

“This work aims to study different features of the heart sound through a precordial Doppler, that may provide useful information on VAE episodes” Tedim et al (2014).

Reference:

Tedim, A., Amorim, P. and Castro, A. (2014) Development of a system for the automatic detection of air embolism using a precordial Doppler. Conference proceedings : ... Annual International Conference of the IEEE Engineering in Medicine and Biology Society. 2306-9.

Automatic detection of air embolism using a precordial Doppler [#ivteam](http://ctt.ec/2h4xt+@ivteam)

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Abstract:

Venous air embolism (VAE) is the air bubble accumulation in the right side of the heart. Changes in Doppler heart sound (DHS) are characteristic of VAE, and the anesthesiologist has to pay attention to this event continuously, which may not always be possible. This work aims to study different features of the heart sound through a precordial Doppler, that may provide useful information on VAE episodes. A clinical protocol was designed, and DHS was collected at baseline and following infusions of saline with 4 distinct volumes (1ml, 5ml, 8ml and 10ml), and two infusion rates (slow and fast), given by central and peripheric catheters. Signal was pre-processed, the envelope of each signal was extracted, and five features were implemented and evaluated: frequency corresponding to 95% of Welch periodogram power (f95), frequency corresponding to 50% of Welch periodogram power (f50), frequency corresponding to maximum power spectral density (fm), entropy (E), and frequency corresponding to maximum energy of a wavelet transform (freqwav). Relation between extracted features and saline infusions were studied and compared to baseline values. A Graphical User Interface (GUI) with a database of Doppler heart sounds and annotations was also developed. Although features present a high variability between patients, E presents a better performance showing an increase in response to saline injections (in 75% injections), followed by f95 (62%), fm (56.3%), freqwav (37.5%) and f50 (0%).

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