Increased Intervisit Blood Pressure Variability and ^{2}-Blockade: Measurement Imprecision Related to Bradycardia?

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Letter to the Editor

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To the Editor:

In their editorial commentary, Dolan and O'Brien[1] reviewed and provided clinical perspective to the series of articles last March in which Rothwell and colleagues[2,3] established a clear link between long-term blood pressure variability and hypertension-related outcome. The conceptual introduction of intervisit variability in blood pressure consolidated previous findings based on intra-arterial and noninvasive 24-hour ambulatory measurements.[4] Additional observations will help shape the ripening assimilation to management guidelines. In this regard, Webb et al,[3] as well as Rothwell et al[2] have suggested a medication-class effect on blood pressure variability, which might mediate outcome differences. As highlighted in the editorial,[1] assignment to β-adrenergic blockade–based treatment was associated with increased intervisit variability and worse outcome.[2] Although a direct effect of a drug on cardiovascular reactivity is plausible, it is somewhat in contrary to the strong link between the mean blood pressure and its variance.[5] We suggest an alternative explanation for the association of β-blockers with intervisit variability. Determination of blood pressure relies on detection of Korotkoff sounds (by auscultation) or the pulse wave oscillations (by oscillatory devices). Bradycardia can decrease the precision of these determinations; namely, it can increase the scatter around the true level of blood pressure, because the observer (listener or device) is awaiting the next Korotkoff sound or pulse wave, while deflating the cuff at constant rate. Indeed, in our ambulatory blood pressure measurement data set of referred patients,[5] we found a connection between increased awake blood pressure variability and slow heart rate, both measured by the automated ambulatory blood pressure measurement device (Figure). Thus, we speculate that bradycardia induced by β-blockers mediates lack of diagnostic precision, which might have impact on outcome rather than true increase in blood pressure variability. The differential effects of angiotensin antagonists and calcium channel blockers on heart rate might follow the same rationale. In future studies, it would be interesting to explore the degree to which drug effects on variability withstand adjustment for heart rate.

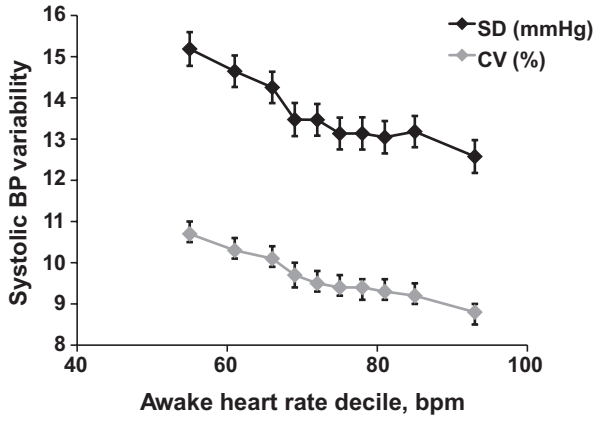

Figure. Patients (n=4690) referred to ambulatory blood pressure monitoring were split to deciles according to awake heart rate, and median heart rate at each decile was plotted against awake systolic blood pressure variability, expressed as either the SD from the mean (black) or the coefficient of variation (gray).

Disclosures

None.

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Response to Increased Intervisit Blood Pressure Variability and ²-Blockade: Measurement Imprecision Related to Bradycardia?

Eamon Dolan and Eoin O'Brien

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Response to Increased Intervisit Blood Pressure Variability and β-Blockade: Measurement Imprecision Related to Bradycardia?

We welcome the letter from Ben-Dov and Bursztyn[1] and agree that further studies are required to confirm the influence of medium-term blood pressure variability (BPV) on outcome and to elucidate the underlying pathogenetic mechanisms. However, we must take issue with the alternative explanation put forward for the association of β-blockers with intervisit BPV.

First, in support of the theory that β-blocker–induced bradycardia can decrease the precision of blood pressure measurement, ambulatory data from a cohort are presented in which subjects with the slowest heart rate had greatest BPV. This association is hardly surprising, but to postulate that it can be explained by measurement inaccuracy with validated automated devices such as those used in the Anglo-Scandinavian Cardiac Outcomes Trial is simply not sustainable.[2]

The authors then speculate that the theoretical measurement induced by bradycardia accounts for the negative outcome associated with medium-term variability. However, this is refuted in the analysis by Rothwell et al,[3] which confirmed that the prognostic value of visit-to-visit systolic BPV was independent of mean heart rate and heart rate variability in the Anglo-Scandinavian Cardiac Outcomes Trial. Furthermore, the Ohasama group showed that both increased visit-to-visit mean heart rate and heart rate variability were complementary to the prognostic benefit of increased medium-term BPV in a community-dwelling cohort.[4]

Disclosures

None.

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