

Usama Mohamed Bensaad
Dr. med.

Evaluation of accuracy measurement of cardiac index, stroke index and left ventricular stroke work index with a new thoracic electrical bioimpedance instruments in comparison to thermodilution method in post-cardiosurgical patients.

Date of birth: 28.11.1964 in Tripoli-Libya

QUALIFICATIONS:

1. MBBCh July.1989 Faculty of Medicine Alfatah University for Medical Sciences.
2. German specialist qualification: [FACHARZT] in anaesthesiology 11.jun.2001.
3. German specialist qualification: [FACHARZT] in intensive care medicine 16.01.2003.

Internship rotation from 15.07.1989 to 14.07.1990.

Tutor: Prof. Dr. med. J. Motsch
Subject: Anaesthesiology

In a prospective study, we compared two hemodynamic measurement methods, an invasive method i.e the thermodilution method with the need of pulmonary catheter insertion and a noninvasive method i.e the thoracic electrical bioimpedance method without the need of pulmonary catheter insertion in Patients after cardiac surgery with cardiopulmonary bypass.

Cardiac output, stroke index, and left ventricular stroke work index was measured simultaneously at four differentiated time points in both methods in 29 patients after open cardiac surgery operations with cardiopulmonary bypass (CPB).

The four time points of measurement were performed as follows; Time 1 within 1 hour of the ICU admission, Time 2 just prior to extubation, Time 3 just after extubation, and Time 4 few hours after extubation.

There was a very poor agreement of C.I, SI, and LVSWI means of both methods. The TEB method has recorded nonrealistic values in the mean cardiac index measurements, which decreases its reliability for measuring and managing patient's hemodynamic abnormalities.

According to the observations in our study bias was mostly in a satisfactory range of values, but precision represented meaningful clinical differences. We can report that, when cardiac and stroke indices increase and left ventricular stroke work index decrease, this leads to an underestimation of the TEB and overestimation of the TD precisions.

The influence of some parameters such as, weight, height, age, heart rate, hemoglobin, central venous pressure, temperature, potassium, pulmonary capillary wedge pressure, and hematocrit were studied on the bias of the cardiac index, and they showed no influence on the standard error (bias), except in:

- (a) Age, i.e the older the age the larger the overestimation by the the TEB method.
- (b) Heart rate, i.e the higher the heart rate the greater the underestimation by the TEB method.
- (c) Hemoglobin, i.e the higher the hemoglobin level the greater the overestimation by the TEB method.

Our results demonstrate a very poor agreement of thoracic electrical bioimpedance and thermodilution cardiac output measurements. Measurement of CI, SI, and LVSWI using thoracic electrical bioimpedance is not a reliable method to guide inotropic and fluid therapy after cardiac surgery. Therefore invasive thermodilution CO measurements are still to be recommended in cardiac surgery patients.