SEESHA – KRCH CME SERIES

WOUND HEALING

Dr. J. Gnanaraj MS, MCh (Urology), FARSI, FICS, FIAGES
Normal skin

- Outer layer epidermis and inner layer dermis is in a steady state equilibrium
- Forms a protective barrier against the environment
- Healing produces scar
Phases of Wound healing

- Hemostasis
- Inflammation
- Proliferative phase
- Remodeling phase
Types of wound healing

- Primary healing
- Delayed primary healing
- Healing by second intention
- Epithelization in partial thickness injuries
Hemostasis phase

- Defensive phase where the platelets plug and stop bleeding
- Several chemicals are released \{ADP, PDGF, TGF, serotonin, prostaglandin, prostacyclin, histamin, etc\}
- Few hours
Inflammation phase

- From 6-8 hours to 72 hours
- White blood cells do the cleansing job while transforming growth factors start the repair process
- Can last several days
Proliferative or granulation phase

- Consists of fibroplasia, matrix deposition and angiogenesis

- Type 3 collagen forms initially and is replaced by type 1.

- This phase can last up to 4 weeks
Remodeling phase

- Starts from 2-3 weeks and can go on to 2 – 4 years

- 70 – 80% tensile strength by 3 – 6 months

- Fibroblasts and myo-fibroblasts contribute to contraction
Types of wounds

- Scratches and abrasions are superficial
- Lacerations or cuts go through all layers of skin
- Puncture wounds
- Bites
Home care of wounds

- Stop bleeding
  - Clean bandage
  - Elevation above heart level
  - Pressure

- Clean wound with running water. No scrubbing
To look for

- Decreased immunity {diabetes, HIV, cancer and on chemotherapy}
- Range of movement
- Circulation
- Foreign body { X rays}
Wound management principles

- Reducing / eliminating causative factors
- Providing systemic support
- Appropriate topical therapy
Principles of wound dressings

- Depends on the characteristics of the wound
- Absorptive dressing for exuding wounds
- Necrotic wounds need dressing facilitating debridement
Types of dressings

- Gauze
- Hydrogel
- Hydrocolloid
- Transparent film
- Alginate
- Foam
- Accessory products
  - Enzymes
  - Growth factors
  - Compression
Factors affecting healing

- Perfusion & oxygenation
- Infection
- Nutrients {Vitamin A, C & B, Zinc and copper}
- Underlying diseases
Associated problems

- Hematoma formation
- Infection {Staph., E. Coli, Pseudomonas, etc.}
- Dehiscence or disruption
- Keloid or excessive scar formation
Newer options

- Medicated and non-medicated, single layer and multilayer compression bandages
- Intermittent pneumatic compression devices
Newer options

- Hyperbaric oxygen
- Bio-surgery (myiasis) {use of sterile maggots for treatment}
- Electromagnetic therapy
Newer options

- Vacuum assisted closure devices {One of the most successful therapy}

- Medicines {Pentoxifylline, Illoprost, Diltiazem and Glycerly trinitate ointment, Retinoids, honey, etc.}
Controlled Negative Pressure therapy

- Moist protected environment
- Reduces peripheral edema
- Stimulates circulation of the wound bed
- Decreases bacterial colonization
- Increases rate of granulation
Mechanisms

- Basic cellular functions like oxygen transport, cellular transduction signaling are at the cellular level

- Chronic wounds have impaired circulation and dead tissue
Cycles

- Initial continuous for 48 hours
- Five minutes on and 2 minutes off cycles
- 125 to 175 mm Hg pressure (50 for diabetic and vascular ulcers)
Developed at KU

- SEESHA / Silicon Technologies / EIE department

- Low cost 3 in 1 machine that could also be used as
  - Nebulizer
  - Pediatric / Emergency suction machine