DIFFERENTIAL DIAGNOSIS OF EDEMAS
UNDERSTANDING THE PHYSIOLOGIC BAYOU

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NOT ALL SWELLING IS EQUAL

- Edemas - 30+ medical causes of edema
  - Including but not limited to:
    - CHF
    - CVI*
    - DVT
    - Renal Insufficiency
    - Dependent edema
    - Lymphedema*
    - Phlebolymphedema
    - Lipedema
    - Lipolymphedema
    - Malignant lymphedema
    - Anasarca
    - Myxedema

Differential diagnosis based upon history, physical and clinical presentation of ‘edema’

Compression is cornerstone therapy!
It is the foundation for success when used properly

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EDEMA

• Presence of abnormal amounts of fluid in the extracellular tissues

• Equilibrium is maintained by the balance between the hydrostatic and osmotic pressure inside and outside the blood vessels
  • hydrostatic pressure determined by blood pressure, effects of gravity
  • osmotic pressure determined by concentration of protein inside and outside the vessels
BODY FLUID DISTRIBUTION

Total Body Fluid
40 liters in 70 kg man

- Intracellular Fluid
  25 liters (62%)

- Extracellular Fluid
  15 liters (38%)

  - Interstitial Fluid
    12 liters

  - Intravascular
    3 liters (plasma)

Content of interstitial fluid exists in a “free fluid” and a tissue “gel” state
- in healthy individuals most ISF is in a gel state
- any large concentration of fluid is edema
DRY STATE (GEL STATE)

- Negative pressure in interstitial fluid normally (less than atmospheric pressure)
  - vacuum
  - keeps excess fluid to minimum in tissues
- Above 0 mmHg ISF = edema
  - physical cause of edema is positive pressure in the interstitial spaces
    - at +3 mmHg ISF = 3-4x ISF amount
    - at +8 mmHg ISF = 20x ISF amount
- Improves rate of nutrient diffusion
TWO OPPOSING FORCES MOVING FLUID ACROSS CAPILLARIES

- Hydrostatic Pressure
  - Favors filtration of plasma out of capillaries

- Osmotic Pressure
  - Favors osmotic movement of interstitial fluid into capillaries

HYDROSTATIC PRESSURE DIFFERENCES

<table>
<thead>
<tr>
<th>arterial end</th>
<th>capillary</th>
<th>venous end</th>
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<td>30 (25) mmHg</td>
<td>18 mmHg</td>
<td>10 mmHg</td>
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Interstitial Tissue Pressure

- 6 mmHg

Difference = 24 mmHg
diffuse out of capillary
**OSMOTIC PRESSURE DIFFERENCES**

- Plasma colloid osmotic pressure = **28 mmHg**
- Interstitial colloid osmotic pressure = **4 mmHg**

**Osmotic Pressure Difference (into the capillary)**

= **24 mmHg**

**STARLING’S HYPOTHESIS OF THE CAPILLARY (LAW OF THE CAPILLARY)**

- Normal state of equilibrium
- Hydrostatic Pressure Diff (**24 mmHg**) = Colloid Osmotic Pressure Diff (**24 mmHg**) across the capillary
  - EQUAL
- Explains how circulation keeps blood volume
PROBLEM WITH VASCULAR SYSTEM

• Normally small leakage of plasma protein from capillaries
• Only way to return protein is through LYMPHATIC SYSTEM

LYMPHATIC CAPILLARIES

• Most important function - returns protein to circulation
• One way route from interstitium to blood
• Arise as blind end capillaries
• Present except cornea and CNS
• Permeable to protein - helps maintain dry state in interstitial fluid
Chronic venous insufficiency

High filtration pressure/increased fluid in tissues

Waterload exceeds lymphatic transport capacity

Low protein edema

Lymphatic damage

Lymphatic hypertension leads to fibrosclerosis

Lymphedema is underlying pathology contributing to formation of venous ulcers
DIFFERENTIAL DIAGNOSIS
LYMPHEDEMA & LIPEDEMA

CLINICAL DIFFERENCES

Lymphedema

Lipedema
CLINICAL DIFFERENCES

LYMPHEDEMA
- Not symmetric
- Feet involved
- Pitting edema*
- Positive Stemmer sign
- Tissue feels firm (stage 2)
- Generally not painful to touch
- Generally no bruising
- Generally no hormonal imbalances

LIPEDEMA
- Symmetric, buttocks involved
- Feet spared
- No pitting/mild pitting
- Negative Stemmer sign
- Tissue feels rubbery
- Painful to touch
- Easy bruising
- Frequent hormonal disturbances

CLINICAL DIFFERENCES
LYMPHEDEMA & LIPEDEMA
- Primary or secondary lymphatic malfunction/dysfunction
- Often associated with CVI
- Inflammation/fibrosis
- Feet and other body regions may be involved
- Pathologic deposition of fatty tissue leading to progressive leg enlargement
- Often misdiagnosed as lymphedema
  - Can result in secondary lymphatic dysfunction leading to lipolymphedema
- CVI not common
  - Minor impairment of venous function
CLINICAL DIAGNOSTIC TESTS - LYMPHEDEMA

- Dx typically from history and physical
- Dx tests do exist (lymphangiography, lymphoscintigraphy, CT, MR, US)
- Positive Stemmer’s sign
- Deepening of natural skin folds
- Unilateral or bilateral
  - If bilateral, edema is asymmetrical
- Persistent edema
- Non-pitting edema
- Fibrotic skin changes

CLINICAL DIAGNOSTIC TESTS - LIPEDEMA

- No diagnostic tests for lipedema; Based on exam and history
- Difficult to dx in overweight/obese individuals
- Primarily affects women
- Onset typically during teenage years or in third decade of life
- Bilateral, symmetrical enlargement of LEs with sparing of the feet
- Condition is progressive
- Stove pipe appearance of legs
- Fat pad sign at medial ankles
- Skin normal in color
- Min/mild pitting edema
- Tender to pressure
- Easy bruising
- Psychosocial issues
- Diet resistant
- Edema is orthostatic; resolves with rest
- Aching dysesthesia
SUMMARY

References

7. www.lymphedemapeople.com
DIFFERENTIAL DIAGNOSIS
CVI & CHF

CLINICAL DIFFERENCES

Chronic Venous Insufficiency  Congestive Heart Failure Edema
CLINICAL DIFFERENCES

CVI
- Failure of valves
- Venous hypertension
- Edema primarily in gaiter area
- Brawny
- Progresses distal, below knee
- Reduces with elevation
- Slow onset
- Achy, worse in dependent position, end of day
- Weeping, shallow venous ulcers common
- Hemosiderin staining, atrophe blanche, lipodermatosclerosis, varicosis, dermatitis, inverted champagne bottle appearance

CHF EDEMA
- Due to CHF
- Edema common on dorsal feet
- Soft, doughy, deeply pitting edema
- Progresses distal to proximal
- Reduces rapidly with elevation
- Onset is rapid
- Distention discomfort
- Weeping, watery edema blisters can occur
- Cyanosis, jugular distention, SOB

Affects up to 30% of population

Affects up to 1% of population

CLINICAL DIAGNOSTIC TESTS

CHRONIC VENOUS INSUFFICIENCY

- Ankle brachial index
- Transcutaneous Partial Pressure of Oxygen (tcPo2)
- Venous duplex studies
- Tests of peripheral venous circulation
  - Percussion
  - Trendelenburg
  - Homans
  - Impedance plethysmography
  - Air plethysmography
  - Doppler ultrasound
CLINICAL DIAGNOSTIC TESTS
CHF EDEMA

- Ankle brachial index
- Venous duplex
- Ultrasound r/o DVT
- History and physical

REM EMBER- BEFORE COMPRESSION…

Ankle Brachial Index (ABI) should be performed on any patient with lower extremity swelling and/or ulceration.
SUMMARY

References