

AUSTRALIAN SNAKES

GENERAL APPROACH:

Definite or suspected snake bite is a regular presentation in most parts of Australia and is a time-critical emergency.

RISK ASSESSMENT:

- There is NO RISK STRATIFICATION PROCESS that allows us to identify patients who can be discharged early or without lab investigations

PRE-HOSPITAL CARE:

- Pressure immobilisation bandage to delay spread of venom proximally by lymphatic drainage
 - This involves pressure bandage over the whole limb, with immobilisation of both the limb and the whole patient
 - If the bite is on the trunk, apply local pressure over the site and immobilise the patient
 - This can be left on for many hours
 - *No patient who received early and appropriate PIB has subsequently died*
- Tourniquets, washing, ice, cutting, sucking are ALL UNPROVEN AND POTENTIALLY HARMFUL --> DO NOT DO THIS
- **Only remove PIB if:**
 - Patient has been fully assessed in an appropriate facility and is found to show NO OBJECTIVE EVIDENCE OF ENVENOMING i.e. normal exam & labs
 - Antivenom administration has commenced if patient envenomed

HOSPITAL CARE:

- Most patients will not require immediate resuscitation
- Potential early life threats include:
 - Hypotension: BROWN, TIGER, TAIPAN
 - Respiratory failure (due to paralysis) DEATH ADDER, TAIPAN, TIGER & BROWN (rarely)
 - Seizures: TAIPAN
 - Severe venom-induced consumptive coagulopathy (VICC) with uncontrolled haemorrhage: BROWN, TAIPAN, TIGER
- The aim is to seek objective evidence of envenoming on the basis of history, exam and labs
 - **Serial examination** and labs are performed until envenoming is diagnosed or 12 HOURS HAVE EXPIRED. *Perform at 1, 6 & 12 hours*

HISTORY:

- Geographic area of bite
- Appearance --> do not rely
- Number of strikes
- Use of PIB
- Early symptoms: collapse, N+V, bleeding, weakness

EXAMINATION:

- Vital signs
- Mental status
- Evidence of bite: envenoming is NOT excluded if there is no evidence of a bite
- Abnormal bleeding i.e. from gingival, IV sites
- Descending flaccid paralysis (ocular, small facial muscles and bulbar muscles first)
- Spirometry.

LABORATORY:

- Coagulation Profile
- Fibrinogen, D-dimer and FDP
- FBC, CK, EUC
- LDH

If the patient remains clinically well & initial lab studies are normal, PIB is removed --> if deterioration occurs, reapply PIB, repeat labs and antivenom is administered

Determine type of monovalent antivenom required:

- **IT IS MORE SPECIFIC, CHEAPER, SAFER AND HAS A LOWER PROBABILITY OF SERUM SICKNESS**
 - Serum sickness can occur at 4-21 days post administration and is treated with prednisone for five days
- Polyvalent has the equivalent of one ampoule of each monovalent antivenom, *hence it has a large protein load*
- Use **CSL snake venom detection kit:**
 - This is NOT USED TO DETERMINE ENVENOMATION - it is used to identify the correct antivenom for use if envenomation is confirmed on clinical grounds
 - Use a bite swab site after cutting a key-hole in the PIB
 - *The first well to turn blue gives the result (within 10 minutes)*

DOSE OF MONOVALENT:

- Once antivenom selected, give an initial dose to provide definitive treatment
- Must be prepared to manage anaphylaxis
 - Low prevalence: 1% with monovalent, 5% with polyvalent
 - Hence, no routine pre-treatment
- Follow lab values at six & twelve hours until normalised

INDICATIONS FOR POLYVALENT:

- Appropriate monovalent not available
- No venom detection kit available
- Severe envenoming, hence insufficient time to wait for detection kit results

ADJUVANT TREATMENTS:

- The use of blood products such as FFP or cryoprecipitate in the management of VICC is controversial
 - These are indicated in *uncontrolled or life-threatening haemorrhage*.

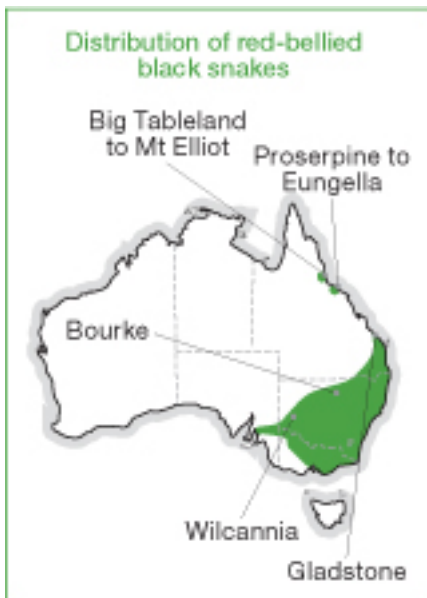
BLACK SNAKES:

MULGA SNAKES (aka KING BROWN, but it is NOT a brown snake):



- Large, aggressive snakes. Inflict a large bite and painful bite, producing a lot of venom. Potentially lethal. **RARELY IMMEDIATELY LIFE-THREATENING.**
- Toxin contains MYOTOXINS, NEUROTOXINS, ANTICOAGULANT. **NO PROCOAGULANT**
- Extensive local tissue swelling with regional adenitis in 60%
- Headache, abdominal pain, N+V, diarrhoea occur rapidly in envenomed patients. Mild paralysis in 15%
- Rhabdomyolysis/renal failure
- Bleeding is rare
- Black snake antivenom in those with objective evidence of evolving rhabdo (CK >5000) or in those with GI symptoms refractory to supportive care
- FBC, EUC, CK, coags, DDL, fibrinogen all standard
- Repeat CK every 6 hours if symptomatic (usually high on presentation)
- In contrast to brown, taipan and tiger: APTT, INR abnormalities are mild and fibrinogen is normal.

RED-BELLIED BLACK SNAKES:



- **LESS POTENT TOXINS** cause minor myolysis only
- No paralysis or coagulopathy
- Bites can cause local pain and discomfort, but systemic envenomation is rare
- FBC, EUC, CK, Coags, DDL, fibrinogen all **STANDARD**
- Rarely requires antivenom; if required, use **TIGER**

BROWN SNAKE:

THE MOST COMMON CAUSE OF DEATH FROM SNAKEBITE IN AUSTRALIA

THE MOST IMPORTANT FEATURE OF SEVERE ENVENOMING IS VENOM INDUCED CONSUMPTIVE COAGULOPATHY (VICC)



- Majority of those bitten are NOT envenomated
- Venom contains PROCOAGULANTS, CARDIOTOXINS, POTENT PRESYNAPTIC NEUROTOXIN
- Present with headache, N+V, abdo pain
- *Early COLLAPSE* is almost pathognomonic !!
- Early death is rare, but prob due to cardiotoxicity
- Hallmark of envenomation is VICC, which develops soon after the bite (bleeding gums, ICH, venesection site)
- THROMBOTIC MICROANGIOPATHY:
 - ↓platelets, MAHA (microangiopathic haemolytic anaemia)
- ARF in 10%
- Rhabdo DOES NOT OCCUR
- Neurotoxicity can occur, but is rare
- Antivenom (2 vials) for systemic envenomation (objective evidence of VICC or collapse)
 - Can be life saving in cardiac arrest as rapid IV push
- VICC = ↑INR (>3 at least), undetectable fibrinogen, ↑↑↑DDL & FDP. Watch for ↓plt, and evidence of MAHA (↑LDH, fragmented red cells)
- Can be indistinguishable from Tiger early...
 - Tigers --> paralysis & rhabdo over ensuing hours.
 - Taipans will have EARLY paralysis and rhabdo.
- Up to 8 weeks of dialysis can be required
- Fit for discharge if INR <2, renal fn and FBC normal after 24 hours (envenomed) or 12 (not envenomed)
- Recent evidence suggests antivenom does not hasten recovery from VICC, but may prevent other manifestations. Blood products do help, plasmapheresis used in MAHA, but role is uncertain.

TIGER SNAKE:

Distribution of tiger snakes



- Second most common of snakebite-related death
- Only venomous snake in Tasmania, but coexist with Brown snake and presentation similar
- PRE- and POST-SYNAPTIC NEUROTOXINS, MYOLYSINS, PROCOAGULANTS --> presents with VICC, rhabdo and GRADUAL onset paralysis
- Headache, N+V, abdo pain
- VICC occurs rapidly, but should resolve spontaneously within 10-20 hours
- Paralysis within 1-2 hours (diplopia/ptosis early)
- Systemic envenomation evidenced by coagulopathy or collapse
- 2 ampoules of antivenom, IV push in arrest.
- Distinguish from Brown by paralysis/rhabdo (rare in Brown), Taipans have VICC but more rapid onset of neurotoxicity, rhabdo. Black snake; mild coagulopathy (norm fibrinogen)
- Antivenom does not hasten recovery from VICC, but prevents other manifestations.
 - Does not reverse established paralysis.
- Observe all patients for 12 hours

TAIPANS

ENVENOMATION IS RARE, BUT IS USUALLY LETHAL WITHOUT ANTIVENOM

CHARACTERISED BY RAPID ONSET OF VICC, NEUROTOXICITY AND RHABDOMYOLYSIS



- Venom contains potent PRE- and POST-SYNAPTIC NEUROTOXINS (paralysis), MYOTOXINS (rhabdo) and PROCOAGULANTS (activators of factor VII and prothrombin)
- Some people may not know they have been bitten
- Systemic envenoming heralded by collapse within minutes and paralysis within 1-2 hours
- Clinical features of VICC develop --> bleeding
- Rhabdomyolysis manifests by myalgia and myoglobinuria --> renal failure
- Thrombotic microangiopathy = MAHA/ARF (rare)
- PIB in field.
- Early life threats = hypotension, rapid onset paralysis, VICC with uncontrolled haemorrhage and seizures
- Undiluted antivenom in cardiac arrest.
- Taipan antivenom is definitive treatment of envenomation (coagulopathy, collapse or respiratory failure) --> initial dose one ampoule. Does NOT reverse established paralysis, but does halt progression
- Investigations = VICC characterised by \uparrow INR, undetectable fibrinogen, \uparrow D-Dimer, FDP
- Watch for worsening renal function and MAHA (fragmented red cells, \uparrow LDH)
- Differentiated from Brown snakes by paralysis and rhabdomyolysis (rare with Brown)
- More rapid onset of neurotoxicity and rhabdo than Tiger
- Remember venom detection kit DOES NOT diagnose envenomation, just the presence of venom on the skin!

DEATH ADDER:



- Found throughout most of mainland Australia, however bites & envenoming are uncommon.
- Mortality approached 50% prior to mechanical ventilation.
- Nocturnal animals --> most bites at dusk.
- Venom = *post-synaptic neurotoxin*.
- Envenoming characterised by progressive symmetrical descending paralysis within 6 hours.
 - Ptosis, blurred vision, diplopia & dysphagia.
 - Generalised paralysis & respiratory failure result.
- **NO** coagulopathy, rhabdo or renal failure.
- **Antivenom** = 1 ampoule of monovalent Death Adder antivenom (sufficient to reverse paralysis).
- Spirometry & peak-flow act as surrogate for respiratory muscle strength.
- Requires 24 hours of observation.

SEA SNAKE

30 SPECIES, CLOSELY RELATED TO VENOMOUS AUSTRALIAN TERRESTRIAL SNAKES

RARELY AGGRESSIVE, BUT THEY ARE INQUISITIVE AND MOST BITES WILL OCCUR WHEN THEY ARE HANDLED



- Sea-snake venom contains post-synaptic neurotoxins (paralysis) & myotoxins (rhabdo).
- Most bites are small, superficial and painless.
- Envenoming characterised by symmetrical, descending flaccid paralysis (within 6 hours).
 - Ptosis, diplopia, blurred vision, dysphagia.
 - Myalgias & myoglobinuria --> ARF.
- Sea-snake Antivenom --> one ampoule !!
 - Tiger snake antivenom is also effective (3 amps).
 - Alternatively, 3 amps of *polyvalent* can be given.
- DDX:
 - Tiger/Taipan --> assoc w/ VICC.
 - Black --> Rarely neurotoxic (but rhabdo present)
 - Death Adder --> Paralysis common (no rhabdo).

A snake-bite on the beach (or in estuarine water) can still be from a terrestrial snake !!