



Wound Care

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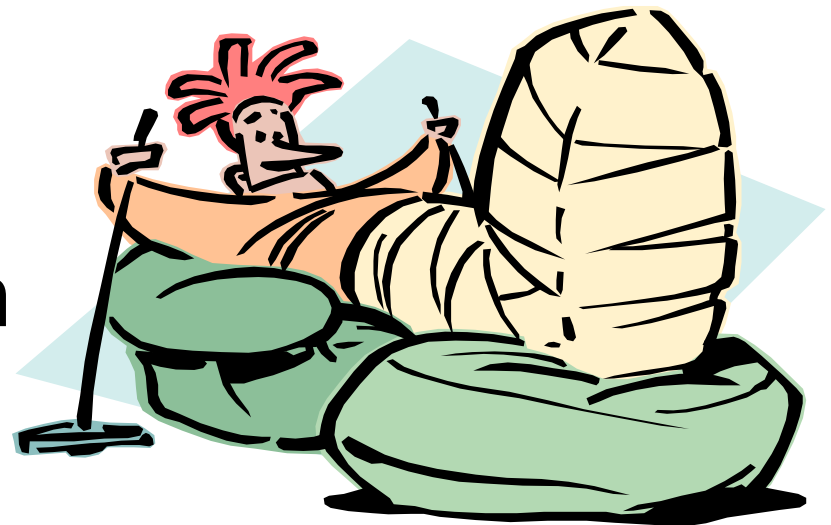


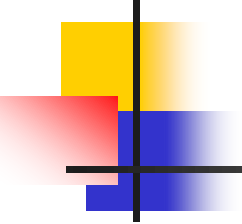
Historical Perspective

- 1867 first antiseptic dressing
- 1900 true sterilization
- WW I nonadherent dressings
- WW II more absorptive dressings
- 1960's and 70's moisture
- 1980's moisture acceptance

Goals of Wound Care

- Minimizing infective risks
- Removing dead and devitalized tissue
- Allowing for wound drainage
- Promoting wound epithelialization and contraction
- Tissue perfusion
- Adequate nutrition



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- Factors That Delay Wound Healing:
 - Intrinsic Factors
 - Extrinsic Factors



Factors That Delay Wound Healing: Intrinsic

- **Wound infection**

- Bacterial count
- Colonization VS infection
- Assessment of infection

- **Foreign bodies**

- **Adequacy of blood supply**



Factors That Delay Wound Healing: Extrinsic Factors

- Smoking
- Diabetes
- Elderly
- Medication
- Malnutrition
- Obesity



Nutrition and Wound Healing

- Anabolic process
- Immune response
- Vitamins C, A, B6
- B1, B2, zinc, and copper, fatty acids



Acceleration of Wound Healing

- Wound dressing
- Oxygenation
- Adequate nutrition
- Preparation of the wound
- Future



“Three Healing Gestures”

- Washing the wound
- Making plasters-herbs,oils and ointments
- Bandaging the wound



Mechanism

Shearing (perpendicular division of tissue)

Tearing (<90 degree angle)

Compressive (perpendicular with ragged edges)



Environment

Household – generally “clean”, but not “sterile”

Outdoor – contaminated in varying degrees (the barn, industrial machinery)

Bites (human, animal) – highly contaminated



Modifying Factors

Age of wound: Rule of Thumb +/- 12 hr.

Wound: Type (mechanism, sharp vs blunt object)

Location and vascularity (face, scalp >12hr.?)

Contamination

Comorbid factors



Co morbid Factors

Age

**Medical hx. – anemia,
nutrition, DM, PVD,
ETOH, uremia, immuno-
compromised**

**Medications – steroids,
NSAIDS, anticoagulants,
anti-neoplastics**



Tetanus Status

> 5yr. < 10yr. Hx. primary series,

Need: toxoid

**> 10yr. Need: toxoid, homotet
and toxoid in 60da.**

**No primary series, Need:toxoid,
homotet, and toxoid in 60da.**



Wound Healing

- Neovascularization
- Inflammation
- Epithelialization
- Granulation
- Contraction
- Remodeling



Phases of Wound Healing

- Hemostasis 0-3 hours
- Inflammatory 0- 3 days
- Proliferation 3-21 days
- Maturation 21 days to 1.5 years



Preoperative Management

- Debridement & Irrigation
- Instrumentation
- Anesthesia
- Incision planning
- Patient consultation



Intraoperative Precautions

- Incision placement
- Undermine where necessary
- Meticulous hemostasis
- Dead space obliteration
- ****Dermal closure****
- Suture type & placement
- Anti-tension taping of wound



Postoperative wound care

- Topical emollients for moisture
- Frequent cleaning with H₂O₂
- Early dermabrasion of irregular wounds
- Avoidance of sun, water
- Steroid creams, retinoids, etc.



Goals of scar revision

- Flat scar, level with surrounding skin
- Good color match with local tissue
- Narrow
- Parallel to the patient's RSTL
- Absence of straight, unbroken lines



ASSESSMENT



Neurovascular

Pulses, capillary refill, motor/sensory

Musculoskeletal

Muscle, bone, tendon, joint

Foreign Body

Visualize/x-ray (radiopaque materials)



PREPARATION

Hair

Clip, not shave

**Shaving increases incidence
of wound infection**

NEVER SHAVE EYEBROWS



Irrigation

Volume 250 – 1000 + ml. NS

60ml. Syringe and 16 – 18 ga.

intracath



Irrigation

✓ Do not scrub wounds or use full strength Betadine for irrigation (denatures protein, impairs wound healing)

10 : 1 solution for irrigation or temporary dressing



Repair

- Sutures
 - Act as splints
 - Should be Passive
 - Aim to Return Tissues to
 - Original Position
 - New preplanned Position



Sutures

- Immobilize Tissues to Allow
 - Rapid healing
 - Primary intention
 - Less bleeding
 - Reduced haematoma
 - Reduced oedema
 - Reduced discomfort
 - Reduced risk of infection



Sutures

- May Aid haemostasis
 - By direct vessel ligation
 - By compression of vessel against bone edge
 - By retaining a pack or dressing



Suture Needles

- Eyed
- Swaged
- Straight/Curved
- Large/Micro
- Taper/Spatula
- Round Bodied/Cutting/Reverse Cutting



Sutures

- Physical Properties
 - Size
 - Strength
 - Elongation
 - Elasticity
 - Torsional Stiffness
 - Flexibility
 - Surface
 - Capillarity



Selection of Sutures

- How long is a suture to be responsible for wound strength?
- Is absolute fixation required?
- Is there a risk of infection?
- How does the choice of sutures affect the tissues?



Selection of Sutures

- How does the suture affect the healing process?
- What size of suture
 - Is strong enough?
 - Provides adequate fixation?



Suture Types

- Absorbable
 - Organic
 - Catgut
 - Soft
 - Plain
 - Chromic
 - Synthetic
 - Polyglycolic Acid
 - Dexon
 - Polyglactin 910
 - Vicryl



Suture Types

- Non Absorbable
 - Single Filament
 - Nylon
 - Multifilament Organic
 - Silk
 - Multifilament Metallic
 - Stainless Steel
 - Silver
 - Multifilament with Sheath
 - Polyamide
 - Supramid



Biological Properties of Sutures

- Tissue Reaction depends on
 - Material Organic > Synthetic
- Absorbable Materials
 - Catgut
 - Proteolytic absorption
 - Vicryl
 - Hydrolytic absorption
- Non Absorbable
 - Natural but have considerable tissue reaction
 - Synthetic have little tissue response



Suture Sterilization

- Gamma Radiation
 - Cobalt 90
- Electron Radiation
 - Linear Accelerator
- Ethylene Oxide
 - Gaseous
 - Liquid



Suturing Techniques

- Continuous
 - Subcuticular
 - Blanket Stitch
 - Over and Under
 - Interlocking
 - Purse String
- Interrupted
 - Simple
 - Mattress
 - Vertical
 - Horizontal



Suture Tying Techniques

- Hand Ties
 - One Handed
 - Two Handed
- Instrument Ties
- Minimise trauma by
 - Delicate handling of tissues
 - Not constricting tissues
 - Avoidance of dead space
 - Close but not over approximation of tissue edges



Anesthesia

Lidocaine

Inject in sub-q tissue (21 – 25ga. needle)



Anesthesia

Lidocaine with epinephrine (if you must), but Never in digits, nose, ear, penis

Skin Prep

Betadine (not in wound)

Always prep more area than you think you need



Primary – suture, staples, glue

Secondary – granulation and re-epithelialization

Delayed primary closure – closure after 48 – 72hr.

Interrupted sutures in ED



DRESSINGS



DRESSINGS

Dry sterile dressing – avoid ointments(tend to macerate)

Avoid tape on skin if possible

Paint skin with tincture of benzoin if you must use tape



DRESSINGS

Encircling dressing (ACE)

Do not wrap tightly

Immobilization

**Excessive motion impairs
wound healing**

Splinting may be necessary



Characteristics of Dressings

- Protect wound from bacteria and foreign material
- Absorb exudates
- Prevent compression to minimize edema and obliterate dead space



Dressings

- Be nonadherent to limit wound disruption
- Create a warm, moist occluded environment to maximize epithelialization and minimize pain
- Be esthetically attractive



ANTIBIOTICS



Indications

- Contaminated wound
- Areas of marginal viability
- Wounds involving joints, open fractures
- All human bite wounds
- Most animal bite wounds
- Generally, wounds > 12hr. old

SPECIAL

WOUNDS





Bite Wounds

High risk of infection with involvement of bones, joints, tendons, vessels, nerves
Puncture wounds (difficult to irrigate and decontaminate)



Dog Bites

75% involve the extremities

Most dog bites in children involve an extremity

Severe facial lacerations involve the cheeks and lips as they try to "kiss the doggie"



Dog Bites

Closure

Dog bites – scalp, face, trunk,
proximal extremities may be
closed if superficial

Human bites – “never” close
primarily (delay 48 – 72hr.)



Puncture Wounds

Never close

Irrigate drain, if necessary

Foot – shoe on or barefoot?

**Increased infection risk if shoe
on**



Abscesses

- **Incise, drain, irrigate, loosely pack with Iodoform gauze**
Return at 24 hrs. for irrigation
fresh pack
Return at 48 hrs. for pack removal
and healing by granulation



Abscesses

New onset DM may present with abscess

Antibiotics may be indicated in addition to I&D



Nail / Nail Bed Injury

**Subungual hematoma, < 40 %
nail area, nail bed injury unlikely,
but distal phalanx fx. might be
present**

**Treatment: Battery cautery to
make drainage hole in nail, irrigate
with 25ga. needle and 1%
lidocaine Nail Bed - requires
surgical repair**



Foreign Bodies

- **Inert – (glass, metal), may leave unremoved if necessary**
Organic – (wood), must be removed