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ORIGINAL ARTICLE

Evaluation of carotid wave intensity in firefighters following firefighting

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Abstract Sudden cardiac events are the leading cause of line-of-duty firefighter deaths, but little information exists elucidating the physiologic responses. Wave intensity (WI) is a new hemodynamic index that provides information about the dynamic behavior of the heart and the vascular system and their interaction. The larger first peak wave (W1) occurs during early systole and is associated with cardiac contractility. The second smaller peak (W2) follows a period of relatively little net wave (NA) production and may be caused by reflected waves from the brain. This study aimed at determining arterial WI changes in response to live firefighting activities. We examined the WI of 39 firefighters (2 females) with a mean age of 28 ± 1 years and BMI of 26.6 ± 0.7 kg m^{-2} at rest, and immediately after 3 h of live firefighting drills. WI was assessed on the right common carotid artery using an Aloka high-resolution ultrasound. The magnitude of the W1 decreased significantly from 15,925 ± 1,341 to 11,540 ± 886 mmHg m s^{-3}, $p < 0.05$. The magnitude of W2 remained unchanged (W2: from 2,080 ± 200 to 2,144 ± 358 mmHg m s^{-3}). Net NA decreased from 53 ± 5 to 40 ± 4 mmHg m s^{-2}. In conclusions, our data suggest that left ventricular function and arterial-ventricular coupling decreased following live firefighting, and this may be related to the documented increase in risk of clinical events during and after firefighting activities.

Keywords Firefighting · Carotid wave intensity · Arterial-ventricular coupling

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