

## **Edema Management Handout 2015**

Bryan A Spinelli, PT, MS, OCS, CLT-LANA

### **Traditional Edema Management**

- Elevation
- Exercise
- Massage
- Modalities
- Compression (Tubigrip, edema gloves)

### **Complete Decongestive Therapy**

Phase I: Reduction Phase

- Skin and Nail Care
- Manual Lymphatic Drainage
- Compression Bandaging
- Exercise
- Education in Lymphedema Self-care

Phase II: Maintenance Phase

- Skin and Nail Care
- Compression garment during waking hours
- Compression bandaging or bandaging alternative device while sleeping
- Self-Manual Lymphatic Drainage
- Exercise
- Periodic Medical Monitoring

### **Skin and Nail Care**

- Wash and dry skin daily
- Use natural or pH neutral soap
- Apply moisturizer without dyes or fragrance (ie Eucerin) daily
- Monitor for cuts, abrasions or insect bites, paying particular attention to any areas with reduced sensation
- Use sunscreen and insect repellent
- Use care with razors to avoid nicks and skin irritation
- Avoid punctures such as injections and blood draws if possible
- Wear gloves while doing activities that may cause skin injury
- Monitor for signs of infection (worsening of edema, redness, warmth, pain, fever, chills etc.)
- Contact physician immediately or send patient to ER

## **Manual Lymphatic Drainage (MLD)**

- Skin mobilization technique that is designed to:

1. Stimulate lymphatic system
2. Remove biochemical wastes from body tissues
3. Reduce edema by enhancing fluid dynamics
4. Decrease sympathetic nervous system

(Vairo et al., 2009)

## **Evidence**

- Increased lymph flow
  - Enhanced filling and emptying of lymphatics due to variations in interstitial pressure
  - Reduction of limb volume
  - Increased blood flow
  - Produces calming effect due to influence on autonomic nervous system
- (Williams, 2010)

## **Principles**

- Hand movements are used to stretch the skin in a specific direction
- Light pressure (< 30 mmHg)
  - Varies according to underlying tissues
  - Excessive pressure may increase capillary filtration, cause hyperemia, and damage lymphatics
- Movements are slow (approximately one stroke per second) and repetitive (at least 7 strokes per area)
- MLD sequence starts proximally or centrally, and work distally
- Each stroke has a “pressure” phase and “relaxation” phase

## **General Contraindications**

- Absolute
  - Congestive heart failure
  - Acute infections
  - Renal failure
  - DVT
- Relative
  - Active cancer

## **Neck-specific MLD Contraindications**

- Cardiac arrhythmias
- Thyroid disease
- Carotid sinus hypersensitivity
- Carotid artery stenosis
- Over the age of 60 years (relative)

### **Abdominal-specific MLD Contraindications**

- Pregnancy
- Menstruation
- Recent abdominal surgery
- Unexplained pain
- Pelvic DVT
- Abdominal aortic aneurysm (AAA)
- Radiation fibrosis/colitis/cystitis
- Diverticulitis/diverticulosis
- Crohn's disease
- Portal hypertension (cirrhosis of liver)

### **Indications**

- Lymphedema
- Lipedema
- Phlebo-lymphostatic edema
- Cyclic-Ideopathic Edema
- Post-traumatic Edema
- Post-surgical Edema
- Complex Regional Pain Syndrome (CRPS)
- Migrane/sinus headache
- Scleroderma
- Chronic fatigue
- Fibromyalgia
- General relaxation

### **MLD Strokes**

#### Stationary Circles

- Application: Lymph node groups, face, neck
- Circular (perpendicular) skin stretch using entire palmer surface of the hand
- Working phase: Perpendicular to alignment of lymphatic collectors
- Resting phase: Hand relaxed remaining in contact with skin
- Variations: Stationary/dynamic, bilaterally or alternating

#### Pump

- Application: Limbs
- Longitudinal skin stretch
- Working phase: Wrist flexion with ulnar deviation and thumb abduction/extension. Transition into wrist radial deviation. Avoid gripping with fingers
- Resting phase: Return to ulnar deviation while maintaining skin contact
- Variations: Unilateral or bilateral alternating

## Scoop

- Application: Limbs
- Longitudinal skin stretch
- Working phase: Starts with the wrist flexed, and thumb and 2<sup>nd</sup> digit in contact with the skin on the lateral surface of the extremity. Extend the wrist as you slide your hand to the back surface of the extremity. Your hand should be in full contact with the skin and your palm and fingers should be parallel to the long axis of the extremity
- Resting phase: Flex your wrist without your thumb and 2<sup>nd</sup> digit losing contact with the skin
- Variations: Unilateral or bilateral alternating

### **Upper Extremity Sequence with Intact Axillary Lymph Node (Foldi, Foldi et al. 2003)**

This sequence is not appropriate for individuals with impaired regional axillary lymph node drainage (IE s/p breast cancer treatment)

1. Effleurage
  - Soft strokes along the length of the arm in the direction of normal lymphatic drainage
2. Treatment of the axilla
  - Stationary circles in the region of the axillary lymph nodes
3. Treatment of the medial upper arm
  - Stationary circles in the region of the medial upper arm from the elbow to the axilla. Pressure phase directed towards the axilla.
4. Treatment of the deltoid region
  - Stationary circles in the region of the anterior and posterior deltoid.
  - Hands alternate with the pressure phase directed towards the axilla.
5. Treatment of the posterior and lateral surface of the upper arm
  - Pump technique at the posterior and lateral aspects of the upper arm from the elbow to the shoulder.
6. Treatment of the elbow region
  - Stationary circles with the thumb in the region of the lateral and medial epicondyle. Pressure phase directed proximally.
  - Stationary circles in the cubital fossa.
7. Treatment of the forearm
  - Scoop technique from the wrist to elbow. Repeat several times.
    - The arm is rotated medially and laterally to cover the entire forearm.
  - Alternate pump technique and stationary circle with both hands from the wrist to elbow.
8. Treatment of the wrist
  - Stationary circles in the region of the dorsal wrist. Pressure phase directed proximally.
9. Treatment of the dorsal hand
  - Stationary circles on the dorsum of the hand. Alternate thumbs with the pressure phase directed proximally.
10. Treatment of the fingers
  - Stationary circles. Pressure phase direct proximally.
11. Treatment of the palm
  - Stationary circles on the palm, with the pressure phase directed laterally towards the dorsal hand. Alternate thumbs.

## Self-Manual Lymphatic Drainage

Things to remember

- Be gentle. Use light pressure. You should not notice any skin redness.
  - Go slow. Each hand movement should be about 1 stroke per second.
  - Each stroke involves stretching your skin. Do not let your hand slide on your skin.
1. Place your hand in your armpit and perform 7 stationary circles.
  2. In the inside region of your upper arm perform stationary circles stretching your skin upward from your elbow towards your armpit. Work this pathway 7 times.
  3. Perform 7 stationary circles on the front of your shoulder stretching your skin towards your armpit.
  4. Perform 7 stationary circles on the back of your shoulder stretching your skin towards your armpit.
  5. Perform stationary circles stretching your skin upward on the outside and back of your upper arm from your elbow to your shoulder. Work this pathway 7 times.
  6. Perform 7 stationary circles on the outside of your elbow stretching your skin upwards. Repeat on the inside of your elbow.
  7. Perform 7 stationary circles where your elbow bends.
  8. On the front of your forearm, perform stationary circles stretching your skin upward from your wrist to your elbow. Work this pathway 7 times.
  9. On the back of your forearm, perform stationary circles stretching your skin upward from your wrist to your elbow. Work this pathway 7 times.
  10. Perform 7 stationary circles on the back of your hand stretching your skin towards your wrist.
  11. Perform stationary circles on your thumb and fingers individually stretching your skin towards your hand. Repeat 7 times.
  12. Perform stationary circles with your thumb on the palm of your hand stretching skin out to the side towards the top of your hand. Repeat 7 times.

## **Compression Bandaging**

Compression is defined as the pressure that is exerted on the tissues, blood vessels, and lymphatics (Foldi et al., 2003)

- Pressure
  - Law of Laplace
- $P = (T \times N \times 4630) / (C \times W)$ 
  - P = sub-bandage pressure (mmHg)
  - T = bandage tension (kilograms force – kgf)
  - N = number of layers
  - C = limb circumference (cm)
  - W = bandage width (cm)

### **Types of Pressure**

- Resting pressure
- Working pressure

### **Factors that Influence Amount of Compression**

- Type of bandage
- Tension on bandage
- Strength of bandage
- Number of layers
- Condition of bandage
  - How old?
  - Length of time worn?

(Foldi et al., 2003)

### **Effects of Compression**

- Reduces ultra-filtration
- Increases venous and lymphatic drainage
- Increases central venous blood volume
- Enhances muscle pump function
- Increases re-absorptive surface
- Softens fibrotic tissue

(Foldi et al., 2003)

## **Contraindications**

- Absolute
    - Congestive heart failure
    - Renal failure
    - Acute infection
    - Peripheral artery disease
  - Relative
    - Arterial high blood pressure
    - Cardiac arrhythmias
    - Stenosis of cardiac vessels
    - Progressive systemic sclerosis
    - Chronic polyarthritis
- (Foldi et al., 2003)

## **Compression Bandaging Materials**

- Tubular bandage (TG/Tricofix or 100% cotton)
  - Used to protect skin
- Cotton or synthetic (Artiflex/Cellona) padding material
  - Used at bony prominences or joints for protection
- Foam
  - low-density (1/4, 1/2 or 1 inch gray foam)
  - high-density (Kompex)
- Elastic gauze bandages (Transelast/Elastomull)
  - Finger/toe bandage
  - Used to affix foam on extremity
- Short-stretch bandages (Comprilan/Rosidal)
  - Available in varying widths and lengths
  - Low resting pressure/High working pressure

## **Compression Bandaging Instructions (Foldi, Foldi et al. 2003)**

- Pressure should be high enough to be effective for reducing edema, but should not cause pain or restrict circulation (blue or cold fingers)
- Compression bandage must be functional and should restrict motion as little as possible
- Compression bandage should not cause constrictions from creases or increase local blood pressure
- Have patients make a fist if bandaging forearm
- Caution bandaging areas with small curvature radius such as the hand
- Edges of hands have highest pressure due to small curvature radius, and are prone to pain
- Use custom-cut foam pieces to the dorsal hand and/or palm to make the hand a more cylindrical shape

## **Compression Bandage Demonstration**

- Lotion
- Stockinet
- Cut foam
- Finger bandage
- Affix foam
- Apply short stretch bandages
  - One 6cm
  - One 8 or 10 cm
  - One to two 10-12 cm

## **Decongestive Exercise**

### **Effects of Exercise**

- Increases lymph flow
- Improves protein re-absorption
- Increases venous return
- Reduces soft tissue contracture limiting blood and lymphatic flow  
(Foldi et al., 2003; Brennan and Miller, 1998)

### **Principles**

- Muscle pump
  - Skeletal muscle contraction
- Increases interstitial pressure
- Veins are compressed against tissue
  - Valves ensure fluid is directed proximally
- Joint pump
  - Vessels are attached to surrounding tissue
  - Position of joints determines whether vessels are opened or compressed promoting movement of fluid  
(Foldi et al., 2003)

### **Guidelines**

- Diaphragmatic breathing
- Active range of motion
  - Maintain precautions
  - Can be passive if active motion is contraindicated
- Proximal to Distal to Proximal
- Compression should be worn during exercise
- Discontinue if patient experiences pain, numbness, tingling, or increased swelling

### **Decongestive Exercises for UE**

1. Diaphragmatic breathing
2. Neck rotation
3. Neck sidebend
4. Shoulder shrugs
5. Shoulder circles (CW/CCW)
6. Shoulder abduction with elbows flexed
7. Climbing a ladder
8. Elbow flexion/extension
9. Breast stroke
10. Wrist circles
11. Finger flexion/extension

### **Compression Garments**

- Goal: maintain edema reduction achieved during Phase I of CDT
- High resting pressure and low working pressure
- Garment pressure depends on
  - Tissue texture/stage of lymphedema
  - Type of bandage (foam type/# bandages/patient comfort while bandaged) required to achieve the reduction
  - Patient's co-morbidities/age/strength/functional ability
  - Cost
  - Shape of limb
  - Patient adherence during CDT

### **Garment Types**

- Off-the-shelf or custom
- Flat knit, circular knit, or cut and sew

### **Garment Use and Care**

- To be worn during waking hours
- Not to be worn while sleeping (self-bandage or bandaging alternative device)
- Laundered after each wear
  - Follow manufacturer's directions for laundering
- Need to be replaced every 4-6 months
- Avoid over stretching garment when donning and doffing
  - Use garden gloves or latex gloves

## References

Artzberger, S. (2002). Manual edema mobilization: treatment for edema in the subacute hand. *Rehabilitation of the hand and upper extremity*. In Mackin E, Skirven T, Schneider L, Osterman L. St Louis, MO, Mosby. 1: 899-913.

Howard S, Krishnagiri S. The use of manual edema mobilization for the reduction of persistent edema in the upper limb. *J Hand Ther*. 2001; 14: 291-301.

Brennan, M. J. and L. T. Miller (1998). "Overview of treatment options and review of the current role and use of compression garments, intermittent pumps, and exercise in the management of lymphedema." *Cancer* 83(12 Suppl American): 2821-2827.

Brodovicz, K. G., K. McNaughton, et al. (2009). "Reliability and feasibility of methods to quantitatively assess peripheral edema." *Clin Med Res* 7(1-2): 21-31.

Dewey, W. S., T. L. Hedman, et al. (2007). "The reliability and concurrent validity of the figure-of-eight method of measuring hand edema in patients with burns." *J Burn Care Res* 28(1): 157-162.

Eliska, O. and M. Eliskova (1995). "Are peripheral lymphatics damaged by high pressure manual massage?" *Lymphology* 28(1): 21-30.

Foldi, M., E. Foldi, et al. (2003). *Textbook of Lymphology for Physicians and Lymphedema Therapists*. Munchen, Urban and Fischer.

Guerreiro Godoy Mde, F., A. H. Oliani, et al. (2010). "Active exercises utilizing a facilitating device in the treatment of lymphedema resulting from breast cancer therapy." *Ger Med Sci* 8: Doc31.

Karges, J. R., B. E. Mark, et al. (2003). "Concurrent validity of upper-extremity volume estimates: comparison of calculated volume derived from girth measurements and water displacement volume." *Phys Ther* 83(2): 134-145.

Knygsand-Roenhoej, K. and T. Maribo (2010). "A Randomized Clinical Controlled Study Comparing the Effect of Modified Manual Edema Mobilization Treatment with Traditional Edema Technique in Patients with a Fracture of the Distal Radius." *J Hand Ther*.

Leard, J. S., L. Breglio, et al. (2004). "Reliability and concurrent validity of the figure-of-eight method of measuring hand size in patients with hand pathology." *J Orthop Sports Phys Ther* 34(6): 335-340.

Lymphedema\_Framework (2006). *Best Practice for the Management of Lymphoedema. International consensus*. London, MEP Ltd.

Miller, G. E. and J. Seale (1981). "Lymphatic clearance during compressive loading." *Management.2013 Lymphology* 14(4): 161-166.

Priganc, V. W. and M. A. Ito (2008). "Changes in edema, pain, or range of motion following manual edema mobilization: a single-case design study." *J Hand Ther* 21(4): 326-335.

Rowland, T. (2008). "Echocardiography and circulatory response to progressive endurance exercise." *Sports Med* 38(7): 541-551.

Sander, A. P., N. M. Hajer, et al. (2002). "Upper-extremity volume measurements in women with lymphedema: a comparison of measurements obtained via water displacement with geometrically determined volume." *Phys Ther* 82(12): 1201-1212.

Tartaglione, G., M. Pagan, et al. (2010). "Intradermal lymphoscintigraphy at rest and after exercise: a new technique for the functional assessment of the lymphatic system in patients with lymphoedema." *Nucl Med Commun* 31(6): 547-551.

Taylor, R., U. W. Jayasinghe, et al. (2006). "Reliability and validity of arm volume measurements for assessment of lymphedema." *Phys Ther* 86(2): 205-214.

Vairo, G. L., S. J. Miller, et al. (2009). "Systematic review of efficacy for manual lymphatic drainage techniques in sports medicine and rehabilitation: an evidence-based practice approach." *J Man Manip Ther* 17(3): e80-89.

Williams, A. (2010). "Manual lymphatic drainage: exploring the history and evidence base." *Br J Community Nurs* 15(4): S18-24.