

The presence of an open fracture or a large wound over a compartment does not necessarily preclude the need to decompress the compartment.

Fasciotomy may also be indicated in the foot. The dorsum of the foot should be released using two longitudinal incisions over the second and the fourth metatarsals. The muscles in the sole of the foot can be released through a medial incision reaching deep to the plantar fascia. (This is less relevant to landmine injuries.)

Joints on the less injured side

1. Foreign bodies should be removed from joints.
2. Never leave a joint open — the cartilage will dry out.
3. Wash it out and cover with whatever tissues are available — even skin alone.
4. If the joint is badly injured, cover the synovium, rotate muscle if necessary, and do not close the skin.
5. If in doubt, drain the joint and establish a suction drain if available.

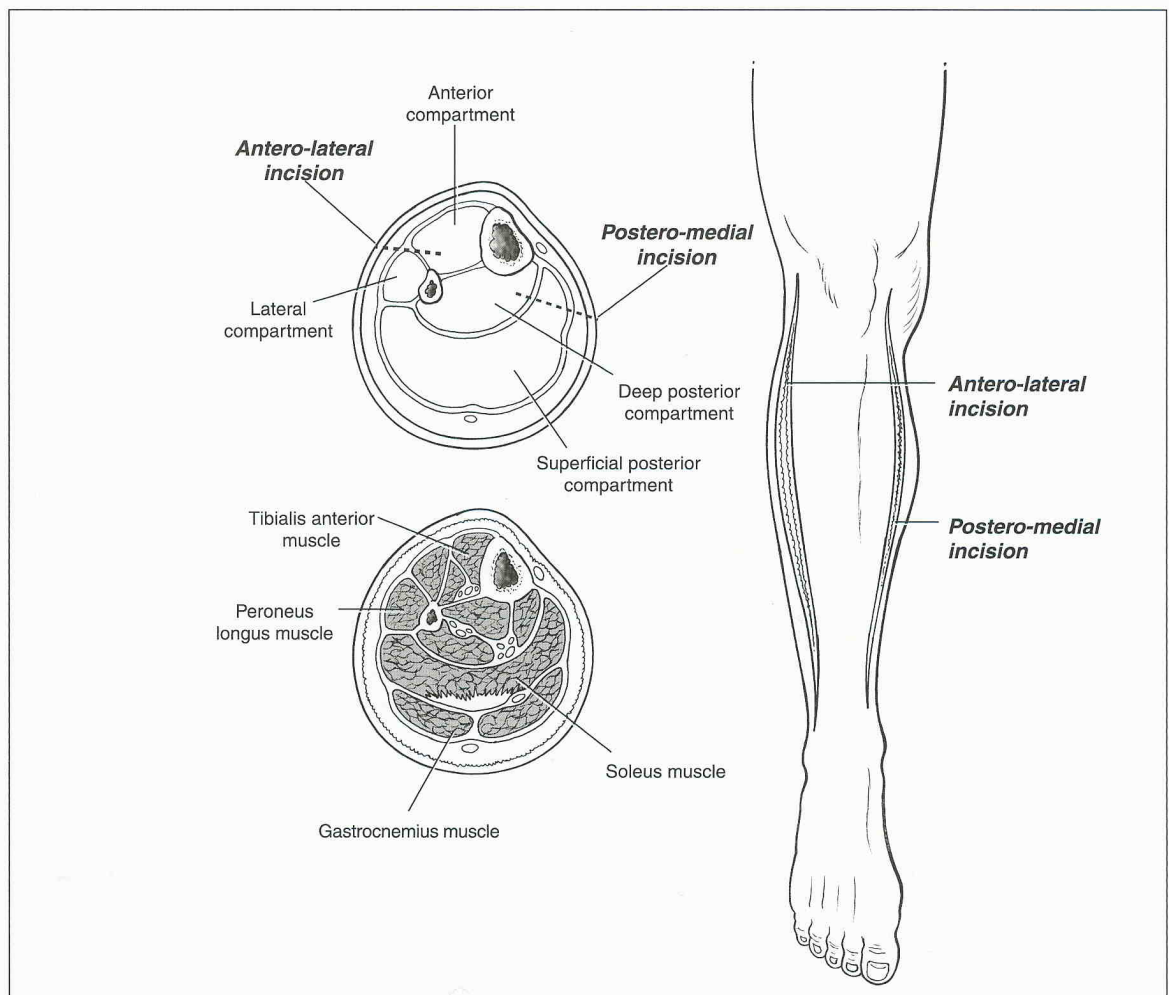


Figure 27. Sites for fasciotomy: Cross section through the lower leg with sites of incision.

Nerves

If one leg has been lost and the sciatic nerve is divided on the other side with total anaesthesia of the limb, explore the wounds, find the divided nerve ends and mark them with black silk, clean the wound, leave open and refer.

Immobilisation of Joints after Injury

Immobilise an injured joint at first, but not for long — no longer than 48 hours — and then mobilise. The time for immobilisation will vary with the degree of injury and what the patient feels able to do. As soon as the pain allows movement encourage movement. Machines which provide continuous passive movement are now used in many countries and help restore joint function. A useful saying is “Life is motion, and motion is life.”

Joint injury associated with major damage to ligaments and large amounts of tissue loss will need longer period of immobilisation. On the other hand, a small penetrating injury can be moved early — sometimes a cast is made with hinges allowing movement in one plane.

OTHER ASPECTS OF MANAGEMENT

Give all cases tetanus toxoid.

Resuscitate first, then consider antibiotics.

ANTIBIOTICS

Any injury which occurred more than 6 hours ago, must be assumed to be infected already.

Penicillin and metronidazole are indicated and are best given I-V in this circumstance. But I-V preparations of these antibiotics may not be widely available. Chloramphenicol is a possible substitute if I-V vials are available.

PENICILLIN	2 million Units	6-hrly or
	500,000 Units	6-hrly or
	500,000 Units	8-hrly depending on your supplies

METRONIDAZOLE

400mg orally tds

Continue for 5-7 days, monitoring response. Facilities for culture and sensitivity are available in some centres. The major organisms which will cause problems are anaerobes and clostridia. Penicillin will cover the anaerobes, and a broad-spectrum antibiotic is needed for prophylaxis against gas gangrene and tetanus.

NUTRITION

Patients with injuries to the lower limbs and the chest can eat. 10% dextrose by I-V is not food.

In abdominal injuries, the stomach is likely to be paralysed, but the small bowel may not be. A feeding jejunostomy can accept full feedings.

"Conventional anaesthetic practice may not be possible in areas where land mines are most common. Ketamine and regional anaesthesia are the most widely available anaesthetic agents and provide the potential for effective post-operative pain relief. Spinal anaesthesia can be administered safely by trained non-medical personnel and is used frequently for subsequent operations. Adequate pain relief improves outcome by reducing complications and facilitating early recovery. Increased use of routine pain assessment and introduction of simple analgesic techniques will maximise post-operative analgesia."

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ANAESTHESIA/ANALGESIA

Local anaesthesia is often best, particularly where there is only one doctor or nurse.

The maximum dose of lignocaine is 2 – 5mg/kg. In an adult, this will be 100 – 400mg. 2% lignocaine contains 20mg/ml, so maximum dose is 5 - 20 ml.

Avoid lignocaine containing adrenaline in situations of trauma. It allows the use of a higher dose (delays absorption) and lasts longer, but it can cause vascular spasm and reduce blood supply in field which already has damaged blood vessels.

Lignocaine will be effective within about 2 minutes – wait for it to act! Without adrenaline it will last for up to one hour.

Note that local anaesthetic removes the sensation of pain, but pressure can still be felt.

Use of Local Anaesthetic

1. To infiltrate the edges of a wound for debridement or suture:

- Start just inside the edge of the wound at one end; use the same puncture site to infiltrate each side with a 22G needle, and inject as the needle advances and as it withdraws. It stings as it is injected. Then move to the other end, infiltrating the entire skin edge through two puncture sites.

2. To debride a shallow wound:

- A flush of lignocaine poured onto a burn or a superficial wound will make it comfortable for debridement.

3. To remove (wash out) a foreign body from an eye.

- Instill a few drops into the small pouch formed by pulling on the lower lid.

Digital Block

A ring block is used for repair of fingers, penis. It will catch the two pairs of nerves which run laterally along the dorsum and palmar side of each finger. With 1 – 2 ml of 1% or 2% lignocaine in a syringe, pass the fine needle down from the dorsal surface, suck (to ensure not in a vein) inject up to 0.5 - 1ml, withdraw and inject another 0.5 – 1 ml.

It is less painful to inject in the web space, and from one puncture the adjacent sides of two fingers can be injected.

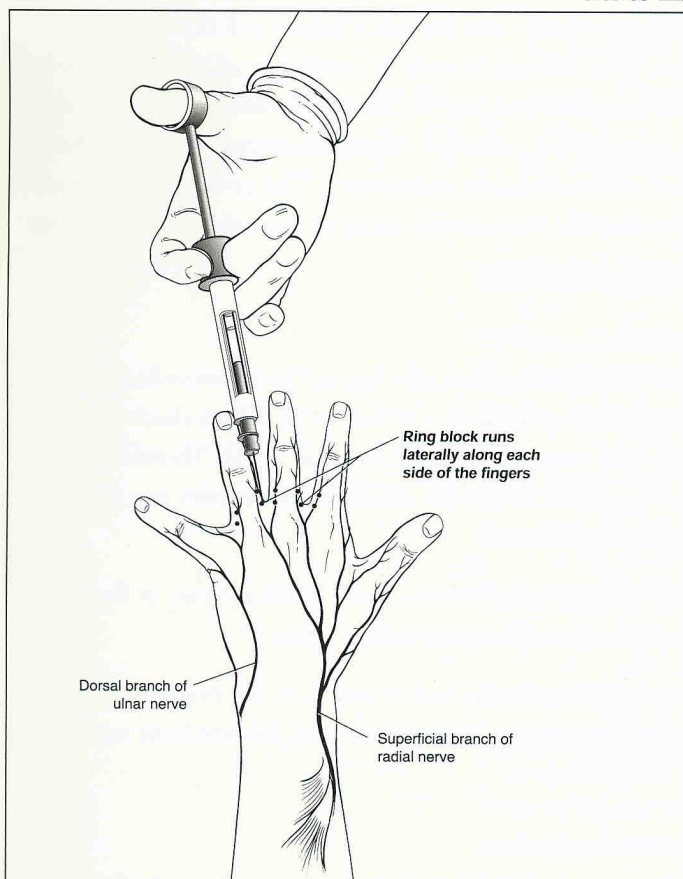


Figure 28. Digital block.

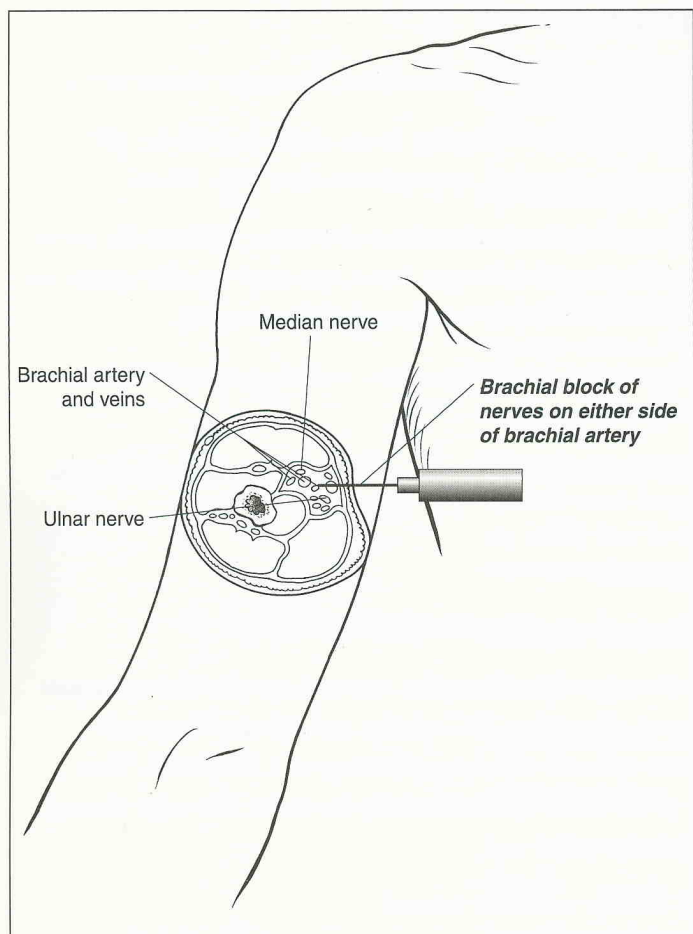


Figure 29. Brachial block.

Ankle Block

Three nerves must be located:

1. Peroneal, at the neck of the fibula, can be rolled on the neck of the bone 1 – 2 cm below the prominent head. Injecting 2 – 3ml of lignocaine will numb the lateral half of the foot. Note that the peroneal compartment will be paralysed and on standing the foot may twist over.
2. Posterior Tibial. Inject 1cm posterior to the medial malleolus 2 – 3 ml of lignocaine.
3. Subcutaneous nerves. Across the anterior surface of the lower leg – perform a ring block.

Brachial Block

Use 20ml of 1% lignocaine and a 22G needle. The nerves to block lie beside the brachial artery in a sheath. Feel the arterial pulse below the belly of the biceps muscle in the upper arm, and pass the thin needle into the artery (blood will flow into the syringe), then through it until no more flow of blood, then inject 10 ml on the lateral side of the artery. Withdraw the needle and again, when blood no longer enters the syringe, inject another 10ml on the medial side of the artery. This gives analgesia from the elbow down. Press on the artery to control any leaking from the arterial puncture.

Intercostal Block

This is useful for multiple rib fractures where pain has not been controlled by conventional analgesia. After an intercostal block it is best to be able to check by X-ray that no pneumothorax has been caused (can occur in up to 20%). Therefore not recommended if no X-ray is available. Injection should be done from one space above to one space below any rib fractures.

Bupivacaine will give longer analgesia (4-8 hours), and a 50:50 mixture of lignocaine and bupivacaine allows rapid response and long-lasting effect.

Inject onto the top of the rib below, then withdraw and slide the needle just under the rib above. Relief of pain should occur in 5 minutes and last one hour with lignocaine, longer with the 50:50 mixture.

Intravenous Block

This is not appropriate for a severely injured limb, because it requires the limb to be drained of its blood.

Spinal Block

Should be limited to those who have had personal instruction in the technique, but need not be limited to fully-trained doctors. With the patient on the side and flexed as for lumbar puncture, advance the spinal needle to enter the CSF and inject 5ml of 2% lignocaine. If this is mixed with 1ml of 50% dextrose it will be "heavy lignocaine" and cause a block to the lower extremities. Prop the patient up at 45° angle for a bi-lateral block; lean to the injured side to block that leg. If the spinal lignocaine runs high in the CSF there may be vasodilation and require I-V replacement of volume. The bladder will be paralysed and a catheter should be put in place. Do not use spinal analgesia for children.

Ketamine Anaesthesia

Ketamine is a dissociative analgesic which allows maintenance of the airway and respiration along with excellent analgesia. It does not affect the gag reflex.

Note that ketamine

- Does not cause relaxation;
- Increases airway secretions;
- Increases blood pressure and heart rate;
- Causes hallucinations
- Allows continual eye movements (therefore not for eye surgery);
- Should probably be avoided in patient with history of psychosis.

Ketamine usually comes in multi-dose vials of 50mg/ml.

I-V is used at a dose of 1-2mg/kg. Subcutaneous or intramuscular dose is usually 5mg/kg but this route is less appropriate for landmine injuries where the vascular perfusion is affected by shock.

Nasal installation of ketamine can be used in small children.

Do not use ketamine for a procedure likely to last more than 2 hours.

If relaxation is required the patient must be ventilated and intubated with the use of scoline.

General Anaesthesia

Note the dangers of a general anaesthetic in a severely injured person.

There is volume depletion and low blood pressure. Thiopentone may cause further cardiac depression and should be avoided.

There may be a full stomach, with the risk of vomiting and aspiration. Every badly

injured person is at risk of acute dilatation of the stomach; intubation is risky and may cause vomiting. Pressure on the cricoid during induction is recommended.

Rapid Sequence Induction

Administer in this sequence:

1. Atropine 0.6mg
2. Induction agent thiopentone 200-400mg, using a 200mg bolus first. or ketamine
3. Scoline 25 –75mg (dose determines duration of paralysis 1 – 5 minutes)

An I-V drip should be in place, and suction ready. Have an assistant push on the cricoid cartilage (show how!) and start to intubate when the tongue fibrillation has stopped. Pass the tube while continuing to push on the cricoid. Using a bag, inflate the lungs and listen on both left and right for air entry. Then inflate the cuff and remove the cricoid pressure.

Maintain anaesthesia with 1-2% halothane.

Phantom Limb Pain (PLP)

Phantom sensations (unlike actual stump pain) are experiences of the missing limb as though it were still an integral part of the body. PLP can start at the time of the operation, or months or years later. Phantom sensations can vary from vivid sensations moving in a complex fashion, to a vague and fixed awareness of fingers or toes attached to the stump.

Phantom limb pain occurs commonly both in children and adults. Patients may not mention it for fear of being ridiculed.

PLP is highly variable in frequency and intensity. Emotional and autonomic influences can sometimes play important roles in provoking or reducing it. The pain is generally felt in the more distal part of the amputated limb (toes, fingers) and has been described as either stabbing, burning, or squeezing, and as cramp-like in nature. It can be continuous or intermittent, and the intensity may be rated as varying from mild to very severe. PLP seems to be less likely if the initial amputation is treated actively and a prosthesis is available and used promptly.

There is no single successful treatment for PLP.

More recently it has been suggested that Transcutaneous Electrical Nerve Stimulation (TENS), paracetamol (with or without a weak opioid) and Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) are more effective than injections, “centrally acting” analgesics like tricyclics or anticonvulsants, and strong opioids in the treatment of PLP. These simpler methods of pain relief are also more likely to be available in countries with landmine problems. Painful neuromas are best treated by neurolytic techniques.

“Phantom limb pain (PLP) may be affected by the experience of pain prior to the amputation. There is less often phantom pain in the leg which has suffered a sudden traumatic amputation. There is more often phantom pain in the other less injured leg which has been amputated late, after various efforts to save it, including surgery which was painful.”

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