Segmental-Body Bioimpedance Measurement for Lymphedema Diagnosis – Is it Superior than Whole-Body Bioimpedance Measurement?

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Background

Lymphedema is an interplay of both pathologic edema and solid tissue deposition. Accurate diagnosis of the presence and the quantification of both disease components are helpful in targeted surgical intervention. Bioimpedance spectroscopy (BIS) technology has been utilized for lymphedema diagnosis and has shown promise in edema quantification. The most commonly used BIS modality is whole-body bioimpedance measurement (WBBM). Segmental-body bioimpedance measurement (SBBM) was developed to separately assess all four extremities and the trunk. In this study we describe our experience with SBBM and compare it to the conventional WBBM.

Method

15 consecutive patients with extremity lymphedema treated at the University of Iowa Center for Lymphedema Research and Reconstruction in May to June 2017 were recruited into the study. All patients underwent WBBM as well as SBBM. Following parameters were assessed – presence/absence, quantity, and laterality of edema. For SBBM all of the above parameters were assessed in each extremity and the trunk. All patients had their lymphedema diagnosis confirmed with indocyanine green lymphography.

Results

SBBM correctly diagnosed lymphedema in all 15 patients (100%) while WBBM results were inconclusive in 5 patients (33%) who had bilateral disease. Furthermore, SBBM allowed determination of the relative disease severity in bilateral diseases and quantify the differential extents of edema. In comparison, WBBM provided a manipulated number which derived from comparison of the abnormal to the normal extremity. SBBM also provided absolute quantity of edema reduction following surgical treatment (lymphaticovenular anastomosis) while WBBM only indicated a trend towards normal. Medical staff reported SBBM being easier to perform, and all patients reported the SBBM measurement experience being more favorable.

Conclusion

While both WBBM and SBBM provide diagnostic information on lymphedema, SBBM is notably easier to perform, providing more information about the disease state, and allowing assessment of treatment efficacy. As a result of this study, our center had converted to universal SBBM measurement.