Edema

Causes, Types, Measurement & Management in Physical Therapy
Review Last Lecture
Edema

Definition:

- A local or generalized condition in which the body tissues contain an excessive amount of tissue fluid. (Taber’s Medical Dictionary)
Edema

**Etiology:**

- May result from
  - Increased permeability of the capillary walls
  - Increased capillary pressure due to venous obstruction or heart failure
  - Lymphatic obstruction
  - Disturbances in renal functioning
  - Chemical substances such as bacterial toxins, venoms, caustic substances, histamine
Edema

- Lymphatic and Venous System
  - “the fluid and transport systems in the body”
Edema

Pathophysiology

- Accumulation of excess fluids in the spaces between the cells of tissues (interstitial spaces)
- Two Types
  - Lymphatic & Venous
Edema

- **Lymphatic**
  - Plasma proteins in the tissues stagnate and a mechanical insufficiency of lymph drainage
Edema

- **Venous**
  - Increased capillary pressure and venous obstruction
Edema

- **Localized**
  - Venous or lymphatic obstruction
  - Increased vascular permeability
  - Tends to be limited to one area of the body
    - May be bilateral
  - May be the result of trauma, infection or obstruction
Edema

**Generalized**

- Systemic process that occurs with chronic illnesses
  - Advanced cardiac disease
  - Kidney failure
  - Liver disease
- Usually apparent in both LE, groin, and abdomen
  - May exhibit whole body edema
Edema

- **Generalized**
  - Congestive heart failure
    - Retention of both sodium and water
    - Spreads from the distal LE and spreads proximally
Lymphedema

**Lymphatic System**

- Removes excess proteins that have escaped from blood vessels returning it to the blood
  - Main lymph ducts
- Removes waste excreted from body tissue
  - Fluid contains phagocytes and lymphocytes
    - Both trap and destroy invading cells
Lymphedema

- **Lymphatic Considerations**
  - Without phagocytosis and lymphocytes
    - The individual is susceptible to infection
    - The immune system is compromised
    - Extreme vulnerability to disease
Lymphedema

- Characteristics of Lymphedema
  - Pitting edema
    - Due to accumulation of thick proteins in interstitial space
    - Returns to pre-pit within 30 seconds
  - Turgor
    - Tone of edematous tissue
    - Hard = more chronic
Lymphedema

- **Characteristics of Lymphedema**
  - Hard turgor (chronic)
    - Contributes to loss of ROM
    - Loss of function
    - Sensory impairment
    - pain
Edema

- **A symptom, not a disease!**
  - It is a safety valve to displace fluids into the interstitial space rather than overloading the heart
  - Treating its cause can alleviate the problem
Edema becomes apparent when the interstitial fluid has reached a level at least 30% above normal.
Signs & Symptoms of Edema

- **Acute Edema**
  - Rapid onset after known injury
  - Redness
  - Warmth
  - Painful to palpation or movement
  - Localized
Signs & Symptoms of Edema

- **Chronic Edema**
  - Hard turgor
  - Skin changes
    - Loss of hair growth
    - Loss of normal skin creases
    - Loss of tissue elasticity
Signs & Symptoms of Edema

- **Venous Edema**
  - Slowly progressive
  - Moderate warmth
  - Dusky color or brownish staining of skin
  - Achy pain as day progresses
  - Normal contours of leg are lost
Signs & Symptoms of Edema

- **Lymphatic**
  - Slowly progressive
  - Mild warmth
  - Color changes are rare
  - Usually painless
  - Sensation of fullness or heaviness in limb
  - Soft & pitting or hard
  - Asymmetrical in comparison of limbs
Edema Assessment

Key Components

- **Infection**
  - Assess with a skin thermometer
  - Compare affected and unaffected sides
  - Comparisons must be performed at room temperature
  - Note pre-existing conditions that may affect skin temperature
Edema Assessment

Key Components

- **Circumferential measurements**
  - Must be taken at designated landmarks
  - Taken at the same time of day
    - With the same tool
    - By the same person
  - Compare affected and unaffected sides
Edema Assessment

Key Components

- **Range of Motion and Muscle Testing**
  - Assess baseline function of involved limb
  - Note if any limitations are due to pre-existing conditions
  - Note if limitations are due to excessive weight or edema of body part
Edema Assessment

- **Key Components**
  - **Neurologic Assessment**
    - Assess sensation including
      - hot/cold
      - Sharp/dull
      - Localization
      - Light touch
Edema Assessment

Key Components

- **Neurological Assessment**
  - Check reflexes
  - Look for
    - Muscle wasting
    - Changes in hair growth
    - Patterns of skin
    - Skin texture
Edema Assessment

Key Components

- **Assess Tissue Quality**
  - Check for color, temperature, wounds, rashes, and texture changes
  - Palpate for sensitive areas, changed in muscle bulk, tissue resistance, temperature changes
Edema Assessment

Key Components

- **Photograph**
  - Take a pre-treatment photograph of affected and unaffected body parts
Edema Assessment

- Conditions that may Skew Circumferential Measurements
  - Use of a diuretic
  - 10 pound weight gain or loss
  - Additional medical problems
  - Change in treatment regimen
Edema Management

- Patient education is critical to success
- Patient compliance is critical to success
- Duration of treatment may consist of many months for lymphedema
Edema Management

- **RICE**
  - Intervention of choice in the first 24-72 hours after injury
  - Rest
  - Ice
  - Compression
  - Elevation
Edema Management

- **Massage**
  - Assistance in lymphatic return
  - Psychological benefits
  - Natural enhancement of the movement of fluid
Edema Management

- **Retrograde massage**
  - 20-30 mmHg of pressure
    - More may block lymphatic vessels
  - Clear proximal areas before distal areas
  - Should be comfortable and relaxing for the patient
Edema Management

- **Retrograde Massage**
  - Time consuming
  - One on one therapy
Edema Management

- **Exercise**
  - Enhances venous & lymphatic flow
  - Can do exercise in combination with compression
    - Isometric exercise during intermittent compression pumping
    - Walking with compressive bandage on LE
  - Elevating the limb during exercise enhances edema reduction
Edema Management

- **Exercise**
  - Aerobic exercises often prescribed for patients with edema
  - Aquatic exercise beneficial for patients with LE edema & a stable CV system
    - Be aware of excessive warmth
Edema Management

- **Non-mechanical Compression**
  - Required to maintain benefits of edema reduction level
    - Compression bandaging
    - Compression garments
Edema Management

**Compression Bandaging**

- **Short stretch**: provides low pressure @ rest & high pressure when limb is moving
- **Long stretch**: provides high pressure @ rest & low pressure when limb is moving
- Short stretch is preferred to reduce edema b/c they provide a better pumping effect in combo with the patient’s muscle when they move
- Long stretch bandages should always be removed at night
Edema Management

- **Contraindications** for bandaging
  - Active infection
  - Recent thrombophlebitis
  - Pulmonary embolus
  - CHF

- **Precautions**
  - Arterial disease
  - DM
  - Decreased sensation
  - Metastatic disease
Edema Management

**Compression Garments**

- Used to **MAINTAIN** a limb size & prevent re-accumulation of fluid during the day when the limb is dependent
- Cannot be expected to reduce a chronic edema
- They provide gradient pressure to the limb
- Off-the-shelf sizes or custom made
Edema Management

Compression Garments continued

- Contraindications
  - Acute thrombophlebitis/infection
  - Cardiac edema
  - Acute vascular blockages

- Precautions
  - Active cancer
  - Decreased sensation
  - Arterial compromise
Edema Management

- **Mechanical Compression Devices**
  - Pneumatic Pump
    - Most commonly filled with air, otherwise water
    - Fills in a sequential or non-sequential pattern
    - (One chamber or many chambers)
    - If sequential, then fills distal to proximal
    - Parameters commonly controlled by PT/PTAs include
      - Inflation pressure
      - On-time/off-time cycle
      - Total treatment time
Edema Management

- **Mechanical Compression Devices continued**
  - **Inflation pressures**
    - Set pressure below patient’s diastolic BP to avoid occluding the arteries
    - Recommend 30-60 mmHg for UE
    - Recommend 40-80 mmHg for LE
  - **On-time/Off-time cycle**
    - No research
    - Unable to adjust this on some devices
  - **Total treatment time**
    - 30 minutes up to 6-8 hours
Edema Management

- **Mechanical Compression Devices**
  - Intermittent pressure can
    - Facilitate edema reduction
    - Normalize tissue texture
    - Increase patient comfort
Edema Management

- **Mechanical Compression Devices**
  - Intermittent pressure
    - Apply an orthopedic stockinette
    - Then the appliance
    - Patients may need to urinate frequently
      - This is to be expected
Edema Management

- Mechanical Compression Devices
  - Contraindications
    - Patients with:
      - Active Infection
      - Long standing, hard, unremitting edema
      - Cardiac disease (CHF)
      - Altered cognitive status
      - Active malignancies
      - Unstable fractures
      - Recent thrombophlebitis
      - Pulmonary emboli
Edema Management

- Follow with compression garments to maintain reduction
- May require lifelong monitoring
Edema Management

**Electrical Stimulation**

- Can achieve rhythmic contraction of muscles in an area of localized edema, enhancing the musculoskeletal pump
- Used below the threshold to elicit muscle contraction can be used to repel proteins
- Most easily used for hand edema
Edema Management

- **Reduction in Edema**
  - Increases the patient’s mobility
  - Softens soft tissue
  - Improves skin integrity
  - Generally makes the patient feel more comfortable
Wrap Up

- Share one new thing you learned today with the class (make sure everyone can hear you)
- Call on the next classmate to do the same
- You MAY NOT repeat what someone has already said
Recap of Lecture

- Definition of Edema
- S&S of edema
- Management of Edema
  - RICE
  - Massage
  - Exercise
  - Non-mechanical compression
  - Mechanical Compression device
  - E-stim
Questions???