WEAPONS

- Some wound characteristics of different weapons
- The power of a missile depends on how much kinetic energy is given up when it strikes tissue.
- The energy formula $E = mv^2$ ($m$=mass, $v$=velocity)

Bullets

- Small entrance wound and a large exit wound.
- Fragmentation of the bullet will cause severe wounds

Fragments

- Caused by explosive devices, such as;
- Bombs, mortars, shells, rockets and grenades.
- The distance between the wounded person and the explosion determines the outcome.
- The blast wave from an explosion might cause rupture of the ear drums and of gas-containing viscera, such as the stomach or bowels
- Hemorrhage in the lungs, without any penetrating wound.

Mines

- Exploding devices
- Traumatic amputation of foot or leg,
- Combined with multiple severe wounds.
- The wounds are all severely contaminated by mud, grass, pieces of shoes and clothes

Draw Heavily On Resources:

- need a long operation time
- many operations
- blood transfusions
- dressing material
- a long hospital stay
- and a difficult period of rehabilitation, includes the fitting of an artificial limb

Principles of management of war wounds:

- Complete wound excision
- Delayed primary closure
- No internal bone fixation
- Antibiotics
- Antitetanus
Record

- Aspects of the wounds
- The treatment
- Patient’s triage category.
- Whole body, including the back, must be examined.

Clinical examination

- All clothing should be removed in so far as possible, bearing in mind local religious and cultural factors.
- Careful clinical examination of vascular supply to a limb, any nerve lesion.

Multiple wounds

- Those on the posterior aspect of the body and limbs should be dealt with before those on
- The anterior aspect.

INFECTION IN WAR WOUNDS

- War wounds are grossly contaminated with bacteria
- Inevitably become infected unless treated quickly and correctly.
- Should be treated by excision of the wound within six hours.

Early and thorough wound excision:

- Reduces chances of death from gas gangrene or generalized infection;
- Reduces the number of operations
- Allows delayed primary closure to be successful.
- Shortens the stay in hospital.

War wounds are often multiple

- Usually no more than 1 mm of the skin edge need be removed.

DRESSINGS

Wounds should be covered by clean dressings to avoid further soiling.

Dressings change

- Wounds should not have dressings changed until delayed primary closure (DPC)
- The exception to this will be when:
  1. persisting contamination
  2. infection develop
Treatment of a soft tissue wound

1. Excision of the wound
2. Delayed primary closure. Wounds should be left wide open, without any suture of skin or deep structures.

Excise Dead muscle

- All dead muscle must be excised.
- Dead muscle is the ideal medium for clostridial infection leading to gas gangrene.
- The track of the missile may be surrounded by dead muscle.

Dead muscle

- Not healthy
- Not contract
- Not bleed when cut
- Must be excised until: healthy, contractile, bleeding muscle is found.

Foreign bodies

Remove:

- Blood clot
- Dirt
- Debris
- Missile fragments
- Clothing
- Vegetation

Gentle and copious irrigation with saline to wash out the residual debris and blood clot.

Fascial compartments

- Muscle Ischemia.
- Interference With The Blood Supply
- Need Decompression By Fasciotomy

DO NOT

- Open fresh planes in healthy tissue.
- Explore unnecessarily for metallic fragments; left in situ.
Closed primarily

- Face, neck, scalp and genitals.
- Soft tissues of the chest wall to make an airtight closure
- Head. The dura can rarely be closed directly
- Joints. Synovial membranes should be closed
- Hand; Tendons and nerves must be covered by healthy tissue.
- Blood vessels. Those blood vessels that have been repaired should, if possible, be covered by viable muscle.

ANTIBIOTICS

- Penicillin, 5 mega-units 6-hourly intravenously,
- substituted by oral penicillin, 500 mg 6-hourly 5 days

TETANUS

- Clostridium tetani is the causative organism
- Produces an extremely potent toxin; tetanospasmin which spreads by intra-axonal routes, or by bloodborne invasion.
- The toxin affects the nervous system at the motor end-plate by inhibiting the release of acetylcholine.
- typical spastic phenomena

All patients whatever their immunization

- Benzylpenicillin 5 million units IV 6-hourly
- Thorough excision of the wound
- Vaccines are toxoids; they prevent disease
- Anti-toxins are used when a problem already exists

Immunized patients

- Booster Dose of tetanus toxoid 0.5 ml IM

Non-immunized patients

- Anti-tetanus human immunoglobulin Ig 500 I.U. IM (Adults)
- If more than 24 hours since injury;
  - Tetanus toxoid 0.5 ml I.M.
  - Tetanus toxoid 0.5 ml to be repeated at four weeks and again six months later.
Treatment of established tetanus

- After the wound has been excised
- Penicillin given
- Nursed in an environment devoid of stimulation.
- Anti-tetanus human immunoglobulin (3000 – 6000 I.U. IM)
- Spasms; intermittent doses of diazepam (2-20 mg IV hourly).

DELAYED PRIMARY CLOSURE

- Within seven days of injury.
- By simple approximation of the deep structures and skin, without tension.

The aim of DPC

- Is to close the wound during the fibroblastic phase of wound healing (3rd and 6th days)
- Some wounds can be closed with safety earlier:
  - Wounds of the face, neck and scrotum (3rd day)
  - Upper extremity (4-5th day)
  - Lower extremities (5-7th day).

Tissue loss

If there has been significant tissue loss;

- Skin grafts, or Skin
- Or Musculocutaneous Flap

Abdominal wounds

- All penetrating abdominal wounds

Should be explored:

- The mortality of a negative laparotomy is low
- Whereas an un-operated abdominal wound is often fatal.

Prognosis of abdominal wounds

1. The type of missile and amount of energy transferred
2. The organs hit and their number
3. The time since injury
SAMPLE QUESTIONS

Q// Write short notes on:

- A flail segment
- compartment syndrome
- penetrating chest injuries

Q// What is:

- Triage?
- Fasciotomy?

Q// How to manage;

- Hemorrhage and restore the volume due to bullet injury to abdomen?
- War wounds
- Tibial compound fracture
  - Pulses (absent pulses in the affected limb)
  - Pallor (loss of normal color)?