Pseudohypertension in the Very Elderly: Important or Not?

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ABSTRACT We clarified the diagnostic and therapeutic challenges associated with pseudohypertension in very elderly patients. Pseudohypertension is diagnosed when cuff blood pressure measurements for both systolic and diastolic blood pressure are significantly higher than direct intra-arterial blood pressure recordings. Pseudohypertension is considered a manifestation of combined intimal and medial arterial calcifications. Non-invasive diagnosis is extremely difficult, but pseudohypertension should be considered in certain groups of very elderly hypertensive patients. Importantly, most of the very elderly patients diagnosed with pseudohypertension present with hypertension, especially isolated systolic hypertension, and this condition should be treated. Treatment must be undertaken cautiously (start low, go slow), with a recommended target blood pressure ≤ 150/80 mmHg. Orthostatism should be measured routinely, both by the patient and the attending physician.

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The treatment of hypertension in the very elderly (arbitrarily defined as people ≥ 80 years of age) is a therapeutic challenge. In 2008, Beckett and colleagues [1] showed that in this age group, medical therapy with a diuretic or angiotensin-converting enzyme (ACE) inhibitors not only achieved blood pressure of ≤ 150/80 mmHg but showed significant reductions in fatal and non-fatal strokes, heart failure, and all-cause mortality rates [1].

However, medications prescribed to this ever-increasing age group can lead to an increased incidence of adverse effects, especially orthostatism, dehydration, acute kidney injury, and electrolyte disturbances. Most very elderly patients have multiple medical co-morbidities in addition to hypertension. In long standing diabetics, patients with Parkinson's disease, and in patients using chronic anticoagulation medications, orthostatism and any subsequent fall can lead to life-threatening complications.

PSEUDOHYPERTENSION MAY GO UNDIAGNOSED IN MANY VERY ELDERLY PATIENTS

The existence of pseudohypertension in the very elderly is real, but it remains a neglected area for management of hypertension in these patients. Pseudohypertension is not new, and it basically refers to a discrepancy between cuff measured blood pressure and direct intra-arterial blood pressure recordings, with higher blood pressure recorded with cuff measurements.

Originally pseudohypertension was thought to be a problem of diastolic blood pressure (DBP) only, with little attention given to systolic blood pressure (SBP) recordings [2,3]. The diagnosis was present when cuff DBP ≥ 100 mmHg, with measured direct intra-arterial blood pressure ≤ 90 mmHg. Currently, however, pseudohypertension is known to cause spurious rises in both DBP and SBP [4]. Thus, Dai et al. [5] showed significantly higher SBP (19 ± 9 mmHg) and DBP (5 ± 7 mmHg) in patients when cuff measurements were compared to direct intra-arterial blood pressure measurements conducted during coronary catheterizations.

The pathophysiology behind pseudohypertension is partial (or at times complete) non-compressibility of the brachial artery. This non-compressibility is caused by the combined presence of classical intimal calcifications, typical of atherosclerosis, and a degenerative process of medial calcifications known as Monckeberg's arteriosclerosis. This non-compressibility also causes higher blood pressure recordings when using a cuff.

Diagnosing pseudohypertension is problematic. Initially, it was thought that the diagnosis was only in elderly patients (a) with chronically uncontrolled resistant hypertension, with polypharmacy being used unsuccessfully in an attempt to control blood pressure; (b) with long-term uncontrolled hypertension but with no overt evidence of end-stage organ damage, no previous history of major cardiovascular events, no evidence of severe hypertensive retinopathy, and no indications of chronic kidney disease or left ventricular hypertrophy; and (c) with marked orthostatism with minimal drug doses [6]. Obviously, any patient with uncontrolled hypertension must have non-compliance to medical therapy ruled out, and this is especially true for very elderly patients with cognitive dysfunction.

Osler's manoeuvre/sign is positive when the radial pulse is palpable but pulseless after cuff blood pressure is raised above the patient's systolic blood pressure in the ipsilateral arm [7]. This condition was first described by Messerli and associates in 1985 [7]. Despite having advocates [8], most regard it as

a physical sign with both a low sensitivity and specificity as far as the diagnosis of pseudohypertension is concerned [9]. Today, with the near-exclusive use in clinical practice of automatic cuff measurements and the inability of the machine to maintain the cuff above the patient's SBP), it is not possible to elicit Osler's sign. The gold standard for the diagnosis is a discrepancy between cuff blood pressure measurements and direct intra-arterial recordings. But direct intra-arterial blood pressure recordings require specialized invasive equipment, and therefore few physicians perform this procedure to arrive at the diagnosis of pseudohypertension. The detection of distal arterial calcifications on an X-ray of the upper limb may help physicians make the diagnosis [6,10].

DIABETICS AND PATIENTS WITH CHRONIC KIDNEY DISEASE MAY BE ESPECIALLY SUSCEPTIBLE TO PSEUDOHYPERTENSION

Recently a high reading of the brachial-ankle pulse wave velocity was seen to have a positive predictive value for pseudohypertension in elderly patients [5,11]. The use of ambulatory 24-hour blood pressure monitoring cannot help in diagnosing pseudohypertension. Paradoxically, 24-hour recordings may be falsely interpreted, not only as uncontrolled hypertension but also as a 24-hour pattern consistent with non-dipping. Both diagnoses lead to even more aggressive therapy.

The prevalence of pseudohypertension in the very elderly varies from a low 5% to a possible 50% [2]. In 2017, Dai et al. [5] detailed that in a select Chinese cohort who underwent coronary angiography, 50% of their patients were found to have pseudohypertension. Furthermore, two subgroups of patients have a significantly increased incidence of the Monckeberg's form of arteriosclerosis and therefore an increased incidence of pseudohypertension. First, diabetics are at high-risk, as are patients with chronic kidney disease [5]. In 1994, Kuriyama et al. [8] described a 65% incidence of pseudohypertension in their chronically hemodialysed atherosclerotic patients.

Pseudohypertension was originally thought to be a benign phenomenon [2], but this is not necessarily so. Pseudohypertension should be regarded as one clinical manifestation of probable widespread calcifications of the arterial tree, with all its possible ensuing cardiovascular complications if left untreated. Furthermore, despite the influence that pseudohypertension has in causing falsely elevated SBP and DBP, most of these very elderly patients will have true isolated systolic hypertension (ISH), and ISH should be treated.

Importantly, treatment of hypertensive very elderly patients must be attempted. Yet too many elderly patients are overtreated inappropriately [12]. Therefore, treatment should be tailored individually to reduce blood pressure ≤ 150/80 mmHg. It should be performed cautiously, with a deliberate slow upward titration of drug dosage as required. Many patients and physicians must provide constant home blood pressure measurements. This practice should be discouraged, as it causes unnecessary anxiety for patients and their family. However, the physician should always rule out orthostatism on a patient's physical examination. If pseudohypertension is a possibility, then medical treatment should be adjusted accordingly, and the patient should be reassured despite high blood pressure measurements. In patients with suspected diastolic pseudohypertension, effort must be made not to reduce DBP to unacceptably low levels, as this situation may impair optimal coronary artery filling, especially in patients with known ischemic heart disease [13].

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The most perfect technique is that which is not noticed at all.
Pablo Casals (1876-1973), Spanish cellist, conductor and composer