



Lower Extremity Wounds

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Disclosure

- I have nothing to disclose
- No medications will be used off label.

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Objectives

- Understanding the diagnosis and treatment of venous wounds
- Examining new methods of treatment for ischemic wounds
- Expressing the diagnosis and treatment for neuropathic wounds.

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Factors that Delay Wound Healing in Geriatrics and Long Term Care

- Poor tissue oxygenation
- Immunosuppression
- Malnutrition
- Obesity
- Age
- Medications
- Dry wound beds
- Infection

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Equity in Wound Care

- Equity issues and differences in care are apparent in wound care
- Based upon availability of care, insurance, out of pocket costs, caregiver support, health literacy.
- General principles to help equity and avoid disparities.
- Use good approaches (guidelines, standard work up, appropriate treatment)
- Many advanced therapies are expensive and not available. However, they often don't have strong evidence base.

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Question One

- A 78 y/o woman with recurrent venous wounds presents in the office with new left sided venous wounds. 2 wounds noted with venous changes. She is using ace wraps and foam dressing. The wounds continue to recur. What is next step?
1. Consider Silver therapy
 2. Use topical antibiotic for ulcer
 3. Consider surgical repair for the venous insufficiency
 4. Talk about triple wrap ace wraps for more compression

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Case One

- 82 y/o male with history of heart failure with reduced ejection fraction is a long term resident at a long term care facility. He has ongoing lower extremity ulcers. He has edema and has been using non-stick pad which soaks through his wraps.
- Examination: 3+ swelling in legs with irregular ulceration of the legs around the shin. Venous stasis changes noted.
- Question: What are the treatment options and how do we optimize care?

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Venous Ulcers

- Caused by stasis, DVT, varicose veins, deep venous incompetence;
- Associated with firm, brawny edema in the gaiter area;
- Arteries are normal, veins are abnormal;
- Irregular borders, pink/red base;
- Generally painless (unless infected).



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Venous Ulcers: Treatment

- **Compression** is key
- Patient should elevate legs 30 minutes 4 times a day;
- Caution in patients with mixed vascular problems (arterial and venous disease).
- Compression wraps (single or dual layer)
- Compression hose
- External compression (pumps)
- In Long Term Care, discuss options and develop a unified plan for edema control (wraps versus hose)



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Venous Ulcers Ideal Dressings

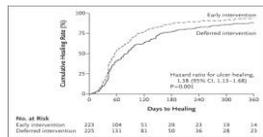
- Good absorption of exudate to prevent maceration
- Non-stick or adherent dressings to prevent tearing fragile skin.
- Easy to use (while controlling edema)
- In LTC, consider formulary issues and nursing times.
- Options: foams, alginates, gauze.



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Endovenous ablation

- Gohel et. Al. NEJM A Randomized Trial of Early Endovenous Ablation in Venous Ulceration.
- 20 centers in UK
- 450 patients randomized to endovenous ablation and compression immediately versus compression and delayed ablation
- Results: improved healing time in immediate versus delayed 56 days (95% CI, 49 to 66) in the early-intervention group and 82 days (95% CI, 69 to 92)



Gohel. Randomized Trial... NEJM. PMID: 29688123



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Guideline Pearls, American Venous Forum

- Evaluate other conditions affecting healing (best practice)
- Recommend wound biopsy for non-healing ulcer (grade 1, level B)
- Recommend against routine wound cultures (grade 2, level c)
- Recommend arterial evaluation pulses in leg and ABI (grade 1, level B)
- Recommend duplex ultrasound for venous ulcers (grade 1, level B)
- Debridement of ulcer (grade 1, level B)
- **Use Compression for wound (grade 1, level A)**
- Typical dressings: maintain moisture (gr 1, level c) and exudate (gr1, level B)
- Consider adjunctive wound therapies (grade 1, level B)

© Dorsal Management of venous leg ulcers: Clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum. PMID 24974070



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Case two

- 67 y/o woman with history of diabetes presents with toe ulceration in your ambulatory practice.
- Arterial flow is intact
- History of previous ulcers noted
- Examination: 3rd toe ulcer on base of toe. Neurological examination shows absent sensation.

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Neuropathic Ulcers

- Indolent plantar lesions on metatarsal heads;
- Painless;
- Frequently associated with osteomyelitis;
- Discrete wound edges;
- + periulcer callus.



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Neuropathic Ulcers

- Tendon or bone frequently exposed;
- Associated with DM, ASO, neuropathy;
- Healthy/pale wound base;
- Arteries may be normal or abnormal;
- Veins are normal;
- Neither dependency nor elevation relieves the pain.



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Treatment: Pressure Reduction

- Patients should completely off-load a neurotrophic ulcer to ensure healing
- Patients need to be nonweightbearing; however, can be challenging in LTC.
- May need wound shoes/ walker to offload the foot
- Will need insoles and shoes for future prevention of future ulcers
- Need some consideration of fall risk for wound shoes and boots.



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Neuropathic Ulcers Dressings

- Wound packing and maintaining wound hydration are essential
- Often require the use of antimicrobial or debridement agents (but not together)
- Caveat: pack wounds completely (including sinus tracts)
- In LTC, continued communication with the wound team if the situation changes.

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Randomized Trial for Neuropathic Ulcer

- Efficacy and Safety of Low-Frequency, Noncontact Airborne Ultrasound Therapy (Glybetaac) For Neuropathic Diabetic Foot Ulcers: A Randomized, Double-Blind, Sham-Control Study. *Int. Jour. Of Wounds.*
- RCT of 58 patients
- Intervention: non-contact ultrasound versus sham therapy
- Received daily ultrasound/sham for first 6 days then 2x a week for 28 days
- Aim: Determine change in wound size and healing (>50% reduction in size over 28 days)

Rastogi-PMD:30836809

Duration	Ultrasound Group (WA in cm ² , Median (IQR))	Sham Group (WA in cm ² , Median (IQR))
Baseline	10.6 (5.6-18.1)	8.6 (6.3-16.0)
Week 1	7.3 (4.5-13.2)	6.8 (2.3-15.3)
Week 2	5.9 (2.9-10.8)	6.0 (2.3-13.2)
Week 3	4.1 (2.0-8.4)	4.4 (1.3-11.9)
Week 4	3.2 (1.2-6.4)	3.5 (1.0-10.3)
P ^a	<.001*	

Abbreviations: WA, wound area; IQR, interquartile range.
^aP value: Intra-group comparison from baseline to week 4.
 *Significant at 5% level of significance (P < .05).

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RCT Neuropathic Wounds results

Results

- A >50% reduction in wound area in 97.1% (US) and 73.1% (Sham) subjects (P = .042)
- wound area reduction of 69.4%(US) ± 23.2% and 59.6%(sham) ± 24.9% (P = .126)
- Overall: small study, did not assess healing. No differences in overall size at 28 days.
- PYT note: For all advanced therapies, be thoughtful about the cost issues in LTC.

Reduction in area

Week	US (Mean ± SD)	Sham (Mean ± SD)
Week 1	~3.5 ± 2.5	~2.5 ± 2.5
Week 2	~5.5 ± 2.5	~3.5 ± 2.5
Week 3	~7.5 ± 2.5	~4.5 ± 2.5
Week 4	~9.5 ± 2.5	~5.5 ± 2.5

* P = 0.028
 ** P = 0.008
 *** P = 0.004
 * P for subgroup comparison = significance (0.05)

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Pearls from guidelines

- Recommend annual foot examination in diabetics (grade 1C)
- Test for peripheral neuropathy (grade 1B)
- Recommend custom Therapeutic footwear for high risk patient (grade 1B)
- Adequate glycemic control with the hemoglobin A1c < 7% (grade 2B)
- Recommendations for total contact cast or fixed ankle walking boot (grade 1B)
- Evaluate for infection (sharp debridement) or surgery (grade 1B)
- For wound products: keep area moist and avoid maceration (grade 1B)
- For Mixed ulcers with PAD: revascularize (grade 1B)
- Hingorani et. Al. 2016 J. Vasc. Surgery PMID: 26804367

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Case Three

- 77 y/o male with history of diabetes, vascular disease. History of coronary disease.
- Examination: Absent pulses in the feet toe ulcer at tip of toe with some tracking to bone.
- Testing: Decreased ABI noted.
- Outcome: After 2 months of treatment (pumps local wound care) underwent toe amputation.

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Ischemic Ulcers

- Most problematic wound
- Caused by vascular insufficiency or trauma;
- Seen distally
- Wounds have discrete edges;
- Pain is severe and relieved with dependency;
- Usually present with gangrenous skin changes.



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Ischemic Ulcers

- Skin is thin, shiny and dry
- + dependent rubor
- + elevation pallor
- Pale wound base
- Distal pulses are not palpable
- Diagnostic options: non-invasive tests, angiograms

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Ischemic Ulcers

- Pain control
 - Analgesics
 - Warmth
 - vascular boots
 - lamb's wool
- Antibiotics (if needed)
- Revascularization critical



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Ischemic Ulcers Dressings

- Gauze
- Advantages: readily available, low cost, primary or secondary dressing, wicks exudate, facilitates debridement, can be used in tunneling wounds
- Disadvantages: frequent dressing changes, may traumatize healthy tissue, exudate may dry out, cutting leaves fibers in wound.



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Ischemic Ulcers Treatments

- Cadexomer Iodine gel: biodegradable hydrophilic beads of iodine
- Advantages: absorbent and debides
- Disadvantages: difficult to remove, may dehydrate the wound



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Silver-Impregnated Dressings

- Broad-spectrum effect on bacteria, viruses and fungi, thus decreasing wound bioburden;
- Its use decreased with the advent of antibiotics (except as a topical agent i burn care);
- Silver's ionic current affects electrical potentials, blocking pain in chronic wounds;
- Advantages: requires less dressing changes, cost-effective, limits tissue damage and increases patient comfort;
- Disadvantage: may stain the wound grey.



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Summary

- Remember the essential elements for optimal wound healing for the three types of wounds: venous, compression, neuropathic, offload, ischemic revascularization
- Keep wound base moist and free of infection.
- From Recent trials (small studies)
- Possible effect of endovenous ablation
- In neuropathic wounds, no reduction in wound size
- In ischemic wounds with diabetes, hyperbaric oxygen did not reduce amputations or improve complete wound healing at 12 months.



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Question Two

- An 85 y/o male diabetic patient with known vascular heart disease presents for a new ischemic wound on his great toe. Which recommendation has the weakest evidence for therapeutic recommendation
1. Statin Use
 2. Aspirin Use
 3. Arterial pump use
 4. Smoking cessation



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THANK YOU

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