INTRODUCTION

BACKGROUND

If arm lymphedema occurs after mastectomy and related cancer treatment, it often develops gradually, and if untreated tends to worsen¹. There is now compelling evidence that complete decongestive therapy (CDT) or alternatively, complex physical therapy (CPT), is highly effective in reducing lymphedema and in reversing its potentially progressive course in many patients²⁻⁴.

Although the details of application vary somewhat, the four principle components are skin care, lymph drainage ia manual massage, compression and exercise, with emphasis on prevention.

One physiological aspect of properly applied massage is its promotion of lymphatic drainage by the expansion of collateral lymphatic channels that connect to normally functioning lymphatic collectors. This then provides useful alternative lymphatic pathways to accommodate drainage of excess lymph that is blocked from its normal routes.

It was reasoned that if a simple method were available to facilitate collateral lymphatic enlargement then it might initially augment CPT outcomes and possibly provide patients with a longer-term continuous therapy option. Since a few reports⁵⁻⁶ have described good adjunctive results using microwave treatments, it was reasoned that an alternate form of electromagnetic therapy might also be effective. Because previous work⁷⁻⁸ showed that lowenergy pulsed radio-frequency therapy at 27.12 MHz increased skin blood flow, likely due to enlargement of vascular channels, it was hypothesized that this approach might also serve to similarly affect lymphatic channels. We therefore sought to determine if such short-wave diathermy might also have a positive impact on ymphedema reduction. Because this form of therapy has not been previously reported, the present research effort was exploratory, with its main goal to determine if such

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reatments alone would provide evidence

of potential efficacy.

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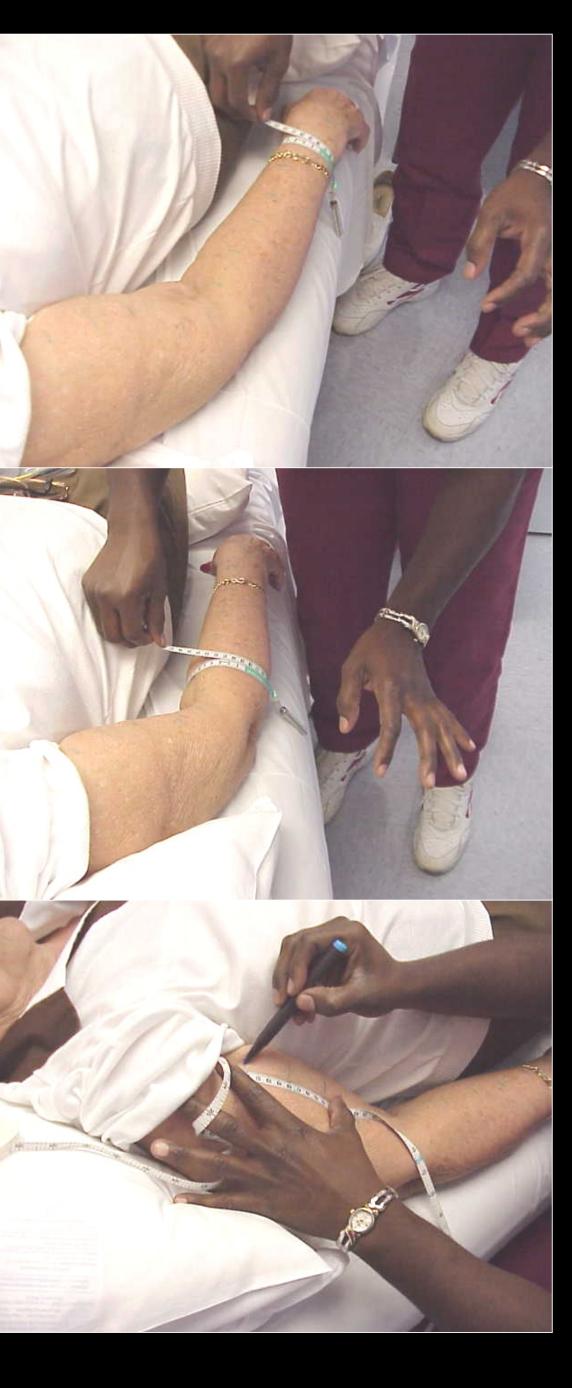
OBJECTIVES

The specific objective of this part of the research was to to determine if low energy pulsed short-wave diathermy at 27.10 MHz, used as the sole therapy, would reduce arm lymphedema as determined by arm volume measures

A PILOT STUDY OF THE EFFECTS OF PULSED RADIO FREQUENCY ENERGY ON POST-MASTECTOMY LYMPHEDEMA HN Mayrovitz, N Sims, J Macdonald College of Medical Sciences, Nova SE Univ, NBHD, Ft. Laud, FL

METHODS

Arm Volumes and Calculations



Arms were measured before starting treatment and then prior to the start of each follow-up treatment

Circumferences (C) were measured at seperations of L = 4 cm starting from the wrist

Segmental volumes, Vseg within adjacent circumference measurement sites (C_1 and C_2) was calculated using a truncated cone model

Vseg = $(L/12)(C_1^2+C_2^2+C_1C_2)$

The total arm volume was determined by summing all segmental volumes

Edema volume was calculated as the difference between the volume of the affected arm and thecontralateral control arm

Percent Edema was calculated as the Edema Volume divided by the control arm volume

Subjects and Treatments



Seven women (age 37-78) with

arm lymphedema (grade 2) for a duration of 0.7 to 10 years due to breast surgery (3-23 years earlier) were included in this ot study. All had previous CDT treatments (0.5 - 4 years ago) but were not now being treated.

Each had 4-6 study treatmets over a 2-week interval with no other treatment provided. Each treatment was given for 60 minutes with the patient supine and lightly covered.

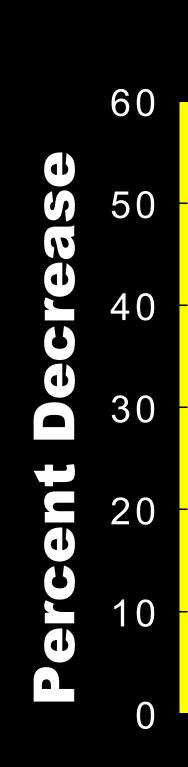
The dual heads of the device (Magnatherm) were placed so as to encompass all, or nearly all of the affected arm

Power levels were standardized to the device max peak power and minimum repetition rate. Average power was estimated to be about 12% of maximum

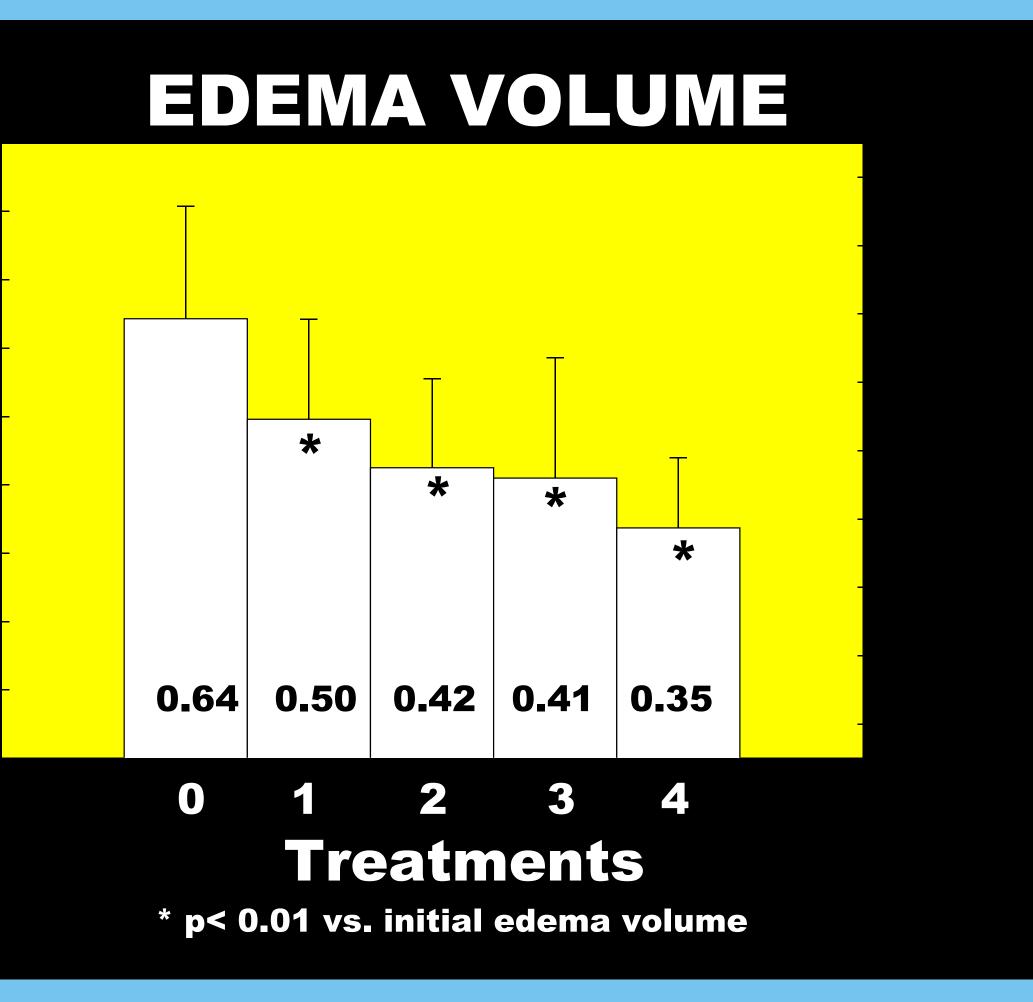
The excitation pattern at these settings consists of radio frequency energy (27.120 MHz) pulsed on for 95 sec at a rate of 700 pulses per second. This modality is also referred to as short wave diathermy

C O.7 0.6 0.5 0.4 0.3 0.2 0.1 0.0

% 30 **2**5

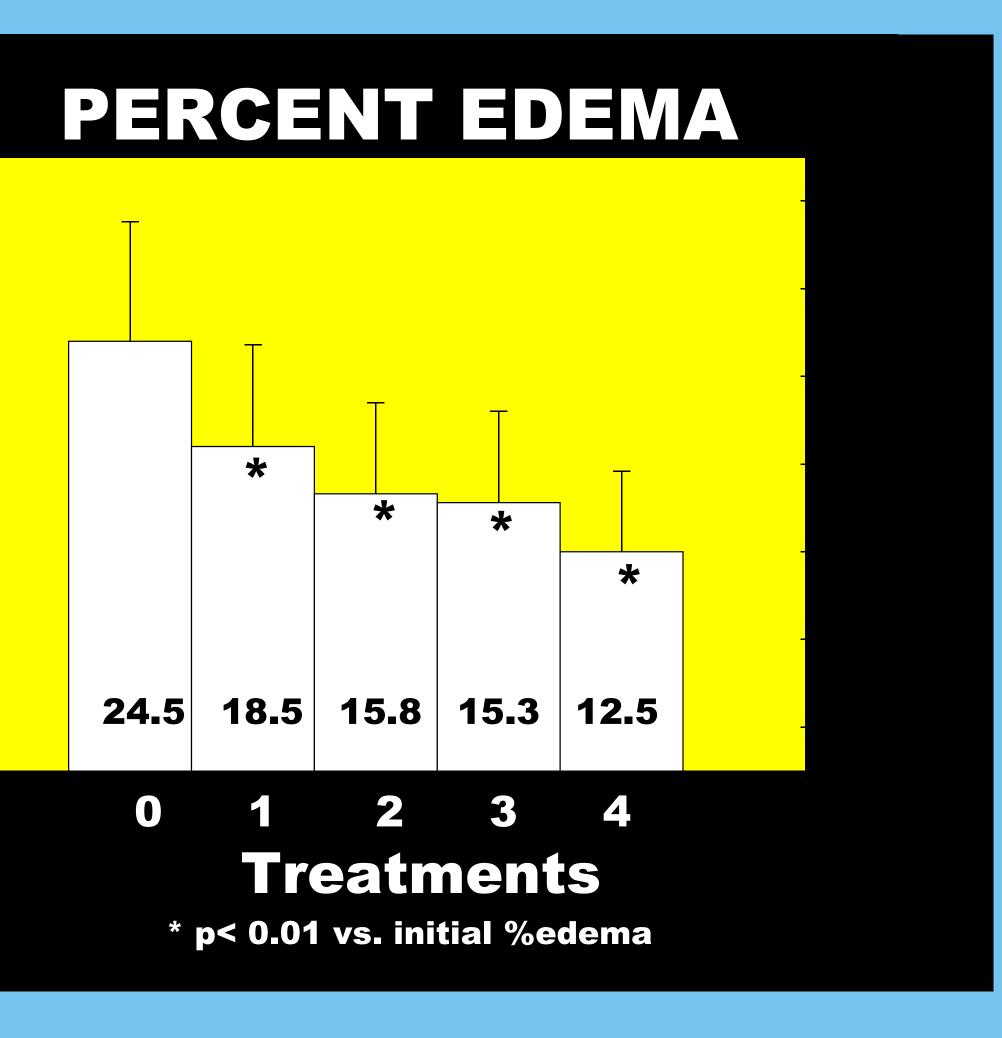


RESULTS



The initial edema volume was decreased after one treatment, with subsequent decreases through the 4th treatment

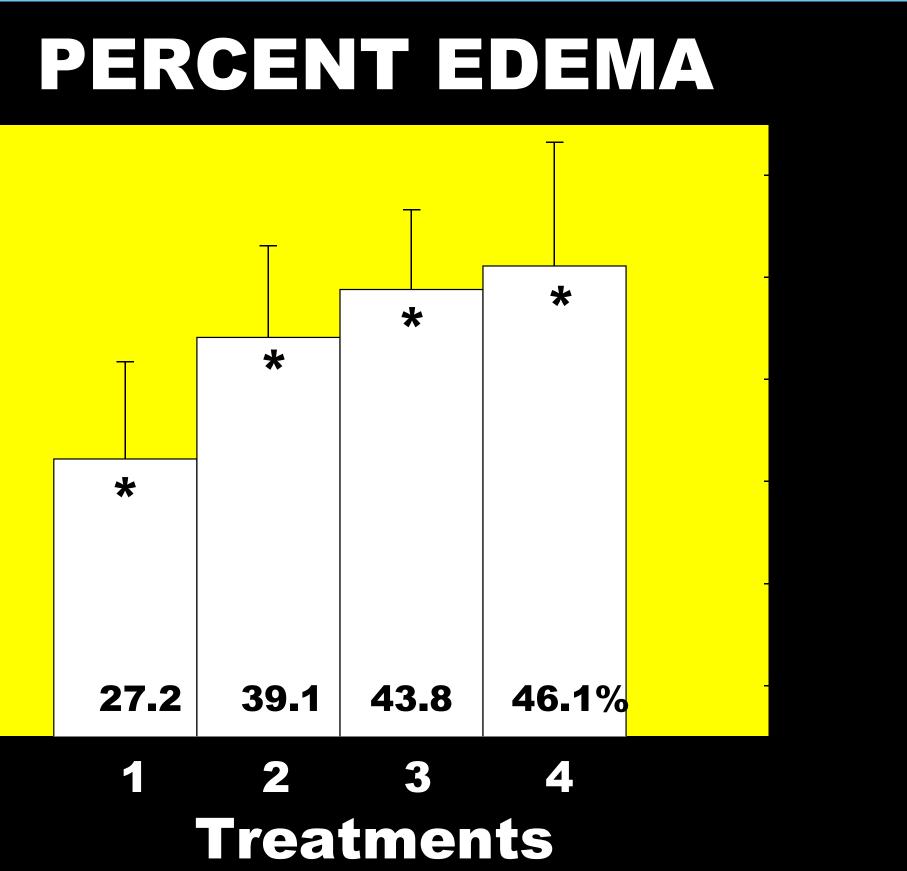
Seven patients received at least four treatments



Similar patterns of change occurred for percentage edema, which by the 4th treatment, was about half of that present prior to treatment start

However, the main effect appeared to occur early in the treatment sequence

Calculations of the change in percentage edema also indicates a progressive decrease but again the most dramatic decrease occurs early in the treatment sequence



* p< 0.001 vs. initial %edema

CONCLUSIONS

The main findings of this part of the study indicate a potentially beneficial effect of pulsed radio frequency energy with respect to reduction in arm lymphedema

These initial findings are especially encouraging in light of the fact that the women included in this pilot study had already received CDT therapy and had long standing residual lymphedema

The treatment related reduction in the percentage of lymphedema,was rapid and significant,and was associated with a single treatment power level, which was deliberately maintained low at about 12% of the total device power. It is unknown whether increased power levels would improve the short-term outcome herein observed.

Although these initial findings are extremely encouraging and the method tested may prove to be a useful compliment to current therapeutic practice, final conclusions must await further and expanded placebo controlled tests that are currently underway.

The main findings of the companion part of the study indicate a significant increase in skin blood perfusion (SBF) that is associated with the application of pulsed radio frequency energy.

The increase in SBF occurs after 30-40 minutes of treatment and SBF remains elevated as compared with its pre-treatment baseline for at least 20 minutes after treatment is stopped.

The role of the observed SBF increase during treatment in mediating the treatment related reduction in arm lymphedema (summarized above) is as yet unknown.