Editorial

Blood Pressure Measurement: Sitting and Standing?

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Prior to discussing some thoughts about positional changes in blood pressure, I'd like to comment on the measurement of blood pressure.

It is rare for a medical student, a resident-in-training, a cardiovascular fellow-in-training, or even a practicing or academic cardiologist to take the patient's blood pressure. I would even go so far as to say that it is uncommon for a registered nurse to measure blood pressure.

Key words: blood pressure measurements

Introduction

It is unusual, except in the setting of a clinical trial relating to hypertension, that there is any standard method for measuring blood pressure in the office or on inpatient services. In fact, blood pressure measurements taken on hospitalized patients are taken with patients in all sorts of odd positions.

Unless it was so ordered, the blood pressure is rarely taken in both arms to assess subclavian stenosis, even in patients with obvious generalized atherosclerosis.

I can't recall the last time I saw a blood pressure taken in the arm and the leg on an inpatient on the cardiology service, unless it was done by a vascular technician assessing limb ischemia using the ankle-brachial index as an objective measurement.

Standing Blood Pressure

Blood pressure taken while the patient is standing is also a rare event. The exception is when either the patient complains of feeling unsteady when standing up compared with lying down, or when the physician was suspicious of orthostatic hypotension for some other reason, (e.g., anemia, blood loss, etc.).

What follows in this editorial may be well known to hypertension specialists, but it was not well known to me, and I suspect many of the readers may not be aware of this as well.

I'd like to share with the reader something that I learned about measurement of standing blood pressure based on a conversation that I had with Elizabeth Muss, MD, a practicing physician in New York City. Dr. Muss has talked to me on several occasions about her practice of measuring standing blood pressure in her patients and she was kind enough to send me some literature on the subject. Two recent reports, one in 2002 and the other in 2003, addressed this subject of positional changes in blood pressure and relate that to the risk of developing hypertension in the future.

Standing Blood Pressure and the Risk of Developing Hypertension

Rose and colleagues[1] noted the association between the blood pressure response to a change from the supine to the standing position and the 6-y incidence of hypertension. Subjects studied were a bi-ethnic, middle-aged cohort of 6,951 normo tensive men and women, ages 45 to 64 y, and were free of coronary heart disease at baseline. Their findings revealed that orthostatic hypotension (upon standing) was associated with subsequent hypertension and isolated systolic hypertension. In their study, almost 3% of participants were classified as having orthostatic hypotension at baseline; on the third visit, 31% developed hypertension. An increase in systolic blood pressure upon standing was not a significant predictor of hypertension. In contrast, orthostatic hypotension was found to be predictive of both incident hypertension and isolated systolic hypertension.

Thomas and colleagues[2] also reported on the relationship of positional blood pressure changes. They had an 8-y follow up in a bi-racial cohort of young adults, ages 18 to 30 y, to determine the subsequent development of hypertension. This study was part of the Coronary Artery Risk Development in Young Adults (CARDIA) study and consisted of 2,781 participants. In this report, the 8-y incidence of hypertension was more common in participants who had an increase in systolic blood pressure on standing (particularly if the increase in blood pressure

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was >5 mm Hg) compared with those who had no increase in systolic blood pressure when standing.

One of the major differences between these 2 studies was the age of the patients. In the Rose study, the ages of men and women were between 45 and 64 y, whereas in the Thomas study the ages were between 18 and 30 y.

Based on these 2 studies, I am persuaded that we should routinely check for changes in blood pressure when the patient is standing compared with sitting or lying. The message that I take from both of these reports is that, in apparently healthy subjects, orthostatic hypotension as well as orthostatic rise in blood pressure should be considered as a potential marker for the subsequent development of systemic hypertension. Standing hypotension seems to be associated with the subsequent occurrence of hypertension in the older patient, and a standing rise in blood pressure associated with the development of systemic hypertension in the younger patient.

Therapy Based on Standing Blood Pressure

As far as therapy is concerned, to my knowledge there are no data to indicate that treatment of orthostatic hypotension will abort the development of hypertension, nor are there any data to suggest that use of anti-hypertensive agents in normo tensive patients whose pressure rises with standing will prevent the development of hypertension. However, at least in those whose blood pressure rises when standing, one could consider those subjects as potential prehypertensives. Perhaps initiating treatment with an anti-hypertensive drug might prevent the development of hypertension at a later stage. This, of course, is speculation on my part and as far as I can tell, has not been tested. Nonetheless, these patients, if not treated with drugs, should be advised to lose weight and decrease salt in their diet, especially if they have a family history of hypertension. In addition, they should be monitored more closely than those who do not have these blood pressure responses.

References

1. Rose KM, Holme I, Light KC, Sharrett AR, Tyroler HA, et al.: Association between the blood pressure response to a change in posture and the 6-year incidence of hypertension: prospective findings from the ARIC study. *J Human Hypertens*. Nov. 2002; 16(11):771–777
2. Thomas RJ, Liu K, Jacobs, Jr., DR, Bild DE, Kiefe CI, et al.: Positional Change in Blood Pressure and 8-Year Risk of Hypertension: The CARDIA Study. *Mayo Clinic Proc.* 2003;78:951–958

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