Correlation of Bioimpedance Spectroscopy with Risk Factors for the Development of Breast Cancer Related Lymphedema

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BACKGROUND:
We reviewed our institution’s experience performing serial L-Dex measurements to quantify the relationship between changes in these scores over time based upon a patient’s clinical risk for developing breast cancer related lymphedema (BCRL).

METHODS:
From April 2010 through November 2016, 505 patients were prospectively evaluated with bioimpedance spectroscopy (BIS) in a structured BCRL surveillance protocol. Patients received pre and post-operative L-Dex measurements at regular intervals and were categorized based upon the use of sentinel lymph node biopsy (SLNB), axillary lymph node dissection (ALND), taxanes, regional nodal irradiation (RNI), having an elevated body mass index (BMI) or various combinations of risk features. Differences in changes in L-Dex scores (magnitude and time) based upon high-risk features were analyzed.

RESULTS:
The change in L-Dex was associated with the type and number of risk factors. Both ALND and RNI were associated with a greater change in L-Dex (p < 0.001). The median, maximal change in L-Dex for patients treated with ALND/RNI/Taxane was 16.7 versus 5.2 for ALND alone and 3.7 for SLNB alone (p = 0.016). The effects of risk factors were additive. In a multiple linear regression model using all four risk factors to predict the maximal change in L-Dex, ALND and RNI still remained significantly associated with greater maximum change (p < 0.05). The time required to reach the maximal change in L-Dex was also shorter in patients treated with ALND or RNI. (the time for 25% of patients achieving an L-Dex ≥7 was 4.3 months for ALND/RNI/Taxane patients versus 30.8 months for SLNB alone patients).

CONCLUSIONS:
Risk factors for the development of BCRL were associated with both the magnitude of change in L-Dex scores and the time to reach maximal changes. These findings demonstrate the utility of serial L-Dex measurements in providing an objective assessment of a patient’s lymphedema status and the value of L-Dex serial measurements to assist in monitoring patients for the development of BCRL.