BIOPHYSICAL PARAMETERS AS POTENTIAL INDICATORS OF PRE-CLINICAL LYMPHEDEMA

Purpose: Our goal was to evaluate different quantitative measures for their potential utility in detecting sub-clinical or latent lymphedema in women treated for breast cancer (BC).

Methods: In 60 women with BC, arm volume and electrical conductance (BIOG) and local skin tissue water (LTW) of forearm, biceps, axilla and lateral thorax were measured bilaterally prior to their surgery. LTW was based on the 300 MHz tissue dielectric constant to a 2.5 mm depth. Each parameter’s cancer affected-to-control side ratio (A/C) was determined and the standard deviations (SD) in A/C used to set tentative lymphedema thresholds. As of now, 33 women have been tracked from a pre-surgery visit (V0) to visits V1 and V2 that were 3.2±0.9 and 6.8±1.9 months post surgery.

Results: Prior to surgery (N=60), there was no statistical difference between affected and control sides for any parameter. Pre-surgery A/C ratios (mean±SD) were for volume 0.990±0.050, for BIOG 0.998±0.051 and for LTW at forearm, biceps, axilla and thorax 1.010±0.097, 0.989±0.085, 1.030±0.203 and 1.010±0.117 respectively. For women tracked from V0 to V2 (N=33), the thorax LTW A/C ratio at V2 was significantly greater than at V0 (p<0.01) whereas neither the BIOG ratio nor LTW ratios at other sites were significantly greater than at V0. Tests of a tentative detection threshold, equal to the pre-surgery mean A/C ratio + 3SD, indicated that by V2 the thorax LTW A/C ratio exceeded the threshold in 15.2% of patients. Contrastingly, by V2, 9.1% of patients exceeded the arm volume threshold and only 3% exceeded the BIOG threshold.

Conclusions: These preliminary findings suggest the possibility that monitoring of thorax or truncal LTW may provide a useful early indicator of pre-clinical or incipient lymphedema in at-risk persons.