

Instantaneous Time-Courses of Baroreflex Sensitivity, Sympathetic and Vagal Activities in Response to Valsalva Maneuver

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The Valsalva maneuver (VM) effects on RR intervals (RR), systolic (SBP), and diastolic (DBP) blood pressure time series have been extensively characterized, unlike the VM effects on the time-courses of autonomic spectral indexes and baroreceptor sensitivity (BRS), for which no studies were identified. Thus, because of the physiological and clinical relevance of BRS and VM, we assessed, in 59 valid recordings of healthy young volunteers, the effects provoked by VM (40mmHg for 20s) on the 140-s-instantaneous time-courses of the low-frequency components of RR (LF_{RR}), SBP (LF_{SBP}), DBP (LF_{DBP}), the high-frequency component of RR (HF_{RR}), estimated by a time-frequency distribution, BRS computed by alpha index ($\sqrt{LF_{RR}/LF_{SBP}}$) and its coherence (BRS_{CO}) obtained by cross-time frequency analysis. Ensemble averages of BRS, LF_{RR} , LF_{SBP} , LF_{DBP} , and HF_{RR} dynamics showed similar response patterns in each phase of VM, relative to baseline: decreased in early phase II (II_e), LF_{SBP} , and LF_{DBP} after an initial increment; raised progressively in late phase II (II_L), except HF_{RR} which remained reduced and recovered at the end; peaked in phase IV, LF_{RR} and LF_{SBP} in the early part, and BRS and HF_{RR} in the late part. Mean phase-IV-to-phase- II_L ratios (IV/ II_L) of BRS, LF_{RR} , LF_{SBP} , HF_{RR} , and RR (Valsalva ratio), ranged from 1.4 ± 0.2 to 7.0 ± 2.1 . The table shows the means of BRS and BRS_{CO} in VM phases, and the BRS IV/ II_L ratio. Our findings support that: while the moderate effects of SBP increment and RR reduction in phase II_L are associated with moderate effects of BRS and vagal activity reductions and sympathetic activity increment, in phase IV the large SBP and RR increments are associated with large peaks of BRS, sympathetic and vagal activities. The similarity between the IV/ II_L ratios of BRS and spectral autonomic indexes, suggests that BRS changes possibly drive their patterned response to VM, including the Valsalva ratio.

Table. Mean \pm SD of BRS and BRS_{CO} in phases II_e , II_L , IV and IV/ II_L ratio. N=59.

	Control	Phase II_e	Phase II_L	Phase IV	IV/ II_L ratio
BRS (ms/mmHg)	9.9 \pm 2.4	2.5 \pm 1.0*	3.4 \pm 1.0*	20.5 \pm 5.8*	5.7 \pm 2.1
BRS_{CO}	0.84 \pm 0.07	0.79 \pm 0.16	0.78 \pm 0.14	0.69 \pm 0.10	--

*p<0.001 vs. Control