Compression

Effects of External Compression

• Improved Venous and Lymphatic Circulation
• Limits the Shape and Size of Tissue

Clinical Indications for the Use of External Compression

• Edema
  – Causes of Edema
Clinical Indications for the Use of External Compression

- Hydrostatic pressure controlled by BP and gravity
- Osmotic pressure controlled by protein concentration inside and outside of vessels

Clinical Indications for the Use of External Compression

- Edema
  - Causes of Edema

Clinical Indications for the Use of External Compression

- Edema
  - Edema due to venous insufficiency
Clinical Indications for the Use of External Compression

- Edema
  - Lymphedema
Clinical Indications for the Use of External Compression

- Venous stasis ulcers

Clinical Indications for the Use of External Compression

- Edema
  - Complications of edema
    - restriction of ROM
    - limitations of function
    - pain

Clinical Indications for the Use of External Compression

- Edema
  - How compression reduces edema
    - increases extravascular hydrostatic pressure (BP) and circulation
Clinical Indications for the Use of External Compression

• Prevention of deep venous thrombosis

Clinical Indications for the Use of External Compression

• Residual limb shaping after amputation

Clinical Indications for the Use of External Compression

• Control of hypertrophic scarring
Clinical Indications for the Use of External Compression

Fig. 14-21: Intermittent compression units.

Fig. 15-16: Intermittent compression being applied to the swollen leg of a patient.
Contraindications and Precautions for External Compression

- Contraindications for the Use of Intermittent or Sequential Compression Pumps
  - Heart Failure or Pulmonary Edema
  - Recent or acute DVT, thrombophlebitis, or pulmonary embolism

- Contraindications for the Use of Intermittent or Sequential Compression Pumps
  - Obstructed lymphatic or venous return
  - Severe peripheral arterial disease or ulcers due to arterial insufficiency

- Contraindications for the Use of Intermittent or Sequential Compression Pumps
  - Acute local skin infection
  - Significant hypoproteinemia - protein levels less than 2g/dL
  - Acute fracture or other trauma
Contraindications and Precautions for External Compression

• Precautions for the Use of Intermittent or Sequential Compression Pumps
  – Impaired sensation or mentation
  – Uncontrolled hypertension
  – Cancer

Contraindications and Precautions for External Compression

• Precautions for the Use of Intermittent or Sequential Compression Pumps
  – Stroke of significant vascular insufficiency
  – Superficial peripheral nerves

Adverse Effects of External Compression

• Aggravation to the underlying condition that is causing the edema
• If too much pressure is used, could cause ischemia and edema
• Monitor for changes in blood pressure
Application Techniques

• Compression Bandage
  – Equipment required

Application Techniques

• Compression Bandage
  – Procedure
Application Techniques

- Compression Bandage
  - Advantages
  - Inexpensive
  - Quick to apply once skill is mastered
  - Readily available
  - Extremity can be used during treatment
  - Safe for acute conditions
Application Techniques

• Compression Bandage
  – Disadvantages
    - When used alone does not reverse edema that is present
    - Effective only for controlling edema formation
    - Requires moderate skill, flexibility, and level of cognition to apply
    - Compression not readily quantifiable or replicable
    - Bulky and unattractive
    - Inelastic bandages are ineffective in controlling edema in a flaccid limb
Application Techniques

• Compression Garments
  – Advantages
    - Compression quantifiable
    - Extremity can be used during treatment
    - Less expensive than intermittent compression devices for short-term use
    - Thin and attractive
    - Safe for acute condition
    - Can be used 24 hours/day
    - Preferred by patients to compression bandages

• Compression Garments
  – Disadvantages
    - When used alone, may not reverse edema that is already present
    - More expensive than most bandages
    - Need to be fitted appropriately
    - Require strength, flexibility, and dexterity to put on
    - Hot, especially in warm weather
    - Expensive for long term use
Intermittent Compression Devices

Intermittent Compression

- Clinical modality used to help reduce the accumulation of edema
- Primarily used for treatment of pitting edema associated with lymphedema
Intermittent Compression

- 3 parameters for adjustment of an intermittent compression device:
  - Inflation pressure
  - On-off time sequence
  - Total treatment time

Inflation pressure

- Correlated to patient’s blood pressure
- Enough pressure is needed to squeeze the lymphatic vessels and force the lymph to move
- Recommended inflation pressures:
  - Upper extremity: 30-60 mm
  - Lower extremity: 40-80 mm

Inflation pressure

- A pressure approximating the pt’s diastolic BP has been used in most treatment protocols
  - Arterial capillary BP is approx 30 mmHg
  - Any pressure exceeding this should promote reabsorption of edema and movement of lymph
- Maximum pressure should correspond to systolic BP
  - Higher pressure would shut off arterial blood flow
On-off time sequence

• Variable protocols
• No supporting research
• Patient comfort is primary
• Lymphatic massage is the primary vehicle used in this therapy, so shorter on-off times may be advantageous
• Longer “on” times are required

On-off time sequence

• Various protocols:
  – 30 seconds on/ 30 seconds off
  – 1 minute on/2 minutes off
  – 2 minutes on/1 minute off
  – 4 minutes on/1 minute off

Total Treatment Time

• Most protocols for primary lymphedema use 3 to 4 hour time frames
• Research shows....
  – Increased lymph flow upon initiation of massage, decreasing over the next 10 minutes, and stopping when massage is stopped
  – Limb volume reduction after 30 minutes
  – 10 to 30 minute treatments seem adequate
Set-up & Instructions

- When treatment is completed, the extremity should be measured
- The extremity should be wrapped with elastic compression wraps to help maintain the reduction
- If not contraindicated, weight bearing should be encouraged to stimulate the venous pump

Indications

- Lymphedema
- Traumatic edema/injury to soft tissue
- Chronic edema
- Stasis ulcers
- Swelling secondary to limb amputation

Indications

- Edema and contractures in the hand resulting from CVA or surgery
- Reduce possibility of developing DVT post-operatively
- Facilitate wound healing following surgery by reducing swelling
Contraindications

- DVT
- Local superficial infection
- Congestive heart failure
- Acute pulmonary edema
- Displaced fractures