Measuring for Pressure Gradient Stockings

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Objectives
Review of vascular system pathology and compression therapy
Discuss different types of pressure gradient stockings
Describe criteria for selection of appropriate Pressure Gradient stockings
Demonstrate how to measure for standard and custom Pressure Gradient stockings
Vascular 1 Review

Arterial system
- Heart-Pump
- Resistant and elastic
- High blood pressure circulation
- No valves
- Oxygenated blood transport

Venous system
- Returns blood to the heart
- Drainage of the blood
- Temperature regulation
- Works against gravity
- Anti-reflux valves
Composition of Venous System

- Superficial Veins
  - Located outside of the deep muscle fascia. Not walled in by the muscles
  - Great extensibility capability
  - Great reserve of blood
  - Long & short saphenous veins

- Perforating Veins
  - The connectors between superficial veins and deep veins
  - Cross the muscles obliquely
  - Dodd, Boyd, and Cockett veins
Deep Veins
Circulate between the conjunctive fibrous membranes of the muscles
Drainage and means of transport towards the heart
Femoral veins, popliteal, anterior-tibial, posterior-tibial and peroneal

Venous Return to the heart
Low pressure in veins
Blood in legs is far from heart
Force of gravity

Mechanisms of Venous Return
1. Unidirectional valves
2. Leg muscle pump
3. Foot sole and ankle pump
4. Respiratory pump
Valves in veins

One-way valves prevent blood from flowing backward and allow only movement toward the heart.

Calf-muscle pump

Contracting calf muscles compress against vein walls, setting blood in motion through the one-way valves.

Foot sole and ankle pump

- Veins in the sole of the foot are compressed.
- The calf muscle can only function efficiently if mobility of the ankle joint is unimpeded.
Respiratory pump

Pressure changes induced in the thoracic cavity by breathing sucks blood upward toward the heart

Normal venous return flow

Blood flow upward toward heart & from the superficial veins to the deep veins

Venous pressure at ankle

Lying 10mmHg  Standing 90mmHg  Walking 25mmHg
Venous pressure

How do varicose veins appear

- Lack of exercise, prolonged sitting or standing positions
- Inherited weakness of veins walls
- Dilation of the veins, diameter increase
- The valves do not close properly and therefore become incompetent
- Reflux of blood increases the pressure in veins

Compression Stockings

- Gradient compression
- Maximum comp. at ankle & decreases gradually up the leg
- Limit the extensibility of veins & swelling
- Speeds up venous return
- Supports the calf muscle
How compression stockings work?

Compress the legs & superficial veins of the legs
Increase tissue pressure (leading to decreased edema)
Reduce vein caliber/diameter
Accelerate blood flow
Helps the closing of valves

How compression stockings work?

Decrease the backwards flow of blood (reflux)
Relieves stress on vein walls by reducing ambulatory venous pressure
Assist the contraction of venous muscle pump
Restores venous hemodynamic circulation

Venous Pathologies
Causes & Risk Factors of Venous Insufficiency

- Family history
- Prolonged periods of standing or sitting
- Sedentary life-style
- Pregnancy
- Hormones, oral contraceptives
- Diet/obesity
- Age
- Trauma or invasive surgery
- Infectious diseases

Signs of Venous Insufficiency

- Tiredness
- Heaviness
- Aching legs
- Burning legs
- Swelling in legs
- Throbbing in legs
- Itchy legs
- Prickling legs
- Oedema of legs at the end of the day

Venous vs. Arterial Insufficiency

- **Venous insufficiency** is a condition in which the veins fail to return the blood efficiently to the heart. It is characterized by inadequacy of the venous valves.

- **Arterial insufficiency** is inadequate blood flow through the arteries. The amount of blood flowing through an artery is insufficient to meet the needs of the tissue.
Signs of Arterial Insufficiency

- Pain in the affected area
- Cramps
- Exacerbations of symptoms with activity
- Symptoms improved with rest
- Pale limb
- Loss of hair on limb
- Pins and needles
- Absent or diminished pulse
- Cold limb

Varicosities

Often Called “Spider vein”
Not painful

They often indicate underlying varicosities

Venous Ulcers

Often situated on the inside of the ankle
Damage to the valves and membranes of the deep veins
Congestion and destruction of tissues due to a lack of oxygenation

Important: All infection must be under control before applying compression.
Venous Ulcer Treatment

- **Phase 1:** Dressing and compression bandages

- **Phase 2:** Once the wound is almost healed and the edema is reduced, proceed with pressure gradient stockings of appropriate compression level

- **Pressure gradient stockings for life.**

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**Do! Good Habits**

- Walking and frequently moving the legs
- Do sports that stimulate the leg muscles: running, bicycling, swimming...
- If possible, elevate legs when sitting or lying down
- Keep a healthy weight
- Cold legs shower

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**Avoid! Bad habits**

- Long standing or sitting position
- Long sun tanning periods
- Hot bath
- Crossing legs
- Wearing very tight clothes or shoes
- Wearing very high heels
Pressure Gradient Stockings

Types of Pressure Gradient Stockings
- Anti-emboli stockings
- Support stockings
- Medical grade stockings:
  - Class I
  - Class II
  - Class III

Anti-embolism stockings
Compression around 18 mmHg
Prevention of DVT
Bed ridden, Non-ambulatory
Post-surgical, trauma, delivery
White with open toe
Knee, thigh, thigh w/ waist attachment
Support stockings
Compression 15 to 20 mmHg
Prevention and comfort
For heavy and tired legs
No oedema or varicose veins
Sizes: height, weight, shoe size
Not fitted. Not precise.
Compression estimated or unstated.
Fashion

Medical compression stockings
Compression 20 to 60 mmHg
Graduated compression
Treatment, prevention and comfort
Treatment of venous and lymphatic disorders
Designed for ambulatory use
Size chart measurements fitted
Require measurements
Medical & Fashionable form

What compression to use for each medical condition???
**Class I** – 20-30 mmHg
(Moderate medical compression)

- Mild venous insufficiency
- Aching, tired and heavy legs
- Little varicosities
- Minimal oedema
- Post-sclerotherapy of small veins
- Prophylaxis & little varicosities during pregnancy
- Lymphoedema upper extremity (stage 1)
- Scar formation after burns

**Class II** – 30-40 mmHg
(Firm medical compression)

- Chronic venous insufficiency (grade 1, 2)
- Moderate varicose
- Moderate oedema
- Venous ulcers (management and prevention of recurrence)
- Post-thrombosis syndrome
- Moderate varicose and oedema during pregnancy

**Class II** – 30-40 mmHg
(Firm medical compression)

- Post-phlebitis syndrome
- Post-phlebectomy, post-stripping, post-endovenous laser
- Post-fracture & post-trauma oedema
- Orthostatic postural hypotension
- After treatment of anti-coagulant for DVT
- Lymphoedema (stage 2 & primary)
- Stasis dermatitis due to CVI
Class III – 40-50 mmHg
(Very firm medical compression)

- Severe Chronic venous insufficiency (grade 2, 3)
- Severe varicose
- Severe oedema
- Severe recurrent venous ulcers
  (grade 3a)

Class III – 40-50 mmHg
(Very firm medical compression)

- Severe post-phlebitis syndrome
- Severe post-thrombotic syndrome
- Severe post-fracture & post-trauma oedema
- Severe orthostatic postural hypotension
- Chronic venous problems after surgery
- Lymphoedema (grade 3, 4 and primary)

4 Points to Consider when Selecting the Type of Stocking

1. Shape of the leg
2. Severity of disease
3. Activity level
4. Physical ability
Cautions

- Signs of infection
- Extensive venous ulceration
- Skin sensitivities or allergies
- History of diabetes
- Neuropathy
- Confinement to bed or non-ambulatory use unless otherwise prescribed by physician

Contra-indications

- Arterial insufficiency
- Severe peripheral arterial disease
- Acute DVT
- Intermittent claudication, ischemia
- Uncontrolled, decompensated congestive heart failure
- Acute dermatitis, seeping dermatosis, cutaneous infections
- Septic phlebitis

Measuring Aids & Helpful Hints
Practical Issues

How to measure and where

Application of stockings

Instructions to clients

Measuring aids and hints

Where to measure

Calf

Pantyhose and Thigh-Hi
**Landmarks**

Base of first metatarsal  
Instep & Heel  
Smallest of the ankle  
Base of calf or midpoint between ankle and calf  
Biggest part of the calf  
2 fingers or 2.5 cm down the fold of the knee

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**Landmarks – Knee length**

- Base of the first metatarsal  
- Instep & heel  
- Smallest of the ankle  
- Base of calf or midpoint between ankle and calf  
- Biggest part of the calf  
- 2 fingers or 2.5 cm down from the fold of the knee

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**Landmarks – Thigh length**

- Patella apex  
- Mid-thigh  
- Biggest part of the thigh about 3 fingers down from the crotch
Landmarks – Pantyhose

- Larger part of thighs at crotch
- Hip bone
- Waist

Made to measure Pressure Gradient Stockings

Metatarsal circumference (A)

Foot circumference (B)

- Leg has to be level on the stock
- Foot not at 90° position to floor
- Measure circumference depending on model
Foot length

Foot length (W):
Open toe: / straight and level
Measure length from head to heel of foot.

Foot length (T):
Diameter:
Measure length from weight-bearing foot.

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Leg circumferences

--- Measure lengths in standing position ---

 Knee (E):
See following information.

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Patella apex circumference (E)

**Circumference measure with NO tension**

Mid thigh (F) and thigh (G) circumferences

**Leg length**

1. Leg length (E)
   - a. Leg lies relaxed on the couch
   - b. Hold foot in 90° plantar and measure length to E
   - c. In terms of transverse plane head, always measure along the axis of:

   - Leg length (G)
   - Leg length (F)
Panty measurements

Buttock and crotch circumference (K)

Hips circumference (L)
**Waist circumference (M)**

![Image showing how to measure waist circumference.]

*Figure 14: Measure around the waist.*

**Panty length**

![Image showing how to measure panty length.]

*Figure 25 and 26: Measure from crotch to waist front and back.*

**Lengths**

All lengths are taken straight from the ground to landmarks

***NOT FOLLOWING CONTOURS***

NB: Please give total length from ground to waist.
Donning & Doffing devices

Good reasons to use gloves

• Better grip
• Facilitates application
• Protects stockings
• Equal distribution of compression

How to put them on… with gloves

Reverse technique
Butler-Off

To remove stockings
For people that cannot bend over

Care of Stockings

- Wash stockings every day to maintain their effectiveness
- Can be handwashed in luke warm water or machine washed in a laundry bag
- Liquid laundry soap such as Tide, Sunlight, or Artic Power can be used
- Choose a detergent with NO softener or bleach
- Any other types of detergent like shampoo, dishwasher soap, should not be used because they can damage the fibers and elasticity of the stockings
- Make sure they are rinsed well
- Lay flat to dry

References


