Pressure Sore Primer For Surgeons

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Pressure Sore Nomenclature

- Decubitus Ulcer often used as synonym but, many sores originate in sitting position

- Pressure Ulcer term lowers recognition of lesions that have not yet ulcerated

- Pressure Sore is therefore best term
Sitting Sores

- Any chair contact point
- Ischial commonest and least likely to heal without surgery as ischium bears highest pressures - 90 mm Hg
Decubitus Locations

- Any contact point in supine OR lateral position
- Pelvic bony prominences generate highest pressures
- 60-70 mm Hg
- Sacral and trocanteric sores therefore commonest and most likely to be surgical

Pressure Sore Reconstruction
Pathogenesis

- Abrasion
  - often cited as initiating factor by patient
  - eg abrasion during transfer to chair
  - possible edema occludes skin caps
  - possible ulcer deepens later
  - but improbable sequence
Pathogenesis - Pressure Ischemia

- 32 mm Hg cap perfusion
- likely sole mechanism in most cases
- pressures highest at bone, not skin
- pressure isobars
- highest pressures at bone, not skin
Pathogenesis - Pressure Ischemia

- skin change “tip of the iceberg”
- explains time sequence in many sores of minimal early skin change with later ulceration to bone
Pathogenesis - Time Sequence

• 6-8 hour necrosis time single event
• Reperfusion Injury
  – free radicals make tissue more sensitive to ischemia
  – shortens necrosis ischemia time to 3 hours on repeat exposures
Classification or Staging

- several similar scales akin to burn depth degrees
  1 - epidermis
  2 - into dermis
  3 - into fat / muscle
  4 - to bone
  5 - joint involvement
- Value limited as contrary to likeliest pathogenesis model
- ie Staging model upside down as worst ischemic damage is at bone!!!
Shear Ulcers

- patient sliding down bed or chair
- creates tension in skin
- tension occludes capillaries
- maximal tension at skin surface
- very compatible with 1st, 2nd, 3rd degree classifications
- most heal with dressings
Risk Factors

- EXCESS PRESSURE TIME
- EXCESS PRESSURE TIME
- EXCESS PRESSURE TIME
- skin moisture
- nutrition
- etc
Three Commonest Patient Types

• Temporarily obtunded
  – eg ICU, intoxication, CVA

• Permanently Obtunded
  – eg Dementia, chronic brain injury

• Asensate
  – Spinal chord or peripheral nerve
Investigations

- X-rays
- Nuclear Med Scans
- Sinogram
- CT and MRI
- Cultures
X-rays

- occasionally helpful around hip or thoracolumbar spine
- can confirm hip dislocation, vertebral dislocations, lytic osteomyelitis of femoral head
Nuclear Med Scans

- eg bonescan +/- labelled white cell scan
- often ordered by MD’s for pressure sores
- rarely (? Never) alter outcome or management
- very high false positive rate
- inappropriate prolonged IV antibiotic regimes frequently result
- periostium inflamed by adjacent ulcer in most sores
- positive bonescan proves hypervascularity, not osteomyelitis
- positive white cell scan proves white cells present, not necessarily invasive infection
Sinogram

- Q-tip often more useful to determine extent of ulcer with small orifice
- occasionally helpful in long complex sinus
- very helpful if hip joint involvement suspected and not proven on exam or xray
CT and MRI

- rarely alter management
- occasionally useful
- eg ulcers over complex spinal dislocations
Cultures

• ordered far too often
• useful only if you plan to alter management based on the result
• swabs likely to grow wide range of colonizing bacteria as well as any invasive pathogen
Antibiotic Indications

• Positive culture
  – NOT indicated
  – almost all ulcers grow bacteria
  – rarely are these bacteria causing invasive infection or sepsis in a widely open, well debrided wound
Antibiotic Indications

- Perioperative
  - at time of ulcer excision and flap
  - seems reasonable
  - no studies to prove benefit
  - two common approaches to antibiotic selection
    - 1 - culture directed
    - 2 - generic wide gram +ve and -ve coverage
      - probable higher incidence side effects
Antibiotic Indications

• Prophylaxis for hematogenous spread of infection from ulcer
  – eg cardiac valvular anomalies causing bacterial endocarditis
  – eg prostheses such as total knee
  – Clinical decision poorly guided by studies
Ulcer related sepsis

- rare
- urosepsis and pneumonia much commoner
- but does happen in selected circumstances
  - small orifice with deep abscess
  - necrotic tissue
  - complex tracking eg into hip joint
- I & D and debridement necrotic tissue are more important than antibiotics
Other Complications

- urethrocutaneous fistulae
  - when surgeons over-resect both ischia
  - bulbar penis is next pressure point
- Amyloidosis
  - rare
- Chronic Anemia of Disease
- Pyarthrosis Hip
- Malignant Transformation
  - Marjolin’s Ulcer
Pressure Sore Reconstructive Ladder

- Permanent Dressings
- Vacuum Assisted Closure
- Primary Closure
- Skin Graft
- Flaps
Permanent Dressing Option

• expensive re nursing and dressing material costs
• good choice for patients at high risk of recurrence
• few ulcer related sepsis events in a well debrided, large orifice ulcer
Pressure Sore Reconstruction

VAC Therapy

- V.A.C. = Vacuum Assisted Closure
- Suction improves rate of granulation and coverage of poorly vascularized structures
- Granulation can fill large cavities
- Not proven in areas that will have to sustain pressure loads over time
- Probably not indicated in sores at high risk for recurrence
  - Eg dementia
  - Eg asensate ischial or sacral sores
Skin Grafts

• Occasionally indicated
  – rare shear sore
  – post VAC

• poor long term stability
Miscellaneous Surgical Goals

- Stable Skin Cover in the long term
- Minimize Blood Loss
  - tumescent solution
  - cautery dissection - Erbe helps
Principles to Minimize Periop Infection

- we are closing heavily contaminated wound

- Complete excision of sore
  - Methylene blue helps find extensions

- Radical excision to healthy unscarred periphery
  - Excellent vascularity at wound interface

- Debridement bone until bleeds
  - Do not overexcise

- Jet Lavage
Flap Design

• Fill all dead space
• Tension free skin closure
• minimal donor morbidity
• retain maximum future flap options for recurrences
Primary Closure Under Tension

• Leads to dehiscence, infection in 50% or more
• NB Ischial sores can seem closeable in OR
• Prone position in OR
• Hip flexed 90 degrees plus once sitting
Flap Choices

• Many options available
• Very important for Plastic Surgeons to be familiar with secondary, tertiary and “historical” flap options which can salvage rare cases, particularly in recurrences
My Preferred Flaps

- Sacral
  - Bilateral V-Y Gluteal Flaps
- Trochanteric
  - Tensor Fascia Lata (TFL)
- Ischial
  - low volume
    - Gluteal hemi island
  - high volume
    - V-Y Hamstring
Bilateral V-Y Gluteal Flaps

- laterally based
- preserve inf and sup gluteal vessels also in minor advancements
- repeatable
Tensor Fascia Lata (TFL)

- First choice for trocanteric sore
- Minimal if any donor site morbidity
- Introduces no muscle, only fascia, fat, skin
Hemi-Gluteal Island Flap
V-Y Hamstring Flap
Proximal Femurectomy

- Useful in sores that require resection of an infected hip joint
- Leg soft tissues telescope upward
- Rarely need flap for closure
- Sometimes add e.g. vastus lateralis to fill hip dead space
Total Thigh Flap

- End stage procedure
- High periop mortality & morbidity re poor protoplasm patient and extensive sore resection & blood loss
- Amputate @ knee
- Filet thigh along lateral line
- Resect femur
Pressure Sore Recurrence - Spinal Chord

- Successful long term pressure avoidance regimens limit lifestyle terribly
- Social and work activities almost all exceed pressure time limits for quadriplegics
- Paras liftoffs in chair become harder with:
  - Age related upper limb muscle loss
  - Weight gain
Pressure Sore Recurrence - Brain “Injury”

- Many causes of brain alterations that can alter ability to perceive or respond appropriately to excess pressure
- eg - trauma, CVA, progressive neurological diseases, age related “dementia”, etc
- so called “Dementia Scales” help assess risk
Dementia Scales

• Identify High Risk Patients
  – Helps to direct costly preventative measures
  – q2h RN position changes or KCI beds = $$$

• Predict who can avoid recurrence
  – Very useful for:
    • Selection of patients for surgery
    • Justification for not operating
      – Families, Medical Colleagues, Medicolegal
Dementia Scales

• Many Different Scales Validated

• Norton Scale is a simple example
  – by no means the most complete or valid scale
  – 20 point total
  – Score $\leq 14$ predicts high risk
## Norton Scale

<table>
<thead>
<tr>
<th></th>
<th>4 Points</th>
<th>3 Points</th>
<th>2 Points</th>
<th>1 Point</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Condition</strong></td>
<td>good</td>
<td>fair</td>
<td>poor</td>
<td>very bad</td>
</tr>
<tr>
<td><strong>Mental Condition</strong></td>
<td>alert</td>
<td>apathetic</td>
<td>confused</td>
<td>stupor</td>
</tr>
<tr>
<td><strong>Activity</strong></td>
<td>ambulant</td>
<td>walk-help</td>
<td>chair-bound</td>
<td>stupor</td>
</tr>
<tr>
<td><strong>Mobility</strong></td>
<td>full</td>
<td>slightly limited</td>
<td>very limited</td>
<td>immobile</td>
</tr>
<tr>
<td><strong>Incontinent</strong></td>
<td>not</td>
<td>occasional</td>
<td>usually urine</td>
<td>doubly</td>
</tr>
</tbody>
</table>

Pressure Sore Reconstruction
Thank You