Wound Assessment and Management Options

Initial approach

- Use an **advanced trauma life support** (see ATLS) in life threatening wounds
- Severe haemorrhage may require pressure, elevation, tourniquet, arterial clamp/suture

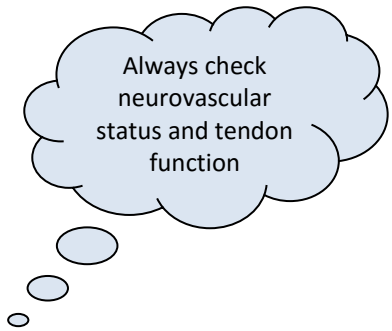
High risk wounds
- **Truncal wounds** – risk of damage to underlying structures e.g. peritoneum, intercostals muscles pleura, lung/heart
- **Wounds near major vessels** – may need angiography
- **Tendon injuries** – need full exposure and ROM observation
- **Bites**

History

- **Who, what, when, where, why**
  - **Who** – age, job, hobbies/sports, hand dominance (if hand involved)
  - **What** happened and exactly how it happened
    - Blunt/sharp object
    - Speed and angle
    - Penetration
    - Blood loss
    - Risk of retained foreign body
    - Additional hazards (e.g. contaminants)

    Work out the mechanism, force involved and likelihood of other structure damage and foreign bodies
  - **When** it happened (document specific time)
  - **Where** it happened & circumstances (e.g. clean/dirty environment)
  - **Why** it happened (for prevention)
- **Rest of history**:
  - PMHx: especially tetanus vaccines, diabetes, immunosupression, organ failure, vascular disease
  - DHx: especially anticoagulants, steroids
  - SHx: living circumstance, smoking/alcohol

Examination



- **Wound** – examine in position injury was sustained
  - Site, Size & Shape
  - Direction & Depth
  - Edges (granulated, macerated, clean, rolled)
  - Flap
  - Foreign bodies
  - Blood loss (oozing = venous; pulsating = arterial)
  - Look for or assess risk of nerve/vessel/tendon/organ damage – get senior help
- **Surrounding skin**: bruising/grazing, erythema, pussy discharge, arterial/venous insufficiency
- **Distal neurovascular exam** (document before and after closure):
  - Neuro: sensation and motor function
  - Vascular: pulses and capillary refill
- **Tendon function** (document before and after closure): test against resistance. Note, pain on testing may indicate a partial tendon laceration which requires a specialist review prior to closure. If the hand is affected, remember to check superficial flexors (PIPJ isolated) and deep flexors (DIPJ isolated) separately.

Note: if wound is bleeding, give patient gauze and ask them to apply pressure over opposed edges and elevate (if still bleeding, inflate BP cuff around limb temporarily to examine in a bloodless field)

Investigations (if needed)

- Consider **X-ray** if any risk of fracture (including all crush wounds) or any possibility of a foreign body (including all glass/grit wounds)
- Consider **USS** if radiolucent foreign body likely
- Bacteriology **swab** if infection likely

Cleaning, anesthetising, inspecting and debriding

Described fully in **OSCEstop** cleaning and closing a skin laceration notes

- **Prepare**: place pad under body part, wash hands and apply apron and eye protection, clean trolley, gather equipment, create a sterile field and drop equipment into it, fill bowel with sterile saline, apply sterile gloves
- **Clean area:** using multiple gauze soaked in sterile saline, clean the wound and area around the wound
- **Anaesthetise** e.g. 1% lidocaine subcutaneously around wound edges (warning: do not use adrenaline for appendages)
  - Ask assistant to snap open lidocaine bottle and hold open upside-down
  - Draw up lidocaine using 1st green needle on 10-20 ml syringe

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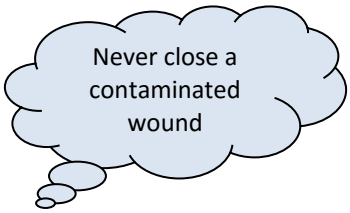
    - Change to the orange needle and anaesthetise the subcutaneously around wound (begin inside the cut margin)
    - Always aspirate before injecting lidocaine (to check you are not in a vessel)
    - Use about 1ml per cm of laceration (max 3mg/kg – *note 1ml 1% lidocaine = 10mg*)
- **Mechanical cleansing (debridement):** remove any debris/contamination/foreign bodies/dead tissue – use sterile cotton gauze swabs soaked in saline to scrub, forceps to grab things and a scalpel edge to scrap/excise.
- **Pressure irrigation**: - can omit if wound is clean. Squirt sterile saline from 20ml syringe with green needle into the wound many times (drawn up without the needle on from the sterile bowel/tray filled with sterile saline). Use a large volume (100ml/cm) and pressure. *Alternative if the wound is very large, contaminated or high risk:* use a 1L normal saline infusion bag (hung with pressure infuser cuff applied) and squirt it throughout the wound via a standard giving set ± orange cannula tube on end. Ensure a disposable cardboard bowl is below the wound to collect the liquid.
- **Deep inspection:** thoroughly **re-inspect** the whole of the wound (may need wound edge retraction), look at **deep structures** and get them to do a **full range of movement** to help look for tendon damage
- Perform any further cleansing/irrigation if required

More thorough debridement is required for certain wounds

- **Wound debridement under general anaesthesia** – required if extensive debris, lots of dead skin, dead muscle or contamination
- **Urgent surgical exploration** – required if any possibility of nerve/vessel/tendon/organ damage

Closure options



- **Immediate primary closure** (immediate closure with sutures/clips/steristrips/glue) – only if negligible skin loss, wound is clean with no foreign bodies, <12 hours old (<24 hours for face wounds), and edges come together easily without tension
    - See closing a laceration procedural notes
- **Delayed primary suture** (wound cleaned thoroughly, then dressed and left open for 48 hours. The wound is then reviewed, and when wound shows no signs of infection, swelling and bleeding have resolved and the wound can be closed without tension, the wound is sutured closed. Antimicrobial dressings and prophylactic antibiotics should be used for contaminated/infected wounds.) – used for contaminated wounds (i.e. heavy debris contamination or exposed to any bodily human/animal fluids), contused/bruised wounds, infected wounds, or wounds >12h old
- **Secondary intention** (allow wound to close by itself i.e. granulation → epithelialisation & scarring) – used for wounds with tissue loss preventing edge approximation, chronic ulcers, partial-thickness degree burns
- **Skin grafts** – for significant skin loss (including most full-thickness burns)
    - Split skin grafts (partial thickness graft taken from somewhere else to close wound)
    - Whole thickness grafts (full thickness graft taken from somewhere else to close small wounds)
    - Skin flaps (flap of skin/muscle/fascia taken from elsewhere to cover large defects)

Dressings

- See dressings page

Other aspects to management

- Infected or contaminated wounds require **antibiotics** – see local 'Green Guide' e.g. bites – co-amoxiclav; staph/strep – flucloxicillin; poseudomonas – ceftazidime; old (>2-3 days) burns – flamazine cream
- Give **tetanus booster** for any wound if patient is not up to date with tetanus vaccines (should have 5 total)
- Give **tetanus immunoglobulin** if wound is heavily contaminated with tetanus prone material, **or** if patient is not up to date with tetanus vaccines and the wound is tetanus-prone (require surgery >6h after injury; significant degree of devitalised tissue; puncture injuries, especially if any soil contact; wounds with foreign bodies; compound fractures; wound with sepsis)
- **Analgesia** e.g. entenox, morphine IV, regional anaesthesia e.g. local infiltration, regional blocks, nerve blocks
- **Blisters** – leave intact unless they are open/contaminated, then fully debride
- If swelling likely – **rest, ice, elevation** for 24 hours
- Consider **rabies immunoglobulin** if high risk wound in high risk area
- Consider correcting any factors which may hinder wound healing e.g.
    - Consider nutritional supplements (protein drinks, ascorbic acid 500mg OD, folic acid 5mg OD, zinc sulphate TDS, complete A-Z multi-vitamin OD)
    - Stop steroids and NSAIDs if possible (interfere with healing)

Follow up

- Give patient wound advice: predicted course (primary closure heals in 5-10 days, secondary intention in a 2-3 weeks); return if increasing pain/erythema/pus; if wound is closed, they can shower after 48 hours (re-dress wound after with simple dressing) but must not allow pressurised water to contact the wound, scrub it or immerse the wound in water until sutures removed/wound fully healed
- Injured limbs need elevation for 24-48 hours
- Arrange follow up at 48 hours if:

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- Wounds is for delayed primary closure (to close)
- Patient is diabetic or immunocompromised (to review healing)
- Burns (to look for infection)

- Follow up with general practice nurse for:
  - Suture removal
    - Head & face - 5 days
    - Upper limb/trunk/abdomen - 7 days
    - Lower limb/diabetic/immunocompromised - 10 days
  - Re-dressings

Wound types requiring special management

Burns

Class	Characteristics	Management
Superficial	Red and dry, blanches with pressure (like sunburn)	Simple moisturiser/Aloe Vera gel
Partial-thickness (superficial/deep) *Need re-epithelialisation ± granulation to heal*	Red and moist, with blisters, do not blanch	See below
Full-thickness	White/grey/scalded, insensate, solid, dry	Skin graft

- Test sensation, blanching and check tetanus status
- Determine the **% body surface area** involved using *rule of 9's*: head 9%, arm 9%, leg 18%, trunk front 18%, trunk back 18%
- **Initial management** for all burns:
  - Severe burns: use ABCDE assessment (including fluid resus) and cover burns with sterile sheets or cling film until specialist review
  - Minor burns: immerse in cool water for 30 minutes (or cover with cool sterile saline soaked towels)
- **Further management of partial-thickness burns**
  - Use systemic (never topical) analgesia if required
  - Cleanse with soap and water, then thoroughly rinse
  - Scrub off any necrotic tissue
  - Dress with petroleum/paraffin gauze covered with a sterile non-adherent absorbent dressing and secure with bandages/dressing retention tape
  - Review in 48 hours to look for signs of infection
  - Re-dress every 2 days
- **Blisters:** leave intact unless they are open/contaminated, then fully debride
- **Burns requiring specialist opinion:** full thickness burns (need skin graft); >10% body surface area (risk of significant fluid loss); infants/children (look better than they are); hands (put in bag with paraffin and keep moving); face (use Vaseline); burns over joints; groin (admit as difficult to dress); chemical (irrigate, irrigate, irrigate!); electrical (spare skin)

Puncture wounds

- X-ray if any possibility of any bits broken off or object not known to be removed intact
- If wound is deep and contaminated, it needs wide debridement in theatre
- If not, use simple debridement and irrigation
  - Shave the surface with a scalpel and remove any debris
  - Attach saline filled syringe to cannula tubing and insert into wound tract to irrigate it with an up and down movement
- Follow up patients in 2 days

Bites

- Cats and humans are worst
- High risk of tendon injury
- All require aggressive cleaning then delayed primary closure/healing by secondary intention
- Give antibiotics for 5 days

Others

- **Gunshot wounds** are usually treated with thorough debridement and delayed primary suture
- **Facial injuries** should be sutured by plastic surgeon ideally – use fine sutures e.g. 6/0 nylon or 5/0 absorbable and remove after 2-3 days
- **Crushed tissues** need to be elevated for 7-10 days to alleviate swelling prior to closure

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