Approach to Non-healing Diabetic Foot Ulcers

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Questions to Answer

1. What are expected healing rates for DFU with standard of care?
2. When to move to advanced wound therapies to accelerate wound healing potential?
3. What are the choices for true non-healing DFUs?

Patient Evaluation and the Systems Approach to the Exam

Successful wound healing depends on comprehensive assessment

History
- HPI
- PMH
- Meds / Allergies
- Social history
- Previous surgeries
- Family History
- Review of Systems

Physical Exam
- Vascular
- Neurologic
- Orthopedic
- Dermatologic
- Wound History
- Shoegear

Surgery
 Palliative Wound Care
Patient Evaluation and the Systems Approach to the Exam

**Laboratory Studies**
- CBC
- Comp panel
- HbA1C
- Pre-albumin
- ESR / CRP

**Ancillary Testing**
- Plain film x-rays
- CT / MRI / Bone Scan
- Vascular Testing
- TCP02 / SPP
- Biopsy
- Tissue cultures

**Local Wound Evaluation**
- Probe to bone
- Moisture balance
- Size, structures, quality

**Systemic Evaluation**
- Smoking cessation
- Hypertension
- Glycemic control

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Healing DFUs with Standard of Care

**Purpose:** To evaluate the rate of neuropathic ulcer healing in 10 control groups from prospective clinical trials via meta-analysis

- **450 patients**
  - 12 week endpoint
  - Healing rate **24%**

- **172 patients**
  - 20 week endpoint
  - Healing rate **30.9%**

**Good wound care**
- Debridement
- Offloading
- Saline gauze or gel

There is significant need for advanced wound therapies……..

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Advanced Wound Care: Predicting Healing

**Percent Change in Wound Area of Diabetic Foot Ulcers Over a 4-Week Period Is a Robust Predictor of Complete Healing in a 12-Week Prospective Trial**

- Wound area changes over a 4-week period can strongly predict complete wound healing over an extended 12-week period **53%**
- 4-weeks can be a pivotal clinical decision point in the management of diabetic foot ulcerations

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Patient Factors Affecting Wound Healing – the Science

**Age**
**Nutrition**
**Infection**
**Perfusion**
**Senescent cells**
**Bacterial bioburden**
**Metabolic disorders**
**Sustained inflammation**
**Deficient growth factor response**

General wound appearance
- Periwound skin integrity
- Wound evolution
- Wound etiology
- Drainage

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Falanga V. Wound healing and its impairment in the diabetic foot
- Lancet. Vol 366; Nov 2005
Patient Factors Affecting Wound Healing – the Art

- Smokers
- Depression
- Fibromyalgia
- Homelessness
- Financial distress
- Goals and motivation
- Lack of social support
- Patient attitude and buy-in
- Previous experiences with health care teams

When to Consider Surgery?

Consider surgery when conservative therapy fails

- Failure of conservative treatment -- Ulcers that cannot be accommodated and offloaded by footwear, orthoses, or related care
- Therapeutic shoes – recurrence rates of ulcers 28% at 12 months to 100% at 40 months
- Deformity which places limb at risk
- General medical status
- Arterial perfusion
- Rigid vs. flexible

Surgeries for Treating Wounds in Patients with Diabetes

- Prophylactic Procedures
  - Correction of Deformities
  - Hammertoes
  - Charcot
- Ablative Procedures
  - Amputation
- Curative Procedures
  - Debridements
  - Wound closure
  - Flaps and grafts
  - Closure devices
  - Ankle joint equinus
- Procedures addressing underlying etiology in the presence of a wound

Healing Lesser Toe Ulcers

Clinic based flexor tenotomy procedure for digital ulcers

**Results**
- 34 toes in 14 patients
- 8 male / 6 female
- 24 ulcers / 10 at risk
- 3 Osteomyelitis
- Average duration of ulceration 11 months
- Mean f/u 13 months

- Ulcers without osteo healed within 3 weeks
- Ulcers with osteo healed within 8 weeks
- No complications
- No recurrence
- No hyperextension deformities seen

Healing Hallux IPJ Ulcers

Retrospective comparative cohort study of operative vs non-operative management of hallux IPJ ulcers

**Results**
- 21 Surgical patients underwent Keller type arthroplasty
- 20 age, sex-matched patients receiving standard non-surgical care

- Ulcer healing:
  - 24 days vs 67 days
- Ulcer recurrence:
  - 5% vs 35%
- Infection:
  - 40% vs 38%
- Amputation:
  - 10% vs 5%

Healing Ulcers Sub 5th Met Head

Retrospective cohort study to evaluate outcomes of operative versus non-operative treatment of ulcerations sub 5th metatarsal head

**Results**
- 22 patients underwent 5th met head excision
- 18 patients received standard non-operative care
- 6 month f/u

- Ulcer healing:
  - 5.8 weeks vs 8.7 weeks
- Ulcer recurrence:
  - 4.5% vs. 28%
- Infection:
  - 18% vs. 22%
- Amputation:
  - 4.5% vs. 12%

Approach to Patients with Non-healing DFUs?

Palliative Wound Care
- Chronic Wound Maintenance Wound Hospice

**Historical focus of wound care has been:**
- Curing / managing the underlying disease
- Healing the wound

**Palliative wound care is the evolving body of knowledge and skills that take a holistic approach to relieving suffering and improving quality of life for patients and families living with chronic wounds, whether the wound is healable or not.**
Approach to Patients with Non-healing DFUs?

Encompasses therapeutic interventions that aim to:
• Guide effective communication, decision making, and care delivery
• Stabilize the wound
• Minimize the risk of infection and further progression of the wound
• Manage the multiple issues that cause patient and family suffering
• Optimize the patient’s function and quality of life for as long as possible

Would life be different if the wound healed?

Approach to Patients with Non-healing DFUs?

Summary

The majority of wounds will not heal with standard of care
Advanced wound care can accelerate wound healing in the appropriately selected patient
Successful wound healing is dependent upon comprehensive local and systemic assessment
Surgery has a role in the prevention and management of DFUs
Palliative wound care is an acceptable alternative in many cases

Thank you!