Which Patients Benefit from a Lymphedema Pump?

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Lymphedema

Interstitial accumulation of protein-enriched fluid

- Affects over 90 million worldwide
- Chronic disfiguring disease secondary to excessive fluid and protein accumulation in the interstitium as a result of lymphatic system stasis or obstruction

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Lymphedema prevalence and causes

- Primary lymphedema prevalence occurs in ~1:10,000 individuals.\(^1\)
- Secondary lymphedema affects 5-16 million people in the U.S. alone\(^2\)
- The most common cause of secondary lymphedema in the western world is chronic venous insufficiency (phlebolymphedema)
- Cancer and its treatment is actually the second most common cause of secondary lymphedema. Incidence of cancer-related lymphedema is increasing (31% rise incidence from 2007 to 2013)\(^3\)
- Other common causes of secondary lymphedema include obesity, trauma, and surgery

Signs/symptoms

- Edema
  - Expansion of the interstitial space
  - Swelling extends to the toes: Stemmer’s sign
  - Swelling is initially soft with "pitting edema"
  - Induration and Fibrosis
- Pain
  - Rare
  - Aching/heaviness of the limb

Traditional treatment approach

MAINTENANCE NOT CURE

- Mainstays of treatment for lymphedema:
  - Skin hygiene
  - Diet and Exercise
  - Pressure and trauma avoidance
  - Manual lymphatic drainage
  - Compression wraps and elevation
  - Pneumatic Compression
  - (Surgery?)
Pneumatic Compression Device Treatment of Lower Extremity Lymphedema

**Efficacy of Limb Volume and Patient-reported Outcomes**

- **Stage of lymphedema**: Stage II or greater included
- **196 total limbs**
- The cohort was characterized by more female patients (68%)
- Individuals with secondary lymphedema accounted for nearly 80% of the study population
- The follow-up clinical assessment: 60±27 days (range 17-242; median 55.5)

- **90% of APCD-treated patients experienced a significant reduction in limb volume**
- **35% had a limb volume reduction >10%**

**Conclusions from this study:**

- **90% of APCD-treated patients experienced a significant reduction in limb volume**
- **35% had a limb volume reduction >10%**
- **Mean limb volume reduction was 1,150 mL or 8% (p < .0001)**
- **Greater baseline limb volume and BMI were strong predictors of LV reduction (p < .0001)**

**Body Mass Index and Age**

**Figure 3.** The relationship between limb volume change (LV C) and body mass index (BMI). This figure demonstrates that as BMI increases, limb volume (LV) reduction with advanced pneumatic compression device (APCD) treatment also increases significantly. As age increases, LVC tends to decline (p < .05).

**Table 1. Baseline demographics and clinical characteristics**

- **Gender**: Female (46%), Male (54%)
- **Age**: Mean ± SD = 59 ± 15 years (range 16-84; median 64.7)
- **BMI**: Mean ± SD = 32.5 ± 6.2 kg/m² (range 19.0-56.7; median 30.3)
- **Type of lymphedema**: Primary (10%), Secondary (90%)
- **Presence of diabetes**: Yes (40%), No (60%)
- **Presence of CKD treatment**: Yes (30%), No (70%)
- **Duration of diagnosis**: 5 years (40%), >5 years (60%)
- **Presence of obesity**: Yes (20%), No (80%)
- **Presence of smoking**: Yes (50%), No (50%)

**Pneumatic Compression Improves Quality of Life in Patients with Lower-Extremity Lymphedema**

- **100 consecutive patients with lower extremity lymphedema**
- **Presence of lymphedema in the lower extremity > 14 days**
Methods

- Pneumatic compression device was given to all patients for a minimum of 3 months
- Venous duplex ultrasound obtained at initial visit
- Pre- and post-PC data collected on cellulitis, venous insufficiency, ulcers and limb-girth
- Quality of life questionnaire (CIVIQ-2 QOL) administered to all patients at 3, 6 and 12 month follow up.

Results: Questionnaire

Results: Venous reflux & Patient Reported Outcomes

Results: Quality of Life
Study Design:
• Analyzed health insurer administrative database of 34 million individuals
• Identified patients with lymphedema who received the Flexitouch System (total n = 718)
• Examined health outcomes and costs for cancer-related (n = 374) and non-cancer-related (n = 344) lymphedema patients


Follow-Up Ends
Baseline Period (12 months continuous insurance eligibility)
Follow-Up Period (12 months after device use initiated)
Follow-Up Starts
Baseline Begins

First receipt of a PCD (Index Date)

In-patient Visits
Out-patient Visits
Clinic Visits

Episodes of Cellulitis

Conclusions:
keys to long term success
• Pneumatic compression works
• 90% of patients experience a significant reduction in limb volume
• Greater baseline limb volume and BMI may serve as predictors of LV reduction
• Improves symptoms and quality of life in patients with lower extremity lymphedema
• Decreases the number of infectious and wound healing complications and ER visits
• Significant decrease in Lymphedema-related cost per patient (37%)

Which patients benefit from a lymphedema pump?
• Primary Lymphedema
• Secondary Lymphedema
• Post-surgery
• s/p Mastectomy
• Radiation
• Edema following trauma or sports injuries
• Filariasis

Conclusions
Which patients benefit from a lymphedema pump?
Chronic venous insufficiency with C3 or greater
(Possibly earlier?)