

Evaluation of the Effectiveness of In-hospital Treatment of Chronic Heart Failure Patients During Exacerbation by Non-Invasive Net Lung Impedance Monitoring During Admission

Michael Shochat, Avraham Shotan, Mark Kazatsker, Aya Asif, Iris Dahan, Ilia Shochat, Lubov Vasilenko, Yaniv Levy, Elena Noyman, Tatiana Sigalov, Aaron Frimerman, David Blondheim, Simcha Meisel
Cardiology, Hillel Yaffe Medical Center, Israel

Background:

Prevention of hospitalization for de-compensation chronic heart failure (CHF) patients is an unresolved issue. The accuracy of implantable and non-invasive devices in predicting deterioration before hospitalization is only 50%.

Aim:

Evaluate the ability of a new non-invasive method for lung impedance monitoring to predict CHF de-compensation.

Methods:

CHF patients were monitored by a device that derives the net lung impedance (LI) from measured trans-thoracic impedance. This device is 25-fold more sensitive than existing ones. A decreasing LI reflects accumulation of lung fluid. Changes in the clinical status of patients and LI were recorded monthly. The optimal LI was calculated for each patient. LI changes from this value are represented as percentage change.

Results:

200 CHF patients (67±11 years-old, male- 85%, LVEF- 26±9%) at NYHA II/III/IV (77/90/33) were recruited after index hospitalization for acute heart failure (AHF) and followed in an outpatient clinic for 26±22 months. Initial NT-proBNP level was 3771±5185 pg/ml. Patients were treated according to guidelines. During follow-up, 48 patients (24%) died of AHF. Of study patients, 106 were not hospitalized while 94 required 326 re-hospitalizations for AHF.

At hospital admission for AHF, LI was -36.8±10.5% from optimal LI. During hospital stay (4.3±5.1 days) LI increased to -30.4±12.5%. Study patients were divided by LI %change into groups. A: 0<DLI< 5%; B: 5 <DLI < 10%; C: 10 <DLI < 20% and D:DLI > 20%. During the first month after hospitalization, re-hospitalization was required in 62.5% (100/160) of group A, in 16% (16/100) of group B, in 7.4% (4/54) of group C and 0% (0/12) of group D (p<0.001).

Conclusions:

Noninvasive LI monitoring may be used to evaluate effectiveness of therapy in hospitalized decompensated CHF patients. Small (less 5%) improvement in LI during hospitalization is a very strong predictor for re-hospitalization during next month.