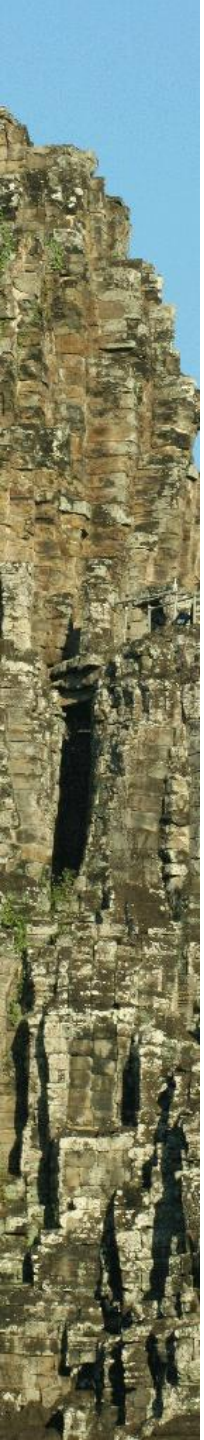


Resuscitation:
Identifying & Treating the Critically Ill Patient

Lecture 4: Snake Bite Management Course

Introduction (1)

- Many snake bites cause no symptoms or only minor effects, while some cause mainly local toxicity
- Other snake bites can cause life-threatening systemic symptoms, including;
  - Airway obstruction & respiratory failure (neurotoxicity)
  - Serious bleeding or shock (coagulopathy, cytotoxicity)
  - Hyperkalaemia or pulmonary oedema (acute renal failure)
  - **These patients may need immediate treatment to prevent death soon after arrival**
- Therefore, **all** snakebite patients should be seen & assessed very soon after **arrival**, to determine if they require resuscitation

Introduction (2)

- Resuscitation should occur promptly and **before**
  - assessing the patient for specific toxinodromes
  - before making an antivenom decision
  - before attention to wounds & local tissue injury
- Health care personnel at all levels should be able to recognise the key features & causes of medical emergencies such as
  - Airway obstruction (actual or potential for this)
  - Breathing (respiratory) failure
  - Circulation failure (shock) & acute renal failure
  - Disability (neurological function impairment/coma)

Triage

- Aims to sort patients according to:
  - the severity of their illness
  - their potential to deteriorate
- Patients who appear mildly unwell can deteriorate (sometimes very quickly)
- They should be under observation while they are waiting to be fully assessed
- Snake bite patients should always been given a high priority (e.g. category 1-2 on the Australasian Triage Scale [1-5]), even if they have been transferred from another health facility several days after a bite

Identifying any Critically Ill Patient

- A structured approach should always be followed:
  - Observations
  - Get help, if alone
  - Ensure that any snake brought with the patient is dealt with safely
  - Vitals signs & begin monitoring them
  - Brief, focused history
  - Resuscitation
  - Application of first aid (e.g.: Pressure Immobilisation Bandage), if indicated
  - Tubes & tests
  - Antivenom decision

Observations: Vital Clues

- Always look for the following:
  - walking or carried
  - sitting or lying on bed
  - talking or not
  - breathing or not
  - bleeding or not
  - pale or not
  - Pressure Immobilisation Bandaging (PIB) in place
  - tourniquet or signs other traditional treatment visible

Vital Signs & Start Monitoring

- **VITAL SIGNS ARE VITAL!**
- Always measure and keep a timed record of:
  - Respiratory rate (& depth), RR
  - Peripheral oxygen saturation, SpO2
  - Pulse rate/heart rate, HR
  - Blood pressure, BP
  - Temperature, T
  - Blood sugar, BSL, especially in children
- Continue to monitor the patient and to keep a timed record of the vital signs

Brief Focused History

- Relevant to:
  - likely presenting complaints/symptoms
  - likely diagnosis
- Get this from relatives if the patient cannot talk
- Specifically ask about:
  - Bite details
  - Symptoms
  - First aid & other treatments that may have been given
  - Past medical history
  - Current medications being taken
  - Known allergies
  - Patient's body weight

Resuscitation: Definition

- Defined as urgent treatment to correct serious & life-threatening deficits in:
  - vital signs
  - vital functions
- The following management guidelines are applicable to any critically ill patient
- More detail is presented in subsequent lectures

Resuscitation Priorities: ABCDEF

- The internationally recognised order of priorities in any resuscitation is based on the order in which problems can kill the patient:
  - **A**irway
  - **B**reathing (& **B**andage)
  - **C**irculation
  - **D**isability/Neurological
  - **E**xposure (& **E**nvenomation)
  - **F**luids & Renal **F**ailure
- Identify and treat problems in the order that they can kill the patient, <u>fixing one before moving on to the next</u>

In a team situation, with several staff, several problems can potentially be attended to at once

ABCDEF: Importance

- All patients must be assessed in this manner to identify & treat immediately those who need resuscitation before any other treatment
- Patients may die if medical staff focus on the local effects of snake bite & neglect maintaining bodily functions
- Once significant deficits are recognised & treated, staff can focus on managing other aspects of the patient's care

Resuscitation: Airway (1)

- Refers to the region of the airway above the vocal cords - i.e., the upper airway
- Airway problems can kill a patient within minutes, if they occur suddenly, or over hours, if they occur slowly
- In a snake bite patient airway problems can occur as a result of:
  - Neurotoxicity & cranial muscle paralysis
  - True coma - due to intracranial bleeding, severe hypoxia, severe shock, hypoglycemia,
  - Anaphylaxis to drugs or antivenom, causing airway oedema

Resuscitation: Airway (2)

- Snake bite patients must be assessed for:
  - Agitation
  - Stridor (may not occur if respiratory muscles are very weak)
  - Voice - hoarse, weak
  - Colour - cyanosis
  - Pooling/drooling of saliva
  - Bleeding in the airway
  - Evidence of air flow/normal chest movement
  - Paradoxical breathing
  - True coma

Resuscitation: Airway (3)

- Treatment may require:
  - Basic airway manoeuvres
    - Chin lift, jaw thrust
    - Position patient on their side
    - Gentle suctioning
    - Guedel airway (or nasopharyngeal airway)
  - Advanced airway manoeuvres
    - Laryngeal mask airway (LMA)
    - Endotracheal intubation (where available/possible)

- Demonstrated & practiced in Respiratory Management Practical and further discussed in Lecture 9

Resuscitation: Breathing (1)

- Breathing problems can kill a patient in minutes to hours
- In a snake bite patient breathing problems can occur because of:
  - Neurotoxicity (respiratory muscle weakness, pulmonary aspiration)
  - Any cause of coma (as above)

Resuscitation: Breathing (2)

- Snake bite patients must be assessed for :
  - Respiratory muscle weakness
    - Low RR (occasionally high RR)
    - Poor expansion/shallow breathing
    - Abnormal breathing pattern - abdominal breathing
    - Low SpO2
    - Weak cough, voice
  - Pulmonary aspiration
    - Crepitations, especially at the lung apices

Resuscitation: Breathing (3)

- Treatment of breathing problems involves:
  - Treat abnormalities of **A** first!
  - Oxygen!
    - Nasal prongs
    - Hudson mask
    - Non-rebreather mask
    - Bag-valve-mask (BVM)
  - Assisted ventilation - BVM
  - Controlled ventilation - intubation & mechanical ventilation (sedate the patient)

- Further discussed in Lecture 9

Resuscitation – Bandaging (PIB)

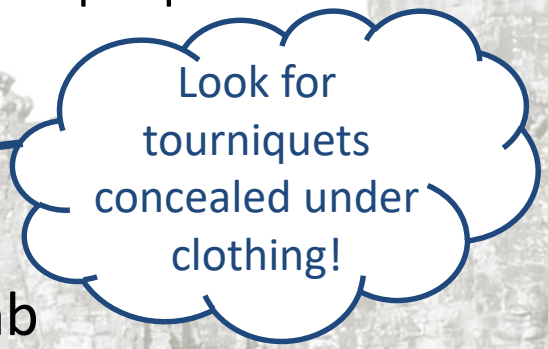
- Apply to bitten limb on arrival if the patient:
  - Was bitten by an unidentified snake and there concern a neurotoxic species may be responsible **AND** there is no evidence of abnormal bleeding
  - Has current evidence (signs) of neurotoxicity
- Some cobras can cause local tissue damage, but the risks from airway obstruction & respiratory failure from neurotoxicity, outweigh the risks from local tissue necrosis
- Once a patient is assessed, the need to retain the first aid bandage can be decided, otherwise it can be removed during, or just after, giving antivenom

Resuscitation: Circulation (1)

- Circulation problems/shock can kill a patient in minutes to hours
- In a snake bite patient circulation problems/shock can occur because of:
  - Severe hypoxia
  - Large blood loss
  - Widespread oedema (loss of intravascular volume)
  - Anaphylaxis to antivenom or other drugs
  - Septic shock
  - Severe dehydration
  - Laying a patient in advanced pregnancy supine

Resuscitation: Circulation (2)

- In a snake bite patient assess for:
  - Signs of shock
    - High HR
    - Low BP
    - High pulse pressure (SBP-DBP)
    - Slow capillary return in an unbitten limb/cool peripheries
  - External bleeding
  - Tourniquets
  - Abnormal cardiac rhythm
  - Evidence of infection in the bitten limb
  - Poultices or unsterile dressings
  - Dehydration



Resuscitation: Circulation (3)

- Treat the patient with:
  - Treat abnormalities of **A** & **B** first!
  - Careful IV cannulation, take blood samples, and do the 20WBCT (20-minute Whole Blood Clotting Test)
  - Give IV fluid crystalloid (20ml/kg) & assess effectiveness
  - Removal of tourniquets (beware release of K^+ - watch heart rhythm/ECG) +/- replace with PIB
  - Broad spectrum antibiotics, where indicated

- Discussed further in Lecture 11

Resuscitation: Disability (1)

- This refers to deficits in neurological function (reduced level of consciousness), hypoglycemia (**D**extrose) & significant pain
- Problems which cause a reduced level of consciousness can kill a patient in 1 hour or more
- Hypoglycemia can kill a patient in minutes to 1 hour (common in small, unfed children)
- In a snakebite patient disability problems/coma can occur because of:
  - Severe hypoxia or shock
  - Intracranial bleeding
  - Hypoglycemia

Resuscitation: Disability (2)

- In a snake bite patient assess for:
  - Level of consciousness (describe what is found):
    - Eye-opening (Awake/Verbal/Pain/Unresponsive)
    - Speech/vocalisation
    - Motor function
    - But be aware that in the presence of neurotoxicity the patient is **still awake**, though can't open their eyes, can't speak or even obey commands (the best way to assess brain function)(hence the use of GCS is discouraged in these patients)
  - Unequal or unreactive pupils
  - Low blood sugar (**D**extrose)
  - Urinary retention (common in the presence of neurotoxicity & coma)

Resuscitation: Disability (3)

- Treat with:
  - Treat abnormalities of **A**, **B**, **C** first!
  - Protect the airway if paralysed or true coma
  - IV dextrose (1ml/kg of 50% or 5ml/kg of 10%)
  - Urinary catheter insertion
  - Give non-sedative pain relief

Resuscitation: Exposure/Envenomation

- Ensure the patient's temperature has been measured
- Give anti-pyretic to lower the body temperature if there is significant fever
- Completely expose/undress the patient to:
  - Ensure that the extent of the local toxicity & other signs of envenomation are obvious
  - Look for tourniquets or other evidence of harmful traditional treatments
- Then cover the patient up again to prevent a drop in body temperature

Resuscitation: Fluids & Renal Failure (1)

- Renal failure can kill a patient in 1 to several days (they may arrive at a large hospital in established renal failure) by:
  - Hyperkalaemia
  - Fluid overload/pulmonary oedema
- All patients who cannot safely drink should receive maintenance IV fluids
- In snake bite renal failure can occur because of:
  - Indo-Chinese Russell's viper bite
  - Prolonged hypoxia, shock or dehydration
  - Certain types of coagulation disturbances
  - Prolonged urinary retention

Resuscitation: Fluids & Renal Failure (2)

- In a snake bite patient assess for:
  - Hyperkalaemia (ECG)
  - Fluid overload (pulmonary oedema, raised JVP)
  - Generalised oedema
  - Urinary retention
- Treat the patient with:
  - Treat abnormalities of **A, B, C, D, E** first!
  - Treat hyperkalaemia (See Lecture 11)
  - Treat fluid overload
  - Maintain oxygenation, blood pressure
  - Treat dehydration
  - Insert urinary catheter

Tests & Tubes

- Ensure that all required tests are taken at this stage (see Lecture 6):
  - Bedside, i.e.:
    - 20WBCT
    - Blood glucose
  - Laboratory, i.e.:
    - Blood for cell and platelet counts
    - Haemoglobin
    - Urea, creatinine and electrolytes (if possible)
  - Chest X-Ray
    - Ultrasound or CT scan may be required later

Antivenom Decision

- Note and record evidence of envenomation
- Note and record the presence of indications for antivenom
- Test results: 20WBCT, platelet count
- May require the results of other blood tests
- Consider likely species
- Begin giving correct antivenom as soon as is indicated
- If the correct antivenom is not available, referral and transfer of patient to another hospital may be necessary

Resuscitation: Key points (1)

- All heath workers should be able to recognise & begin (or immediately seek help with) treatment of these problems
- Use a structured approach for all patients
- All snake bite patients must be seen & assessed **as** soon as possible after arrival to find problems with:
  - **A & B**: Neurotoxicity - Airway or Breathing problems; PIB
  - **C**: Serious bleeding & Shock
  - **D**: Coma or Hypoglycemia
  - **E**: look for signs of Envenomation & Traditional Treatments
  - **F**: Fluids & Acute Renal Failure

Resuscitation: Key points (2)

- Vital signs should be assessed & treatment of abnormalities begun before other treatment is started
- Tests & tubes should be taken & inserted during or immediately after resuscitation
- Antivenom selection & administration should occur as soon as possible after resuscitation