

Lymphoedema and Laser Therapy

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Lymphoedema develops in people born with inadequate lymphatic systems which have difficulty transporting the lymphatic load. This can be from hypoplasia (not enough vessels or nodes), and what they have does not work very well. This is primary lymphoedema and tends to be genetically inherited. A secondary form of lymphoedema is more common in which the lymphatic system has been damaged by surgery or radiotherapy or other trauma. The trauma of removal of varicose veins or other veins for heart surgery can lead to overload of the previously normal lymphatic system. Spider bites from several spiders can lead to lymphoedema.

Lymphoedema is a progressive condition with four main characteristics (1):

1. excessive protein in the tissues
2. excessive fluid in the tissues (both intra and extracellular fluid)
3. excessive deposition of fibrous tissue
4. chronic inflammatory reactions.

The excess fluid and fibre are immediately under the skin and well within the reach of the laser beam. New lymph vessels cannot grow through scar tissue or fibrosed tissues. Following laser therapy there is a softening of the tissues and reduction in the fluid. New lymph vessels can grow (2). The limbs do not reduce in size until there is softening. In 1993 a pilot study was undertaken to determine the effect of laser therapy in large post mastectomy arms of 4 or more years duration. (3). This trial found that the arms responded well to laser therapy - there was reduction in the amount of oedema and the volume of extracellular fluid as measured by bioimpedence, the tissues became softer as measured by tonometry and the patients perceived an improvement in symptoms of bursting pains, tightness, heaviness, cramps, pins and needles, mobility and limb circumference. The arms lost a mean 19.7% collectively during the 16 treatments and we then continued to measure them and a further loss of 7% occurred over the following 6 months. During this 6 months there was no treatment of any kind and they did not wear support sleeves. With improved measuring techniques (perometry, tonometry, and bioimpedence and sometimes lymphoscintigraphy) we can detect areas of fibrosis and blockages and can target these areas with the laser, to get better results. In the trial all the patients had identical treatment.

The current assessment and treatment used at Mitcham Rehab Clinic and The Lymphoedema Assessment Clinic at Flinders Surgical Oncology Clinic at Flinders Medical Centre is a full assessment of external measurements, volume and circumference at 200 positions using the Perometer. The resistance of the tissues to compression is measured by the tonometer. Bioimpedence shows the fat, fluid (intra and extracellular) and fibre in the tissues. Measurements are taken on both arms or both legs. Subjective information on heaviness, cramps, pins and needles and range of movement are all recorded.

Laser therapy then targets the areas of blockage or fibrosis starting over the chest wall and axilla and moving distally in the arm or, for the leg, lymphoedema abdominal scars and the inguinal region are treated first and then progress distally. Fifty minutes of scanning laser precedes an hour of Complex Physical Therapy - massage.

The laser used is a Space M3 with an output of 9 mW He Ne at 832.8 nm and peak power of 4 x 27mW GaAs at 904 nm scanning laser which covers an area of 20 x 30 cm. The energy density was 2-4 J per cm².

Interesting Observations

Most of the patients with lymphoedema feel the effect of the laser at the time of treatment - what they feel is pulsing in the limb distal to where the laser is shining. Several people with whole body primary lymphoedema can feel pulsing in their face or arms while the laser is on their leg, proving the generalised stimulating effect on the whole lymphatic system in an under active lymphatic system.

Lymphoedema patients tend to get skin infections like cellulitis which often requires hospitalization, but following laser and massage their tissues become healthier (less fibre and fluid) and their rate of infection drops dramatically.

A few people - about 7 out of over 700 treated with laser for lymphoedema have suffered a reaction - overdose.

They all describe themselves as sensitive and cannot take drugs, even non prescription drugs. Several had drastic reactions to Radiotherapy. The reaction these people have had is feeling very tired and sleepy for 24 hours after the laser. On subsequent treatments the laser power level has been reduced considerably and they get a normal treatment effect with no sleepiness. Could this effect be from stimulating light sensitive areas that regulate the body's clock as described in NewsScientist?(5).

An exciting reaction we found when a 43 year old woman who developed lymphoedema of the face neck and left arm following surgery and 2 courses of radiotherapy for cancer of the thyroid 9 years before (6). Her vocal cords

were badly affected by the radiotherapy and for 9 years she could not talk but only whisper. She could not use the phone and working at a whisper was tiring and difficult. After the first treatment of laser to her neck she could talk!! After 10 treatments she could start speech therapy and sing a little. She now speaks normally and her lymphoedema has reduced considerably.

References.

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3. Piller N B, Thelander A (1995): Treating Chronic Post Mastectomy Lymphoedema with LLLT: a Cost Effective Strategy to Reduce Severity and Improve the Quality of Survival. Laser Therapy Vol 7 No 4 p163-168

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