

Transcutaneous Oxygen in Arms of Women with Unilateral Postmastectomy Lymphedema before and after Complete Decongestive Physiotherapy

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BACKGROUND and PURPOSE

- Previous reports suggest that skin blood flow is reduced in arms of women with lymphedema due to breast cancer treatment.
- Since tissue oxygenation depends on blood flow, we sought to determine if tissue oxygen tension ($TcPO_2$) is also reduced and if so, if therapy that reduces edema and tissue hardness has a beneficial effect.

METHODS

- Transcutaneous oxygen tension ($TcPO_2$) was measured on fibrotic tissue areas of 15 breast cancer survivors who had unilateral arm lymphedema.
- Measurements were done on affected and control arms with arms down and with arms raised.
- Measurements were done prior to starting CDP therapy and at the end of the treatment sequence

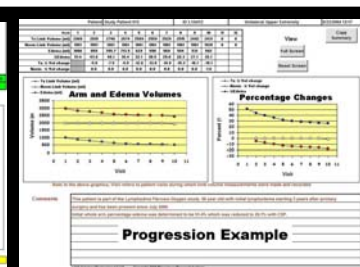
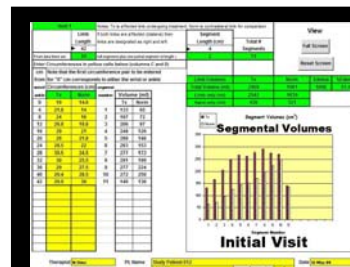
ABSTRACT: Reports suggest that skin blood flow is reduced in arms of women with lymphedema due to breast cancer treatment. Since tissue oxygenation depends on blood flow, we sought to determine if transcutaneous oxygen tension ($TcPO_2$) is also reduced and if so, if therapy that reduces edema also improves oxygenation. $TcPO_2$ was measured in fibrotic areas of edematous arms and in non-affected arms of 15 women with unilateral arm lymphedema before and after CDP therapy. Fibrosis was assessed by indentation recovery times (IRT) after applying an indenter-like device. Arm volumes and edema percentages were determined from circumferences using automated software calculations. Treatment significantly ($p < 0.01$) reduced arm edema (mean \pm SD) from $28.6 \pm 22.9\%$ to $18.1 \pm 17.7\%$ and fibrotic segment edema from $42.6 \pm 30.1\%$ to $25.0 \pm 20.4\%$ and softened fibrotic tissue judged by reductions in IRT (88.7 ± 60.7 sec vs. 23.1 ± 38.8 sec, $p < 0.001$). Surprisingly, $TcPO_2$ did not differ between arms initially and was unchanged by treatment, being 60.1 ± 8.8 mmHg at the start and 61.8 ± 9.2 mmHg after treatment. Thus, despite significant amounts of initial edema, $TcPO_2$ was not less in edematous arms nor was it changed by therapy that decreased edema. These findings suggest that for resting conditions, blood perfusion is adequate to prevent significant tissue oxygenation deficits.

Transcutaneous Oxygen and Tissue Properties

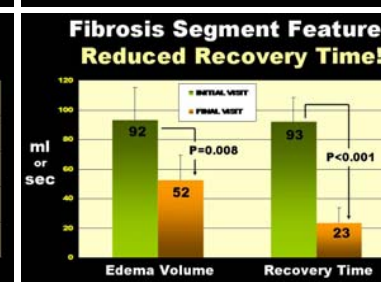
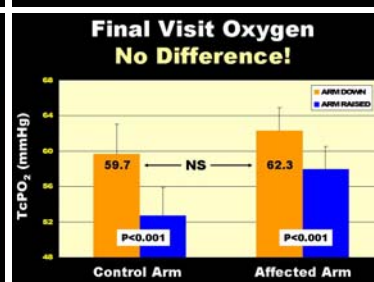
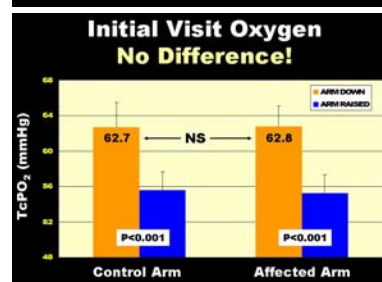
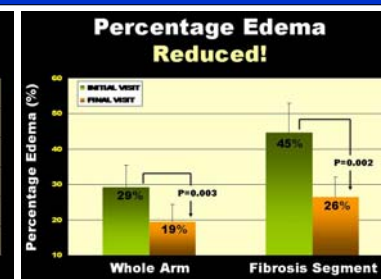
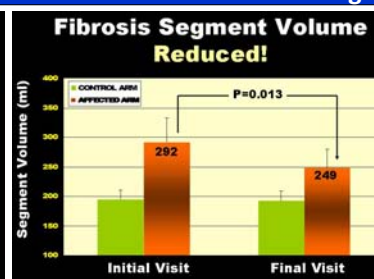
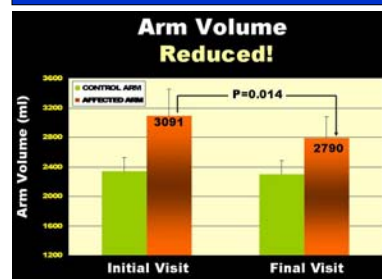


ARM VOLUME DETERMINATIONS

- Volumes of whole arm and target fibrotic segments were determined by software (LVP3.0)* that automatically calculated volume and edema percentages from measured girths.
- Measurements were made before and after standard CDP therapy sequences. *www.limbvolumes.org



Main Research Findings



Summary and Conclusions

In this study of a small group of post-mastectomy patients, treatment of the affected arm significantly reduced total arm and fibrotic segment edema and softened fibrotic tissue.

However, despite significant amounts of initial edema of the affected arm, its $TcPO_2$ value was not initially less than in the non-affected contralateral arm nor was the affected arm's $TcPO_2$ value changed by therapy.

These findings suggest that for resting conditions, blood perfusion is adequate to prevent significant tissue oxygen deficits within the edema territory as determined by the present measures.