

Abstracts from the 6th International Lymphoedema Framework Conference

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The 2016 Asia Pacific Lymphology Conference is a product of a collaboration between the International Lymphoedema Framework and the Australasian Lymphology Association. It brings together delegates (including patients) from around the world, but with a focus on those from developed and developing nations from the Asia-Pacific region. The aim of the conference is to explore and examine techniques and strategies for the detection, treatment and management of lymphoedema, and to share best practice to lead to an improvement in health outcomes for those at risk of and with all lymphoedemas, including filariasis. Here are some of the key abstracts to be presented at the conference.

Empowering patients and health professionals. The collaboration to launch a unique national lymphedema magazine

Anna Kennedy¹, Kim Avanthay², Diane Martin³, Cathy McPherson, Rachel Pritzker⁴, Jean-Ann Ryan⁵, Elaine Tucker-Lloyd⁶, Lucette Wesley⁷

¹Canadian Lymphedema Framework, Toronto, Canada,

²Lymphedema Association of Manitoba, ³Alberta Lymphedema Association, ⁴Lymphedema Association of Quebec, ⁵Atlantic Clinical Lymphedema Network, ⁶Saskatchewan Lymphedema Association, ⁷British Columbia Lymphedema Association

Introduction: Pathways is a national magazine published quarterly for the lymphedema community by the Canadian Lymphedema Framework (CLF) and its provincial affiliates. This publication is unique in targeting a diverse group of lymphoedema stakeholders: patients and caregivers, clinicians, product distributors, fitters, researchers and educators.

Context: A 2011 CLF study highlighted the need for increased education and awareness of lymphedema in Canada. Prior to the creation of the CLF, eight provincial/regional community organisations were already leading local efforts to educate patients and professionals, but with duplication of efforts and valuable resources.

Objective: To improve the management of lymphedema in Canada and to disseminate

lymphedema education and awareness nationally while incorporating customised local content.

Process: Under the leadership of the CLF, all organisations contributed to the concept, design and distribution of the magazine. Canadian and International authors contribute evidence-based articles on topics such as research, clinical perspectives, case studies and patient stories.

Results: Pathways has surpassed all readership targets and met key objectives: 1) the CLF and its provincial affiliates have united in one official voice, 2) the magazine provides the CLF with a sustainable revenue source to support its annual operating-related costs and 3) the provincial lymphedema associations have a cost-effective tool to boost their membership, attract local advertising and support their own advocacy efforts.

Conclusion: The development of Pathways provides a model of effective collaboration; several organisations united in a single passion worked collectively to advance lymphoedema education and awareness. Additional collaborative projects are currently under way.

The global challenges and priorities for education on lymphoedema

Margaret Sneddon¹, Maree O'Connor²

¹Nursing and Health Care School, School of Medicine, University of Glasgow, Glasgow, UK

Introduction: As a first step in developing a strategy for education, a project, under the auspices of the

International Lymphoedema Framework, sought to determine common challenges experienced in addressing education needs internationally; to identify priorities and make recommendations to meet these.

Methods: A focus group (FG) interview involving international stakeholders was held at the 2011 International Lymphoedema Framework conference. The FG comprised lymphoedema experts/practitioners from various professional backgrounds and people with lymphoedema, many of whom engaged in delivery of education. The FG interview was recorded, transcribed and analysed using NVivo software. Experts from the wider international lymphoedema community were recruited to explore, within their own country, what education in relation to the lymphatic system and lymphoedema was already being delivered.

Findings: Multiple education needs and many challenges at various levels were identified by the FG. However, there was much common ground, with agreement that increasing awareness across all registered health professions would have the most positive impact on patients in terms of early recognition, referral, intervention and support. Agreement was achieved on key content of education and various mechanisms suggested to support this.

Conclusion: Such great need for education on lymphoedema exists at many levels with limited resources with which to address these. Achieving international consensus on the top priority being pre-registration professional education has enabled a more strategic approach to addressing common needs world-wide and provided opportunities to channel effort and resources

effectively. Consequently, a process of determining minimum standards for lymphoedema education in pre-registration programmes was initiated.

Maintaining best practices through evidence-based lymphedema treatment guidelines: update on the american lymphedema framework project's systematic reviews

Jane Armer¹, Joseph Feldman², Bob Stewart¹, Kandis Smith¹, Janice Cormier³

¹University of Missouri Sinclair School of Nursing, Columbia, MO, USA, ²University of Chicago, Pritzker School of Medicine, Chicago, IL, USA, ³University of Texas MD Anderson Cancer Center, Houston, TX, USA

Introduction: The American Lymphedema Framework Project (ALFP) aims to assess and promote appropriate healthcare services for patients with all forms of lymphedema (LE) and advance the quality of care in the US and worldwide. One goal is to help develop and maintain evidence-based best practices LE treatment guidelines through a series of systematic reviews.

Methods: A research librarian assisted with searches of 11 major medical databases. Experts sorted relevant literature for inclusion/exclusion; included articles were sorted into topical areas for data extraction and assessment of evidence level using published grading systems and consensus process.

Results: From almost 6,000 screened articles, selections were based on defined eligibility criteria for final review (n=1,303) and categorisation (n=659) by topic experts. Articles were rated according to a classification system evaluating methodological quality with consistent inter-rater reliability. Surgical treatment; exercise; self-management; palliative care; intermittent compression pumps; complete decongestive therapy; complementary/alternative therapy; psychosocial issues; economic and health policy; and botanicals reviews are in print (n=10). Wounds, assessment, risk-reduction, and complex cases remain in process and in review.

Conclusions: There is a paucity of rigorously-conducted research studies related to treatment of patients with and at risk for LE. In order to provide evidence-based practice guidelines, it is critical to design and test strategies using relevant patient-reported outcomes. It is also imperative to bring the scientific findings to the level of understanding and application by therapists, clinicians, patients and families.

Sub clinical lymphatic pathology in children in a filariasis endemic area of odisha, india

Bhagirathi Dwivedi¹, Birendra Kumar Das¹, Shantanu Kumar Kar²

¹Regional Medical Research Centre (ICMR), Bhubaneswar, Odisha, India, ²Utkal Institute of Medical Sciences and Imaging, Bhubaneswar, Odisha, India

Background and aims: *Wuchereria (W) bancrofti* infection accompanies a prolonged asymptomatic phase before chronic morbidity. Pathology during this course and treatability of the condition was not explored. This study aimed at evaluating sub-clinical lymphatic pathology and the effect of treatment with DEC plus Albendazole in the dose used in mass drug administration (MDA) programme.

Methods: We enrolled *W. bancrofti*-infected (Og4C3 antigen or microfilarial positive) children from villages of Khurdha district of Odisha, India, between 5–18 years of age with or without symptoms. 102 children (52 asymptomatic and 50 symptomatic) were subjected to lymphoscintigraphy and ultrasonography for lymphatic pathology in the lower limbs and filarial dance signs of adult worm respectively. The children were randomised to receive either annual (n=51) or biannual dose (n=51) of DEC plus Albendazole and followed 6 monthly. 100 completed the 24 months follow up.

Results: Lymphoscintigraphy revealed lymphatic pathology in 73 (71.5%) and ultrasonography detected FDS in 9 (8.9%). Repeat investigation (n=72, with lymphatic pathology at baseline) showed improvement in lymphatic flow in 91% cases at 24 months, while 79% showed complete reversal of pathology. Children with early lymphedema also showed reduction in edema.

Conclusion: The study gave the first evidence of reversal of the lymphatic pathology with DEC plus Albendazole. This can be utilised for prevention and early treatment of morbidity and will be useful as a strong advocacy tool to improve compliance in MDA programme.

Detection of sub-clinical morbidity in lymphatic filariasis in myanmar

Janet Douglass, Susan Gordon, Patricia Graves

LEPRA Society, Bihar, India

Introduction: As a major cause of disability worldwide, morbidity from lymphatic filariasis (LF) already affects 40 million people, a further 120 million are infected and 20% of the world's population live in tropical

countries where they are at risk of future infection. Like lymphoedema after cancer therapy, filarial lymphoedema cannot be cured. Advanced disease is disfiguring and disabling and affects the poorest of the poor people living in rural areas of developing countries where a big leg can lead to social exclusion and contribute to community poverty. Currently no valid method exists to detect sub-clinical lymphatic dysfunction in this population.

Methods: Fifty young people (10–21 years) infected with LF and 50 age and gender matched uninfected controls were recruited in Myanmar. Tissue tonometry and bioimpedance spectroscopy were used to record physical measures of the lower limbs. Blood samples were taken for analysis of biochemical markers of morbidity. Measures were repeated after participants had consumed deworming medication.

Results: Initial analysis of the physical data has confirmed statistically significant differences between infected and uninfected participants. Biochemical analysis may elucidate the optimal timing and form of preventative interventions.

Conclusion: Simple, low-cost diagnosis of sub-clinical lymphoedema will inform development of preventive strategies for people infected with LF. Such strategies have the capacity to move global policy from a focus on late morbidity management towards the inclusion of morbidity prevention, potentially saving millions of young people from a future of disability and social exclusion.

Tonometry in lower limb primary lymphoedema: a reliability study

Jane Phillips, Susan J Gordon

Mercy Health Lymphoedema Services, Victoria, Australia

Introduction: Increased tissue resistance in lymphoedema can result in more complex management (Bagheri et al, 2005) and is difficult to quantify. Tonometry potentially provides an objective measure of skin resistance in lymphoedema; reliability studies have been predominantly carried out in upper limbs post-breast cancer treatment (Pallotta et al, 2011). This study investigates reliability of the tonometer (Indurometer Model: BME1S63G) in lower-limb primary lymphoedema.

Methods: Twenty-eight each of lymphoedema (LP) and non-lymphoedema (NLP) lower limbs were sourced through a convenience sample at a public lymphoedema outpatient service and screened by questionnaire. Tonometry measures were repeated three times at three sites on each limb, using the Indurometer. Measures for statistical analysis included repeated measures ANOVA

(analysis of variance), Intra Class Correlation Coefficient (ICC) and the Coefficient of Variation (COV).

Results: ANOVA calculations indicate the Indurometer measures were not significantly different to each other in all except for two points ($p > .05$; both sides, posterior calf in NLP). The degree of correlation, using the ICC, was found to be greater than .844 in all measures. COV calculated for each site were all under 10%.

Discussion: This is the first known investigation of the reliability of the Indurometer in lower limb primary lymphoedema and in a lower limb non-lymphoedema population and indicates reliability for both populations. While a trend for higher measures were observed in children, no conclusion can be drawn until a larger sample is investigated.

Conflict of interest: None

The occlusion pressure of the superficial lymphatic network - a near-infrared lymphofluoroscopic approach in the upper extremity of healthy volunteers

Jean-Paul Belgrado^{1,2}, Liesbeth Vandermeeren^{1,2,4}, Sophie Vankerckhove^{1,2}, Jean-Baptiste Valsamis^{1,2,3}, Julie Malloizel-Delaunay⁵, Jean-Jacques Moraine¹, Fabienne Liebens⁴

¹Lymphology Clinic of Brussels, Brussels, Belgium, ²Lymphology Research Unit, ULB, Brussels, Belgium, ³ISALA Breast Clinic, CHU St-Pierre, Brussels, Belgium, ⁴Bio, Electro & Mechanical Systems (BEAMS), Ecole Polytechnique de Bruxelles, Brussels, Belgium, ⁵Department of Vascular Medicine, University Hospital Rangueil, Toulouse, France

Lymphatic network is generally overlooked. Because most of filtered fluids reintegrate circulation maintaining the interstitial fluid balance thanks to the lymphatic system, lymphatic occlusion pressure could be a valuable parameter to characterise transport capacity of lymphatic vessels, and could complete clinical reasoning in the physiopathology of edema. Former measurement techniques of lymphatic pressure in humans were invasive and complex, leaving knowledge incomplete. Near-Infrared fluoroscopy allows observing superficial lymphatic flow in real time. Using a transparent sphygmomanometer cuff, we determined the range of normal pressure of the superficial lymphatic vessels. Near-infrared fluoroscopy was performed on the upper limb in 32 healthy volunteers. Lymph flow was observed through a transparent cuff, inflated by steps of 10 mmHg. Optimised manual lymphatic drainage was executed during experiment to fill the observed lymphatic collectors, making sure they were stocked with lymph. Lymphatic pressure was established when lymph flow stopped. Superficial lymphatic occlusion

pressure range between 80–140 mmHg, mean 88.75 (SD 14.76). Outcomes do not highlight significant differences between age group, genders and lateralisation.

Near infrared fluoroscopy, combined with a transparent sphygmomanometer cuff and optimised manual lymphatic drainage, is an efficient tool to determine the lymphatic occlusion pressure of the superficial lymphatic collectors. This new parameter could be integrated into the clinical discussion of impairment of the vascular system and more particularly in the interstitial fluid balance. Our study pointed out that the occlusion pressure of healthy superficial lymphatic collectors in the upper limb seems to be much higher than previously described.

Acute inflammatory response to low-, moderate- and high-load resistance exercise in women with breast cancer-related lymphoedema

Ben Singh¹, Prue Cormie², Robert Newton³, Sandi Hayes¹

¹Institute of Health and Biomedical Innovation, Queensland University of Technology, Brisbane, Australia, ²Institute for Health and Ageing, Australian Catholic University, Melbourne, Australia, ³Exercise Medicine Research Institute, Edith Cowan University, Joondalup, Australia,

Introduction: Resistance exercise is emerging as a potential adjunct therapy to aid in the management of breast cancer-related lymphedema (BCRL). The mechanisms underlying the relationships between the acute and long-term benefits of resistance exercise on BCRL are not well understood. This study examined the acute inflammatory response to upper-body resistance exercise and compared these effects between resistance exercises involving low-, moderate- and high-loads.

Methods: Twenty-one women with mild to severe BCRL participated in the study. Participants completed a low-load (15–20 repetition maximum), moderate-load (10–12 repetition maximum) and high-load (6–8 repetition maximum) exercise session consisting of three sets of six upper-body resistance exercises. Sessions were completed in a randomised order separated by a seven day period. Venous blood samples were obtained to assess markers of exercise-induced muscle damage and inflammation (creatinine kinase [CK], C-reactive protein [CRP], interleukin-6 [IL-6] and tumour necrosis factor-alpha [TNF- α]). Lymphoedema was assessed using bioimpedance spectroscopy and arm circumferences, and associated symptoms were assessed using visual analogue scales. Measurements were conducted before and 24 hours after exercise.

Results: No significant changes in CK, CRP, IL-6 and TNF- α were observed following the low-, moderate- or

high-load resistance exercise. There were no significant changes in arm swelling or symptom severity scores across the three exercise conditions.

Conclusion: The magnitude of acute exercise-induced inflammation following upper-body resistance exercise in women with BCRL does not vary between loads. Given these observations, moderate- to high-load resistance training is recommended for this patient population as these loads prompt superior physiological and functional benefits.

Reference

Cormie P, Singh B, Hayes S, Peake JM, Galvao DA, Taaffe DR, Newton RU (2015) Acute inflammatory response to low-, moderate- and high-load resistance exercise in women with breast cancer-related lymphedema. *Integr Cancer Ther* 1534735415617283 [Epub ahead of print]

Efficacy of complex decongestive therapy on breast cancer-related lymphedema: demonstration by MRI

Etsuko Fujimoto, Ayana Mawaki, Chika Ohshima, Keisuke Nakanishi, Fumiya Kurono, Sachiko Nagaya, Shoko Ando, Yukari Takeno

Dept. Nursing, Nagoya University Graduate School of Medicine, Nagoya City, Japan

Introduction: To prove clearly the efficacy of complex decongestive therapy (CDT) on lymphedema, the internal structure of edematous arm was examined by MRI before and after CDT.

Method: Patients were recruited from Nagoya University Hospital, and received CDT for four weeks (two or three times per week). Before and after CDT, the structure of edematous arm was assessed by MR system (Siemens Healthcare, Germany). MR imaging sequences (T1, T2, STIR, FLAIR) of transverse slices (4 mm thickness, 1 mm interval between slices) were uploaded into a computer, and visualised using a stand-alone viewer (Syngo fastView, Siemens AG). For quantitative analysis, hyper-intense signal areas on STIR images (i.e. free-water-containing areas) were calculated in every slice by image processing software (WinRoof, Mitani Corporation, Japan). The study was approved by the ethics committee of the Nagoya University School of Medicine. All patients gave written informed consent.

Results: Eight patients (ranging in age from 40 to 77 years) participated in this study. All were suffering from unilateral arm lymphedema with ISL stage II. Before CDT, hyper-intense signal areas mainly distributed in the ulnar half of forearm. Upper arms of most patients contained no rich hyper-intense signal. After CDT, the

distribution of hyper-intense signal areas was basically similar to that of before CDT. However, signal areas were obviously reduced in varying degrees, in all patients.

Conclusion: Our findings suggest that CDT is effective against lymphedema, and MRI (specially STIR image) is useful for the proven assessment of improvement after CDT.

Simplified compression therapy for lymphedema: evaluation of compression levels and time required for application

¹Sawako Anada, ¹Tsunenori Arai, ¹Kayoko Sato, ²Yoko Yoshida, ²Miho Okuda, ¹Patrick Wagner

¹Goto College Lymphedema Institute, Tokyo, Japan, ²Goto College Massage Therapy Center, Tokyo, Japan

Introduction: In order to simplify compression therapy and enhance quality of life for lymphedema patients, we developed a new type of compression material called a wave garment (WG). The uneven surface of this wave-shaped stocking-like garment adjusts itself to the shape of the affected limb, increases lymph drainage and softens indurated skin. Moreover, it reduces therapist's and patient's time and labour for compression therapy.

Methods: The effects of the WG on softening indurated skin and increasing range of motion were shown in a previous study (Annual meeting of the Japanese Society of Phlebology, 2014). This time we used an air pack type pressure analyser to measure the pressure difference between the concave and convex shape of the WG itself and evaluated compression levels of four different WG-outer-layer-compression-combinations compared to conventional multilayer bandaging in 10 patients. In addition, we asked 112 patients to answer to our questionnaire.

Results: Compression levels were measured at the calf in standing position. Irrespective of the number of bandages all WG-combinations showed more than the necessary 60mmHg when applied by a trained therapist. Time saving was compared to conventional bandaging about 54 to 65%. When applied by the patient the degree of time saving was similar but compression levels dropped to a large extent.

Conclusion: From our findings we can say that the WG contributes to a significant reduction in time and labour for compression therapy. However, patients

might need some bandaging training to achieve more sufficient compression levels.

Conflict of interest: None

The addition of a simple 10 minute self-care for breast cancer related lymphoedema improves hand volume and qol: results of a pilot randomized controlled study

¹Yoko Arinaga, ²Neil Piller, ³Fumiko Sato, ⁴Hisashi Hirakawa, ³Takanori Ishida, ⁵Takeyasu Kakamu, ⁵Tohru Otake, ³Katsuko Kikuchi, ¹Akiko Sato-Tadano, ³Gou Watanabe

¹Tohoku University, Sendai, Japan, ²Flinders University School of Medicine, Adelaide, Australia, ³Tohoku University Graduate School of Medicine, Sendai, Japan, ⁴Tohoku Kosai Hospital, Sendai, Japan, ⁵Fukushima Medical University, Fukushima, Japan

Introduction: Quality evidence for the effectiveness of self-care for breast cancer-related lymphoedema(BCRL) is limited. In this pilot randomized controlled study, we aimed to assess the effectiveness of a holistic self-care programme on the patients with BCRL.

Methods: 43 patients were randomised into the intervention or control group. The intervention group undertook a self-care program consisting of a Japanese national health exercise (Rajio taiso), gentle arm exercise with deep breathing, and skin moisturising care using a simple lymphatic drainage technique. The control group received standard care only. For outcome measures of the impact on lymphoedema, we used L-Dex for fluid levels, relative volume change(RVC), relative edema volume(REV), skin induration(SI), Transepidermal water loss(TEWL), SF-8, and times of self-care after 6 months in each group.

Results: 22 patients in the intervention and 21 patients in the control group who undertook the study were analysed according to the intention to treat principle. RVC and REV of the hand on the affected side, physical component summary in SF-8 were significantly improved only in the intervention group. SI of the affected breast was significantly reduced only in the control group. TEWL of the affected forearm and upper arm were significantly improved in both groups. TEWL on the affected breast was improved only

in the intervention group. The self-care time was significantly increased in both groups.

Conclusion: Although self-care time was increased in both groups, many important improvement occurred only in the intervention group, attesting to the benefit of this program over standard care.

Conflict of interest: None

Liposuction as an effective treatment for lower extremity lymphoedema: a review of fifty consecutive cases

Camilla Jay Stewart, David Alexander Munnoch

Department of Plastic Surgery, Ninewells Hospital, Dundee, United Kingdom

Introduction: Lymphoedema is a chronic, debilitating condition that has traditionally been seen as incurable. In recent years, the success of treating upper extremity lymphedema with liposuction has been translated to patients with lower extremity lymphedema, yet there remains a paucity of clinical evidence firmly supporting its use within this patient group. We present the largest case series of its type to refine and evaluate liposuction as a treatment for lower extremity lymphoedema (LEL).

Methods: Fifty patients with LEL were consecutively treated by liposuction by a single surgeon. Compression garments were applied in theatre.

Results: Mean pre-operative volume of oedema was 4371 ml (range 463 -10427 ml), and mean volume of aspirate was 4706 ml (range 575 -10425 ml); volume of aspirate correlated linearly with the volume of preoperative oedema. There were no major surgical complications. An average reduction in volume of oedema of 81% was found at 3 months (n=46), 91% at 2 years (n=23) and 100% at 4 years (n=10).

Conclusions: We have demonstrated that liposuction combined with continuous compression therapy (CCT) is a safe and effective technique for treatment of primary and secondary LEL, with complete reduction in volume of oedema at four years postoperatively.