LOCAL SKIN COOLING AS AN AID TO THE MANAGEMENT OF PATIENTS WITH BREAST CANCER RELATED LYMPHEDEMA AND FIBROSIS OF THE ARM
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Background/Purpose: There is an ongoing need for new treatment techniques to aid lymphedema and fibrosis management of the arm for breast cancer patients living with secondary lymphedema and resulting fibrosis. Our goal was to assess local skin cooling (LSC) as an adjunctive modality to current standards of lymphedema care.

Methods: Women with arm lymphedema judged to be fibrotic had bilateral skin measurements prior to LSC with measurements on affected sides after cooling and after an MLD session. Measures included tissue dielectric constant (TDC) as an index of tissue water and tissue hardness based on the force in Newtons (N) needed to indent tissue 1.3 mm (F1) and 4 mm (F4). Limb girth and skin temperature (SKT) were also measured. Cooling was done by draping affected sites in washcloths immersed and wrung out in cold water. This was repeated 3-4 times to get a SKT decrease of near 10°C. TDC and F1 were measured in all (N =16) with F4 measured in 9 patients. Measured sites were varied with evaluations at 1-4 visits yielding 48 separate F1 values and 23 separate F4 values.

Results: Pre-cooled girths, F1, F4, TDC AND %H2O (mean ± SD) were significantly (p< 0.001) greater on affected vs. contralateral arms. Values were for girth: 28.5 ± 4.0 vs. 23.9 ± 3.8 cm, for F1: 0.11 ± 0.06 vs. 0.06 ± 0.03 N, for F4: 4.67 ± 1.48 vs. 2.50 ± 0.54 N, and for TDC: 63.1 ± 14.8 vs. 34.7 ± 6.5. Pre-cool SKT was bilaterally similar at 31.8 ± 2.5 vs. 31.6 ± 2.7 °C. Post-cooled SKT of affected arms was reduced to 23.7 ± 2.2°C (p<0.001). F1 was reduced to 0.08 ± 0.03 N (p<0.001) and F4 to 3.83 ± 1.5 N (p<0.001). Cooling-related reductions in F1 and F4 were 21.8 ± 21.2% and 19.0 ± 8.6%. Cooling caused a slight TDC increase to 66.0 ± 15.4 (p<0.01) but no change in %skin water (82.6 ± 19.5% vs. 83.8 ± 19.8%). F1 and F4 stayed reduced after MLD being 0.08 ± 0.04 N and 3.54 ± 1.67 N.

Conclusions: Skin cooling reduces tissue hardness and thereby facilitates therapy effectiveness. The quantified hardness reduction of fibrotic areas on the arm is consistent with the palpated impression of softening of the tissue and to patient subjective feed-back that the feeling of pressure and aching diminish post cooling. Further study is needed to determine the optimum role of cooling as an adjunctive treatment in the management and prevention of chronic arm lymphedema and fibrosis.