342g; measurement method - oscillometric; inflation - using an electrical pump at rates of 8mm. The measurement threshold is: SBP - 40-50 mmHg, DBP - 40-180. The number of automatic measurements is over 100. This device is connected to a computer.

ABPM is performed over a 24-hour period, and the patient is asked to maintain their normal daily activity. The patient is required to fill out an Activity Journal, which includes: time of getting up, meals, work activity, physical exercise, drugs, stress, visits to the doctor, sleep, and any unusual activities. Usually, daytime is defined as the period from 7am to 10pm, during which time measurements are taken every fifteen minutes; night-time is from 10pm to 7am, with measurements every thirty minutes.

In order to have good quality readings and interpretation, the following are required: a number of measurements higher than 3/hour; no interruptions of recordings for more than two hours; and number of valid measurements higher than 80%. Daytime blood

pressure values are arbitrarily considered abnormal if they are higher than or equal to 140/90 mmHg, and night-time values, if higher than or equal to 120/80.

Clinical application

The indications for ABPM are multiple and varied: borderline high blood pressure - defined as SBP values between 140 and 160 mmHg, and DBP between 90 and 95 mmHg. This monitoring is extremely useful; in case of abnormal results, it is necessary to improve hygiene and dietary measures; and in case of association with signs of high blood pressure, it is easier to decide on a drug therapy.

It can also help diagnose white coat hypertension - high peaks of BP occurring while the patient is in the consulting room. It is more common among Caucasian women, and cardiovascular prognosis in these patients seems different than for patients with normal blood pressure. Resistant high blood pressure - high BP that does not return to normal after bi- or tri-therapy indicates the need for ABPM, which will confirm or rule out the existence of resistant HBP.

Symptomatic HBP with therapy - ABPM allows the detection of abrupt blood pressure falls or rises, and correlates them with the symptoms recorded in the activity journal.

HBP with associated pathology - for example, coronary insufficiency or peripheral ischemic arterial pathology - it is essential to ensure a good pressure balance, since very marked falls may compromise perfusion, and excessive rises may aggravate lesions.

ABPM has also other types of indications that are not part of clinical practice: in Clinical Pharmacology, it represents a very important tool in the assessment of hypertensive patients in relation to the duration of action, associations, times of taking drugs, etc.

Some precautions are required when performing ABPM: it is important to explain the objectives of the test and how the device works to the patient; to instruct the patient to maintain their normal daily activity, and to fill out the activity journal. The monitoring should not be performed in anxious patients or patients with arrhythmia; it is also important to bear in mind that previous monitoring may alter the results. As for the technical characteristics, care must be taken when placing the cuff and using the device.

In conclusion, ABPM is a valuable tool for the diagnosis, monitoring, therapy assessment and prognosis of HBP. It can be easily performed in any

hospital, allowing a more thorough understanding of hypertensive patients ■

References

1. Asmar R, Maldonado J. Medição ambulatória da pressão arterial. Laboratórios Delta. Lisbon, 1997.
2. Pickering TG, Harshfield GA. What, is the role of ambulatory blood pressure monitoring in the management of hypertensive patients? *Hypertension* 1985; 7:171-177.
3. Pickering TG, Harshfield GA. Ambulatory versus casual blood pressure in the diagnostic of hypertensive patients. *Clin Exp Hypertension* 1985; 7:257-262.
4. Staessen J, Fagard R, Lijnen P et coll. Reference values for ambulatory blood pressure: a meta – analysis. *J Hypertension* 1990; 8 (Suppl.6):57-64.
5. Kaplan NM. Misdiagnosis of systemic hypertension and recommendation for improvement. *Am J Cardiol* 1987; 60:1383.
6. Cox J, O'Malley K, Atkies N, O'Brien E. A comparison of the twenty four hour pressure profile in normotensive and hypertensive subjects. *J Hypertension* 1991; 9(Suppl.1):3-6