Assessment & Treatment of Lower Extremity Ulcers

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Training Objectives

- Define the characteristics of venous, arterial and peripheral neuropathy/diabetic ulcers
- Gain knowledge of compression usage as the gold standard for venous ulcers
- Describe effective strategies to prevent and manage lower extremity wounds
- Review activity related to increase duration in those people presenting with arterial involvement

Defining Lower Extremity Wounds

- Arterial Insufficiency
- Venous Insufficiency
- Peripheral Neuropathy/Diabetic
Lower Arterial Extremity Disease/LEAD

Arterial Insufficiency

History continued

- Anemia
- Arthritis
- CVA
- Intermittent Claudication
- Traumatic Injury to Extremity
- Vascular Procedures/Surgeries
- Hypertension
- Arterial Disease
Arterial Insufficiency

Characteristics of Arterial Insufficiency:\n
- Extremity becomes pale/pallor with elevation and has dependent rubor
- Atrophy of skin, subcutaneous tissue and muscle
- Shiny, taut, thin, dry skin
- Hair loss
- Dystrophic nails

- Increased pain with activity and/or elevation (intermittent claudication, resting, nocturnal and positional)
Arterial Ulcer Pain & Insufficiency

Intermittent Claudication:
- Blood flow inadequate to meet tissue needs
- Occurs at night
- Patient complains of cramping, burning, or aching

Nocturnal Pain:
- Rest pain occurs even without activity
- Burning/numbness aggravated by leg elevation
- Constant/intense
- Stop activity or dangle legs

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
Arterial Insufficiency Tests

Testing for Arterial Insufficiency:
- Systolic Toe Pressure
  TP < 30 mmHg
- 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)

Arterial Insufficiency Ulcers

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)
Arterial Insufficiency Ulcers

**Possible complications**¹

- Cellulitis
- Gangrene
- Osteomyelitis

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**Management of arterial wounds**¹

- 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 in-effective for arterial wounds)

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**Topical Therapy**³

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

**Pain Management**
- 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 has shown to provide significant pain relief
- For some cases of intractable pain, referral for surgical evaluation maybe indicated.

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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.

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Arterial Insufficiency

**Basic Principle of Nutrition**
- Aggressive management of diabetes
- Control hyperlipidemia
- Control hypertension
- Hydration
- **Nutrition therapy**
  - Individualized
  - Give consideration to usual food and eating habits, metabolic profile, treatment goals, and desired outcomes
Arterial Insufficiency

**Nutrition**
- Provide nutritional support with 2,000 or more calories 11 days preoperatively and postoperatively, if possible.

**Arterial Insufficiency Interventions**

- **Adjunctive Therapies**
  - Hyperbaric oxygen therapy (HBOT)
  - Intermittent Pneumatic Compression with resident seated and legs in neutral position 3-4x/day for 45-60 minutes
  - High-voltage pulsed current (HVPC) electrotherapy
  - Low frequency ultrasound

- **Referral for further evaluation**
  - Refer the following cases for further evaluation:
    - Cellulitis
    - Osteomyelitis
    - Atypical wounds
    - Intractable pain
Arterial Insufficiency Interventions

Referral for further evaluation

- A Vascular Consult is indicated if:
  - Absence of both dorsalis & posterior tibial pulses
  - ABI < 0.9, plus any one of the following:
    - Wounds failing to improve within 2-4 weeks of appropriate therapy
    - Severe ischemic pain
    - Intermittent claudication
    - Toe pressure < 30mmHg
    - Ankle pressure < 50mmHg
    - Clinical signs of infection

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Referral for further evaluation

- An URGENT Vascular referral is indicated if the ABI is < 0.4 or gangrene is present

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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
Arterial Insufficiency Interventions

Patient Education & Risk Reduction Strategies
- 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

Veins carry blood
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

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
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

Before Treating Venous Insufficiency

Recommend to get a Baseline ABI

- 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 Insufficiency:

- 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
  - Manufacturers instructions must be followed when applying
Venous Insufficiency

Treatment of Venous Insufficiency

- Examples of elastic bandages/long stretch

FOLLOW MANUFACTURER 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

**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.
Venous Insufficiency

**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

**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

**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
Peripheral Neuropathy/Diabetic

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)

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

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

- Assess arterial insufficiency as it commonly co-exists with peripheral neuropathy
- Assess feet for:
  - 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

Location of Peripheral Neuropathy Ulcers

- Plantar aspect of the foot
- Metatarsal heads
- Heels
- Altered pressure points
- Sites of painless trauma and/or repetitive stress

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

Result of walking barefoot on hot pavement

Peripheral Neuropathy/Diabetic

Treatment/Management of Peripheral Neuropathy

- 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

Peripheral Neuropathy/Diabetic

- Chronic or non-responding wounds:
  - Growth factors
  - Skin equivalents
  - Negative Pressure Wound Therapy (NPWT)
  - Hyperbaric Oxygen
Peripheral Neuropathy/Diabetic

Treatment/Management of Peripheral Neuropathy

- 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 footwear
- 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 guide listed under arterial insufficiency

Mixed Etiology
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 (Wound, Ostomy & Continence Nurse Society)
- www.ahrq.gov (Agency for Health Care Research and Quality, formally AHCPR)
- www.aawm.org (American Academy of Wound Management)
- www.npuap.org (National Pressure Ulcer Advisory Panel)
- www.woundsource.com (Great source to find wound care products)
References


QUESTIONS?

Thanks for your participation!!

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