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Risk from low blood pressure in frail older adults: diastolic pressure and pulse pressure are important

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Letter to the Editor

Risk from low blood pressure in frail older adults: diastolic pressure and pulse pressure are important

Abstract

Blood pressure measurement with a cuff in patients with stiff arteries can be misleading, with false elevation of the diastolic pressure. Coronary flow, and most of the cerebral blood flow occur during diastole. There is a marked diastolic J curve in patients with diastolic pressure <60 mmHg and pulse pressure >60 mmHg. Aiming for a systolic target of 120 mmHg is not safe in some frail older patients.

Keywords: pulse pressure, J curve, arterial stiffness, diastolic blood pressure, cuff artefact

Masoli et al. [1] reported that low systolic blood pressure was associated with increased risk in frail elderly patients. However, they would probably have seen even higher risk, particularly of stroke, in patients with a wide pulse pressure and a low diastolic pressure. The J curve is probably more pronounced for diastolic pressure, particularly in the elderly.

McEvoy et al. [2] reported from the ARIC trial that a diastolic pressure <60 mmHg with a pulse pressure >60 mmHg (DBP <60/PP >60) doubled subclinical myocardial ischemia, and Park and Ovbiagele [3] reported from the VISP database that such participants had a 5.85-fold increase in the risk of stroke.

Reasons for this include the following:

1. People with a wide pulse pressure have stiff arteries;
2. People with stiff arteries are more likely to have a large cuff artefact (i.e. the true intra-arterial pressure is much lower than the blood pressure measured by a cuff) [4];
3. Virtually all of coronary perfusion [2] (Figure 1) and most of cerebral perfusion [5] occurs during diastole;
4. There is a large pressure gradient in the brain: when the blood pressure in the brachial artery is 117/75 mmHg, it is 113/73 mmHg in the lenticulostriate artery but only 59/39 mmHg in small branches in the posterior parietal subcortex [6].

Thus, an old person with stiff arteries might have a blood pressure of 130/55 by cuff, with an even lower true diastolic pressure, at times below thresholds required to perfuse the heart and brain.

Osler wrote in 1892 about the hard radial artery that was still palpable after inflation of a blood pressure cuff [7]. I first described what I called ‘pseudohypertension’, better called

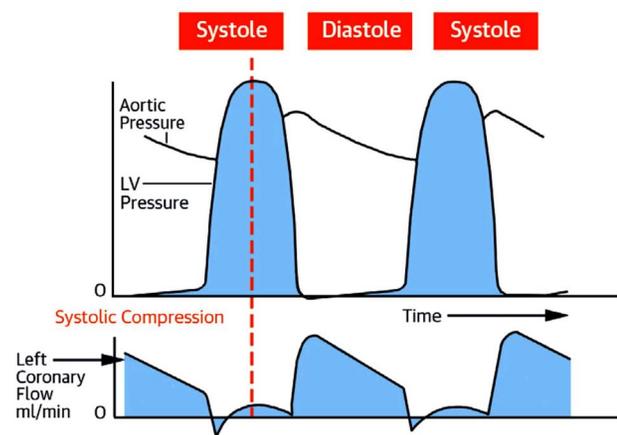


Figure 1. Coronary blood flow occurs mostly during diastole. During contraction of the heart in systole, the pressure in the myocardium is so high that there is virtually no blood flow; thus, perfusion of the myocardium occurs during diastole (Reproduced by permission of Elsevier from McEvoy JW, Chen Y, Rawlings A, Hoogveen RC, Ballantyne CM, Blumenthal RS, et al. Diastolic blood pressure, subclinical myocardial damage, and cardiac events: implications for blood pressure control. *J Am Coll Cardiol* 2016;68(16):1713–22.)

Cuff Artefact, in 1978 [8] (At the time I was focusing on the indication for treatment of hypertension, which in those days was a diastolic pressure >90 mmHg.) Messerli [7] and others commented on the issue in later years, but doctors seem to have forgotten that in old people with stiff arteries, the diastolic pressure measured by cuff may be much higher than the true intra-arterial pressure.

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I hope that Masoli and colleagues will re-analyse their data through this lens.

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