



Intermittent Pneumatic Compression Therapy –(IPCT)

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Outlines

- What is IPC?
- Characteristics of IPC Devices
- Physiological Effects of IPC
- Treatment techniques of IPC
- Indications for IPCT
- Contraindications for IPCT
- Potential complication and percuations of IPC
- Intermittent Pneumatic Compression advantage/disadvantage
- Technique of application
- Evidence bases and clinical guideline for use of IPC

What is IPCT?

- **Intermittent pneumatic compression (IPC)** is a mechanical therapeutic modality that include an air pump that intermittently inflates supportive sleeves, gloves or boots around an edematous part to improve venous and lymphatic circulation.

IPCT has the following Treatment Parameters

- ❖ Inflation Pressure
- ❖ On/Off Time Sequence
- ❖ Total Treatment Time



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Types IPC Devices: Non-segmental pneumatic pump

Non-segmental single Chamber:

Single cuff that expands (inflation) and contracts (deflation) applying uniform pressure against the limb.

No manual control over pressure distribution

No pressure gradient exists.

Not optimal for lymphedema management

Adjustable pressure range 1-100mmHg (therapeutic range 25-30mmHg)

Pre-set inflation/deflation cycle



Types IPC Devices: Segmented without manual control

Multiple chambers (2-12) which

Inflate sequentially from distal to proximal until

(all are inflated and then all deflate together).

Each chamber may have fixed pressure or pressure gradient

(pressure gradient is achieved by the limb contours).

Limited pressure programming options and are not independently adjustable

These pumps can treat one or two legs or arms

Sequential Circulator SC-2004 E0651

Pressure Range: 0-125mm Hg

Cycle Time: 18secs per chamber

Inflation: 72secs

Deflation: 18secs

Used with 4 chamber garment

Bilateral operation available



Types of IPC Devices: Multi-Chamber segmented, calibrated

Gradient pressure exists; higher pressure in the distal chambers & lower pressures in the proximal chamber

Exhibit at least three zones of pressure; some pumps allow adjustment of each chamber.

Enabling adjustment of the level and location of compression

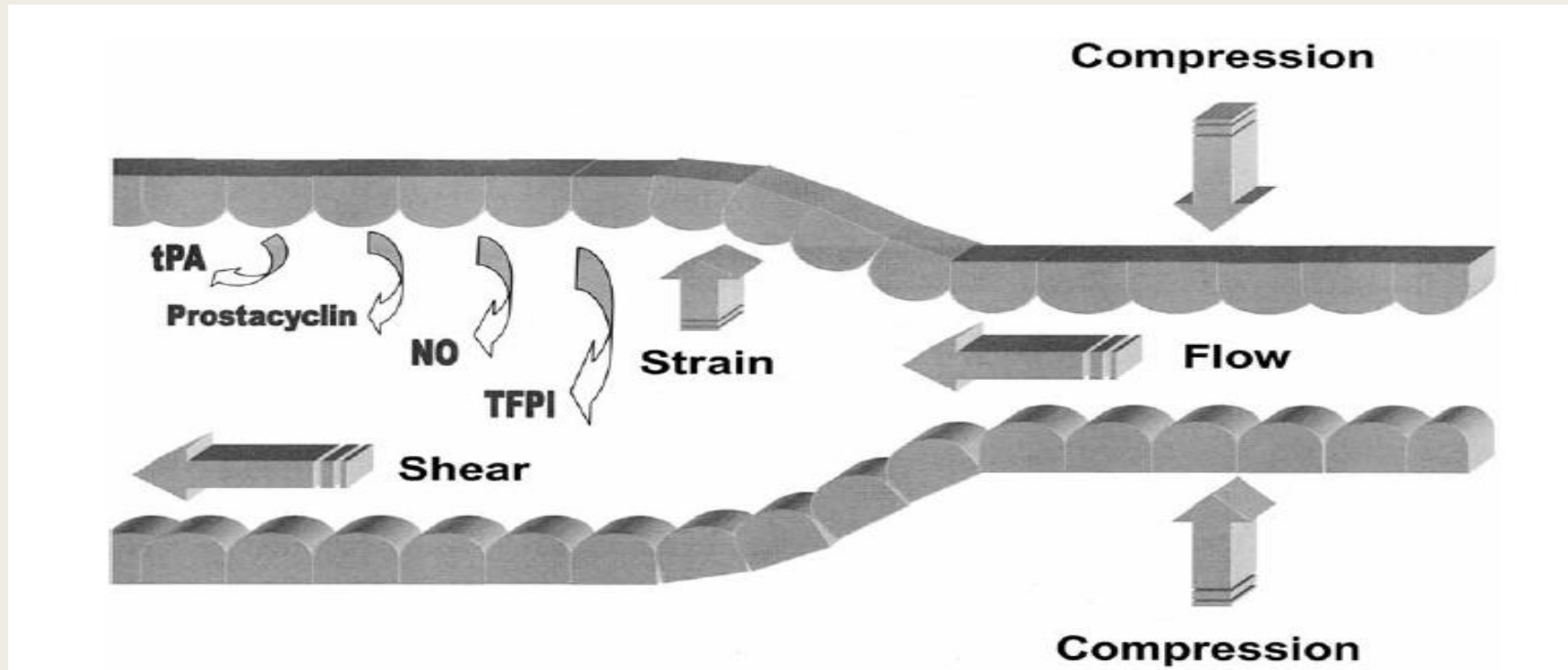
May have from 4 to up to 36 chambers



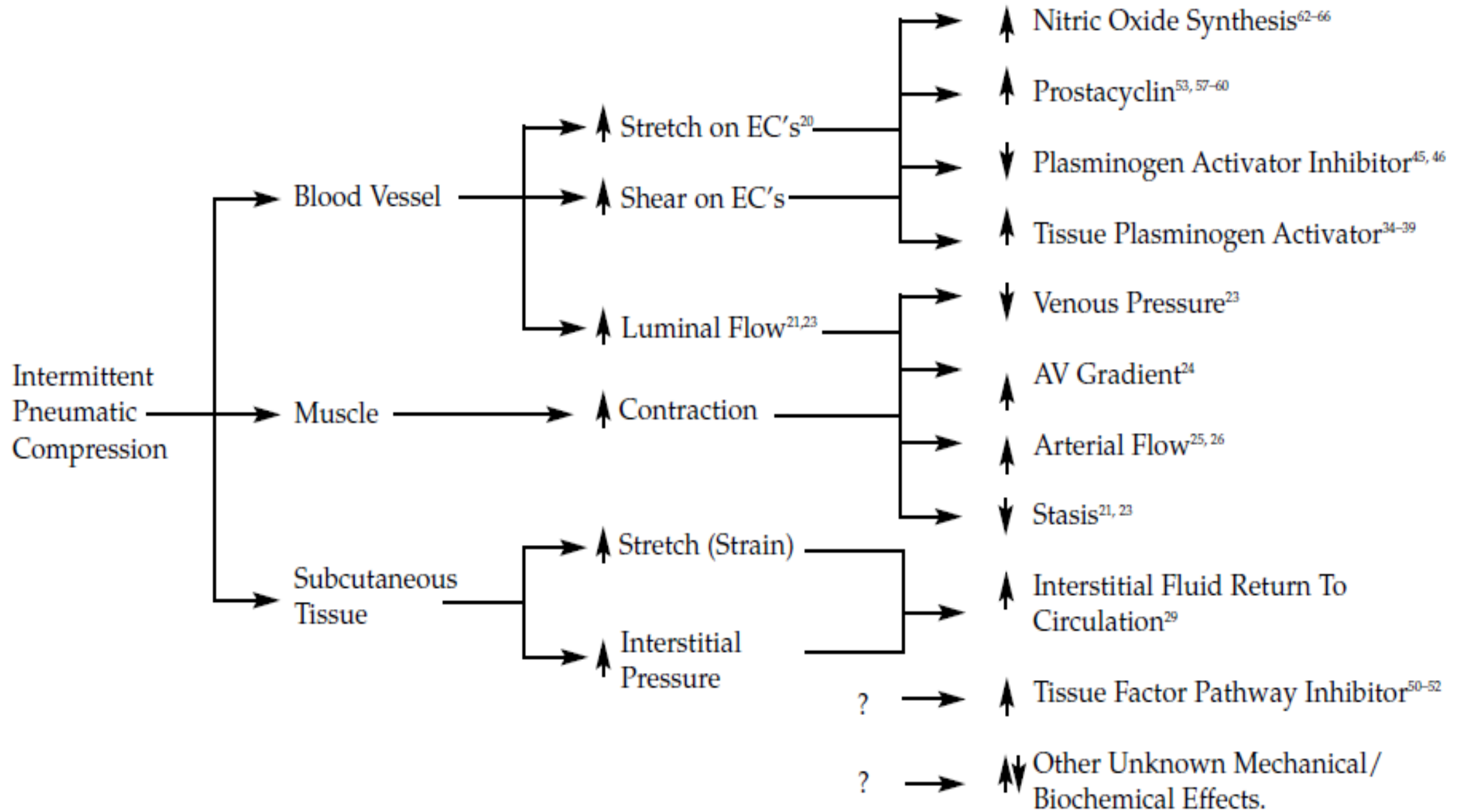
Physiological Effects of IPCT

Mechanical pressure reduces edema

- Forces venous fluids proximally
- Decreases capillary filtration pressure, (*limiting formation of edema*)
- Increased lymphatic uptake
- Improved absorption and removal of waste products



Physiological Effects of IPCT



Physiological Effects of IPCT

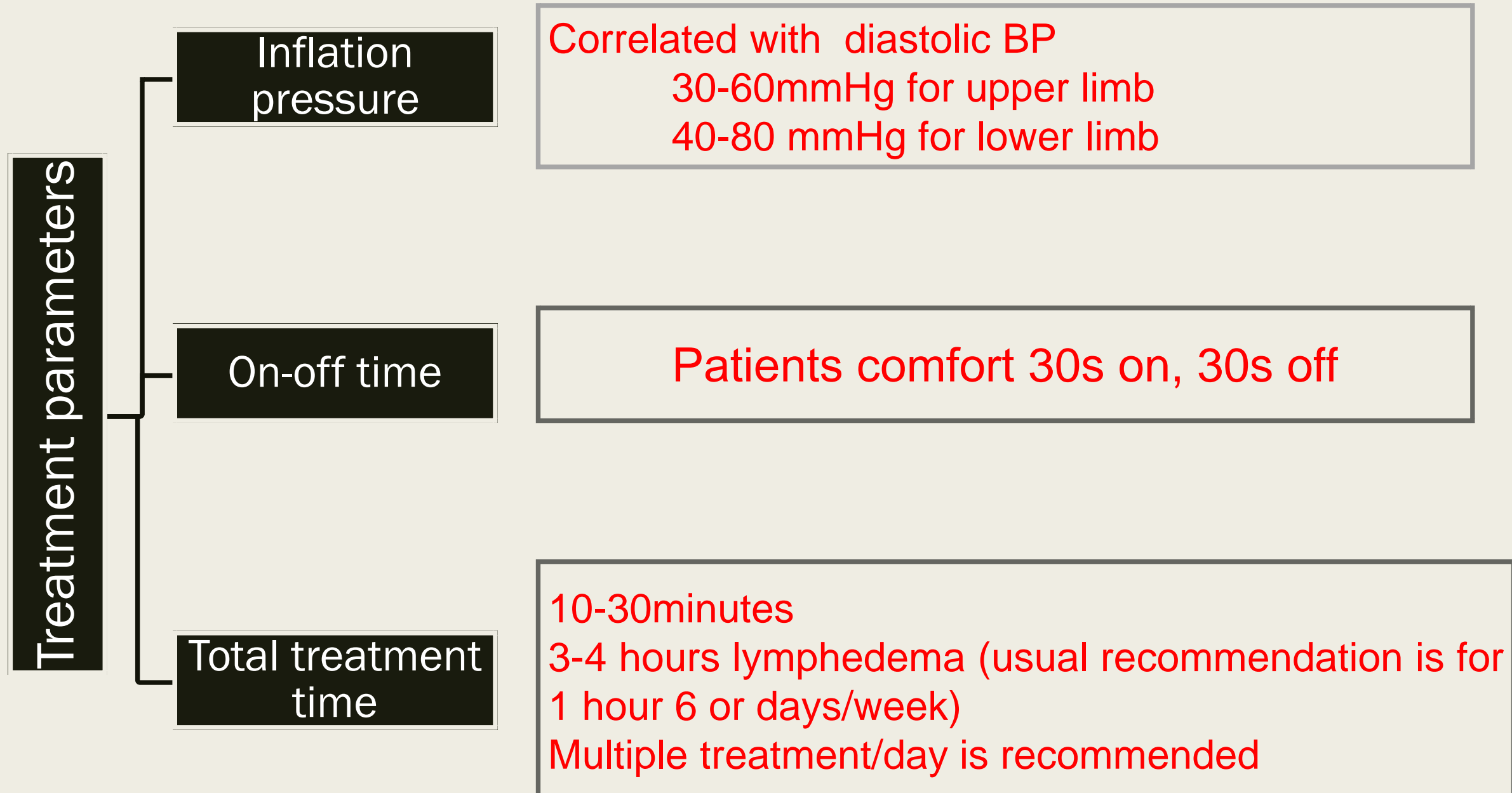
Reduces neuromuscular inhibition

Improves range of motion

Decreases pain

- *Decrease pressure on nerve endings lead to decrease mechanical pain*
- *Improved vascular function decreases chemical pain*
- *Improved blood/oxygen supply*

Treatment techniques of IPC



Indications for IPCT

- Primary/Secondary lymphedema,
- Venous insufficiency,
- Venous stasis ulcers,
- Dysfunction of the muscle pump like
Intermittent claudication
Discomfort leg fatigue
- Posttraumatic edema
- Postoperatively to reduce the possibility of developing a DVT
- Facilitate wound healing following surgery



Contraindications for IPC

IPCT is not recommended in the presence of one or more of the following:

- Deep vein thrombosis and/or pulmonary embolism;
- Acute infection of the affected limb (e.g. cellulitis) ;
- Severe arteriosclerosis or other ischemic vascular disease **ABI >0.8**
- Heart disease, Acute pulmonary edema, Renal failure
- Displaced /unstable fracture
- Recent skin grafts
- Compartment syndrome
- Pregnancy
- Gangrene
- Dermatitis

Potential Complications and Precautions

- Neuropathy e.g. Peroneal nerve palsy
- Neurovascular compression
- Too much pressure may result in ischemia
- Compartment syndrome
- Genital lymphedema
- The pressure applied should not exceed the diastolic blood pressure
 - *Upper extremity: 30 to 60 mm Hg*
 - *Lower extremity: 40 to 80 mm Hg*
- Wrinkling of underlying Stockinet may result in high-pressure areas

Intermittent Pneumatic Compression

Disadvantages: -

- Do not mobilize protein effectively.
- If used as the sole treatment, fluid returns.
- May not decongest the adjacent trunk.
- Can cause swelling in the adjacent trunk.
- High cost: \$ 1,000 to 9,000.

Advantages: -

- ❖ Increase total tissue pressure.
- ❖ Can soften the limb and squeeze out water.
- ❖ Relatively easy to use.
- ❖ Programmable pumps can simulate MLD
- ❖ Usually covered by insurance.

Tips for Clinical Application of Intermittent Compression



Preparation of the Treatment

- Establish the absence of contraindications.
- Remove any jewelry on the extremity being treated.
- Determine the patient's diastolic blood pressure.
- Note the girth measurement of the body part being treated.
- Cover the area to be treated with Stockinet™ or similar material.
 - *Care must be taken to ensure that this inner layer is free of wrinkles.*
- Select the appropriate appliance for the extremity being treated.
- Insert the injured limb into the appliance.
 - *When full-length appliances are used, avoid bunching the garment in the axilla or groin.*
- For best results, elevate the limb during treatment.
 - *Inflate fluid-filled units before elevating the body part.*
- Connect the appliance to the compression unit.

Initiation of the Treatment

■ Select PRESSURE

-30 to 60 mm Hg for the upper extremity

-40 to 80 mm Hg for the lower extremity

■ Select the ON-OFF times.

– *A 3:1 duty cycle (e.g., 45 seconds ON, 15 seconds OFF) is often used*

– *Effects of these ratios has not been substantiated*

■ Select the appropriate TREATMENT TIME.

– *Post-traumatic edema: 20 to 30 minutes.*

– *Lymphedema: several hours.*

Initiation of the Treatment

- Inform the individual about the sensations to be expected during the treatment.
- Instruct the patient to perform gentle range-of-motion (ROM) exercises during the off cycle, if appropriate:
 - *Wiggle the fingers (upper extremity treatments) or*
 - *Wiggle the toes (lower extremity treatments).*
- If long-term treatments (i.e., more than 60 consecutive minutes) are being administered, regularly interrupt the session and inspect the extremity being treated for proper capillary refill and sensation or the presence of unusual marking or unexpected pitting edema.

Alternate Applications +IPCT

- Combination of cold and compression

Temperature adjustment ranges between 10 - 25oC

- Elevate the extremity

- *Gravity assists in venous/lymphatic return*

- Electrical Stimulation

- *Motor-level stimulation provides muscle pump*



Termination of the Treatment

- Reduce the ON time or select the DRAIN mode to remove the air or fluid from the appliance.
- Allow the appliance to deflate
- Gently remove the body part from the appliance.
- Re-measure the circumference of the extremity and determine the amount of edema reduction.
- Apply a compression wrap and any appropriate supportive devices.
- Encourage the patient to keep the limb elevated whenever possible between treatments.