Assessment & Treatment of Lower Extremity Ulcers

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Lower Extremity Wounds

- Arterial Insufficiency
- Venous Insufficiency
- Peripheral Neuropathy/Diabetic

Arterial Insufficiency
Arterial Insufficiency

• **History**
  - Atherosclerosis is the most common cause of lower extremity arterial disease
  - Diabetes
  - Tobacco Products
  - Hyperlipidemia
  - Advanced Age
  - Obesity
  - A Family History of Cardiovascular Disease

• **History continued**
  - Anemia
  - Arthritis
  - CVA
  - Intermittent Claudication
  - Traumatic Injury to Extremity
  - Vascular Procedures/Surgeries
  - Hypertension
  - Arterial Disease

• **Characteristics of Arterial Insufficiency¹:**
  - Extremity becomes pale/pallor with elevation and has dependent rubor
Arterial Insufficiency

• Characteristics of Arterial Insufficiency¹:
  ▪ Atrophy of skin, subcutaneous tissue and muscle
  ▪ Shiny, taut, thin, dry skin
  ▪ Hair loss
  ▪ Dystrophic nails

Arterial Insufficiency

• Characteristics of Arterial Insufficiency¹:
  ▪ Increased pain with activity and/or elevation (intermittent claudication, resting, nocturnal and positional)

Arterial Insufficiency

• Characteristics of Arterial Insufficiency¹:
  ▪ Purpura
Arterial Insufficiency

Characteristics of Arterial Insufficiency:

- **Perfusion**
  - Skin Temperature: Cold/decreased
  - Capillary Refill: Delayed – more than 3 seconds
  - Peripheral Pulses: Absent or Diminished

Arterial Insufficiency Tests

Testing for Arterial Insufficiency:

- **Ankle Brachial Index (ABI)**
  - ≤ 0.9 Arterial Insufficiency
  - ≤ 0.6 to 0.8 Borderline Perfusion
  - ≤ 0.5 Severe Ischemia
  - ≤ 0.4 Critical Ischemia Limb Threatened

- **Systolic Toe Pressure**
  - TP < 30mmHg

- **Transcutaneous Oxygen Pressure Measurements (TcPO₂)**
  - TcPO₂ < 30 mmHg
Arterial Insufficiency Ulcers

• Location of Arterial Ulcers
  • Toe tips and/or web spaces
  • Phalangeal heads
  • Over lateral malleolus
  • Areas exposed to pressure or repetitive trauma (shoe, cast, brace, etc.)
  • Mid-tibia (shin)

• Typical Wound Appearance
  • “Punched out” appearance
  • Dry, pale or necrotic wound base
  • Minimal or absent granulation tissue
  • Wound size usually small & may be deep
  • Minimal exudate
  • Gangrene (wet or dry), necrosis common
  • Localized edema (may indicate infection)

• Possible complications
  • Cellulitis
  • Gangrene
  • Osteomyelitis
Arterial Insufficiency

• Management of arterial wounds¹
  - Revascularization if possible
  - Dry, stable black eschar should not be debrided: KEEP DRY
  - Consider "painting" dry stable eschar with povidone iodine – ONLY on stable arterial eschar, no other wounds
  - Dry INFECTED wound: Immediate referral for surgical debridement/aggressive antibiotic therapy (Topical antibiotics are typically ineffective for arterial wounds)

Arterial Insufficiency

• Topical Therapy²
  - Open Wounds
    • Moist wound healing, for dry open wound beds
    • Non-occlusive dressings (e.g. hydrogel)
    • Aggressive treatment of any infection

Arterial Insufficiency

• Pain Management¹
  - Neutral or dependent position for legs may relieve pain
  - Walking 30-60 minutes 3x/week of sufficient intensity to bring on claudication and then followed by rest
  - Pain medication as indicated
  - Consider Spinal Cord Stimulation (SCS) for patients in intractable pain
  - For some cases of intractable pain, referral for surgical evaluation maybe indicated
Arterial Insufficiency

**Nutrition**

- A small study indicated that L-Arginine (vasodilator properties) oral intake of 6.6 g/day for 2 weeks improved symptoms of intermittent claudication.
- However, the effectiveness of nutritional supplementation with L-Arginine has not been well established.
Arterial Insufficiency Interventions

**Adjunctive Therapies**
- Hyperbaric oxygen therapy (HBOT)
- High-voltage pulsed current (HVPC) electrotherapy
- Low frequency ultrasound

**Patient Education & Risk Reduction Strategies**
- Smoking/tobacco cessation
- Manage diabetes – glucose control hemoglobin A1c < 7%
- Control hyperlipidemia
- Control hypertension
- Adherence to medication regimen
- Increased physical activity

Avoid chemical, thermal and mechanical trauma to lower extremities and feet:
- Do not expose to extremes of temperature (hot soaks, heating pads)
- Do not use aggressive tapes/adhesives or medicated corn pads
- No moisture between toes
- Avoid friction and constrictive clothing
- Do not go bare foot
- Do not cross legs
Arterial Insufficiency Interventions

- **Patient Education & Risk Reduction Strategies**
  - Perform proper foot care
  - Examine feet daily for blisters, wounds and skin/nail changes. Report any findings immediately
  - Professional care for toenails, corns and calluses
  - Proper fitting footwear and wear socks or stockings with shoes
  - Use heel lift devices if immobile
  - Use neutral or dependent position for legs
  - Maintain adequate nutrition
  - Visit healthcare provider on a regular basis

Venous Insufficiency

- **History**
  - Previous DVT & Varicosities
  - Reduced Mobility
  - Obesity
  - Vascular Ulcers
  - Phlebitis
  - Traumatic Injury
  - CHF
  - Orthopedic Procedures
  - Pain Reduced by Elevation
  - History of Cellulitis
Venous Insufficiency

- **Lower Leg characteristics**
  - Edema
    - Pitting or non-pitting

Venous Insufficiency

- **Lower Leg characteristics**
  - Venous Dermatitis (erythema, scaling, edema and weeping)

Venous Insufficiency

- **Lower Leg characteristics**
  - Hemosiderin Staining
    - Brown staining (hyperpigmentation)
Venous Insufficiency

- **Lower Leg characteristics**
  - Active Cellulitis

Venous Insufficiency

- **Characteristics of Venous Insufficiency**
  - Pain
    - Minimal unless infected or desiccated
  - Peripheral Pulses
    - Present/palpable
  - Capillary Refill
    - Normal-less than 3 seconds

Venous Insufficiency Ulcers

- **Location of Venous Ulcer**
  - Medial aspect of the lower leg and ankle
  - Superior to medial malleolus
Venous Insufficiency Ulcers

• Typical Wound Appearance
  - Wound edges: irregular
  - Wound bed: ruddy red, yellow adherent of loose slough, granulation tissue, undermining or tunneling are uncommon, wounds are shallow
  - Amount of exudate: mild, moderate to heavy
  - Peri-wound skin: macerated, crusty, scaling, hyper-pigmented

Venous Insufficiency

• Treatment of Venous Insufficiency
  - Elevation of legs – above the heart at least 30 minutes, 3-4x/day
  - Compression therapy to provide at least 30mm Hg compression at the ankle
  - T.E.D. hose or anti-embolism stockings and Ace wraps are not effective compression
Venous Insufficiency

• **Before Treating Venous Insufficiency**
  Recommend to get a Baseline ABI³
  • If ABI is > .8 use compression at ankle at 30-40 mm/HG or 20-30 mm/HG depending severity
  • If ABI is .8 to .6 use reduced compression up to 23mm/HG
  • If ABI is .5, resident has a DVT or exacerbated CHF compression is contraindicated

• **Treatment of Venous Insufficiency³**
  - Compression wraps to get edema under control or while wounds are healing:
    • Inelastic bandages or short stretch wraps require ambulation – Unna boots
    • Elastic bandages or long stretch wraps are not dependent upon ambulation
    • In severe cases compression pumps
    • Manufactures instructions must be followed when applying

- Examples of elastic bandages/long stretch:
  Single Layer 2 Layer 4 Layer
  Farrow Wrap Farrow Wrap

  FOLLOW MANUFACTURE’S INSTRUCTIONS
Venous Insufficiency

• Rated compression stockings once edema is under control and ulcers healed
  • Need to be fitted
  • Monitor for loss of elasticity and fit, change 3-6 months

Venous Insufficiency

• Topical Therapy – Venous Dermatitis
  • Avoid the use of known skin irritants and allergens in residents with dermatitis
    • Use emollients such as petroleum to counteract dryness and scaliness
    • Avoid the use of tapes and adhesives on the skin
    • Use topical corticosteroid ointment to reduce inflammation and itching for no longer than 2 weeks
  • Venous dermatitis often are treated unsuccessfully as cellulitis

Venous Insufficiency

• Topical Therapy – Venous Dermatitis
  • Avoid products with the following ingredients or do a patch test to an area to rule out allergy
    • Lanolin
    • Topical antibiotics
    • Balsam of Peru
    • Bacitracin
    • Corticosteroid ointments
    • Neomycin sulfate
    • Chloramphenicol
    • Nickel sulfate
    • Silver nitrate
    • Propylene glycol
    • Certain hydrocolloid formulations
    • Parabens
    • Benzalkonium chloride
    • Povidone-iodine
    • Colophony
    • Rubber-related allergens
    • Ester gum resin
    • Fragrance mix
Venous Insufficiency

**Topical Therapy**
- Protect peri-wound from maceration with barrier ointment
- Apply a contact layer to the wound base before applying dressing to prevent from sticking
- Debridement of black eschar (rule out arterial insufficiency first)
- Utilize dressings to control exudate without desiccating the wound bed (i.e., foam, calcium alginate, polymers)
- Then apply appropriate compression therapy
- Monitor closely for infection/cellulitis

**Nutrition**
- Referral to Dietary to ensure adequate protein and calories for healing

**Pain Management**
- Provide adequate pain medication before dressing changes and scheduled as appropriate
- Utilize contact layer dressings to wound base to prevent the dressing from sticking
Venous Insufficiency

• Medications
  - Pentoxifylline (Trental) 400mg 3x/day in conjunction with compression therapy has been shown to be effective in healing
  - DO NOT use diuretics to control edema secondary to venous insufficiency, it will lead to dehydration

Venous Insufficiency

• Patient Education & Risk Reduction Strategies
  - Commit to lifelong compression therapy
    • Apply upon rising in the morning
    • Replace stockings/wraps every 3-6 months
    • Avoid wearing high heels
  - Smoking/tobacco cessation
  - Healthy weight management & nutrition
  - Avoid trauma to legs
  - Avoid crossing legs & standing for prolonged periods of time

Venous Insufficiency

• Patient Education & Risk Reduction Strategies
  - Exercise
    • Elevate legs above the heart for 30 minutes, 3-4x/day
    • Perform ankle flexion 5-10 times every few minutes for 1-2 minutes every 30 minutes
    • Perform brisk walking
    • Perform planter flexion, tip-toe exercises, and walk on incline treadmill
    • Sit and rock in a rocker chair, using feet to push down to planter flex the ankles
Peripheral Neuropathy/Diabetic

**History**
- Diabetes
- Spinal cord injury
- Hypertension
- Smoking
- Alcoholism
- Hansen’s Disease
- Trauma to lower extremity
- Family history
*Please note that there are over 100 known causes

**Characteristics of Peripheral Neuropathy**
- Relief of pain with ambulation
- Parasthesia of extremities
- Altered gait
- Orthopedic deformities
- Reflexes diminished
- Altered sensation (numbness, pricking, tingling, burning sensation)
Peripheral Neuropathy/Diabetic

- **Characteristics of Peripheral Neuropathy**
  - Intolerance to touch (e.g., bed sheets touching legs)
  - Presence of calluses
  - Fissures/cracks, especially the heels

- **Assessing for Peripheral Neuropathy**
  - Light pressure using a Semmes-Weinstein Monofilament Exam
  - Vibratory sense using a tuning fork
  - Deep tendon reflexes of ankle and knee

- **Assessing for Peripheral Neuropathy**
  - Assess for arterial Insufficiency as it commonly co-exists with peripheral Neuropathy
    - Reduced skin temperature
    - Capillary refill of greater than 3 seconds
    - Limb color changes (pallor on elevation and dependent rubor)
    - Diminished or absence of pedal pulses
    - Recommend an ABI
Peripheral Neuropathy/Diabetic

▪ Location of Peripheral Neuropathy Ulcers
  ▪ Plantar aspect of the foot
  ▪ Metatarsal heads
  ▪ Heels
  ▪ Altered pressure points
  ▪ Sites of painless trauma and/or repetitive stress

Peripheral Neuropathy/Diabetic

▪ Characteristics of Peripheral Neuropathy Ulcers
  ▪ Deep
  ▪ Painless
  ▪ Even wound margins
  ▪ Callus surrounding the ulcer
  ▪ Granular tissue unless arterial insufficiency

Peripheral Neuropathy/Diabetic

▪ Complications of peripheral neuropathy
  ▪ Cellulitis
  ▪ Gangrene
  ▪ Osteomyelitis
Peripheral Neuropathy/Diabetic

- **Complications of peripheral neuropathy**
  - Charcot fracture
  - Edema
  - Erythema
  - Increased temperature
  - X-ray confirming fractures and dislocations

Peripheral Neuropathy/Diabetic

- **Treatment/Management of Peripheral Neuropathy**
  - Pressure relief for heal ulcers
  - "Offloading" for plantar ulcers (bedrest, contact casting, or orthopedic shoes)
  - Appropriate footwear at all times
Peripheral Neuropathy/Diabetic

**Treatment/Management of Peripheral Neuropathy 2**

- **Topical Treatment**
  - Maintain dry stable eschar on non-infected, ischemic, neuropathic ulcers
  - Debridement of neuropathic wounds and calluses, by a trained professional
  - Cautious use of occlusive dressings (transparent films or hydrocolloids)
  - Dressings to absorb exudate
  - Dressings to keep dry wound moist

- **Chronic or non-responding wounds:**
  - Growth factors
  - Skin equivalents
  - Negative Pressure Wound Therapy (NPWT)
  - Hyperbaric Oxygen
  - Nitric oxide and monochromatic infrared photo energy (MIRE)

- **Aggressive infection control**
  - Immediate Referral for:
    - Cellulitis
    - Osteomyelitis
    - Atypical ulcers
    - New onset or diagnosis of Charcot
Peripheral Neuropathy/Diabetic

**Nutrition**
- Dietary referral
  - Appropriate calories and protein for wound healing
- Control:
  - Serum glucose
  - Hyperlipidemia
  - Hypertension
- Consider:
  - Multivitamins
  - L-Arginine

Peripheral Neuropathy/Diabetic

**Exercise**
- Regular exercise program
- Exercise must be conducted with caution due to the insensate lower extremity
- Institute non-weight bearing exercises such as swimming, water aerobics, bicycling, rowing and upper body exercises
- Wear well fitting shoes and socks
- Recommend daily range of motion to avoid loss of muscle strength and flexibility

Peripheral Neuropathy/Diabetic

**Pain Management**
- Referral to resources for pain management such as:
  - Pain clinics
  - Neurologists
  - E-stim for chronic pain
Peripheral Neuropathy/Diabetic

- Patient Education & Risk Reduction Strategies
  - Inspect feet daily and after removal of foot wear
  - Smoking/tobacco cessation
  - Weight loss
  - Adequate blood pressure control
  - Limit alcohol to 1-2 drinks/day
  - Maintain blood glucose levels of < 7%
  - Refer to and follow the recommendations listed under arterial insufficiency, as well

Mixed Etiology

- Management of Mixed Etiology
  - Use reduced compression bandages of 23-30 mm Hg at the ankle. Compression therapy should not be used in patients with ABI < 0.5
  - Keep extremities in neutral position
  - Protect from trauma & appropriate footwear at all times
  - Referral as appropriate
Lower Extremity Wounds

• **Documentation Tips**
  - Assess wound weekly, noting location, type, size, wound base, wound edges, drainage, odor and pain
  - Do not stage lower extremity ulcers:
    • Partial: involves the skin only
    • Full thickness: deeper than the skin
  - Ensure care plan has appropriate goals
  - Physician diagnosis and prognosis

Resources

Available Resources and Web Sites:
- [www.wocn.org](http://www.wocn.org) (Wound, Ostomy & Continence Nurse Society)
- [www.ahrq.gov](http://www.ahrq.gov) (Agency for Health Care Research and Quality, formally AHCPR)
- [www.abwm.org](http://www.abwm.org) (American Board of Wound Management)
- [www.npuap.org](http://www.npuap.org) (National Pressure Ulcer Advisory Panel)
- [www.woundsource.com](http://www.woundsource.com) (Great source to find wound care products)

References

Thanks for your participation!!!

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