

---WOUNDS AND WOUND HEALING---

Wound = disruption of nl anatomy

Phases of wound healing

1. Inflammatory (substrate) phase
Usu 3 days but varies
Platelets→ PMNS→ macrophages (crucial)→ TMMPs
Rubor, tumor, calor, dolor, loss of function
2. Proliferative phase
3 days to 1 month
Only occurs once epithelialization has occurred
Fibroblasts = collagen production
Requires Fe, alpha ketoglutarate, vit C
3. Maturation (remodeling) phase
1 month to 1 year
collagen remodeling

Classification of wound healing

Partial thickness wound

Incomplete penetration of top epithelial layer

Basal stem cells regenerate layer (not possible in complete thickness wound)

Primary healing

Direct approximation of wound edges

Used for clean or contaminated wounds

Epithelialization within 12-24 hours

Secondary healing

Left open to spontaneously heal from edges

1mm/day unless infxn

Granulation tissue = capillaries + tissue proliferation

Epithelialization occurs over granulation tissue

Tertiary healing

Left open then actively closed later

Must have <100,000 organisms per gram of tissue to close

Negative pressure devices, hyperbaric O₂ accelerate granulation

Factors altering wound healing

Avulsion / crush: debride to remove all nonviable tissue

Prevent hematoma: increases infxns

Radiation→ vasculitis→ ischemia

Infxn depletes nutrients, O₂

Smoking

Folic acid and fat (absorption of vits A,D,E,K) required

Hyperglycemia inhibits fibroblasts and endothelial cell proliferation

General management of wounds

Local anesthetics

Do not use anesthetics containing vasoconstrictors in tiss supplied by end arteries

Order of loss: pain→ temp→ touch→ proprioception→ muscle tone

Classification of wounds

Clean wound: <12 hours old, minimal contamination

Avulsion: shearing force undermines underlying tissue

debride, suture down free flap, close wound edges, pressure dressing

Abrasion: superficial loss of epithelium

clean thoroughly, keep moist

Punctures: usu do not require closure

Wound closure

No tension on wound edges (cvs necrosis)

Torso / extremities: 3-0, 4-0 for 7-10 days

Face / neck: 5-0, 6-0 for 4 days

Skin – use nonabsorbable monofilament (prolene); dermis layer provides strength

Deep – use absorbable (chromic, PDS, monocryl, vicryl); fascia provides strength

Dressings – protect, immobilize, compress, absorb

Steps in wound care (sterilize, anesthetize, clot, clean, close, dress)

Sterile prep and draping

Local anesthetic

Hemostasis

Irrigation and debridement

Wound closure

Dressing

Complex wound management

---Contaminated wounds

All wounds

Exceptions to primary closure: hi bacterial count, long time lapse, crush inj

When in doubt, use delayed closure

---Infected wounds

> 100,000 bacteria per gram of tissue

Change dressing twice daily (more frequent prevents healing)

Topical ABX effective (systemic not)

---Chronic wounds

Stuck in inflammatory phase; increased TMMPs

Healing retarded by: malnutrition, hyperglycemia, hypoxia, infxn, edema, pressure

1. Pressure ulcer

Sacrum, heel, ischial tuberosities

Grade: 1=erythema; 2=blister/abrasion; 3=subq tiss necrosis; 4= into muscle/bone

Prevention: turn pt, use foam pads

Wound VAC = rapid closure, drainage, keeps wound moist

2. Venous stasis ulcer (#1)

Anteromedial leg above ankle (not in foot)

Dermatofibrosis = hyperpigmentation and edema

Rx: Elevation, Exercise, Elastic compression (Unna boot); venous ablation
Most heal in months

3. Arterial insufficiency ulcer

Often involves toes

Black = dry gangrene; oozing = wet gangrene

Rx: revascularization and excision of wound

4. Diabetic neuropathic ulcer

Motor neuropathy → atrophy → bony deformity → pressure ulcer (w/ arterial dz)

Wound w/ callus (d/t pressure)

Rx: debridement, immobilization (wheelchair, cast), Achilles tendon lengthening

Advanced care

Negative pressure devices

Topical occlusive bandages

Topical growth factors (PDGF, esp good for diabetic pts)

Devitalized biologic tiss

Topical ABX (1% silver nitrate, cadexomeric iodine)

0.25% acetic acid decreases pseudomonas concentration