Chronic wound management – Choice of dressing material?

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QEH
Modern wound product

- Moist wound dressing method
  - Hydrogel, enzymatic cream
- Advanced dressing product
  - Alignate, hydrofibre
  - Anti-microbial dressing material
- Before we start to apply any dressing material, something we should consider ........
Clinical approach of wound management

- Analyze the factors causing delay wound healing
- State the objective of management
- Use appropriate method or product to achieve the objective
Clinical approach of wound management

- Factors affecting wound healing
General factors

- Age
- Nutritional status
  - Oral intake
  - Serum albumin
  - Total protein
- Immune status
  - Autoimmune disease
  - Infection
- Circulation insufficiency
  - Venous ulcer vs DM ulcer/ arterial ulcer
General factors

- Co-morbidity
  - Diabetes
  - Gouty

- Medication
  - Steriod

- Psychosocial status of patient

- Environmental factor
  - Temperature
Local factors

- What is the reason for non-healing or deterioration?
  - Moisture balance
  - Bacterial loading (heavy colonization)
  - Infection
  - Over-granulation
  - Foreign body
  - Non-viable tissue
  - Nature of tissue exposed on wound bed
  - **Chronic inflammation**
Local factors

- What is the reason for non-healing or deterioration?
  - Skin tension
    eg. wound over joint area
  - Pressure & friction
    eg. foot deformity, ischial sore, protrude coccyx
  - Micro-circulation
  - Edematous of surrounding tissue
  - Crust & scab
Clinical signs of delay wound healing

- General signs
  - Infectious markers
    - ESR, CRP
    - WBC, neutrophil count
  - Haemoglobin

- Local signs
  - Color and consistency of exudate
  - Local sign and symptom of infection
  - Smooth wound edge
  - Thicken skin edge
Clinical approach of wound management

- Objective of management
  - Wound healing
  - Prevention of deterioration / inactivation
  - Conservative vs surgical management
  - Prepare for the next step of medical or surgical intervention
    - Wound bed preparation
    - Moisture balance
    - Bacterial loading control
Case scenario 1
Poor distal circulation

- ESRF
- DM
- Distal circulation compromise
- Successful rate of wound healing at distal region decreased
Poor distal circulation

- Objective of management:
  - Inactivation & prevention of deterioration

- Method:
  - Povidine-iodine daily with light gauze covering
Case scenario 2
Co-morbidity

- F/75
- H’x of SSS on pacemaker with long term warfarin
- Bleeding tendency
- AF on amiodarone
- Pleural effusion
- Bed bound with general edematous

- dry eschar
- fluctuate -ve
- skin temp -ve
Co-morbidity

- Objective of management:
  - Inactivation & prevention of deterioration

- Method:
  - light gauze covering and free heel to avoid pressure
  - Povidone-iodine daily and observe for any systemic & localized infection

- Beware of silent infection
  - dry eschar
  - fluctuate -ve
  - skin temp -ve
Case scenario 3
Immune status

- F/ 27
- RA
- Repeated foot & leg ulcer
- Latent unhealed ulcer for several months
- On long-term oral steroid drugs

Dry & fragile skin
Prone to have skin maceration problem
Pain +++ve
Immune status

Objective & actions

- Promote wound healing by moist wound method & anti-inflammatory dressing
- Moisture balance to prevent maceration
- Skin care of intact skin with cleansing & skin moisturizer

Dry & fragile skin
Prone to have skin maceration problem
Pain +++ve
Immune status

- Objective & actions
  - Check for pressure point and callosity
  - **Excise the corn before walking exercise**
  - Refer P&O for in-sole
Case scenario 4
Anatomical factor

- Minimal soft tissue on the lateral malleolus
- Underlying structure with fascia and bone
- Reluctant to perform aggressive debridement
Anatomical factor

- F/ 89
- DM, PVD
- Rt foot chronic ulcer on lateral malleolus
- 3 x 2.5 cm
- Slough with no granulation
- Scanty pus
Anatomical factor

- Dressing method
  - **Off-loading**
  - Extra care is needed on sharp debridement
  - Minimal debridement with pure collagen dressing
  - Enzymatic debridement is another choice

2 months later
Case scenario 6
Nature of tissue exposed

- Fascia / tendon exposed

Treatment approach
- Is the tendon / fascia healthy?
- Any slough or necrotic tissue on the surface
- Paratenon exist
- Function of the tendon
- ADL of patient

Extensor digitorium exposed on dorsum of hand
Nature of tissue exposed

- Objective of management
  - Tendon cannot preserve
  - Keep soft tissue moist for skin graft

Preserve or not ??
Dressing materials
Moisture balance

- Moist wound healing product
  - e.g. Hydrogel
Moisture balance

- Hydrogel
  - More than 90% of water content
  - Colorless, transparent gel commonly comprising polymers and preservatives
  - Suitable for rehydration and autolytic debridement
  - Beware of bacterial loading especially on those with poor distal circulation and joint space exposure
Moisture balance

- Paste
  - Little water content than hydrogel
    - e.g. Iruxol mono cream
    - collagenase
  - Enzymatic debridement
  - Not for eschar
  - Remove the slough, leaving the wound bed ready for healing
Moisture balance

- Exudate absorption
  - e.g. Foam
Moisture balance

• Foam (cont’d)
  • Adsorbent dressing
  • Polyurethane foam wafers which absorb fluid into their matrix
  • Different commercial products have different speed of absorption and evaporation power
  • Can be adhesive or non-adhesive
  • Mild pressure relieving property on local area
Control bacterial loading

- Antimicrobial dressing
  - Beware that dressing does not have enough penetration to treat deep wound infection
- Need to rule out any deep wound infection or osteomyelitis before use
  - X-ray
Control bacterial loading

- Silver dressing
  - Aquacel Ag (~1 ppm), Biatain silver, Polymen silver, Acticoat (~100 ppm), Urgotul with SSD
  - Silver concentration from 1 to 100 ppm
  - Different form of silver including metallic silver, ionic silver, nano-crystalline silver
  - Useful in chronic DM foot ulcer which usually have colonization
Control bacterial loading

- Silver dressing & repeated conservative sharp debridement

week 0  week 2  week 4  week 10
Control bacterial loading

- Suprasorb X + PHMB
  - Suprasorb X
    - Cellulose of hydro-balance dressing
    - Can absorb or donate moisture
Control bacterial loading

- Suprasorb X + PHMB
  - Polihexanide (PHMB)
    - Interfere with bacterial cell metabolism
    - Prohibit the cell’s ability to absorb nutrients and dispose waste product
    - Able to kill MRSA or VRE
    - No known cytotoxicity or resistance
Molecular pathophysiology

- Cellular and molecular aberrations
  - prolong inflammatory phase
  - impaired granulation formation
  - Up-regulation of matrix metalloproteinases (MMPs), cytokines and several destructive enzymes
  - destroy extra-cellular matrix (ECM)
Molecular pathophysiology

Healing wound vs chronic ulcer

(Schultz & Mast, 1999)
Combined dressing

- Silver impregnated collagen
  - Anti-inflammatory action
  - Control bacterial loading and promote wound healing simultaneously
  - *In vitro* tests demonstrate that PRISMA Matrix allows wound healing and kill bacteria at the same time
Promote wound healing

- Medical Manuka honey
  - honey gel
  - honey tulle
  - honey with alginate
Promote wound healing

- Medical Manuka honey (cont’d)
  - Anti-bacterial function
    - pH 3.2 – 4.5
      - Kill micro-organism due to acidic nature
  - Super-saturated sugar solution
    - Draw water from micro-organisms by osmotic effect
    - Water drawing effect inhibits the growth of most species of bacteria
  - Moisturize wound bed
Promote wound healing

- Medical Manuka honey (cont’d)
  - Anti-bacterial function (cont’d)
    - Methylglyoxal
      - Unique Manuka factor (UMF)
    - Anti-bacterial property
  - Anti-inflammatory function
    - Flavonoids
      - inhibit the formation of free radicals
      - decrease the excessive activity of collagenase and elastase since these enzymes can cause premature degradation of collagen and growth factors in chronic wounds
Promote wound healing

- Medical Manuka honey (cont’d)
  - Advantage:
    - Moist wound bed through osmosis especially for relatively dry DM foot ulcer
  - Dis-advantage:
    - Frequency of dressing needs to be increase to counteract the dilution effect
    - A little bit messy because of oozing when compared with other modern wound dressing material
Medical honey dressing
Advancement of medical technology
Negative Pressure Wound Therapy (NPWT)
NPWT

- Negative pressure wound therapy (NPWT) = Vacuum-assisted Closure (VAC)
- Developed since 1993
- Expose wound bed to negative pressure by closed system
NPWT

- Approach
  - Debride dead tissue thoroughly
  - Apply NWPT 80-175 mmHg
  - Change every 2-3 days
  - Apply until wound bed covered or filled with granulation tissue
  - Skin graft / flap coverage / other dressing materials
NPWT
NPWT

- Function
  - Drainage of wound exudate
  - Decrease bacterial loading
  - Improve local circulation and angiogenesis
  - Stimulate granulation and epithelization
  - **Decrease the number of surgeries required**
  - **As an adjunctive therapy to simplify the complexity of surgery afterwards**
Advancement of medical technology
Artificial skin
Biological artificial skin

- Dermagraft®
- It can be used when patient does not want or is not suitable for autograft
- Biological dressing which extracted from the foreskin of infant
Biological artificial skin

- Apply every week which can reduce the need of skin graft in the operation theatre
Future trend

- Diagnostic tool development
  - Check for any abnormality in micro-environment
    - biochemical of wound fluid
      - e.g. wound check
  - Target on the biochemistry / molecular pathology
    - Anti-inflammatory dressing
    - Drug development
      - e.g. doxycycline, immunoglobulin
Bring home message

- Consider general and local factors affecting wound healing
- Estimates the probability of wound healing based on different factors
- Set objective of management
- Correlate the clinical sign to wound healing physiology & molecular pathophysiology
- Use appropriate dressing product/device to achieve the goal
Thank you !!