LYMPHEDEMA AND WOUND CARE

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Lymphedema and Wound Care

- Lymphatic system review
- Lymphatic system’s role in wound healing
- Treatment options
- Outcomes

Lymphatic System Review

- The lymphatic system is a transport mechanism for clearing the interstitial spaces of intercellular fluid, protein and blood waste, macromolecules and immunological products.
Lymphatic System Review

• About 10-20% of the fluid that leaves the arterial capillaries is expected to enter the lymphatic system.

• Lymph fluid is reabsorbed from the interstitial tissues by the initial lymph capillaries.
Lymphatic System Review

- The initial lymph capillaries transport lymph fluid to the collectors which in turn transport the fluid to larger vessels, ducts and eventually, the venous system.

- The lymph collectors operate much like veins in that they have smooth muscle and valves.
Lymphatic System Review

- Diffusion is one of the mechanisms by which fluid is exchanged at the capillary level.
- Some factors that influence diffusion time are temperature, concentration gradient, and distance.
Lymphatic System Review

- Normally, the lymphatic capillaries lie very close to the blood capillaries... about 1 mm apart.
- With edema, the distance can be as much as 10 mm.
Lymphatic System Review

• This increase in diffusion distance creates a poor nutritional environment extremely susceptible to infection, skin breakdown, cell damage and delayed healing.
Lymphatic System Review

- Another is osmosis.
- Osmosis is where water equilibrates its concentration across the cell membrane.
- Water and micro-molecules easily pass into the venous capillaries.
Lymphatic System Review

• A third way is filtration.
• Filtration depends on a pressure gradient.
• This pressure gradient depends on blood pressure and colloid osmotic pressure.
Lymphatic System Review

- Colloid Osmotic Pressure is the pressure on fluid exerted by proteins in the blood. Because proteins are hydrophilic, they will draw water to them.

- In the presence of an impaired lymphatic system, the concentration of proteins becomes higher in the interstitial fluid. This is one of the reasons lymphedema is referred to as a high-protein edema and is characterized by fibrotic or dense areas felt in the area beneath the skin.
Lymphatic System Review

• The lymphatic system is designed to encourage reabsorption. It houses a lower pressure and can accept water and larger molecules, such as proteins, easily.
Lymphatic System Review

• Normally, the Lymphatic System can adjust itself to handle an excess of fluid.

• The Lymphatic Load consists of cells and water from interstitial spaces collected into the lymphatic system.

• The Transport Capacity is the maximum amount of fluid the lymphatic system can carry.
Lymphatic System Review

- In a **healthy** lymphatic system, the Transport Capacity exceeds the Lymphatic Load.
Lymphatic System Review

- When the Lymphatic Load increases, the Transport Capacity is still capable of handling the extra fluid.
Lymphatic System Review

• But if something happens to the lymphatic system...
• The Transport Capacity decreases and it can no longer handle the excess Lymphatic Load.
Lymphatic System Review

- What if something causes the Lymphatic Load to rise as well?
- Now we have lymphedema.
Lymphatic System Review

• What are some of the mechanisms that cause the lymphatic load to increase?

- Increased fluid infiltrate
- Increased deposits of cellular waste
- Cardiac Insufficiency
Lymphatic System Review

• Chronic Venous Insufficiency increases fluid filtration at the capillary level and decreases its reabsorption.
• Trauma and skin infections deposit more cellular waste and fluid into the interstitial spaces.
• Obstruction of venous return.
• Cardiac insufficiencies.
• Fluctuations in weight gain and fluid volumes.
Lymphatic System Review

- What causes the Transport Capacity to decrease?
  - Scar tissue formation at the cellular level
  - Trauma to the lymphatic system
  - Primary Lymphedema
Lymphedema and Wound Care

• An impaired lymphatic system has a tremendous impact on wound healing.
  – diffusion distance
  – high protein concentration
  – an increase in lymphatic load
Lymphedema and Wound Care
Treatment Options

• “The standard of care for lymphedema encompasses risk reduction, early detection, Phase-I Complete Decongestive Therapy in a clinical setting, and Phase-II Self Management at home.”

Treatment Options

• Treatment Benefits/Goals:
  1. Prevent/eliminate infections.
  2. Maximize wound healing.
  3. Remove plasma proteins from the interstitial tissue.
Treatment Options

- Complete Decongestive Therapy
  1. Skin and Nail Care education
  2. Decongestive Exercises
  3. Manual Lymphatic Drainage
  4. Therapeutic Compression
Treatment Options

• Skin and Nail Care education
  – “Physiologic impairment (i.e., lymphedema, venous stasis or breaches in the skin barrier) are predisposing factors implicated in recurrent cellulitis. … lymphedema increases the likelihood by 71.2%.” Venous insufficiency by 2.9% and obesity by 2.0%. Chronic open wounds and diabetes also are predisposing factors.

• Burdette SD, Bernstein JM. The gift that keeps on giving. SKINmed: Dermatology for the Clinician. Infectious Disease Capsules. November-December 2005:381-384.
Treatment Options

• Skin and Nail Care education
  – Keep skin clean, dry and moisturized.
  – Avoid activities that will cause injury.
  – Recognize changes in the skin.
Treatment Options

• Decongestive Exercises
  – “… remedial exercises, performed while wearing the bandages, enable muscle and joint pumps to exert their lymphocinetic effects.”

Treatment Options

• “…repeatedly compress the lymph vessels through rhythmic contraction and relaxation of muscles. This triggers smooth muscle contraction within the walls of lymph transport vessels.”

Treatment Options

- **Manual Lymphatic Drainage**
  - Increases lymph production.
  - Increases the rate of fluid uptake.
  - Increases venous return.
  - Directs lymph fluid to healthy lymph quadrants.
- **Light, rhythmic manipulations to the tissue**
  promote parasympathetic responses.
Treatment Options

• Manual Lymphatic Drainage
  – Results showed that in every case [27 legs] the post-treatment TDC [tissue dielectric constant] was reduced 9.8% from its pretreatment value…”

• Mayrovitz HN, Davey S, Shapiro E. Localized tissue water changes accompanying one manual lymphatic drainage (MLD) therapy session assessed by changes in tissue dielectric constant in patients with lower extremity lymphedema. Lymphology. 2008 Jun;41(2):87-92.
Treatment Options

• Therapeutic Compression
  – “Compression bandaging is a cornerstone in the conservative treatment of CVI. … compression up to 60 mm Hg caused an increase in LDF [laser doppler flowmetry] of 84% and a median increase in blood cell velocity of 22%. These results support the concept… favoring microcirculatory effects. … is effective in reduction of CVI-associated lymphoedema”.

Treatment Options

• “Compression increases ulcer healing rates compared with no compression. Multi-component systems are more effective than single-component systems. Multi-component systems containing an elastic bandage appear more effective than those composed mainly of inelastic constituents.”

Treatment Options

• Therapeutic Compression
• Short stretch bandages are used in a multi-layer application.
  – Increase uptake of lymph fluid.
  – Prevent reaccumulation of fluid in the tissues.
  – Influence plasma protein reabsorption.
Treatment Options

- Compression Garments
  - Preserve the treatment effects of the decongestive phase of therapy.
  - Used after the wounds are healed.
Treatment Options

• “The use of diuretics for pure lymphedema is physiologically unsound…”
  – removes only water load
  – leaves interstitial spaces protein-rich
  – contributes to fibrotic tissue
• I recommend they be used judiciously.

Treatment Options

• Compression pumps remain controversial.
  – Removes only water load.
  – Leaves interstitial spaces protein-rich.
  – Contributes to fibrotic tissue.
  – Do not consider lymphatic anatomy.

• Should be used only in conjunction with Manual Lymphatic Drainage.

• Easy to use.
Treatment Options

• “… compression pumps and bandages are comparable in efficacy for the healing of venous leg ulcers. The compression pump is reported as being easier and more comfortable to use than bandages.”

Treatment Options

• “IPC may increase healing compared with no compression, but it is not clear whether it increases healing when added to treatment with bandages, or if it can be used instead of compression bandages… Further trials are required to determine whether IPC increases the healing of venous leg ulcers when used in modern practice where compression therapy is widely used.”

Treatment Options

- “...pneumatic sequential compression therapy leads to interface values up to 80% higher than the present target...” The discrepancy between the target pressure... and the pressure measured... undermines the therapeutic control and efficacy of the pneumatic compression devices. “

Treatment Options

• “Compressive pump therapy for lower limb lymphedema produces an unacceptably high incidence of genital edema.” 43% who used pump compression vs. 2.67% who did not use.

Outcomes

• Three patient with recalcitrant ulcers.

• Only after compression treatment with short-stretch bandages and walking exercises were initiated did the ulcers heal.

Outcomes
THANK YOU.