

**MASKED
HYPERTENSION - THE
ECHOCARDIOGRAM
AND MAP IN THE HELP
OF THIS CLINICAL
DIAGNOSIS
CASE REPORT**

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Abstract: Objective: To demonstrate the importance of complementary exams associated with the clinical picture for the diagnosis of Masked Hypertension (MH). **Methods:** This is a descriptive observational case-report study. Carried out through an outpatient consultation in a specialty office (Cardiology) in the city of Franca, São Paulo. For the description of the case, the primary source of data will be the patient's printed medical record, containing a detailed case history, description of the physical examination and complementary exams. **Case details:** Female patient, 69 years old, asymptomatic, presented with peak pressure and underwent control with residential measurements, also presenting alterations. It has other morbidities, such as dyslipidemia, diabetes and smoking, as well as a family history of coronary heart disease and heart disease, so it was indicated that other complementary exams such as MAP and ECHOCARDIOGRAM be performed. This diagnosis was possible due to the anatomical and functional changes that chronic hypertension causes, making it essential to carry out additional tests, as most of the time, diagnostic confirmation is delayed in association with functional consequences such as heart failure. **Final considerations:** it is concluded that the diagnosis of the pathology in question is essential to prevent damage and complications, in addition to helping to optimize the clinical treatment to achieve the desired therapeutic goals.

Keywords: Masked hypertension, echocardiogram, ABPM.

INTRODUCTION

Masked Hypertension is defined as a normal measurement of blood pressure (< 140x90 mmHg) during office visits, but with a blood pressure level altered by ABPM (Ambulatory Blood Pressure Monitoring) or residential measurements (>135x85 mmHg) if

MRPA (Home Monitoring of Blood Pressure). Epidemiology in recent studies shows a prevalence of 13%, being found mainly when SAH is borderline. The most prevalent risk factors for this condition are stress, obesity, alcohol consumption, smoking, physical activity, anxiety, DM, CKD and a family history of SAH. (MALACHIAS MVB, SOUZA WKS, PLAVNIK FL, RODRIGUES CIS, BRANDÃO AA, NEVES MFT, BORTOLOTTI LA, 2016)

Currently, the investigation of Masked Hypertension with ABPM is recommended when blood pressure is between 130 x 85 mmHg and 139 x 89 mmHg in the office in asymptomatic individuals with target organ damage or at high total cardiovascular risk. (MALACHIAS MVB, SOUZA WKS, PLAVNIK FL, RODRIGUES CIS, BRANDÃO AA, NEVES MFT, BORTOLOTTI LA, 2016)

Early diagnosis is important because patients who have such a clinical condition have an increased prevalence of clinical and subclinical lesions of target organs compared to true normotensive patients. Among these lesions are: increased left ventricular mass, increased carotid intima-media thickness, greater wall stiffness of large arteries, increased metabolic and cardiovascular risk. (CAMPANA G. M. ÉRIKA; FARIA A. RAFAEL; BRANDÃO A. ANDREA, 2014)

This clinical entity is more difficult to detect because there is still the custom of diagnosing HYPERTENSION HYPERTENSION with traditional measures, carried out in offices, during medical care, and is often confused with White Coat Syndrome. (ALESSI, ALEXANDRE; BRANDÃO, A. ANDREA; PAIVA, MG ANNELEISE; NOGUEIRA, R. ARMANDO; FEITOSA, AUDES; GONZAGA, C. CAROLINA; AMODEO, CELSO; MION, DECIO; SOUZA, SM DILMA; BARBOSA, EDUARDO; JUNIOR, L. EMILTON; NOBRE, FERNANDO; FUCHS D. FLAVIO; , 2014)

In a meta-analysis study in which 13 studies were included, a higher prevalence of left ventricular hypertrophy was shown in the HM group (29%) compared to individuals with controlled hypertension (9%). (CAMPANA G. M. ÉRIKA; FARIA A. RAFAEL; BRANDÃO A. ANDREA, 2014)

The increase in mechanical load caused by increased afterload of the left ventricle, chronically to the heart, leads to a myocardial modification to adapt to this new situation, resulting in an increase in ventricular mass which, despite being a compensatory mechanism, helping in the initial phase of hypertensive disease, will in the future reduce the contractility of myocardial fibers and, together with other adaptive factors, will lead to heart failure. (Figure 1) (MACIEL, 2001)

When citing left ventricular hypertrophy (LVH) as a complication of this clinical entity,

it is necessary to understand how it is defined in relation to echocardiographic parameters. Therefore, an increase in left ventricular mass is considered, and it can be calculated by correcting the value expressed only in grams for the body surface area, in square meters. From this, values above 163g/m² in men or 121g/m² in women who do not regress to the proposed treatment or a left ventricular systolic dysfunction with an ejection fraction < 40% is an indicator of severity for hypertensive heart disease. (SON, 2012)

In addition, it is important to emphasize that LVH has an independent relationship with morbidity and mortality, that is, studies show that patients with increased left ventricular mass have a double risk for other cardiovascular events and even high mortality rates, even if there are no other factors risks involved. (SON, 2012)

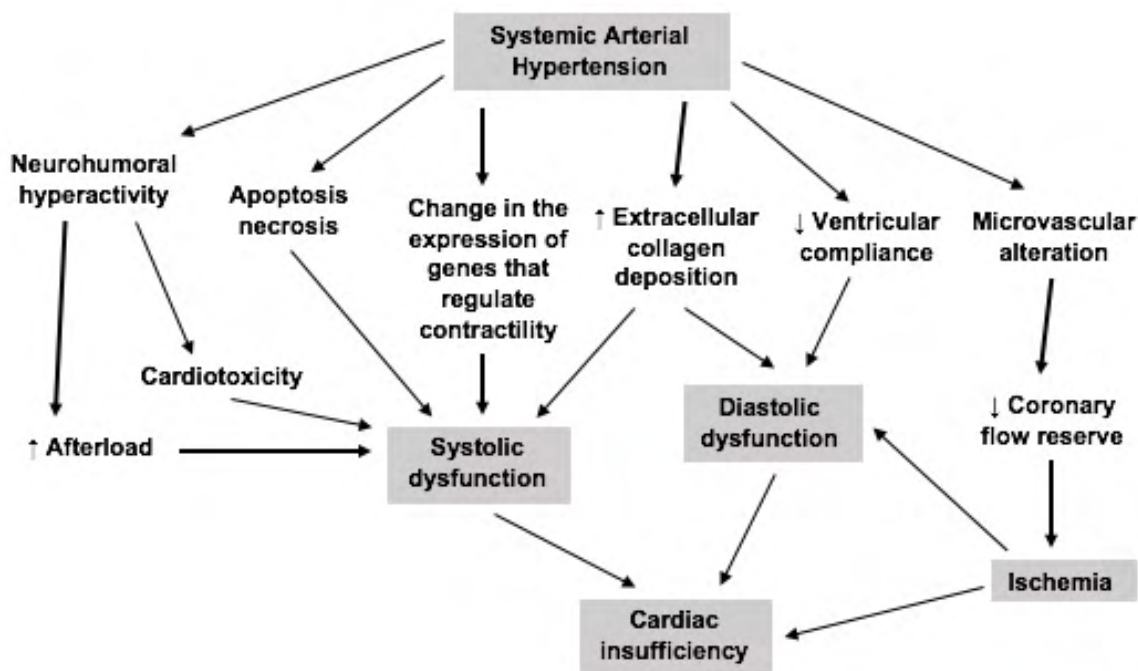


Figure 1 Pathophysiological mechanism of heart failure in chronic arterial hypertension (MACIEL, 2001)

The choice of medication to be used in the treatment will vary depending on the individual's blood pressure measurement value and the goals to be achieved according to the patient's risk factors. (CAMPANA G. M. ÉRIKA; FARIA A. RAFAEL; BRANDÃO A. ANDREA, 2014)

If MH is confirmed in ABPM or MRPA, patients must undergo a comprehensive assessment of global CVR then, depending on this assessment, non-drug treatment of lifestyle changes alone or associated with drug treatment will be chosen. (CAMPANA G. M. ÉRIKA; FARIA A. RAFAEL; BRANDÃO A. ANDREA, 2014)

This treatment will be done in the same way as conventional hypertensive patients, suggesting the measurement of blood pressure outside the office to assess the effectiveness of this proposed treatment. (ALESSI, ALEXANDRE; BRANDÃO, A. ANDREA; PAIVA, M. G. ANNELEISE; NOGUEIRA, R. ARMANDO; FEITOSA, AUDES; GONZAGA, C. CAROLINA; AMODEO, CELSO; MION, DECIO; SOUZA, S. M. DILMA; BARBOSA, EDUARDO; JUNIOR, L. EMILTON; NOBRE, FERNANDO; FUCHS D. FLAVIO; , 2014)

METHODS

This report was submitted to the Research Ethics Committee (CEP) under the Certificate of Presentation and Ethical Appreciation (CAAE): 52381421.8.0000.5495.

It is presented as a descriptive observational study of the case report type with a literature review of the narrative type. Carried out with a 69-year-old female patient, seen at the specialty office (Cardiology) in the city of Franca, São Paulo.

For the case description, the primary source of data will be the patient's printed medical record, containing a detailed case history, description of the physical examination and

complementary exams. Furthermore, for the narrative bibliographic review, the Medline, Scielo and Lilacs databases will be used.

DETAIL OF THE CASE

N.S., 69 years old, female, residing in Franca (SP), diagnosed with primary arterial hypertension 16 years ago.

The patient was asymptomatic, but was referred by the gynecologist to cardiology with BP levels 150 x 110 mmHg in a routine consultation and presenting a home control with also altered levels: 150 x 100 mmHg; 160 x 100 mmHg; 140x90mmHg. She knew she was hypertensive, but made irregular use of the prescribed medication.

PERSONAL BACKGROUND: Dyslipidemic taking Rosuvastatin; Hypertensive in use of Hydrochlorothiazide; Diabetic taking Metformin.

HABITS: former smoker, occasional drinker and performing physical activities on a regular basis.

FAMILY BACKGROUND: Mother with Systemic Arterial Hypertension (SAH), Diabetes mellitus (DM), Stroke (CVA) and Coronary Insufficiency (COC) and father who died of Acute Myocardial Infarction (AMI).

Laboratory tests collected in 2004: Creatinine 0.7; Uric acid: 4.7; Glucose 95mg/dl; Total cholesterol: 328mg/dl; HDL cholesterol: 43mg/dl; LDL cholesterol: 149mg/dl; Triglycerides: 231mg/dl and Potassium (K): 4.7mEq/L.

Due to its high cardiovascular risk and also a family history of hypertensive complications, an echocardiogram was requested for evaluation in 2004, resulting in diastolic septal thickness and borderline LVPP diastolic thickness (11mm), decreased systolic volume (40ml), left ventricular mass 149g and ejection fraction 78%.

Based on these results, the medication was changed, initially to a Conversion Enzyme

Inhibitor, but due to coughing, a calcium channel blocker (Anlodipine) was chosen, initially at 2.5mg and after returning with BP still around 140 x 90mmHg the dose was increased to 5 mg. Regular quarterly/quarterly consultations were started with BP levels decreasing to 120 x 80mmHg and 110 x 70mmHg, with the patient always asymptomatic.

In 2007, N.S reported dyspnea in a routine consultation, maintaining BP 110 x 70mmHg and another echocardiogram (2007) was requested for a new assessment of ventricular function. In this new exam, the septal diastolic thickness showed improvement, measuring 9 mm and the LVPP diastolic thickness 8 mm. Systolic volume of 38 ml, left ventricular mass of 107 g and ejection fraction 70%.

In September 2007, it started to have semiannual returns, maintaining pressure levels at: 120 x 80 mmHg; 110 x 70 mmHg; 110 x 80 mmHg. During this period, still asymptomatic, she ceased regular activities due to musculoskeletal changes in the knee joint.

She continued in clinical follow-up until a new echocardiogram in 2013. The septal diastolic thickness increased to 10 mm and the LVPP diastolic thickness to 8 mm, still within the normal range. However, with signs suggestive of left ventricular diastolic insufficiency.

In 2016, continuing the echocardiographic assessment, the exam showed a diastolic septal thickness of 8 mm, and a diastolic thickness of the LVPP of 9 mm. Regarding the previous examination, in addition to mild aortic root dilatation, there was also mild aortic insufficiency.

In 2017, the diastolic septum thickness was 11 mm and the LVPP diastolic thickness was 10 mm, ejection fraction 79%.

Due to the return of a borderline left ventricular thickness, two ABPM were

performed in 2018 to assess the possibility of Masked Hypertension due to the measurements in the office being within normal limits, with changes in the December 2017 exam.

In May 2018, the first ABPM exam was performed, and some alterations were found, such as an increased abnormal behavior, with partial control of systolic and diastolic blood pressure averages during sleep. Between 23:30 and 4:30 in the morning, there was a variation in the systolic pressure from 139 to 111mmHg and in the diastolic from 74 to 87 mmHg. There were also significant changes during the day (afternoon), with hypertensive peaks ranging from 142 to 165 mmHg and diastolic pressure from 88 to 109 mmHg from 15:45 to 18:45.

The medications in use during this period were: Anlodipine in the morning (6:30) and in the late afternoon (18:30) and Rosuvastatin also in the late afternoon (17:00), in the night period Metformin at 20:00.

In August 2018, another blood pressure mapping test was performed to assess the new prescribed medication. The drug of choice was the angiotensin receptor antagonist, Candesartan, at a dosage of 8mg, in which 1 tablet was prescribed every 12 hours, while Amlodipine was also maintained.

From then on, it was possible to observe an improvement in measurements during the daytime period, with the systolic pressure being within the normal range and the diastolic blood pressure varying between 86 and 97mmHg. At night, during sleep, changes were observed both in systolic and diastolic, the first varying between 111 to 126mmHg and the second between 71 to 84mmHg.

During this period, measurements were taken in the office to assess Arterial Hypertension.

DISCUSSION

According to the definition, Masked Hypertension is characterized by normal BP values inside the office and altered outside the office. In this case, during routine outpatient consultations, the patient's pressure was between 110 x 80 and 120 x 80 mmHg, that is, lower than the value considered for the diagnosis of SAH ($< \text{or} = 140 \times 90$).

In addition to outpatient BP measurements, the patient underwent additional tests such as ABPM, which revealed altered pressure, mainly during sleep. This test was ordered due to the patient's high cardiovascular risk, with a previous history of DM, positive family history for coronary artery disease, former smoker, and with it it was possible to diagnose masked hypertension.

The diagnosis of Masked Hypertension is important due to anatomical and functional changes that chronic hypertension causes, such as increased left ventricular mass, increased intima, media and carotid thickness, greater rigidity of the wall of large arteries and increased metabolic and cardiovascular risk, which may lead, in more advanced cases, to heart failure.

In this pathology, it is essential to perform a complementary exam, due to the difficult diagnosis of Masked Hypertension, which may be late and already have consequences such as heart failure, if this is done late. Among the exams, the echocardiogram helps to assess damage already caused at the cardiac level, such as changes in left ventricular relaxation, ventricular septal thickness, measurement of the posterior wall of the left ventricle and even changes in ejection fraction. These parameters are important because the literature describes a higher risk of cardiovascular events in patients with MH compared to patients with controlled SAH. The ABPM is also important because it is the exam that we can obtain measurements of the patient's blood pressure,

for 24 hours and not only during wakefulness but also during sleep, during all day long.

In the case reported here, the exam was of paramount importance because the initial one showed the posterior wall of the left ventricle and septum in the borderline values and with that it was possible to adjust the medication, associating one more class of antihypertensive, which is indicated for uncontrolled SAH independent of be masked or not, to prevent progression and complications or even regress these values.

With the optimization of the treatment, the improvement in the patient's blood pressure levels, analyzed by ABPM, was remarkable, and with that, also improving the parameters of the echocardiogram, reducing the chance of possible complications that uncontrolled hypertension can cause to patients.

CONCLUSION

Therefore, the importance of complementary exams in the assessment of Hypertension is evident, as they can prevent damage and complications and help to optimize the clinical treatment for the patient to achieve the desired therapeutic goals. The echocardiogram helps to assess local damage caused by chronic hypertension and ABPM helps to analyze blood pressure levels, not only during wakefulness but also during sleep, thus bringing a more complete analysis of blood pressure measurements.

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