

Who Was That Masked Man?

The Challenge of Masked Hypertension

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CardioCase presentation

Bernard's BP

Bernard, 67, is a real estate salesman. He is married and has three children.

History

Bernard has no history of:

- stroke,
- heart attack,
- transient ischemic attack,
- angina or
- intermittent claudication.

He has up to two alcoholic drinks per day and usually about six drinks per week. He is a lifelong non-smoker.

Bernard was diagnosed with hypertension and dyslipidemia at the beginning of 2006.

Family history

Bernard's father was diagnosed with hypertension and died of a stroke at the age of 78. His mother and two sisters are currently alive and well.

Current medications

Bernard is prescribed the following

medications:

- 81 mg of acetylsalicylic acid, q.d.
- a multivitamin, q.d.
- 25 mg of hydrochlorothiazide, q.d.
- 2.5 mg of cilazapril, q.d. and
- 10 mg of atorvastatin, q.d.

Physical exam

Bernard's physical exam reveals the following:

Weight: 80.2 kg

Height: 170 cm

Waist: 98 cm

BMI: 27.7

His cardiac apex is enlarged and sustained. There are no carotid, abdominal, nor femoral bruits and no evidence of abdominal aortic aneurysm.

- Average clinic BP: 127/75 mmHg (134/72 mmHg, 118/78 mmHg and 128/74 mmHg)
- Average clinic heart rate: 81 bpm
- Average home BP: 142/93 mmHg

For more on Bernard, go to page 20.

About the authors...

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CardioCase presentation

Bernard's BP continued...

Bernard underwent ambulatory BP monitoring (ABPM), which showed the following:

- Average 24-hour ambulatory BP: 136/93 mmHg
- Average 24-hour heart rate: 74 bpm
- Average daytime ambulatory BP (6 a.m. to 6 p.m.): 142/94 mmHg

Because daytime ambulatory systolic and diastolic pressures were above goal (135/85 mmHg), 5 mg of amlodipine, q.d., was added to his regimen.

One month later, a repeat ABPM showed controlled hypertension, with an average

daytime reading of 127/86 mmHg. He did not report any adverse effects from this change.

Comment

On this follow-up clinic visit, Bernard's BP seemed well controlled, yet he had clinical left ventricular hypertrophy and his home readings were above goal. ABPM confirmed inadequate BP control. A modest increase in the intensity of his regimen produced better BP readings and may help to prevent hypertensive complications. Why Bernard's BP was lower at this follow up visit than at home remains uncertain.

CardioCase discussion

What is masked hypertension?

What is referred to as “reverse white coat hypertension” or more commonly “masked hypertension” is a relatively new concept.¹ In masked hypertensives, home BP readings, or daytime ambulatory BP is elevated while clinic BPs are at goal. Masked hypertensives are susceptible to risks associated with untreated hypertension. This is the converse of white coat hypertension where clinic BP is higher than daytime ambulatory BP.

Why is it important?

Masked hypertension is important as it identifies a group of patients who are at risk, despite normal clinic readings. They, like sustained hypertensives, have an increased risk for target organ damage and cardiovascular disease (CVD), similar to those with true office and

ambulatory hypertension.²⁻⁵ Cardiac ventricular hypertrophy and carotid atherosclerosis are much more prevalent in masked hypertensives compared to controlled hypertensive subjects.^{1,3-4,6} Silva, *et al* also found impaired large artery distensibility in masked hypertensives.⁷ In the Ohasama study, mortality from CVD and stroke were significantly higher than in normotensives or white coat hypertensives.⁵ This increased risk is common to both treated and untreated subjects, as well as all risk groups.⁵ As the name implies, masked hypertension is not easily detectable by conventional methods of screening.¹ It follows that patients with masked hypertension are less likely to be diagnosed with hypertension. Moreover, in the Hypertension and Ambulatory Recording Venetia (HARVEST) study, masked hypertensives also had a higher risk of severe hypertension compared to true normotensives.⁸

Table 1
Clinical categories with the use of clinical and ambulatory BP readings

	Clinic BP > 140/90 mmHg	Clinic BP < 140/90 mmHg
24-hour ambulatory BP > 135/85 mmHg	True hypertension	Masked hypertension
24-hour ambulatory BP < 135/85 mmHg	White coat hypertension	True normotension

Prevalence of masked hypertension

While the true prevalence of masked hypertension is unknown, estimates have varied from 10% of the population to as high as 23%.^{1,8-11} According to the Ohasama study, the number of masked hypertensives and white coat hypertensives is similar, which is alarming considering the relative lack of knowledge of this condition.⁵ Pickering points out that even if the prevalence were as low as 5%, it would affect 10 million people in the United States alone and by extrapolation, up to one million Canadians.¹

The prevalence of masked hypertension among treated hypertensives is also uncertain. Again, if the prevalence were similar to white coat hypertension, up to 25% of hypertensives seen in a physician's office could have the disorder. It is tempting to speculate that results of antihypertensive therapy might improve if masked hypertension were diagnosed and treated.

How can we detect masked hypertension?

By definition, masked hypertension is not detectable with office screening of BP. Moreover, because most physicians know that, on average, BPs are higher in the physician's office than at home, we tend to discount patient reports of higher readings. Home, drug store and ambulatory BP monitoring (ABPM) may all play a role in diagnosis.

Home and drug store BP monitoring

Self inflating, oscillometric monitors are widely available and generally accurate.¹² Patients often need education on proper equipment, cuff size and technique, but it can easily produce accurate readings. If a patient uses proper technique and good equipment, home BP readings > 135/85 mmHg on several occasions should prompt a request for ABPM. With the same caveats, drug store monitors can also be used. In our area, such monitors are generally accurate (Wilson M, unpublished observation).

ABPM

ABPM uses an automated oscillometric system to periodically record BP reading throughout a 24 hour (or longer) period. While not perfect, it is the current "gold standard" for estimating true BP.¹³

Table 2
2006 Canadian Hypertension Education Program (CHEP) Recommendations for ABPM
(http://www.hypertension.ca/CHEP2006/CHEP_2006_Diagnosis)

- For diagnosis in subject with office BP of 140-179 mmHg/90-109 mmHg
- In patients whose office BP remains elevated despite receiving appropriate chronic antihypertensive therapy
- For patients with symptoms suggestive of hypotension
- Fluctuating office readings

Table 3

Additional indications for ABPM

- Those whose home BP readings are > 135/85 mmHg (either/or) on several occasions
- Those whose clinic BP readings are just at goal or fluctuate around the goal
- Those taking short-acting antihypertensives (such as clonidine) just prior to the office visit
- Those who develop target organ damage (such as stroke, MI, peripheral vascular disease) despite controlled office readings

When both the ABPM and clinic reading are available, the patient can be placed in one of four categories (Table 1). Because it is not feasible to obtain ABPM on all patients, recommendations have been developed (Table 2). We believe there are other situations in which ambulatory BP should be recorded (Table 3).

Risk factors for masked hypertension

Known risk factors for hypertension include:

- family history of hypertension,
- obesity,
- sedentary lifestyle,
- use of oral contraception in women,
- alcohol abuse,
- certain prescription and non-prescription drugs (for example nonsteroidal anti-inflammatory drugs) and
- sleep apnea.

Tobacco and caffeine use have not been generally considered as risk factors for masked hypertension. However recently, tobacco and caffeine use have both been correlated with increased ambulatory BP.¹⁴ The *Pressioni Arteriose Monitorate E Loro Associazioni* (PAMELA) study and the study done by Rasmussen, *et al* show that masked hypertension is more common in younger patients.¹⁵⁻¹⁶ Although it is known that white coat hypertension is more common in women,¹⁷ the

PAMELA study suggests that men and women are equally at risk for masked hypertension.¹⁸ Increased reactivity to stress affects daytime BP¹⁹ and a pronounced elevation in BP with standing also predicted masked hypertension.⁸ The HARVEST study also showed that transiently increased BP in the clinic can also be an indicator for increased ambulatory BP during the daytime.⁸

How should we treat masked hypertension?

Although there are no official recommendations on the specific treatment of masked hypertension, we believe it should not be ignored. We routinely increase the intensity of the antihypertensive regimen and we monitor its efficacy with repeat ABPM.

Conclusion

Hypertension, known as “the silent killer,” is a major risk factor for CVD. Treatment of hypertension brings about many benefits. With a BP decrease of 10/5 mmHg, the following risks are reduced:

- MI by 15%,
- heart failure by 50%,
- stroke by 38% and
- death by 10%.²⁰

An important part of the management of hypertension is accurately estimating true, long-term BP. Home monitors and ABPM can be useful in reducing the risk of hypertensive complications.



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