

# EM CASE OF THE WEEK.

BROWARD HEALTH MEDICAL CENTER  
DEPARTMENT OF EMERGENCY MEDICINE



Care Warriors

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## Leg Ulcers

A 64-year-old obese male with a past medical history of CKD stage 4, CHF, diabetes mellitus, monoclonal gammopathy of undetermined significance and hypertension presents to the ED with 3 day history of bilateral lower extremity swelling and ulcer formation. The swelling improves slightly with leg elevation. He denies pain, fever or trauma but does admit to shortness of breath, wet cough and chills. Patient is afebrile and vitals are within normal limits with the exception of BP which is 181/86. On physical exam, patient has marked left sided leg swelling, blister formation on the right leg and induration, hyperpigmentation and ulcer formation bilaterally. Patient also exhibits decreased sensation to light touch that is present bilaterally but more pronounced on the left leg. Pertinent labs include CBC which was within the normal range and BMP which was normal with the exception of a BUN and creatinine of 60 and 3.4. Other labs that were abnormal include a BNP of 417, Hemoglobin A1c of 8.1 and PTH intact of 226.5. **Which of the following is likely causing ulcer formation in this patient?**

- A. Venous Insufficiency
- B. Diabetic neuropathy
- C. Volume overload
- D. Bacterial infection
- E. All of the above



Left leg shows swelling, ulcers with irregular borders, surrounding pigmentation and stasis dermatitis



Right leg shows a mild swelling, a shallow oblong ulcer on the lower tibia with blister formation and hyperpigmentation which obscures the lower border of the tattoo.

*EM Case of the Week is a weekly "pop quiz" for ED staff.*

The goal is to educate all ED personnel by sharing common pearls and pitfalls involving the care of ED patients. We intend on providing better patient care through better education for our nurses and staff.

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# Warriors

The correct answer is E. The cause of leg ulcers is often multifactorial. As we discuss our differential diagnosis, it becomes apparent that venous insufficiency, diabetic neuropathy, volume overload and bacterial infection all likely contribute to the clinical picture of ulcers in this patient.



Comparison of both legs demonstrates degree of leg swelling

### Differential diagnosis

Higher	Lower
Venous insufficiency	Vasculitis
Arterial insufficiency	Panniculitis
Diabetic neuropathy	Drug reaction
Trauma	Brown recluse spider bite
Infection	Pyoderma Gangrenosa
Volume overload	Hypercoagulable states

### Discussion

Leg ulcers refer to full thickness loss of epidermis of any cause. There are many causes of ulcers and many times the etiology is multifactorial. The history and physical exam can give clues to the likely disease process or processes. **The most common cause is venous insufficiency.** Clues in our patient's history and physical exam that point to venous ulcers being the cause include history of leg swelling improved with elevation, hypertension, obesity, increasing age, mild to no pain, shallow ulcers on the inferior third of the tibia with rounded or irregular borders, surrounding pigmentation secondary to hemosiderin and stasis dermatitis. In contrast, arterial ulcers present with more severe pain and signs of intermittent claudication. Leg elevation decreases blood flow and results in increased pain. Arterial ulcers have a deep and punched out appearance and are usually at distal sites like the toes. The surrounding skin is shiny and atrophic with loss of hair. On physical exam pulses will be weak and capillary refill will be delayed. Our patient's history and physical are not consistent with arterial ulcers but there may be a component of diabetic neuropathy.

Clues in our history and physical pointing to this diagnosis include a known history of diabetes and painless ulcers with decreased sensation in the skin close to the lesions. Our patient denied any trauma to the leg but if there is a component of diabetic neuropathy he may be unaware of destructive physical processes such as repetitive trauma, thermal burns or cold injury. Our patient's Hemoglobin A1c was in the diabetic range. Volume overloaded states can contribute to ulcer formation. Our patient's BUN and creatinine was markedly increased from baseline. Poor renal function likely contributed to excess interstitial fluids and ulcer formation. Infection is another common cause of leg ulcers. The rapid onset of ulcer formation seen in our patient points to an infectious process. Culture and gram stain of the ulcer on the right leg grew staphylococcus aureus and enterobacter cloacae complex.

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*All are welcome to attend!*

## Diagnosis

Venous ulcers are usually diagnosed based on history and physical however venous duplex ultrasonography will demonstrate reflux and obstruction in the veins if diagnosis is unclear. Arterial brachial index can confirm peripheral arterial disease which would support arterial insufficiency. History of diabetes and evidence of decreased sensation on physical exam point to diabetic neuropathy as a possible cause. Volume overload is evident on physical exam but labs that can support this include BNP and BUN/creatinine. If infection is suspected a swab culture of the wound can be performed. Sensitivities should be obtained to direct appropriate management. If diagnosis is uncertain after these initial measures, further workup for less likely causes should be carried out. This may include an ANA, ESR or biopsy of the lesion.

## Treatment

Treatment should be aimed at reversing the factors that have caused the ulcer. Venous leg ulcers can be treated with exercise, leg elevation and compression socks or devices. Slow increases in exercise regimens are also beneficial for arterial insufficiency but elevation and compression stockings should be avoided as they result in further ischemia. Smoking cessation is an important part of management of arterial ulcers but surgical revascularization is the definitive treatment. Volume overload states secondary to heart failure or renal failure can be treated with diuretics or dialysis. Infection is treated with antimicrobials including iodine, silver and even honey.

Regardless of the etiology, all wounds must be cleaned, irrigated, undergo debridement and wrapped in appropriate dressings. Irrigation is important for decreasing bacterial load and removing loose material. Debridement refers to the removal of surface contamination and dead tissue which prevent appropriate healing. There are many dressings and proper dressings depend on the type of ulcer and stage of healing it is in. Topical growth factors such as platelet derived growth factor and epidermal growth factor can promote healing but are expensive.

## Take Home Points

- There are many causes of leg ulcers, the most common being venous and arterial insufficiency, diabetic neuropathy, physical trauma, volume overload and infection. The cause is commonly multifactorial.
- The cause of the leg ulcers is usually evident based on history and physical exam but labs that can aid in the diagnosis include sodium, glucose, hemoglobin A1c, BUN/Creatinine, parathyroid hormone, BNP, ESR and ANA.
- Imaging studies are not needed but it is often helpful to take a swab of the wound or a tissue culture via incision or punch biopsy from the ulcer edge.
- Treatment for leg ulcers depends on the etiology but general wound management includes irrigation, debridement of devitalized tissues, use of antimicrobial agents and wound dressings.



This month's case was written by Jeffrey B. Morris. Jeffrey is a 4<sup>th</sup> year medical student from NSU-COM. He did his emergency medicine rotation at Broward Health North in July 2017. Jeffrey plans on pursuing a career in Dermatology after graduation.

## REFERENCES

- William JD, Berger TM, Elston DM. *Andrews' Diseases of the Skin*. Philadelphia: Elsevier, 2016.
- Ngan V, Writer S (2004). Leg Ulcers. DermNet New Zealand.
- UpToDate: Basic Principles of Wound Management
- UpToDate: Approach to the Differential Diagnosis of Leg Ulcers