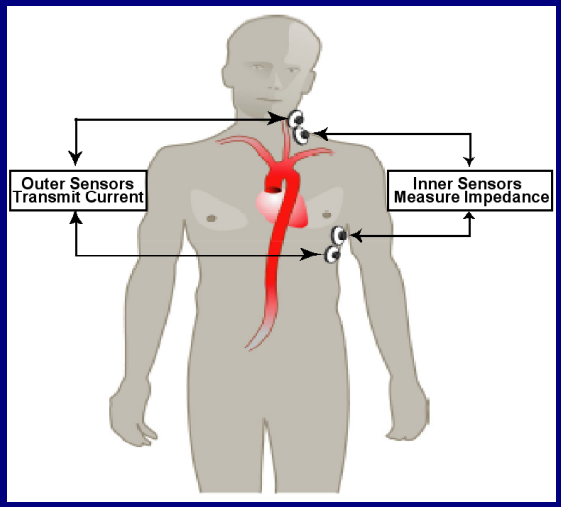
EVALUATION OF ELECTRICAL VELOCIMETRY TO DETERMINE CARDIAC OUTPUT AFTER CARDIAC SURGERY

Meissner, Andreas[1]; Korsmeier, Peter[1]; Van Aken, Hugo K[1]; Etz, Christian[2]; Schmidt, Christoph[1]

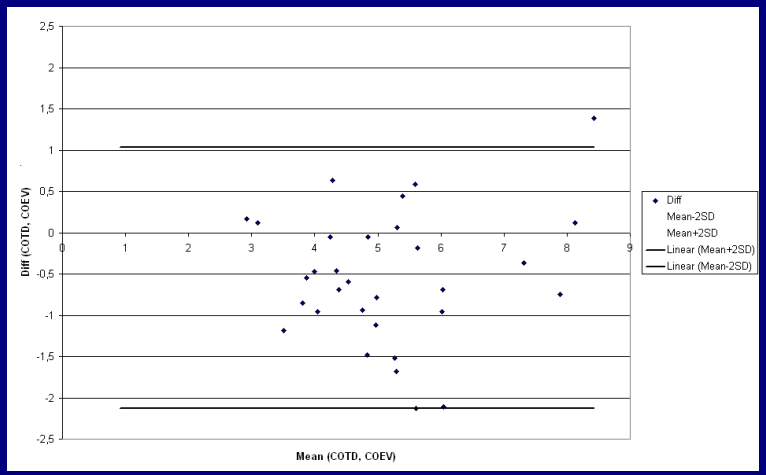
1 Klinik und Poliklinik für Anästhesiologie und operative Intensivmedizin, Universitätsklinikum Münster, Germany.
2. Klinik und Poliklinik für Thorax-, Herz- und Gefässchirurgie, Universitätsklinikum Münster, Germany.



Introduction : The development of a non-invasive procedure to determine cardiac output without the risks of invasive techniques is still a major issue. Electrical Velocimetry is a new method for the determination of cardiac output and stroke volume by the non-invasive measurement. According to the theory, erythrocytes change their random orientation in the descending aorta during diastole to an alignment during systole, resulting in a change of the electrical conductivity of blood.

Hypothesis : The scope of this trial was to determine the correlation between Thermodilution cardiac output (TDCO) and Electrical Velocimetry (EVCO) in patients after the first 24 hours after cardiac surgery. This group of patients was chosen as these patients have been shown to have the lowest correlation with bioelectrical methods.

Methods : After approval of the institutions ethical committee, standard ECG surface electrodes were utilized for noninvasive measurement of thoracic electrical conductivity (Aesculon). SV and CO by EV was determined according to the Bernstein-Osypka equation. Thermodilution values were obtained at the same time with a Hellige-Marquette-system. Bland-Altman analysis was used to assess accuracy.



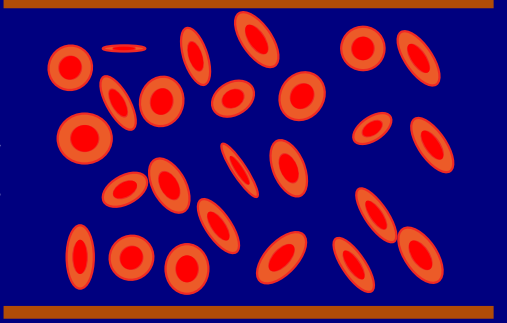
Results : 31 patients aged between 45 and 81 years (10 female/21 male) were included in this study. Cardiac output ranged between 2.9 and 9 l/min (Electrical Velocimetry) and 2.8 and 8.3 l/min (Thermodilution). The bias between EVCO and TDCO was -0.55 l/min with a precision of 0.79 l/min

Conclusions: Cardiac output determined by Electrical Velocimetry correlates well with Thermodilution values. The method incorporated into the Aesculon monitor might be an alternative to invasive monitoring of intensive care patients. This has already been shown by the comparison of cardiac output determined by transesophageal echocardiography and EVCO (1).

1.) C. Schmidt, H. Van Aken, A. Meissner et al: British J Anaesth (2005): 95; 603-10

Conductivity: orientation of erythrocytes

Diastole



Systole