

JAN STEPANEK: Hello, and welcome to this companion content to the article on "Noninvasive Central Vascular Pressures". My name is Jan Stepanek. I am a consultant in the Department of Internal Medicine, division of Preventive Occupational and Aerospace Medicine. And my interest is in cardiovascular health and preventive medicine.

In this context, I wanted to briefly talk in this companion content about the actual clinical measurements of a central vascular pressure recording. As with blood pressure, it is very important to make sure that we record the blood pressure akin to and according to JNC 7 guidelines and avoid things that could interfere with the proper recording of blood pressure.

Things that typically can interfere-- and in our practice is part of the recommendation and the preps we give our patients that are destined to have a central vascular pressure recording-- is the avoidance of vasoactive substances. That would be things like decongestants that are frequently taken by patients over the counter; use of coffee and tea because they have also acute effects on central vascular stiffness and pressures, and hence pressure augmentation; as well as the avoidance of exercise prior to the recording because that would release nitric oxide and would transiently change the vascular stiffness and vascular pressure characteristics, centrally.

As you know, the central vascular pressures is really what we're trying to approximate when we measure brachial pressure. The principle with central vascular pressure recording, as you are going to see in this video, is based on the concept that you can record brachial pressure and at the same time record a pulse pressure curve with a high fidelity strain gauge from the radial artery. And by virtue of applanation of the artery, you get, essentially, a recording of the pulse pressure curve within the vessel with a very good fidelity. These two parameters together with a Fourier transformation allow us to back calculate the pressures at the central compartment.

Now these are truly the pressures against which the heart has to work, and that the [INAUDIBLE] circulation sees, and that the central vascular compartment, including the cerebral vessels see. Hence, it's clinically a very interesting part of the information of blood pressure to get at.

In the following, you'll get the opportunity to see how we actually record blood pressure and the central vascular pressures in one of our patients.

SPEAKER 1: So Mr. Smith, your doctor has ordered a noninvasive blood pressure recording. And we're going to start that sequence with a automatic blood pressure machine. I'm going to put a cuff on your arm, and it will take a series of six blood pressures. And while it's doing that, I'm going to ask you to remain quiet, and not cross your knees or your ankles, and let the machine take its recordings. And I will step out for that time.

I have a couple of questions before I begin that process. And I need your height and your weight.

SPEAKER 2: My height is 172 centimeters.

SPEAKER 1: 172 centimeters?

SPEAKER 2: Or meters. And then 63 kilograms.

SPEAKER 1: 63 kilograms. And have you been fasting today from caffeine products?

SPEAKER 2: Yes.

SPEAKER 1: OK. And are you currently taking any prescription medications?

SPEAKER 2: No, not at all.

SPEAKER 1: OK. All right. With that said then, I will start the blood pressure machine and step out of the room. So if you'll just relax.

SPEAKER 2: OK.

[BEEPING]

SPEAKER 1: OK, so the blood pressure machine is finished. And your blood pressure is 108 over 70. So I'm going to remove the cuff now. And I will ask you to take your watch off.

SPEAKER 2: OK.

SPEAKER 1: [INAUDIBLE] Roll your arm over and I'll be placing the probe-- this probe-- over your radial artery, and getting waveforms. I'll enter your blood pressure into the data.

OK. Now I'll be placing the probe over your artery and we'll be getting a waveform across the screen that will actually be your radial arterial pulse.

JAN STEPANEK: The interpretation of these pressure recordings that we have just obtained is of interest because we can see that on the subject that you just watched being recorded- a young male without being overweight and with favorable peripheral pressures brachially recorded at 110 over 69- his central pressures have come in at being 93 over 70, which means a very favorable aortic systolic pressure and a aortic pulse pressure that is very favorable as well-- 23, with range of normal being 22 through 39.

From the Strong Heart Study, we know that an aortic pulse pressure that exceeds 50 millimeters of mercury is associated with untoward cardiovascular prognosis and outcome. The augmentation pressure in our subject that we have watched being recorded here is also very favorable at zero. And is consistent with a very favorable cardiovascular risk profile and central pressure profile.

The second patient I would like to share with you today is a 71-year-old gentleman, who had peripheral pressures that were in pre-hypertensive range, specifically on this recording at 135 over 77 millimeters of mercury. And had really not had a past history of hypertension or any significant health problems, but he had not seen a physician for quite a few years. And presented for his first general medical examination in quite a while.

The central vascular pressure recording was striking in that his aortic pulse pressure was at 51 millimeters of mercury, which placed him in clearly higher risk range. His augmentation pressure was borderline high normal range. And on further clinical investigation, it became evident that he had a hypertensive response to exercise, abnormal overnight oximetry, suspicious for sleep apnea, and microalbuminuria with glycosuria, and significant high blood sugars consistent with a diagnosis of type 2 diabetes.

Hence, the purple pressures in this subject would be clearly indication for the non pharmacological means of management. But in light of his comorbidities and the high aortic pulse pressure, it makes it necessary to consider pharmacologic therapy, in addition, in order to decrease cardiovascular risk on the multiple levels where the subject is faced with risk. And do that more quickly than one would perceive based on the peripheral pressures of 135 over 77 millimeters of mercury.

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