OUTPATIENT MANAGEMENT OF CHRONIC WOUNDS

Geriatric Grand Rounds
10/19/17

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How Most Doctors and Their Patients Feel About Chronic Wounds.
Effective Wound Care

- Know the etiology of the wound!
- Treat vascular disease
- Treat infection
- Treat Edema
- Treat pressure
- Use good local wound care
- Know when to refer

Number One Priority When You Begin to Evaluate a Chronic Wound.

Determine the underlying etiology of the wound

Wounds, like all other medical conditions, have a Differential Diagnosis

You can’t adequately take care of a wound without first determining what underlying factors are preventing it from healing
The major questions to ask yourself with each wound patient:

- What is the patient’s vascular status?
- Is there edema?
- Is there infection?
- Is there abnormal underlying anatomy/pressure?
- Is there malignancy?

Additional Questions

- Is the patient malnourished?
- Is there a “funny disease” present
  - Pyoderma gangre, Cryoglobulinemia, Bullous disease etc.
- Previous radiation/trauma in the area of the wound
- Is the patient taking confounding medications?
  - Immunosuppressive agents, hydroxyurea, warfarin.
Is There Vascular Disease?

- Arterial insufficiency
- Venous insufficiency
- Thromboembolic disease/ cholesterol emboli/ infectious emboli
- Microvascular/Microthrombotic disease
  - Diabetes
  - Livedoid Vasculopathy (Atrophie Blanche)
  - Vasculitis
    - RA, CTD, Leukocytoclastic Vasculitis, Antiphospholipid syndrome, Lipodermatosclerosis

Arterial Disease
Clues to Large Vessel Arterial Disease

- Patients frequently have underlying risk factors
  - HTN
  - Hyperlipidemia
  - Smoking
  - DM
  - Other macro-vascular disease
    - Carotid Disease
    - CVA
    - CAD

Large Vessel Arterial Wound Symptoms

- May start spontaneously or after trivial trauma
- Tend to be painful
- Claudication or rest pain may be present
Arterial Disease Signs

- Look for evidence of arterial disease away from the wound
  - Carotid, abdominal or femoral bruits
  - Lack of distal hair growth
  - Poor pulses and sluggish capillary refill time

Arterial Disease: Wound Characteristics

- Tend to be well demarcated, “punched out,” deep wounds in distal locations
- Wound-beds lack good granulation tissue
- Necrosis and gangrene may be present
Arterial Disease

Arterial Wounds
Arterial Wounds

Diagnostic Work-up

- Non-invasive arterial studies
  - Normal ABI > 1.0
  - ABI less than 0.75 warrants referral to a vascular specialist
  - With heavily calcified arteries (ABI > 1.4), the Toe Brachial Index (TBI) may be of assistance. Normal > 0.7 -0.75
- MRA
- Angiogram
- Transcutaneous oxygen concentration (TCPO2)
  - > 30 is normal
  - < 20 mmHg are consistent with severe ischemia
Transcutaneous Oxygen Concentrations – TCPO2

Treatment Overview

- Revascularize severely ischemic limbs
- Debride
- Treat infection
- Pentoxifylline or cilostazol may have a role in borderline patients or non-surgical candidates
- Low Frequency US Therapy (MIST)
- Local wound care
Venous Disease

Clues to Venous Insufficiency

- Personal or family history of “varicose veins”
- Symptoms of “aching legs” at the end of the day
- History of previous deep venous thrombosis
- History of previous varicose vein “stripping” or sclerotherapy
Venous Disease: Physical Findings

- Superficial varicosities and spider veins are common
- Edema is very common
- Hemosiderin pigmentation of the skin is common: “Brawny Edema”

Clinical Manifestations of Chronic Venous Disease

Venous Hypertension is thought to be the critical precipitating factor leading to the manifestations of venous insufficiency.
Inflammation

- Venous Hypertension leads to stagnant blood flow
- Venous wall damage
- Prothrombotic changes
- “Sticky White Cells” adhere to venules and become activated leading to inflammatory effects
- Free radical formation

Venous Hypertension as the Hypothetical Cause of the Clinical Manifestations of Chronic Venous Disease, Emphasizing the Importance of Inflammation

Venous Insufficiency: Wound Characteristics

- Venous wounds tend to be located around the ankle (“gaiter”) area
- Medial or lateral ankle
- Irregularly shaped and tend to be shallow
- Wound beds typically more fibrin than granulation

Venous Disease
Diagnostic Evaluation: Venous Studies

- Clinical exam
- Ultrasound to identify DVT
- Experienced ultra-sonographers can identify valvular incompetence and venous perforators
- Ultrasound is helpful in preoperative evaluation before venous surgery

Treatment Overview

- Debride wound
- Control infection
- Control Edema
  - Compression, Compression, Compression!
- Local wound care
- Adjunct therapies
Debridement

- Remove any necrotic tissue and excessive fibrin
- Create a healthy, granular wound bed
- Stimulate wound bed remodeling by enhancing fibroblast activity, epithelial migration and enhanced microcirculation
- Manage the development of surface Biofilm which inhibits wound healing

Wound Debridement in Your Office

- Debridement does not have to be a major undertaking!
- Scrubbing the surface of the wound with a moistened gauze, Q-tip, or edge of a forceps can be effective
- Scalpels, curettes, scissors, and forceps can also be effective
Saline vs Tap Water for wound irrigation

- Cochrane Review 2008
- 11 Trials included in review

Cochrane Review 2008
Authors' conclusions

- There is no evidence that using tap water to cleanse acute wounds in adults increases infection and some evidence that it reduces it. However there is not strong evidence that cleansing wounds per se increases healing or reduces infection. In the absence of potable tap water, boiled and cooled water as well as distilled water can be used as wound cleansing agents.
Debridement

- Neuropathic patients may require little or no anesthesia
- Topical anesthetics such as ice, topical lidocaine, ethyl chloride, or lidocaine/prilocaine can be effective
- Injectable anesthetics
Billing Documentation

- Diagnosis of Wound
- 4 key components
  - Excisional/Non-excisional
  - Instrument used
  - Depth of Tissue – “INTO” epidermis, dermis, SubQ, muscle, or bone
  - Size of Wound. Preferably pre and post debridement measurements (L x W x D)

Billing Codes

- 97597 – Debridement; skin, fibrin, devitalized tissue 1st 20 sq cm
- 97598 – Debridement; skin, fibrin, devitalized tissue - ea addl 20 cm
- 11042 – Debridement; skin & subq tissue – 1st 20 sq cm
- 11045 Debridement; skin & subq tissue – ea addl 20 sq cm
- 11043 Debridement; skin & subq muscle – 1st 20 sq cm
- 11046 Debridement; skin & subq muscle – ea addl 20 sq cm
Documentation

- "Venous stasis wound medial left ankle. Measures 4x4x0.3 cm in largest dimensions. Wound bed is partially granular with fibrin and slough present. Necrotic material is present on 50% of the wound. Wound edges are flat. Surrounding skin is mildly hyperemic. Topical Prilocaine/Lidocaine was applied for anesthesia. Currette was used to excisionally debride into subcutaneous tissue. Fibrin, glycocalyx, biofilm and devitalized tissue were removed. Post debridement wound measurements were 4x5x0.4 cm."

Controlling Edema

- Mechanical compression more effective than diuretics
- Practical devices for an office setting are elastic wraps, graded compression stockings, and Velcro cinch devices
- Horse Chestnut Seed Extract
Estimate of effect of compression treatment versus no compression (complete healing, after varying lengths of treatment)

- Compression treatment increases the healing of ulcers compared with no compression
- High compression is more effective than low compression but should only be used in the absence of significant arterial disease
- No clear differences in the effectiveness of different types of compression systems (multilayer and short stretch bandages and Unna’s boot have been shown to be effective)
- Intermittent pneumatic compression appears to be a useful adjunct to bandaging
Rather than advocate one particular system, the increased use of any correctly applied high compression treatment should be promoted.

**Compression**

- Velcro based devices (Juxta-lite - Circ-aids)
- Edema pumps
- Unna boots/Multi-layer wraps: usually performed in specialty clinics or via trained visiting nurses
Compression, Compression, Compression!

- "TED" Hose purchased in the grocery store have less than 19mm of pressure
- 35-40 mm Hg is required to prevent capillary exudation in legs affected by venous hypertension
- ACE, Setopress or other elastic wraps can achieve adequate pressures and are easier to apply over wound dressings
- Prescription compression stocking are effective but can be hard to place over bulky dressings

Compression Stocking

![Compression Stocking Image]
Compression stocking

Compression: Elastic Wrap
Compression: Circ-aid

Edema Pump
Recurrence is high without ongoing compression

- 79% recurrence of ulcers without ongoing compression vs. 4% with long term compressive therapy

- Nelzen et al Eur J Vasc Endovasc Surg. 1997

Compression with Underlying Arterial Disease.

Myth: All patients with even mild arterial disease should not have compression therapy applied
The decision about whether or not to apply compression therapy in patients with peripheral arterial disease is related to the degree of arterial compromise. Most guidelines use ABPI as a measure of severity: compression therapy with bandages or hosiery is contraindicated in patients with ABPI <0.5 (critical ischaemia) and used with caution or at reduced pressures (modified compression) in patients with ABPI 0.5–0.8. Recent research has found that inelastic bandages with compression pressures of up to 40mmHg are able to increase arterial flow and venous pump function in patients with mixed ulcers and ABPI 0.6–0.8. However, local protocols on the application of compression to patients with peripheral arterial disease and when to refer for specialist assessment should be followed.

Compression therapy in mixed ulcers increases venous output and arterial perfusion

Giovanni Mosti, MD, Maria Letizia Jabichetti, MD, Hugo Partsch, MD
Journal of Vascular Surgery
Volume 55, Issue 1, Pages 122-128 (January 2012)
DOI: 10.1016/j.jvs.2011.07.071

- 25 patients with documented arterial and venous insufficiency related Lower Extremity Ulcerations
- Mean age 76
- ABPI measured: 0.5-0.8
- Systolic pressure at ankle > 60 mmHg
- Systolic pressure and toe >30 mmHg
- Inelastic compression to achieve 20-30 mmHG, 31-40 mmHg and 41-50 mmHg
- Toe pressures, Toe TC PO2, and Venous Ejection Fraction measured.
Adjunct Therapy

- ASA
- Pentoxyphylline
- Horse Chestnut Seed Extract
**Aspirin**

- Two small Studies (N=20, N=40) have demonstrated improved healing rates in patients who add ASA therapy (300mg daily) to standard compressive therapy

  - Layton et al, Lancet. 1994
  - Ibbotson et al, Br J Dermatol. 1995

**Pentoxyphylline**

- Cochrane Review: 2012
- 12 randomized studies
- 864 patients
- Conclusion: relative risk of wound healing with Pentoxyphylline vs. placebo was 1.70 attempt to achieve dose of 400 mg tid
- Some evidence that higher doses - 800mg TID could have additional benefit.
- GI side effects limit its use

PENTOXYPHYLLINE

- **Mechanism Of Action:**
  Pentoxifylline inhibits erythrocyte phosphodiesterase, resulting in an increase in erythrocyte cAMP activity. Subsequently, the erythrocyte membrane becomes more resistant to deformity. Along with erythrocyte activity, pentoxifylline also decreases blood viscosity by reducing plasma fibrinogen concentrations and increasing fibrinolytic activity. May also inhibit platelet aggregation.

Horse Chestnut Seed Extract

- Active ingredient is Escin
- Seven placebo controlled trials and two meta-analysis have shown clinical benefits (venous insufficiency symptom improvement) over placebo
- 300 mg bid (standardized to 50 mg of escin)
Horse Chestnut Seed Extract

- Stimulate “F” series prostaglandins
- Veno-constriction
- Decreased vascular wall permeability
- Equally effective as compression in reducing leg volume and edema
- Decreases symptoms associated with venous insufficiency

Cost-benefit analysis predicts cost savings by using Horse Chestnut Seed Extract to treat venous wounds

Well done clinical trials in wound healing lacking

Microvascular Disease

- Diabetes
- Vasculitis
  - RA and other auto-immune disease
  - Leukocytoclastic vasculitis
  - ANCA
  - Livedoid Vasculopathy ("Atrophie Blanche")
  - Antiphospholipid Antibody Syndrome and other hypercoaguable states
  - Cryoglobulinemia/Cryofibrinogenemia
  - Lipodermatosclerosis
- Cholesterol emboli (post-angiogram or spontaneous)
Diabetes

Diabetic Wounds

- Tend to be multifactorial wounds
  - Ischemia (macro and micro)
  - Infection
  - Neuropathy
  - Anatomic deformity
    - Charcot joints
    - Arch collapse
    - Hammer toes
Diabetic Wounds

- Frequently are located on the legs and feet and over boney prominences
- May be hidden by callous formation
- May be deceptively deep and large
- Osteomyelitis should be presumed when wounds probe to bone

Diabetic Wound: Evaluation

- Determine degree of diabetic control
- Assess for Infection (deep and superficial)
- Assess vascular status
- Assess for neuropathy with a 5.07 Semmes-Weinstein nylon monofilament
- Assess for anatomical deformities which may predispose to pressure ulceration
Neuropathy Evaluation

Is the wound infected?

- May look “normal” without “classic” signs of inflammation, erythema, or exudate
- Purulence, heavy exudate, sinus tracts, or fluctuance may be present
- Wounds with exposed bone, or that probe to bone have osteomyelitis until proven otherwise
- Fasciitis and cellulitis may be present
Quantitative Cultures

- Avoid superficial swab cultures of wounds.
- (If only option debride first)
- Quantitative cultures require one gram of tissue from the wound base (think ½ carat diamond)
- Overlying fibrin and necrotic debris should be debrided first
- Growth of greater than 100K bacteria/gm of tissue has been shown to correlate with a bacterial burden which inhibits wound healing and should be treated.

Levine Technique
For semi-quantitative Cultures

- Debride wound of biofilm/debris
- Firmly press swab on a localized 1 cm² area of the wound for 5 seconds
Semi-Quantitative Culture

- Rare-Few = $2.6 \times 10^3$ CFU/mL
- Moderate = $6 \times 10^3$ to $4 \times 10^4$ CFU/mL
- Heavy = $> 4 \times 10^4$ CFU/mL

Radiological Tests

- Plain X-ray
- MRI
- Bone scans
- CT scan
Abnormal Pressure: Charcot Foot

“Unload” wounds

- Limit or prohibit weight bearing.
- Use special shoes, braces, pads or other devices to decrease direct pressure over wounds.
Unloading Wounds: Boots
Donjoy

Unloading: Ipos Boots
Unloading: Lanaird Boot

Unloading a Neuropathic Ulcer
Treatment Overview

- Debride wound and determine full extent of defect
- Exclude Osteomyelitis if appropriate
- Treat Infection
- Unload wound appropriately to minimize ongoing friction, shear, and pressure
- Local wound care
- Tight Blood Sugar control

Microvascular Disease: Vasculitis
Clues to Vasculitic Wounds

- Auto-immune disease, HCV, or other systemic vasculitic conditions
- Leukocytoclastic vasculitis: may be preceded by systemic infection or new medication
- Unusual location and/or unusual appearance
- Wound stagnates despite conscientious wound care

Vasculitic Wounds: Appearance

- Vasculitic wounds typically have raised purple borders and are irregular in shape
- Livedo reticularis, petichia, purpura, or atrophie blanche may be present
Vasculitic Wound

Leukocytoclastic Vasculitis
Diagnostic Work-up

Biopsy is most definitive way to diagnose vasculitis

Biopsy

- Don’t be afraid, it is not a difficult procedure!
- Have a low threshold to biopsy:
  - long standing wound
  - High suspicion of malignancy/vasculitis
  - when the diagnosis is unclear
Biopsy from Wound Edge NOT center of wound

Try to include some of the surrounding “normal” tissue
Inform the dermatopathologist of your clinical suspicions
Vasculitis: Labs

- Labs vary depending on suspected conditions but can include:
  - CBC, Chem 22, UA, ESR/CRP, ANCA, ANA Profile, RF/ACP, Hepatitis B and C serologies, cryoglobulins, cryofibrinogens, antiphospholipids.

"Off hand, I’d say you’re suffering from an arrow through your head, but just to play it safe, I’m ordering a bunch of tests."
Vasculitis: Treatment Overview

- Treat underlying Condition
  - Antibiotics for infection induced LCV
  - Immuno-suppressive medications for CTD
  - Anti-HCV treatment
  - Withdrawal of inciting medications
  - Colchicine can be effective in idiopathic cases
- Good local wound care

Livedoid Vasculopathy

- “A chronic, recurrent, painful skin disorder that involves the distal lower extremities and feet. The disorder is a thrombotic, non-inflammatory condition associated with the formation of clots within the lumina of medium-sized arterioles and hyalinizing changes within the subintimal region of involved vessels”

- UpToDate – 2007-2008
Livedoid Vasculopathy
(Atrophie Blanche)

- May be idiopathic, or associated with autoimmune disease, arterial or venous disease
- Patients with chronic venous insufficiency frequently have features of Atrophie Blanche

Atrophie Blanche: Appearance

- Atrophic, white scars
- Punctate “cayenne pepper” spots dotting the scar
Atrophie Blanche
Livedoid Vasculopathy: Treatment

- Treat underlying etiologies if present
- Compression (if arterial insufficiency excluded)
- Anti-platelet and anti-thrombotic treatment
  - ASA, pentoxyfylline, cilostazol, warfarin, heparin.
- Para-lesional steroid injections
Wound Care

A Healthy Wound is:

- Free of infection
- Free of necrotic and fibrinous material
- Well perfused with a healthy granulation bed
- Neither too moist nor too dry
- Not threatened by pressure or shear forces
Good Wound Care Does NOT Include:

- Hydrogen peroxide (beyond an initial therapy for acute wounds).

- “Wet to Dry” dressings, which tend to damage healthy granular tissue, cause bleeding and pain for patient, leave strands of gauze in the wound, and promote local vasoconstriction and hypoxia (during the evaporative period).

Dressings Manage moisture in and around wounds

- It has been known for over 50 years that “leaving a wound exposed to dry” is NOT productive.

- Occluded wounds heal up to 40% faster and have improved scar formation.
Picking a Dressing

- Select a small number of dressings that you can become comfortable using.
- Avoid “The Dressing Du Jour”
Picking your dressing

- “Consensus Opinion” rather than definitive scientific evidence
- Debridement Stage – Hydrogels
- Granulation Stage – Foams and low adherence dressings.
- Epithelialization Stage – Hydrocolloids and low adherence dressings.

Skin Tears/Dry Wounds

- Use films which are permeable to water vapor and O2, but not proteins and bacteria
- Allow insensible water loss but trap wound fluids and prevent bacterial contamination
FILMS

TEGADERM

OPSITE

Hydrogels

- Synthetic Polymer Matrices
- Hydrate wounds and enhance auto-debridement of wounds
Hydrogels have the ability to donate water molecules to dehydrated tissue while allowing the passage of water vapor and oxygen to the wound surface (Jones and Milton, 2000). This helps to increase the phagocytic activity of leukocytes and enzymatic activity of damaged cells. This, in turn, removes devitalized tissue during the destructive phase of healing of a wound - autolysis (Thomas and Leigh, 1998; Tong, 1999; Pudner, 2001).

hydrogels

DERMA-GEL  VIGILON
Necrotic and/or heavily exudative wounds

- Alginates
- Foams and gels on self adhesive polyurethane films.

These wick exudate and bacteria from wound surface and serve as a mechanical debridement with each dressing change.

Alginates

- Algae Polysaccharides
- Insoluble in water but able to exchange Ca+ for Na+ (in sodium rich environments) to create an amorphous Gel
- Particularly useful in exudative wounds
Alginates

MEDIHONEY ALGINATE  MAXORB

Medicinal Honey

- Broad spectrum antimicrobial properties secondary to high osmolarity and high H2O2 concentrations
- Discourage wound desiccation
- Usually soothing on application
Foam

- Highly Absorbent
- Good to pack cavities
- Conform to wound
- Conform to challenging body locations

FOAM

MEPILEX BORDER

MEPILEX SACRUM
FOAM – Allevyn Sacrum

Antibacterial Therapy

- Sulfadiazine cream
- Mupirocin cream/ointment
- Gentamycin cream/ointment
- Codexemer iodine
Topical Antibacterials

Topical Proteolytic Agents

- Collagenase
Number of Dressing Changes is Dictated by the Wound

- Wounds with heavy drainage/exudate should be changed frequently to avoid maceration
- Other wounds can be changed QD, QOD and even Q-week

PUTTING IT ALL TOGETHER
## Office supplies for wound care

- Measurement device
- Semmes-Weinstein mono-filament
- Topical/injectable anesthetic
- Tools for debridement (forceps, scissors, scalpel, curette)
- Culture medium/swabs
- Punch biopsy kit
- Dressing supplies (antibiotics/hydrocolloid gels, non-adherent coverings, 4x4s, kerlex)
- Elastic wraps

## Good Wound Care: Each Visit

- Assess the wound’s size and depth. Measurements allow for more objective follow-up.
- Assess for excessive fibrin, necrosis, or signs of infection.
- Debride if necessary.
- Document carefully in notes.
- Dress the wound with an appropriate dressing which avoids maceration or desiccation.
- Utilize compression when needed.
- Unload wounds if needed.
- Assess for role of adjunct therapies
The Patient Encounter

Assess Wound Size, Presence of Necrosis or Fibrin, and Signs of Infection
Anesthetize and Debride wound

Apply Dressing
Apply Compression

When do you ask for help?
Specialty Referral

- Severely Ischemic wounds
- Wounds with exposed tendon, muscle or bone
- Infected wounds not responding to outpatient management
- Wounds with you are not sure of the etiology or that you are not comfortable evaluating and treating
- Wounds which are not responding to appropriate wound care in your office over a 2-4 week period

Effective Wound Care

- Know the etiology of the wound!
- Treat Vascular Disease.
- Treat Infection.
- Treat Edema.
- Unload pressure/sheer.
- Use good local wound care.
- Know when to refer.
No trick questions, Please!

WAP WAP WAP
CALVIN! WHAT ARE YOU DOING TO THE COFFEE TABLE PI?

IS THIS SOME SORT OF TRICK QUESTION OR WHAT?