Sacral Pressure Injury

Michelle K. McNutt, MD

Editorial Review: Joseph M Galante, MD
Stephanie Savage, MD
Clay Cothren Burlew, MD

Injury/Disease Demographics

- Pressure injury is localized damage to skin or underlying soft tissue usually over a bony prominence.
- The term pressure injury is preferred over pressure sore or pressure ulcer because open ulceration is not always present.
- Most pressure injuries occur over the ischium, sacrum, or heel.
- Patients at risk include those with spinal cord injuries, critically ill/injured patients, patients in intensive care units, nursing home residents, and patients confined to bed or with decreased mobility.
- Patients often have a history of prior hospitalization, procedure, or reside in nursing home.

Clinical Presentation

- Presentation varies from intact skin to an open painful ulcer.
- Patients usually have risk factors of prolonged immobility including backboard and/or cervical collar placement for spine immobilization.

Evaluation/Diagnostics/Imaging

- Physical exam is used to stage the pressure injury based on NPUAP staging system:
    - Stage 1 – nonblanchable erythema of intact skin
    - Stage 2 – partial-thickness skin loss with exposed dermis
    - Stage 3 – full-thickness skin loss with visible subcutaneous fat
    - Stage 4 – full-thickness skin and tissue loss with exposed bone, tendon, or muscle
    - Unstageable – obscured full-thickness skin and tissue loss usually by eschar
    - Deep pressure injury – persistent nonblanchable deep red, maroon or purple discoloration
- Labs obtained when clinically indicated include an evaluation of nutritional status (albumin, pre-albumin, transferrin, serum protein) or sepsis work-up (CBC, ESR, CRP).
- Multiple imaging modalities are available to evaluate for osteomyelitis.
    - Pelvic radiograph – While plain films have the lowest sensitivity and specificity, they remain the first line imaging modality due to the ability to exclude other differentials such as fractures, cost, and availability.

    - MRI has the highest sensitivity and specificity and has emerged as the imaging modality of choice. Limitations include cost, availability, and contraindications such as pacemakers, intracranial aneurysm coils, etc.
    - CT scan is a useful alternative when MRI is unavailable or contraindicated. It has excellent bony resolution but poor soft tissue resolution and is limited by streak artifact with metallic implants.
    - Triple phase bone scans have a high sensitivity with non-violated bone even in early stages of infection, but specificity is lower if the bone has been violated (surgery, trauma, open wound, malignance, etc)
    - Nuclear medicine (FDG-PET scan) studies have a high sensitivity but have poor specificity. Abnormal studies frequently require confirmation with MRI or bone biopsy.
- Bone biopsy should be considered with positive bone scan, elevated ESR, refractory wounds, or acute deterioration of chronic wound to rule out malignancy.

Role of Nonoperative Management and Associated Considerations

- The best treatment is prevention of pressure injuries with pressure reduction, patient repositioning every 2 hours, use of pressure relief mattresses, and prevention of friction and shearing.
- Stage 1 and 2 pressure injuries usually heal with proper medical management:
    - Nutritional support
    - Treatment of active infection
    - Wound management with debridement
    - Cleansing or topical agents (such as Dakin's solution, silver sulfadiazine, Sulfamylon, or bacitracin) and dressing changes
    - Maintain clean wound and surrounding tissue
    - Treat incontinence

Indications for Operative Intervention

- Stage 3 and 4 injuries typically require operative intervention following medical optimization.

Pre-operative Preparation

- Optimize nutritional status.
- Medical management of comorbid disease.
- Diverting colostomy if fecal soiling is contaminating the wound.
- While many enzymatic and antimicrobial solutions exist, sharp debridement is the most effective method for wound preparation and may be done at the bedside in some cases.

- In preparation for definitive reconstruction, irrigation and debridement of wound bed removes necrotic tissue and decreases bacterial count, with the goal of producing a granulated tissue bed.
- Negative pressure wound therapy may be beneficial in large complicated wounds and can be performed in the outpatient setting to minimize hospital length of stay if prolonged wound care is anticipated.

Operative Techniques for Definitive Closure of Pressure Injury Wounds

- Primary closure is rarely successful.
- Skin grafts provide thin, rapid coverage for stage 2 wounds.
- Skin flaps are more durable than grafts and are indicated for select stage 2 and 3 wounds.
- Fasciocutaneous flaps (transverse back flap or gluteal rotation flap) provide durable coverage over bony prominences but have limited bulk for large ulcers
- Musculocutaneous flaps (rotation or V-Y advancement flaps) provide greater bulk for filling large cavities and obliterating dead-space

Postoperative Management/ Complications

- Pain control should be optimized.
- Pressure avoidance via prone or lateral positioning and frequent repositioning and turning.
- Suction drains may be utilized in the wound and donor site.
- Mobilization after complete healing, typically 2 weeks after complex reconstruction.
- Complications include wound separation, hematoma or seroma, infection, and flap necrosis.
- The long term complication of carcinoma in the chronic wound (known as Marjolin's ulcer) has a low incidence (0.5% of chronic wounds) but a poor prognosis.

Considerations for Special Populations

- Chronic or terminally-ill patients with complex pressure injuries may not benefit from major operative procedures necessary for definitive closure
- Wound care options include enzymatic or sharp debridement with local wound care.
- A discussion with the patient and family regarding optimization of medical management and focusing on comfort may be more beneficial in this patient population.

Suggested Readings

- National Pressure Ulcer Advisory Panel (NPUAP) announces a change in terminology from pressure ulcer to pressure injury and updates the stages of pressure injury. National Pressure Ulcer Advisor Panel. Available at http://www.npuap.org/national-pressure-ulcer-advisory-panel-npuap-announces-a-change-in-terminology-from-pressure-ulcer-to-pressure-injury-and-updates-the-stages-of-pressure-injury. April 13, 2016.
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- Lee Y, Sadigh S, Mankad K, Kapse N, Rageswaran G. The imaging of osteomyelitis. Quant Imaging Med Surg. 2016; 6(2): 184-198.

Questions

1. What imaging modality has the highest sensitivity and specificity for diagnosing osteomyelitis and has emerged as the imaging modality of choice?
   a. Plain radiograph
   b. CT scan
   c. MRI
   d. Nuclear medicine scan (FDG-PET scan)
   e. Triple phase bone scan

While all listed imaging studies can be utilized to evaluate for osteomyelitis, MRI remains the imaging modality of choice with the highest sensitivity and specifity.

2. Based on the NPUAP staging system, how would classify a sacral pressure injury with full-thickness skin and tissue loss and exposed bone?
   a. Stage 1
   b. Stage 2
   c. Stage 3
   d. Stage 4
   e. Unstageable

A stage 4 pressure injury based on the National Pressure Ulcer Advisory Panel (NPUAP) terminology involves full thickness skin and tissue loss with exposed bone, tendon, or muscle.

3. Patients at risk of developing sacral pressure injuries include all of the following except?
   a. Spinal cord injury
   b. Patients confined to bed with decreased mobility
   c. Patients with prolonged intensive care unit stays
   d. Critically ill or injured patients
   e. Patients recovering from elective surgery

Patients at risk of sacral pressure injury include patients with decreased mobility or those confined to bed. Patients are frequently ambulatory following elective surgery.

4. Operative techniques for definitive closure of pressure injury wounds include?
   a. Primary closure
   b. Skin grafts
   c. Fasciocutaneous flaps
   d. Musculocutaneous flaps
   e. All of the above