Simple Wound Management and Suturing

Principles of wound management
- Assessment.
- Haemostasis.
- Analgesia.
- Skin preparation and wound toilet.
- Closure.
- Dressing.
- Infection prevention.
- Follow-up.

Assessment
- Mode of injury: blunt, penetrating, blast.
- Time of injury.
- Type of wound: puncture, laceration, incision, crush, burst, bite. (Consider removing rings from injured fingers before oedema starts.)
- Location: proximity to major vessels (potential damage to blood supply for healing), nerves and organs.
- Shape: linear, curved, stellate, Y-shaped, inverted V, etc.
- Depth and direction: risk to underlying tissues, skin tension lines.
- Potential foreign body: suggestive history - whether it will be radio-opaque or require ultrasound scan location.

Haemostasis
This may be spontaneous. However, it may require:
- Pressure.
- Elevation.
- Tourniquet.
- Clamp/suture (for arterial bleeders).

Analgesia
Do not forget analgesia; this is not only humane but facilitates the remainder of management.

Local anaesthesia
- Topical: tetracaine-lidocaine combinations can be used to good effect on wounds in children, even if just to allow infiltration of local anaesthetic.
- Infiltrative: most often lidocaine (up to 3 mg/kg. NB: a 1% solution contains 10 mg/mL). Caution is generally advised in the use of adrenaline (epinephrine) especially around end arterioles such as those in digits, the penis, etc. However, there is insufficient evidence to justify this fear. [1] If used, the lidocaine dose can be increased up to 7 mg/kg.
Skin preparation and wound toilet

- Don't put alcohol or detergents inside the wound.
- Tap water has been shown to have as low, or lower, infection rates as proprietary antiseptic solutions.
- The usual compromise is to use sterile saline.
- Irrigation:
  - This is more important where there is high risk of infection.
  - The aim is to remove foreign matter and bacteria.
- Use 50-100 mL/cm saline under pressure (syringe with 25G needle).
- Also consider debridement of ragged, non-viable skin edges.
- If necessary you can trim hair; however, avoid shaving.
- Remove foreign bodies but make sure personnel and equipment to control any increase in bleeding are at hand.

Closure

Timing

- Primary closure: immediate closure for simple wounds <12 hours old (24 hours on the face), with opposable edges.
- Delayed primary closure: if there is high risk of infection, give prophylactic antibiotics and close after approximately four days if there is no infection.
- Secondary closure: allow the wound to close by itself if a bite (except on the face) or it has separated edges or infection. This may result in increased scarring.

Options

- Steri-strips®: not for widely gaping or bleeding wounds. Good for skin tears or to oppose bite wounds loosely, allowing for drainage.
- Tissue adhesive (eg, Histoacryl®, Indermil®): this is good for short lacerations with easily opposable edges. It is often used in paediatrics. A capillary tube, cannula tube or disposable pipette can help to apply the glue thinly. Apply across opposed edges, NOT inside the wound and hold the wound closed for 30 seconds. It forms an artificial scab and falls off in 7-10 days.
- Sutures:
  - Type: absorbable (eg, catgut, Dexon®, Vicryl®, polydioxanone (PDS) for deep sutures or sometimes in children (to avoid removal). Non-absorbable (eg, nylon, polypropylene, silk, cotton). Monofilament (less inflammatory response) vs braided (stronger knots)
  - Needle: generally use a cutting edge rather than tapered-end needle.
- Staples: favoured by some for scalp wounds. They look horrendous but do a good job.
- If hair is trapped in the wound, it can impair healing but if you have no other option you could try tying strands across the wound.

Technique tips

- Generally use interrupted sutures; mattress sutures may be required for larger wounds.
- First oppose midpoint if linear, or corners if jagged wound. There are special tricks for when there has been skin loss or complex-shaped lacerations.
- Ensure good bite of tissue taken with needle entering and leaving vertically.
- Instrument tie with three x double or triple throw knots.
- Align knots outside of slightly everted laceration edges.
- Space sutures about 2-5 mm apart.

Suggested sizes and durations

- Child's face: 6'0 monofilament nylon; remove after 3-5 days.
- Other parts of children: 5'0 catgut; deep part absorbs and the top part sloughs off after 10-14 days.
- Adult's face: 5'0 monofilament nylon; remove after 5 days.
- Adult hand: 4'0 nylon; remove after 7 days.
- Adult scalp: 3'0 nylon/silk; remove after 5 days.
- Adult arm/trunk/abdomen: 3'0 nylon/silk; remove after 9-14 days.
- Adult leg: 3'0 nylon; remove after 14 days.

Risk factors for delayed healing

- Size, location and motion of wound.
- Age.
- Genetics.
- Race.
- Marfan's syndrome, connective tissue disorders.
- Nutrition; deficiencies in protein, vitamins A, C, E, B1 (thiamine), other B vitamins, and zinc have been shown to retard healing. However, supplements to non-deficient patients probably have little or no benefit.
- Local infection.
Dressings

- The first layer in contact with the wound surface should be non-adherent - eg, a lightly lubricated gauze with interstices.
- Occlusive dressings can lead to maceration with retained fluid.
- The next layer should be absorbent material to attract any wound exudate.
- Finally, soft gauze rolls tape can be used to secure the initial materials in place.
- Dressings may not be necessary if the wound is dry and extra protection is not required.

Infection

Signs and symptoms

- Increasing local inflammation - rubor, dolour, calor and tumour.
- Discharge/collection of pus.
- Systemic signs - fever.

Risk factors

- Delayed presentation (>12 hours).
- Foreign bodies.
- Heavily soiled wounds.
- Bites (especially human, cats).
- Puncture wounds (especially on the foot).
- Intra-oral wounds.
- Open fractures/exposed tendons.
- Crush wounds.

Antibiotic usage

This is advisable for high-risk wounds or if there are already signs of infection. It may be advisable to have a lower threshold for prescribing for hand and foot wounds. The choice depends on the most likely pathogen and may be guided by local or hospital formulary.

- Human/cat/dog bites - co-amoxiclav.
- *Staphylococcus/Streptococcus* spp. - flucloxacillin/penicillin.
- *Pseudomonas* spp. - ceftazidime.

Mode of delivery is usually oral, unless there are systemic signs or rapid spread. Topical antibiotic ointment is an option. Be aware of side-effects/resistance.
Follow-up

- Give written advice on wound care.
- Check for healing progress and signs of infection at 48-96 hours.
- Removal of sutures, if present, at the appropriate time.

Further reading & references

- Lacerations; NICE CKS, July 2015 (UK access only)


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