Surrogate Sonographic Markers of Atherosclerosis

To the Editor:

We read with interest the work of Staub and coworkers for the comparison of internal carotid artery resistive index (RI) with the common carotid artery intima-media thickness in the prediction of cardiovascular morbidity and mortality. The authors suggest the use of Purcelot criteria for the measurement of RI as a predictor of cardiovascular events.1

We should take into account the possible influence of heart rate on RI measurements. Even when arterial blood pressure (ABP) and cardiac output remain constant Mostbeck et al demonstrated a significant decrease in RI with increasing heart rate (HR; HR of 70: RI=0.7±0.06; HR of 120: RI=0.57±0.06; P<0.001).2

In the study of Staub and coworkers we noticed that 7% of the patients included in the study were with pulse measurements of <50 or >90 bpm and 11% of the patients were with atrial fibrillation (AF). We consider that the prevalence of AF together with the majority of male sex and wide range of age are not representative of a typical normal dwelling older adult population.3,4 Moreover, in the article no data concerning RI measurements in the AF subgroup is available together with the median age of the general study populations.

Many errors may arise from using the RI even in normal patients with irregular heart rhythm because the index may vary from 0.62 to 0.42 (>30%).5 Changes in the waveform are clearly attributable to the fluctuating cardiac output in tachycardia, HR and/or ABP. Additionally, it is reported in the first study6 that the trial use of the Mostbeck correction formula for the RI values did not show any change in mean value or correlation, so the formula was not further applied.

There is also a similar score called the Gosling Pulsatility Index, PI (versus-Vd)/Vm, but also in this case the changes in cerebrovascular resistance are easily overshadowed by central cardiovascular factors.5

Because a correction of RI values with ABP and HR seems hardly feasible, we suggest the simpler use of a structural and functional surrogate marker obtained by the sum of RI and common carotid artery intima-media thickness. This will minimize the fluctuations attributable to transient systemic cardio-vascular abnormalities offering a reliable tool in daily clinical practice.

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