Vascular filling is a common procedure to restore cardiac output (CO) in critically ill patients. Total stressed blood volume (SBV) is defined as the total pressure-generating blood volume. SBV has been associated with success or failure of vascular filling therapy. Current methods to determine SBV involve repeated phases of circulatory arrests followed by fluid infusion, which is time-consuming and can be harmful. In this work, a model-based method is developed to track SBV during vascular filling experiments.

Vascular filling experiments (successive infusions of saline solution) were performed on 6 pigs:
- pigs 1 and 2 received 500 ml infusions
- pigs 3 to 6 received 225 ml infusions.

Left ventricular, aortic, and vena cava pressures and left ventricular volume were recorded before and after each infusion. The parameters of a 3-chamber cardiovascular system model were adjusted to fit the data.

The SBV value is associated with the change in CO after each 500/225 ml fluid infusion, as previously noticed.

SBV is associated with the change in CO following fluid infusion. The response curves are subject-specific.


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