



SNAKE-BITE MANAGEMENT

Antivenom (AV) therapy and supportive care

(adapted to: Warrell DA, WHO guidelines for physicians 2010)

Indications for AV therapy

AV should be given only to patients in whom its benefits are considered likely to exceed its risks.

AV is indicated:

a) Systemic envenoming (one or several of the following):

- Haemostatic abnormalities: spontaneous systemic bleeding, coagulopathy, thrombocytopenia ($<100 \times 10^9$ /litre)
- Cardiovascular abnormalities: hypotension, shock, cardiac arrhythmia, abnormal ECG
- Acute kidney injury: oliguria/anuria, rising blood creatinine/urea
- Haemoglobin-/Myoglobinuria
- Neurotoxic signs: ptosis, external ophthalmoplegia, paralysis etc.

b) Local envenoming (one or several of the following):

- Swelling involving more than half of the bitten limb within 48 hours after bite
- Severe swelling after bites on digits (fingers or toes)
- Rapid extension of swelling, beyond wrist or ankle within a few hours after bite
- Development of an enlarged tender lymph node draining the bitten limb

When indicated, AV should be given as early as possible, and in case of coagulopathy, as long as coagulopathy exists.

Adverse reactions of patients to AV, and treatment

Adverse reactions to AV typically in $\geq 10\%$ of patients

- Anaphylactic reaction (rare!): usually within 3 hours after AV administration
- Pyrogenic (endotoxin) reactions (common): usually within 2 hours
Treatment for both: adrenalin (0.1% solution, 1:1000, 1 mg/ml), 0.5 mg for adults, 0.01 mg/kg for children; intramuscularly into upper lateral thigh; repeat dose every 5-10 min if patient's condition deteriorates. In addition: antihistamines (chlorphenamine maleate, adults: 10 mg, children: 0.2 mg/kg i.v.; hydrocortisone, adults: 100 mg, children: 2 mg/kg i.v. In pyrogenic reactions: paracetamol per os to reduce fever. In all cases: i.v. fluids to correct hypovolemia.
- Late (serum sickness type) reactions: usually within 7 days
Treatment: Oral antihistamines: chlorphenamine, adults: 2 mg hourly, children: 0.25 mg/kg/day in 5-7 doses; or: prednisolone, adults: 5 mg six-hourly, children: 0.7 mg/kg/day in 5-7 doses.

Administration of AV

Have adrenalin ready before AV administration

- Initial (mono- or polyvalent) AV dose: see Manufacturer's recommendation
- If necessary, reconstitute lyophilized (freeze-dried) AV in 10 ml sterile water (swirl, do not shake)
- i.v. inject AV at 2 ml/minute; alternatively, dilute AV in isotonic saline (5-10 ml/kg body weight) and i.v.-infuse over 1 hour period; DO NOT administer AV locally
- Monitor patient for > 1 hour after starting AV treatment for early anaphylactic signs

AV must be given until symptoms resolve; if necessary at 1-2 hour intervals, for coagulopathy at 6 hour intervals. Bleeding stops within 15-30 minutes; coagulopathy within 3-9 hours; blood pressure



back to normal within 60 minutes; neurotoxicity resolves within 30 min to several hours, haemolysis and rhabdomyolysis within a few hours.

All patients have to be monitored for at least 48 hours.

Treatment when no AV is available, and medical support of AV therapy

a) Neurotoxic envenoming:

- Maintenance of clear airway; assisted ventilation; mechanical ventilation: (required typically from 30 min to 24 hours (mean: 4-7 hours) after a severe neurotoxic bite, for the duration of 24 hours to several days, rarely longer)
- Anticholinesterase treatment should be tried in every patient with neurotoxic envenoming. It may or may not be effective. i.v.-inject atropine sulphate (0.6 mg for adults, 0.05 mg/kg for children), then i.m.-inject neostigmine or prostigmine (0.02 mg/kg for adults, 0.04 mg/kg for children).

b) Hypotension and shock:

- Give plasma expanders (colloids or crystalloids) and monitor central venous pressure. Beware of pulmonary oedema.
- Generally increased capillary permeability: i.v.-infuse dopamine (2.5-5.0 micrograms/kg/minute)

c) Oliguria and acute kidney injury (urine output <20 ml/hour):

- In case of hypovolemia: infuse 2 litres of isotonic saline over one hour. Beware of pulmonary oedema. Catheterize patient, inject 100 mg furosemide over 20 minutes, monitor serum potassium, urea, creatinine, pH, bicarbonate, calcium and phosphate frequently
- In case of hyperkalaemia: give, up to three times, 10 ml of 10% calcium gluconate over 2 minutes, and 50 ml of 50% dextrose with 10 units of soluble insulin, and 40 ml of 8.4% sodium bicarbonate by slow i.v. infusion
- In case of severe acidosis: give 40 ml of 8.4% sodium bicarbonate in 5% dextrose water over 3-4 hours

If no clinical improvement is achieved: dialysis

Dialysis is also indicated in case of: clinical uraemia, fluid overload, creatinine >4 mg/dl (500 micromol/litre), urea >130 mg/dl (27 mmol/litre), potassium >7mmol/litre and symptomatic acidosis

- In case of rhabdomyolysis or haemolysis: maintain saline diuresis (if possible), correct severe acidosis with bicarbonate
- Beware of the diuretic phase of kidney injury (following oliguric phase): correct hypokalaemia with potassium (fruit juice) if necessary; if long lasting (up to several months): replace corticosteroids, fluid and electrolytes

d) Haemostatic disturbances:

DO NOT use heparin or antifibrinolytic agents

In patients with coagulopathy, placement of venipuncture (if necessary) should be chosen where haemostasis by external pressure is most likely to be effective (e.g., antecubital fossa)

Treatment of bitten part: aspirate bullae only when rupture seems likely. Control secondary infection by single dose of amoxycillin and tetanus prophylaxis

Compartment syndrome: intracompartmental pressure of >40 mm Hg (less in children): if possible, fasciotomy should be delayed until haemostatic disturbances have been corrected.