Bioimpedance Analysis As A Screening Tool In Heart-Transplanted Patients

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Introduction: Meticulous management is crucial after heart transplantation. We evaluated the role of non-invasive bioimpedance analysis (BIA) as a screening tool for post-heart transplantation events.

Methods: From December 2019 to July 2022, patients who underwent heart transplantation and performed BIA after 1 month were retrospectively enrolled. Extra-cellular water ratio (ECWr = extra-cellular water ratio * 10) and standard deviation(SD) were evaluated by the BIA. Primary outcome was a composite of treated rejection, heart failure events, and acute renal failure. Patients were grouped according to the presence of the primary outcome(event + group vs. event group). The relationship of ECWr, SD, NT-proBNP, and the primary outcome was evaluated.

Results: A total of 50 heart transplant patients were enrolled. Of these, 18 were classified as event + group and 32 as event group. Simultaneous measurement of ECWr and NT-proBNP were modestly but significantly correlated (r=0.477, p<0.001). The best cut-off value according to the ROC curve was 3909.7 (AUC 0.788, p=0.001) for ECWr, 38.7 (AUC 0.686, p=0.031) for SD, and 559.5 (AUC 0.717, p=0.012) for NT-proBNP. Event + group showed significantly higher ECWr (3887.4±75.5 vs 3980.3±117.2, p=0.001), SD (45.2±24.6 vs 68.6±49.2, p=0.029), and NT-proBNP (340.1±323.1 vs 701.3±655.4, p=0.012). Combination of ECWr and SD (ECWr-SD score, 0: ECWr < 3909.7 and SD < 38.7; 1: either one satisfied ECWr 3909.7 or SD 38.7; 2: both ECWr 3909.7 and SD 38.7) showed highest value (AUC 0.863, p<0.001,). In multivariate analysis, high ECWr-SD score (HR 12.391, p<0.001), high NT-proBNP (HR 4.938, p=0.031) were independent predictors for the primary outcome. Kaplan-Meier survival curve showed well discrimination of event according to the ECWr-SD score (p<0.001).

Conclusion: Increased ECWr with SD by BIA was significantly associated with post-transplantation events. Optimal cut-off value needs to be further validated in the future prospective trials with varied patient population.