Assessment & Diagnosis of Snake Bite in Cambodia

Lecture 6: Snake Bite Management Course

Introduction (1)

- Assessment, diagnosis & treatment of any sick patient requires the same, structured approach:
  - Assessment of vital signs & the need for resuscitation + performing any required resuscitation
  - History - focused, thorough
  - Examination - focused/toxinological & provisional diagnosis
  - Investigations - bedside, laboratory, X-ray & definitive diagnosis
  - Antivenom decision
  - Specific & supportive treatments
  - Ongoing monitoring & re-assessment, nursing care
  - Appropriate referral +/- disposition
  - Physiotherapy & rehabilitation
  - Education & outpatient follow-up

Introduction (2)

- A thorough, accurate assessment is vital to identifying:
  - correct primary diagnosis:
    - envenomation/no envenomation
    - severity of envenomation
    - presence of complications
  - additional diagnoses
  - alternative diagnoses

- Making the correct diagnosis is essential to making correct management decisions

Assessment: Overview

- **Resuscitation first! - ABCDEF**

- Then **HEIDROM:**
  - **H**istory - thorough, focused
  - **E**xamination - head to toe
  - **I**nvestigations - bedside, laboratory, X-ray
  - **D**iagnosis - definitive
  - **R**eassessment & **O**ngoing **M**onitoring

- Back to ABCDEF if any deterioration

History

- Bite
- Traditional “first aid” or “treatments”
- Conventional treatments given elsewhere
- Symptoms:
  - non-specific & specific
  - initial & current
- Past medical history
- Medications
- Allergies
- Other pertinent information, eg social history

Examination

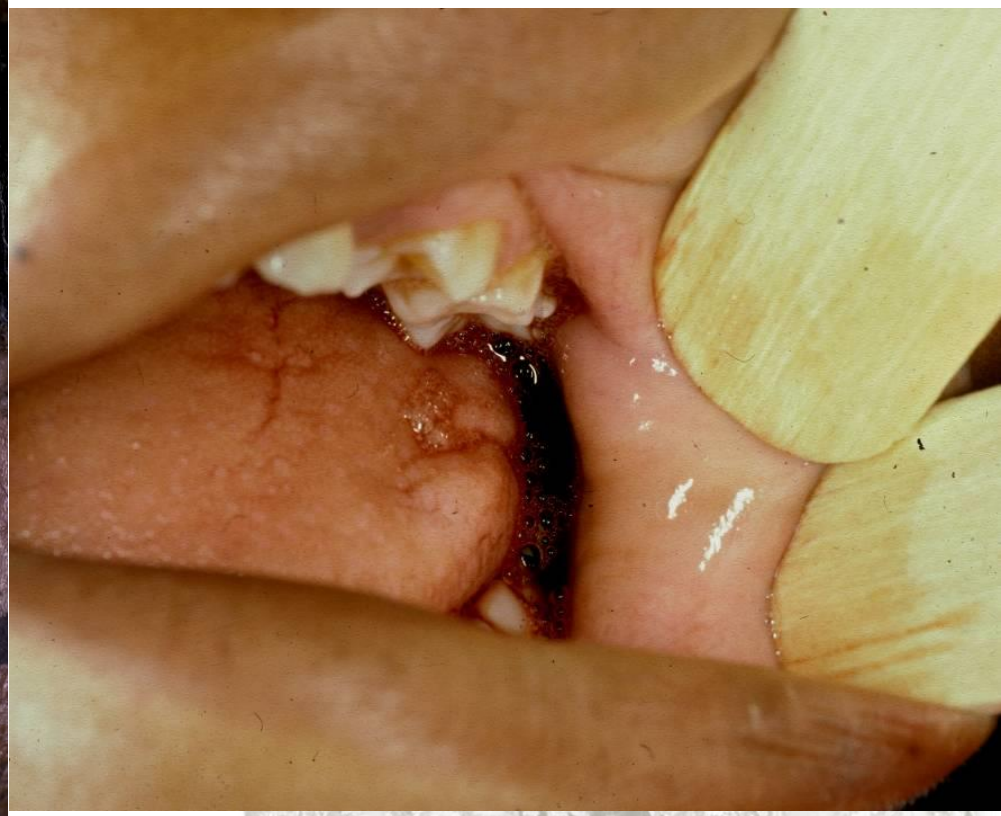
- Thorough, systematic, head to toe, bearing in mind:
  - envenomation syndromes
  - temporal relationship of signs & symptoms of snake bite
  - provisional diagnosis
- Looking for signs of envenomation:
  - Local/bite site & regional
  - Systemic (approximate temporal occurrence):
    - non-specific
    - coagulopathy
    - cardiac effects
    - neurotoxicity
    - myotoxicity
    - renal effects
- Standard National Snake Bite Admission form useful
- Follow signs & symptoms, vital signs with Snake Bite Observation Sheet

Examination: Coagulopathy - Bleeding Sites

- Bite site, old wounds, venepuncture sites (use IV line)
- Incisions from traditional treatments
- Gums, nose, tears
- Soft tissues of upper airway or neck
- Upper & lower gastrointestinal tract, malaena
- Pulmonary - haemoptysis
- Subcutaneous, intrabullar, subconjunctival
- Spontaneous intramuscular, intraperitoneal, retroperitoneal, etc.
- Renal tract - haematuria
- Vaginal bleeding - especially the pregnant or mentruating patient
- Spontaneous intracranial bleeding

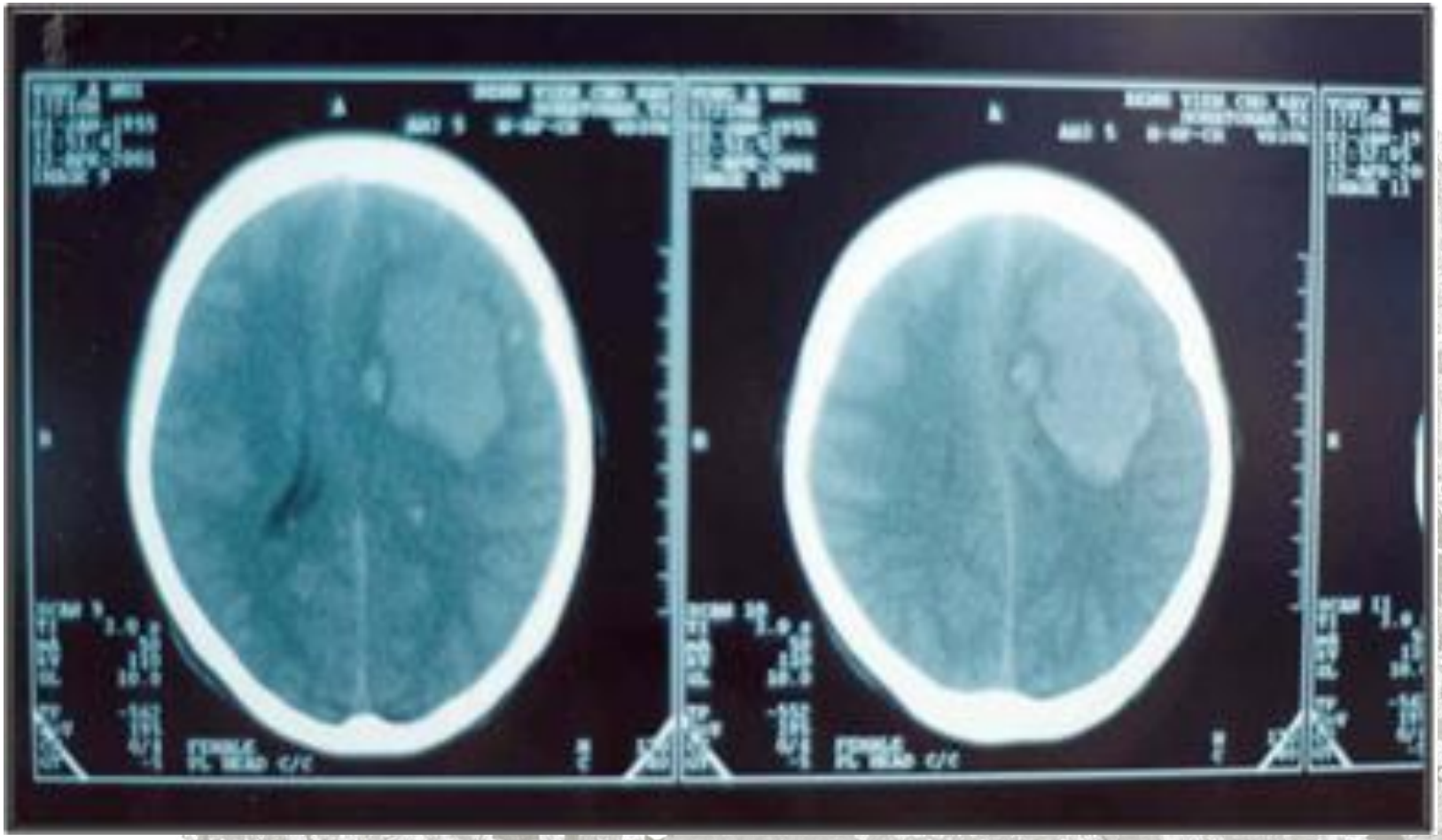
Consumptive Coagulopathy

Bite site bleeding

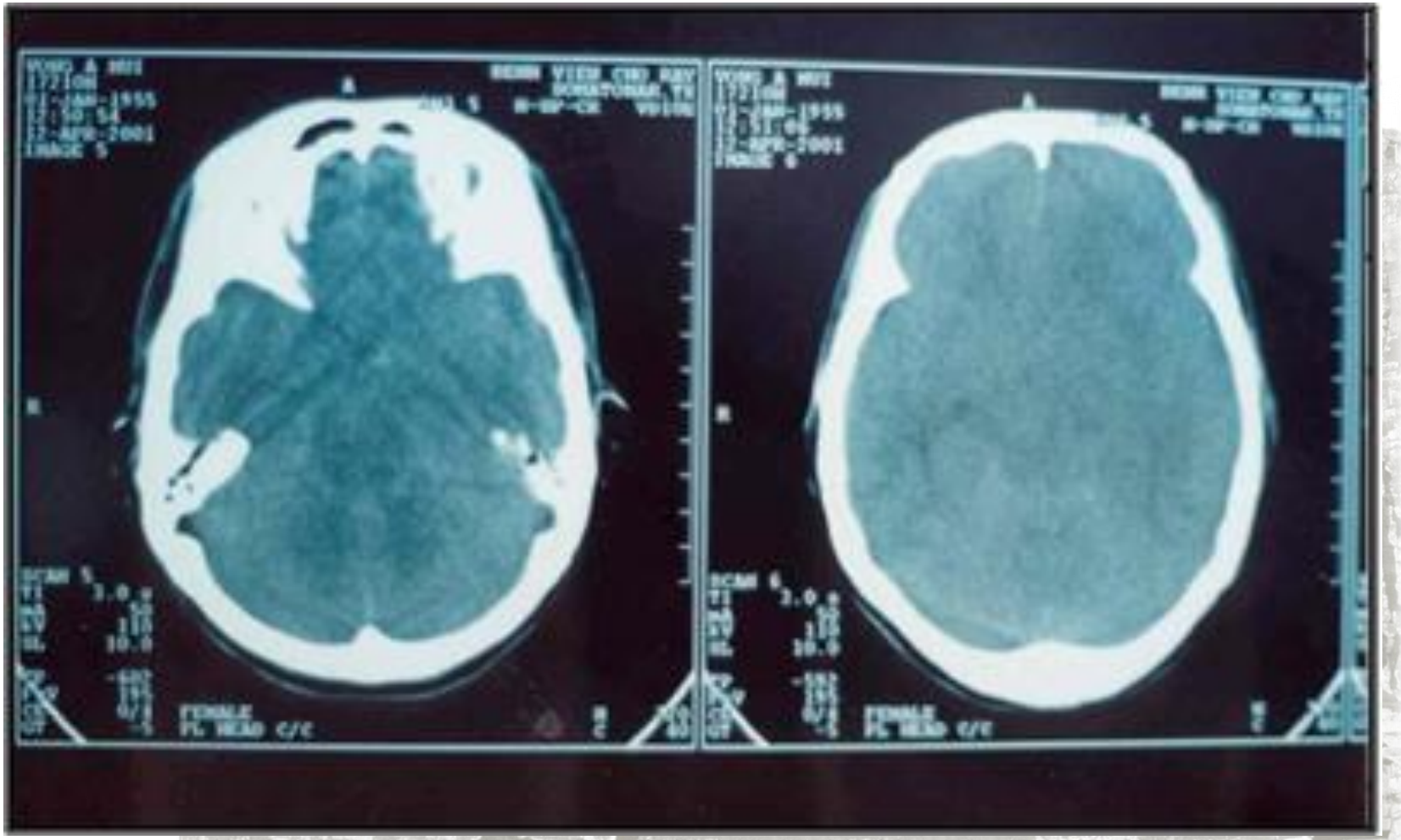


Bleeding gums

Intracranial Haemorrhage (1): Multiple Intracerebral Bleeds



Intracranial Haemorrhage (2): Subarachnoid Bleed



Examination: Neurotoxicity (1)

- Demonstration (or demonstration video)

- Cranial nerves to voluntary muscles:
  - III, IV, VI (extraocular muscles)
  - V (mouth-opening)
  - VII (most other facial muscles)
  - IX, X (speech, swallow, gag)
  - XI (accessory muscles of respiration)
  - XII (tongue)

- **Do not** test for "broken neck sign"

Neurotoxicity (presynaptic)

Mild ptosis

Severe facial muscle paralysis

Examination: Neurotoxicity (2)

- Respiratory:
  - RR, depth of inspiration/tidal volume
  - SpO2 (& cyanosis)
  - accessory muscles - maximal inspiration
  - intercostals - inspiration & expiration (cough)
  - diaphragm - inspiration
  - abdominals - expiration (cough)
  - percussion & ascultation - crepitations (may not be heard if very weak inspiration)
  - respiratory function tests -
    - PEFR meter, blow into sphygmomanometer or electronic spirometer (expiration)
    - incentive spirometer (inspiration)

Examination: Neurotoxicity (3)

- Truncal (abdominal & back) muscles:
  - walk, sit
  - lift head & shoulders off pillow
- Limbs:
  - upper & lower
  - distal & proximal
  - score power 0-5/5
- Care assessing mental state/level of consciousness - cannot use Glasgow Coma Scale when paralysed (devised for head injury):
  - eye-opening, vocalisation, motor function
  - most useful indicator = ability to obey commands

Examination: Cardiovascular Effects

- Shock or hypotension due to:
  - Blood loss
  - Extravascular fluid loss
- Cardiac dysrhythmias
- ECG changes of hyperkalemia (see ECG later)
  - Peaked T waves (early)
  - Broadened QRS complexes, becoming sinusoidal when severe (most important indicator)
  - Tachycardia or complete heart block (late)

Examination: Renal Effects

- Renal dysfunction on lab tests
- Hyperkalemia, acidemia (venous blood gas - avoid arterial punctures)
- Urinary retention - insert IDC in all patients with neurotoxicity
- Reduced urine output (measure hourly)
- Note haematuria, haemoglobinuria, myoglobinuria (keep samples at head of the bed)
- Fluid retention - oedema, pulmonary oedema (CXR)

Examination: Myotoxicity

- Muscle compartment swelling, tenderness, possibly even compartment syndrome
- Myoglobinuria, secondary renal failure
- Raised CK, K^+

Investigations (1)

- Bedside:
  - blood tests:
    - 20WBCT
    - blood glucose
  - respiratory function tests:
    - incentive spirometer
    - PEFR meter
  - urinalysis:
    - care with IDC insertion!
    - visual inspection
    - dipstick testing
    - sun exposure
    - keep samples for comparison
  - ECG (see Lecture 11)

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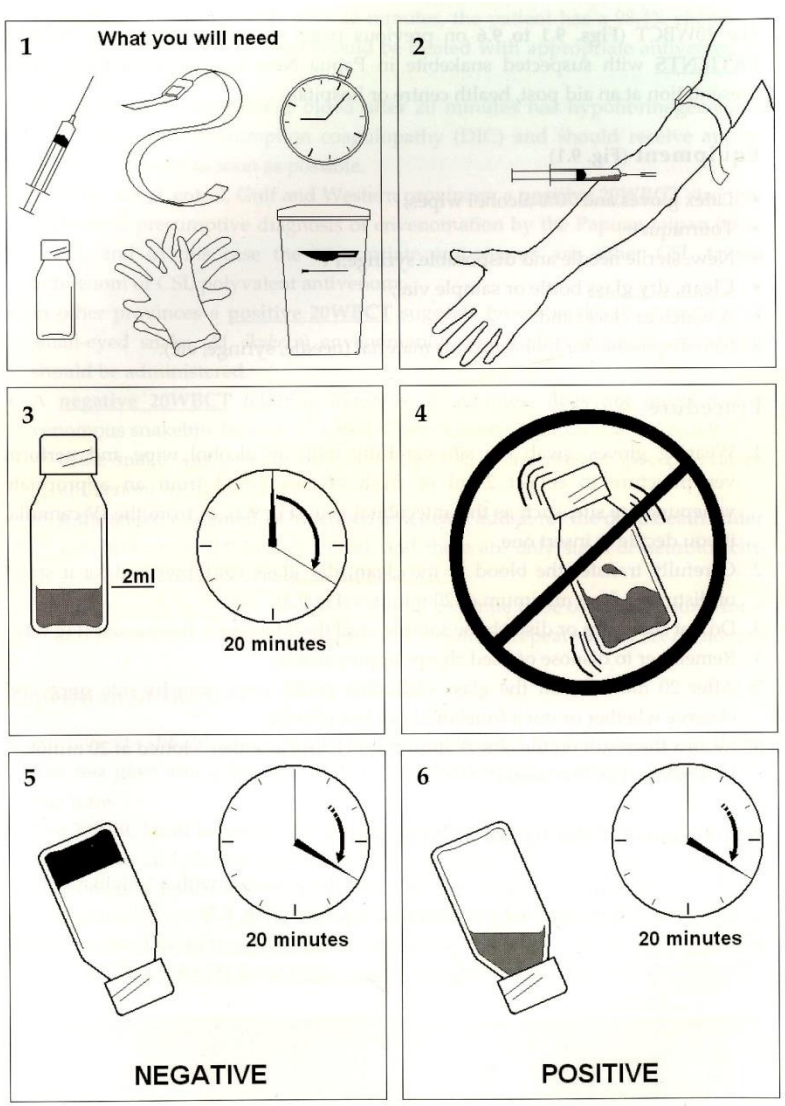
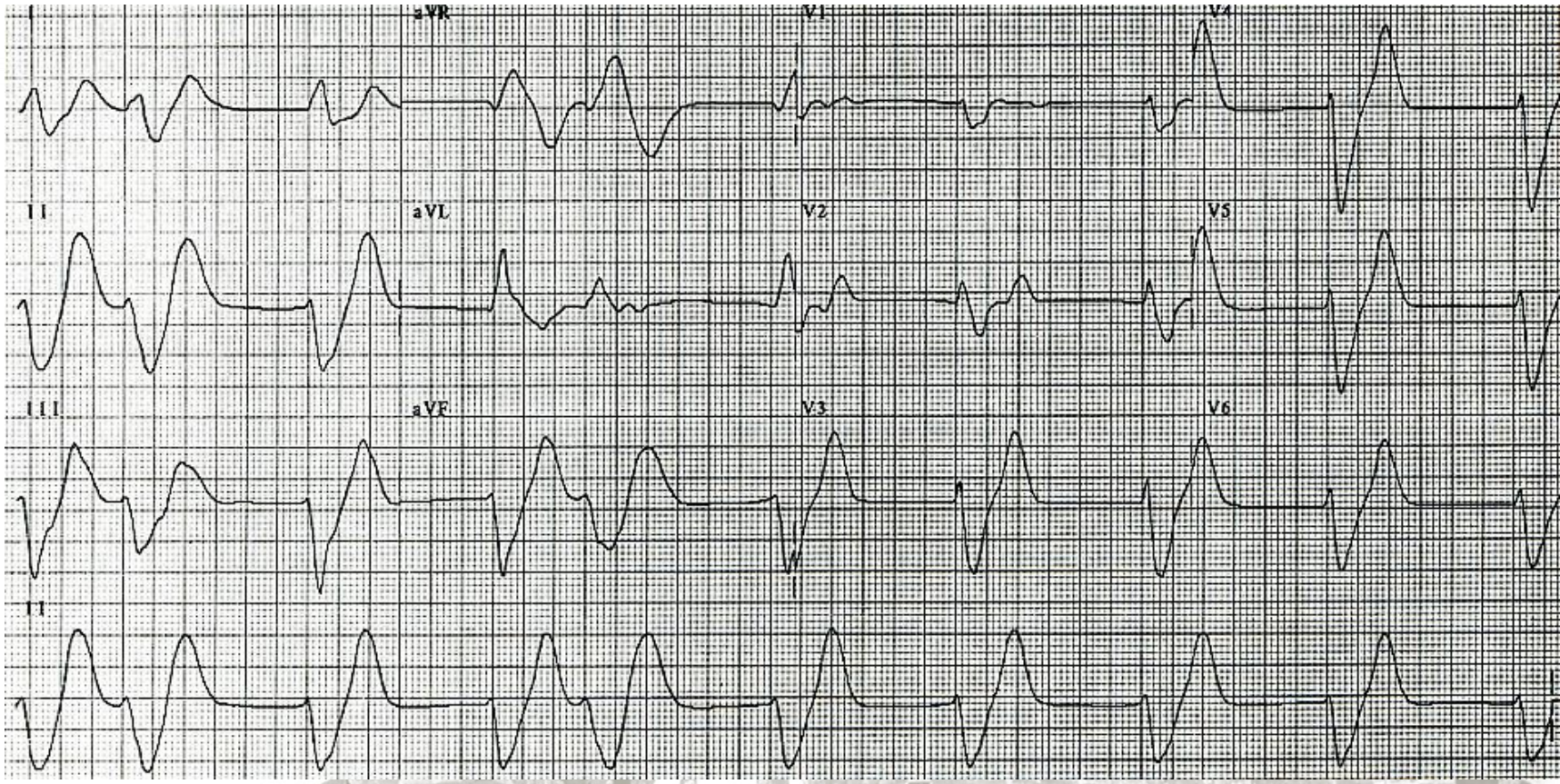
Haematuria

20-minute Whole Blood Clotting TEST - 20WBCT



Severe Hyperkalaemia



Investigations (2)

- Blood Collection:
  - gloves, needlestick precautions
  - procedure:
    - through IV site is best
    - 2ml in glass tube
    - the rest in usual blood tubes
  - serum & plasma separation
  - storage & transport of samples:
    - keep cool, out of the sun
  - interpretation of results:
    - beware of pre-existing anaemia, renal failure
    - if it doesn't make sense, repeat it!

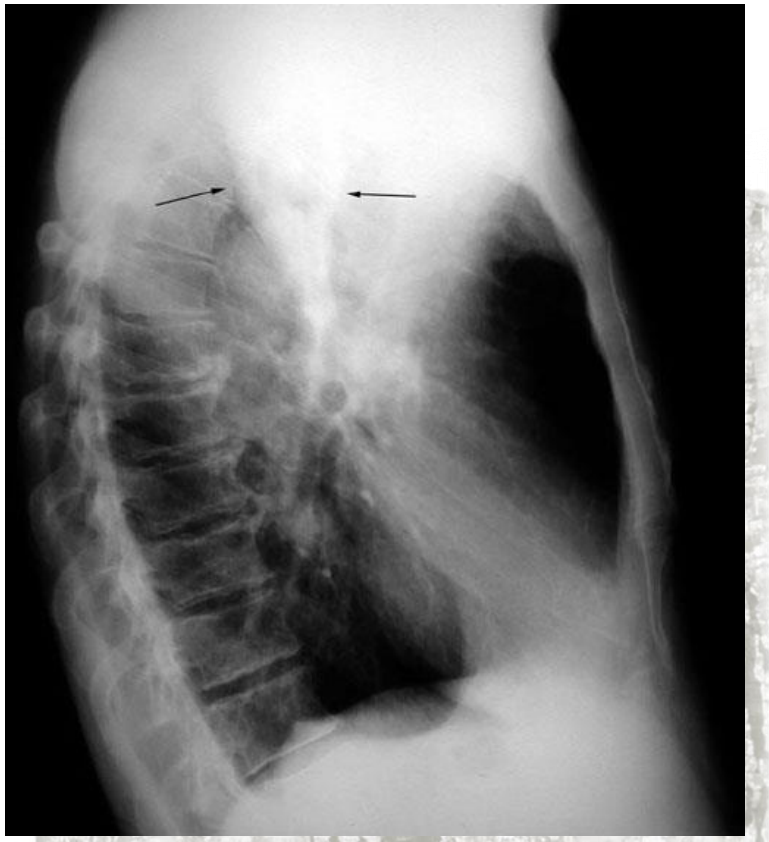
Investigations (3)

- Laboratory:
  - venous blood gas
  - FBC, especially platelet count
  - clotting studies - PT/INR, aPTT, fibrinogen, FDP
  - CK, LDH
  - renal function
  - liver function
  - group & hold
  - blood films for malaria
  - urinalysis (microscopic)
  - wound swab culture

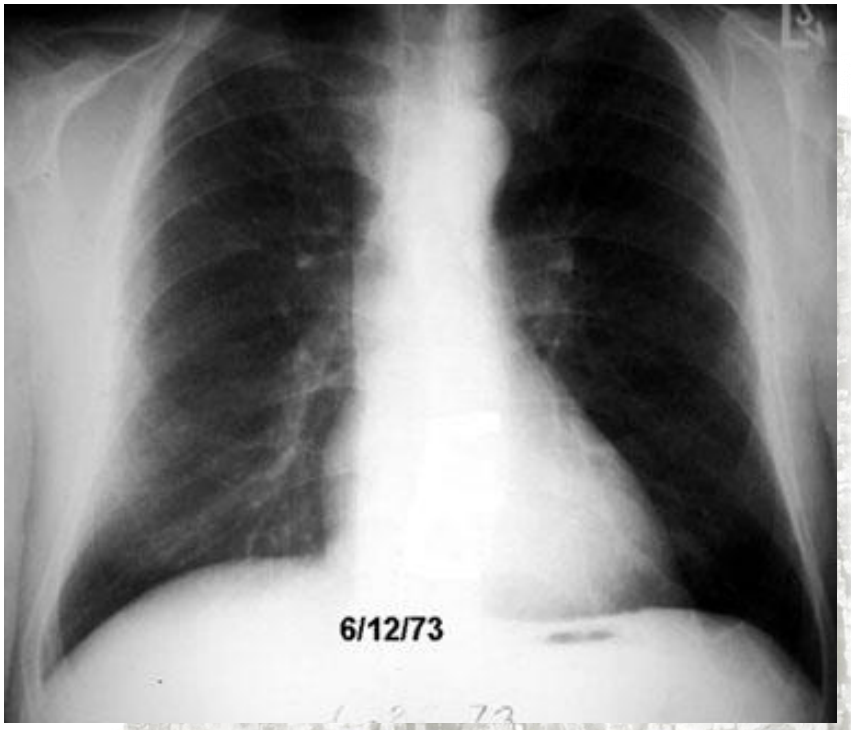
Investigations (4)

- Chest X-ray:
  - Who:
    - every patient with neurotoxicity
    - patients with abnormal respiratory findings
    - every intubated patient
  - Looking for:
    - ETT, OGT position
    - complications of intubation - pneumothorax, malposition
    - aspiration of blood, saliva, or vomit
    - pulmonary haemorrhage
    - pre-existing lung disease

Aspiration Pneumonia



Pulmonary Oedema



Before treatment

After treatment

Diagnostic Decisions

- Snake bite or other bite (stick bite!)
- Snake bite without or with envenomation
- Snake identification if possible
- Give appropriate polyvalent antivenom
- Complications of snake bite present?
- Other or concurrent diagnosis?

Snake Bite Grading Systems

- Developed because of the significant risks associated with impure, relatively ineffective & dilute antivenoms
- They encourage waiting & delaying definitive treatment
- By following them staff lose the opportunity to prevent deterioration, especially due to:
  - Neurotoxicity: irreversible in krait bites after 4hrs
  - Intracranial or other life-threatening bleeding: MPV
  - Serious local toxicity: RV, MPV, King cobra
- However, cytotoxicity/local injury grading **might** be useful for monitoring progress before & after antivenom

Differential Diagnosis

- Envenoming by another organism, e.g. wasps, spiders, scorpions or centipedes
- Infections (malaria, typhoid, other sepsis)
- Stroke
- Myocardial infarction (heart attack)
- Diabetic emergencies (hypoglycemia, hyperglycemia, diabetic ketoacidosis)
- Drug overdose (chloroquine)
- Closed head injury, intracranial bleeding (from other causes)

Summary: Key Points

- Every health care worker who sees snake bite patients must be familiar with the symptoms & signs of snake bite
- Assessment of the snake bite patient must occur **after** resuscitation, where needed
- Careful, thorough assessment is essential
- Assessment involves history-taking, examination, investigations (bedside, laboratory, X-ray)
- A Snake Bite Admission form is useful
- Diagnosis of the likely biting species is vital for an early decision about antivenom - make the diagnosis & treat promptly
- Reassessment & monitoring is critical (Lecture 7):
  - vital signs
  - a Snake Bite Observation sheet is very useful
  - for a minimum of 24 hours after any bite