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Effects of Complete Decongestive Therapy in Lymphedema Patients: a Pilot Study

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Background: Lymphedema is manifested in a chronic severe swelling of various body parts that arises due to stasis in lymphatic outflow and retention of fluid that can reach up to 5-15 liters. Patients suffering from lymphedema have progressive swellings, recurrent infections, pain and a significantly decreased quality of life (1). Currently, there is no cure for lymphedema. It, therefore, requires continuous therapy comprising of meticulous care on behalf of the patient, non-invasive treatment and occasional surgery (2). The non-invasive treatment of this chronic disease is a physical treatment, complete decongestive therapy (CDT), which lasts for three weeks. CDT is a multicomponent therapy program aimed at decreasing limb volume and reducing the progression of lymphedema (3).

Figure 1. Patient with lymphedema in the legs, pre (left) and post (right) complete decongestive therapy.

Methods: We assessed **hyaluronic acid levels** and the volume regulating hormones **aldosterone** and **plasma renin activity** responses in 9 patients (n=3 males, n= 6 females, aged between 25 and 70 years) with lymphedema stage II-III before and after three weeks therapy**. Perometer measurements** as well as **height, body weight, BMI** and **abdominal girth** was assessed. ***Inclusion criteria:*** patients with stage II or III lymphedema (defined as pitting edema, not reversible with limb elevation up to fibroadipose deposition and skin changes)(13). ***Exclusion criteria:*** patients with mental disorders, cardiovascular diseases, syncope or alcoholism as well as those on specific medications such as beta blockers, pregnant woman

Results: The main findings are that lymphedema patients lost volume as well as weight due to therapy in the affected extremity. Hyaluronic acid decreased almost by half pre- and post-therapy but due to the high variance between patients no significance was seen. Volume regulating hormones reflected partly the fluid shift effects of CDT: aldosterone increased significantly after therapy while plasma renin activity increased, but not significantly. Plasma total protein, density, osmolality and sodium and chloride levels did not show differences after CDT.

ID	Diagnosis	Stage	Sex	Age (years)	Volume reduction (mL)	Height (cm)	Weight (kg)	BMI	abdominal girth (cm)
1	secondary begnine leg lymphedema left	II-III	f	59	1174	156	66 (-1)	27 (-1)	86
2	primary leg lymphedema both sides	III	m	59	554 r, 1083 l, total 1637	169	94,2 (-1)	33	112 (+1)
3	primary leg lymphedema left	II	f	39	1718	169	65,8 (-2,6)	23 (-1)	83
4	primary leg lymphedema both sides	III	m	63	3839 r, 4032 l, total 7871	162	140,4 (-8,4)	54 (-3)	138 (-3)
5	primary leg lymphedema both sides	II	m	25	706 r, 444 l, total 1150	168	60,4 (+1,2)	21	78 (+1)
6	secondary begnine leg lymphedema both sides	II	f	67	483 r, 574 l, total 1057	158	58,6 (+1,6)	23	85 (+1)
7	primary leg lymphedema both sides	III	f	61	5110 r, 4113 l, total 9223	170	104,8 (-9,2)	26 (-3)	116 (-11)
8	chronic secondary leg lymphedema both sides	II	f	58	1075 r, 947 l, total 2022	171	70,4 (-1)	24	87 (-4)
9	chronic leg lymphedema both sides	II-III	f	65	1937 r, 1331 l, total 3268	155	107,2 (-4,8)	45 (-2)	145 (-2)

Table 1. Overview of nine lymphedema patients participating in this pilot study. Diagnosis, lymphedema stage, sex, age (in years), height and BMI 365 (body mass index) and was determined for each patient prior to the study. Leg volume (l = left, r = right), weight and abdominal girth was assessed 366 before and after complete decongestive therapy. Absolute changes are displayed in the brackets.

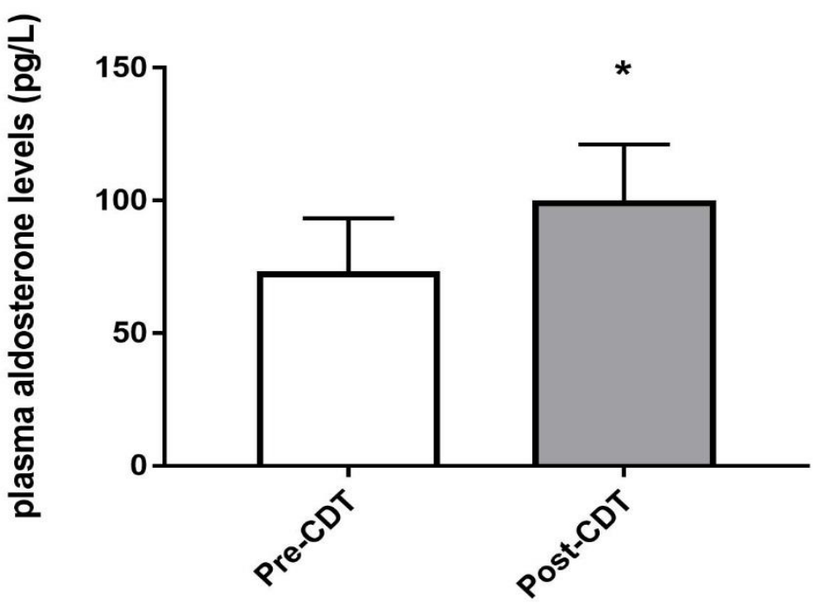

Figure 2. Plasma aldosterone levels increased significantly by 36% from 73.37 ± 19.88 369 pg/mL pre-therapy to 100.1 ± 21.13 pg/mL at the end of therapy (p=0.0039).

Conclusion & Future Direction: The results of this novel pilot study shows that lymphedema patients **reduce leg fluid volume as well as body weight** due to the decongestive physical therapy. Volume regulating hormones reflected partly the fluid shifts effects of CDT: **aldosterone increased significantly** after therapy while **plasma renin activity increased but not significantly**. **Hyaluronic acid**, used as surrogate marker for lymphatic outflow, **decreased almost by half** pre- and post-therapy but due to the **high variance** between patients no significance was seen. To further understand the effects of decongestive therapy on volume regulating hormones as well as plasma hyaluronic acid concentrations as marker for lymphatic outflow, these parameters should be **assessed serially to determine their time course over the three weeks of therapy.**

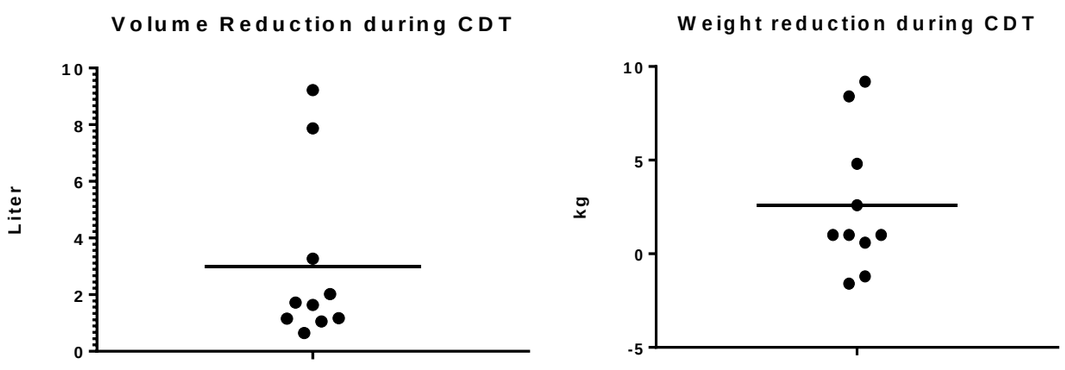

Figure 3. Volume and weight reduction during three weeks of therapy

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