Arterial and Venous Lower Extremity Ulcers

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Lower Extremity Ulceration: Vascular

United States:

- Venous Disease: 72%
- Arterial Disease: 6%
- Mixed Arterial/Venous: 22%
Lower Extremity Ulceration

- Diagnosis and risk assessment
- Active treatment
- Palliative treatment when wound closure not attainable
- Ongoing care to slow progression, prevent recurrence and/or new occurrence
Lower Extremity Ulceration

Wound History and Characteristics:
- Date of onset and site of ulcer
- Date, site of previous ulcers
- Prior treatment, time to heal
- Past vascular surgery (arterial or venous)

Document:
- Size: measure largest dimensions, photograph
- Wound base: granulation, fibrous, slough, necrotic
- Drainage: heavy, moderate, light, none
Lower Extremity Ulceration

Wound Evaluation

- Infection: purulence, odor, cellulitis, necrosis
- Sinus tracking
- Bone exposure
- Gangrene
- Atypical: tumor, vasculitis, SCA, pyogenic gangrenosum
- Pain, Quality of Life, Mobility
Lower Extremity Ulceration

Comorbidities:
- Diabetes
- Renal insufficiency
- Obesity
- Tobacco abuse
- Cardiovascular disease
- Drugs (corticosteroids, chemotherapy)
- CTD: RA, SLE
- Allergies: contact dermatitis, latex, silver
Arterial Insufficiency

History:
- Claudicating pain
- Rest pain, night pain
- Non-healing, painful ulceration

Findings:
- Cold limb or feet
- Shiny, atrophic skin
- Hairless
- Dependent rubor
- Elevation pallor
- Dry, punched-out ulcer of toes or over bony prominence
Arterial Ulcers

- Pale
- Painful
- Slough
- Necrosis
- May be deep
- Dry gangrene
- No staining
  (unless also venous)
Examine carefully
Arterial Insufficiency

Diagnosis – Non-Invasive Studies:

- Ankle brachial index (ABI)
  - 0.5 – 0.8: peripheral arterial occlusive disease
  - >1.2 suggests noncompressibility, need TBIs
  - <0.4: severe ischemia

- Toe brachial index (TBI)
  - <30 mmHg systolic pressure: severe ischemia

*Ischemia requires vascular surgery referral!*
Arterial Ulcers

Standard treatment:

- Diagnose level of arterial insufficiency:
  - Segmental pressures, pulse volume recordings
- Arteriography +/- endovascular treatment
- Open surgical bypass
- Medication Management
- Wound Care: surgical debridement, amputation; dry dressing or open to air
Arterial Ulcers

Wound Care: **Keep Dry!!**

- Dry dressing or open to air
- No ointments or creams
- Minimal to no debridement
- Pressure relief
- Infection control

*Advanced therapies not indicated until wound is reperfused but non-healing!*
Arterial Ulcers

Post-Intervention:
- Keep dry until eschar gone, may trim edges
- For pink wound base, keep moist
- Accommodate wound
- Smoking cessation
- ASA and statin therapy
- Exercise
- Vascular surveillance after procedures
Venous Ulceration

United States:

- 600,000+ new venous ulcers annually
- Affects 1-4% of the population
- Recurrence rate averages 75%
- >50% out of work or disabled
- >25% depression or anxiety

Venous Insufficiency

History:
- Prior SVT, DVT
- Symptomatic varicosities
- LE trauma, vascular injury
- Varicose vein surgery
- Hypercoagulable states (cancer, infection, Factor VIII excess, Factor V Leiden)

Findings:
- Edema
- Shallow wound in lower third of leg
- Venous dermatitis
- Lipodermatosclerosis
- Varicose veins
Normal Venous Flow in the Leg

- Normal Flow
  - Superficial veins → deep veins
  - Feet → Heart

- Superficial vein disease always starts with abnormal valves and interruption to normal flow →

Venous Reflux
Venous Reflux

Healthy Vein Valves & Correct Blood Flow

Damaged Vein Valve & Incorrect Blood Flow
Abnormal flow = Venous Reflux

Damaged Valves:
1. Blood flows to the skin
2. Blood is pushed distally and proximally
3. Closed loop recirculation
4. Blood is retained in the leg
   - Increased volume of blood
   - Increased venous pressure
   - Veins dilate
CEAP Classification

- “C” = Clinical
  - C0 - no visible venous disease
  - C1 - telangiectasias or reticular veins
  - C2 - varicose veins
  - C3 - edema
  - C4 - skin changes without ulceration
    - C4a – pigmentation and eczema
    - C4b – LDS and atrophie blanche
  - C5 - skin changes with healed venous ulcer
  - C6 - skin changes with active venous ulcer
- “E” = Etiology (congenital, primary or secondary)
- “A” = Anatomy (superficial, deep or perforating veins)
- “P” = Pathophysiology (reflux, obstruction, both or none)
Venous Ulcers

- Shallow, moist and red
- Often copious drainage
- Gaitor area
- Brawny staining of skin
- Leg edema
Venous Ulcers

Standard treatment:

- Compression therapy
- Limb elevation
- Calf exercises and walking
- Wound care
- Diagnostic testing for venous reflux
- Correction of superficial venous reflux
Compression Therapy

- Two to four-layer bandage kits (Profore, 3M)
- Unna boot
- Double layer compression stocking:
  - 40-50 mmHg
  - Inner stocking (10-15mmHg) stays on 24/7, remove to bathe and change dressing
  - Outer stocking (30-40mmHg) applied on waking, removed at bedtime
- Pneumatic compression pump
- Maintenance: 30-40 mmHg stocking or Circ-Aid
4-Layer Compression Boot
4-Layer Compression Boot
2-Layer Compression Hose
= 50 mmHg
In search of optimal compression therapy for venous leg ulcers: A meta-analysis of studies comparing divers bandages with specifically designed stockings

Felix Amsler, MS, Torsten Willenberg, MD, and Werner Blättler, MD, Bern, Biel-Benken, and Winterthur, Switzerland

Richard P. Cambria, MD, Section Editor

Objective: In search of an optimal compression therapy for venous leg ulcers, a systematic review and meta-analysis was performed of randomized controlled trials (RCT) comparing compression systems based on stockings (MCS) with divers bandages.

Methods: RCT were retrieved from six sources and reviewed independently. The primary endpoint, completion of healing within a defined time frame, and the secondary endpoints, time to healing, and pain were entered into a meta-analysis using the tools of the Cochrane Collaboration. Additional subjective endpoints were summarized.

Results: Eight RCT (published 1985-2008) fulfilled the predefined criteria. Data presentation was adequate and showed moderate heterogeneity. The studies included 692 patients (21-178/study, mean age 61 years, 56% women). Analyzed were 688 ulcerated legs, present for 1 week to 9 years, sizing 1 to 210 cm². The observation period ranged from 12 to 78 weeks. Patient and ulcer characteristics were evenly distributed in three studies, favored the stocking groups in four, and the bandage group in one. Data on the pressure exerted by stockings and bandages were reported in seven and two studies, amounting to 31-56 and 27-49 mm Hg, respectively. The proportion of ulcers healed was greater with stockings than with bandages (62.7% vs 46.6%; P < .00001). The average time to healing (seven studies, 535 patients) was 3 weeks shorter with stockings (P = .0002). In no study performed bandages better than MCS. Pain was assessed in three studies (219 patients) revealing an important advantage of stockings (P < .0001). Other subjective parameters and issues of nursing revealed an advantage of MCS as well.

Conclusions: Leg compression with stockings is clearly better than compression with bandages, has a positive impact on pain, and is easier to use. (J Vasc Surg 2009;50:668-74.)
Compression Therapy

“Leg compression with stockings is clearly better than compression with bandages, has a positive impact on pain, and is easier to use.”
What about venous reflux?
Long term results of compression therapy alone versus compression plus surgery in chronic venous ulceration (ESCHAR): randomised controlled trial

Manjit S Gohel, specialist registrar; Jamie R Barwell, consultant vascular and transplant surgeon; Maxine Taylor, leg ulcer nurse specialist; Terry Chant, vascular nurse specialist; Chris Foy, medical statistician; Jonathan J Earnshaw, consultant surgeon; Brian P Heather, consultant surgeon; David C Mitchell, consultant surgeon; Mark R Whyman, consultant surgeon; Keith R Poskitt consultant surgeon

• RCT: 500 patients (500 legs) : open/recently healed VSU with reflux
• Interventions: compression alone or compression with saphenous surgery
• Measures: Ulcer healing, ulcer recurrence, ulcer free time
• Surgical correction of superficial venous reflux in addition to compression bandaging does not improve ulcer healing rates (89% [no surgery] vs 93% [surgery])

• Surgical correction can, however, reduce the chance of recurrent ulceration (56% [no surgery] vs 31% [surgery]) and increase ulcer free time (85 wks [no surgery] vs 100 wks [surgery])
SVS and AVF Guidelines

- To decrease the recurrence of venous ulcers, ablation of the incompetent superficial veins in addition to compression therapy is strongly recommended.
- Endovenous thermal ablation (EVLT or VNUS) is recommended rather than high ligation and inversion stripping of the GSV to the knee.
- Treatment of refluxing perforating veins located underneath healed or active ulcers is suggested.
SVS and AVF Guidelines

- Vein ligation, stripping and endovenous ablation appear to be equivalent in reducing the time of ulceration and recurrence of ulceration.
- Ulcer recurrence may be associated with perforator incompetence, branch vein reflux or iliac vein obstruction.
- Compression therapy should continue in both surgically treated and conservatively treated patients with healed ulcers.
Wound Care

- Serial debridement, irrigation
- Infection control:
  - Use clinical findings, don’t treat uncomplicated wounds
  - Culture and sensitivity
  - Empiric therapy
  - MRSA: Sulfamethoxizole (creatinine <1.2) or doxycycline
  - Longer term treatment, suppression
Wound Care:
Moisture-based Wound Management

- Manage exudate and protect periwound skin
- Dressing should stay in place, minimize friction, not cause pain, atraumatic removal
- Cost-effectiveness, ease of use, provider time
- Dressings are used under compression
- Patient-centered and individualized
Moist Wound Therapy = Gold Standard

- Alginates
- Foams
- Hydrofibre
- Hydrocolloids
- Gels
- Composites
Balanced Moist Wound Therapy

- If it’s wet, dry it
- If it’s dry, moisten it

Wet-to-Drys are NOT the Standard of Care!!
Impede Wound Healing
Advanced Wound Care

A large, growing array of therapies have been developed . . .

*Bioengineered Alternative Tissues*

- **Bio-Active Wound Adjuncts:**
  - Oasis: Porcine intestinal submucosa
  - Integra: Bovine collagen / chondroitin-6-sulfate
  - GammaGraft: Gamma irradiated human allograft skin
  - Graft Jacket: Human allograft product
  - Epifix: Dried human amnionic membrane

- **Living Tissues / Growth Factors:**
  - Platelet rich plasma (PRP): Blood plasma enriched with platelets, releases growth factors and other cytokines
  - Regranex (becaplermin): Platelet derived growth factor topical
  - Apligraf: Living human dermal fibroblasts and epidermal keratinocytes in bovine collagen matrix
  - Dermagraft: Living human fibroblasts on resorbable mesh
Advanced Wound Care Therapies for Non-Healing Diabetic, Venous, and Arterial Ulcers: A Systematic Review

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Reviewed 20 RCTs for 9 different advanced products for venous ulcers
Some evidence for Apligraf and Oasis for less time to healing, with less recurrence
Not much evidence for Dermagraft, Collagen, PRP, Silver products, HBO, or EMT

So when should we use these products for venous ulcers?
Advanced Wound Management

STANDARD WOUND CARE x 4 weeks

50% Healed?

- YES: Continue with treatment
- NO: Consider the etiology and “Advanced Wound Therapy”
Apligraf Use for VSU

3WKs Apligraf
2nd appl today
7/29/10 MR

1 wk s/p 2nd appl Apligraf
8-5-10

3rd Apligraf appl
8-24-10

9-1-10
Apligraf Use for VSU

9-15-10

4th Apligraf appl 9-27-10

1 wk s/p 4\textsuperscript{nd} Apligraf appl 10-4-10

10-18-10
Apligraf Use for VSU

New bleeding, inflammation
10-25-10

11-17-10

12-1-10

12-22-10
Apligraf Use for VSU

2-7-11

4 appl Apligraf; 7 months of care
Venous Ulceration

Evaluation, debridement of ulcers. Weekly multi-layer boot or 2-layer 50 mmHg hose with daily wound dressings, treat any infection, visits q 1-2 wks

Evaluation, duplex imaging to assess for reflux, treatment plan to correct reflux, continue compression and wound care, modify other risk factors

Ulcer healing < 50% in 4 weeks

No correctable reflux present

Correctable reflux present

Vascular Surgical Intervention:
- Vein ligation / stripping
- Endovenous Laser Ablation
- Phlebectomies

Ulceter healing ≥50%

Ulcer healing < 50% in 4 weeks


No correctable reflux present

Compression garment 30-40 mmHg

Education, risk factor modification and long-term compression garment use
Education and Risk Reduction

- Nonconstrictive clothing
- Compression garments (venous)
- Weight control
- Smoking cessation
- Exercise, avoid prolonged immobility
- Skin hygiene and protection
- Reduce salt, maintain hydration
~Thank You~

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