Identification & Treatment of Shock

Lecture 11: Snake Bite Management Course

Introduction

- Define shock
- Effects of shock
- Signs of shock
- Cardiovascular measurements
- Causes of shock after snake bite
- Treatment of shock
- Monitoring the effectiveness of treatments

Shock - Definition

- “A state of generalised hypoperfusion of tissues.”
- In other words, the cells of end organs - the critical ones being the brain, heart and kidneys, also liver, bowel - are not receiving enough oxygen & fuels
- It is not a particular BP +/- HR
- It is not just loss of pulse in one limb
- Be careful to be **objective** about it
- We are able to monitor perfusion of brain, kidneys, skin
- Distinguish from psychological “shock”

Effects of Shock

- Can be viewed according to the effect on particular tissues:
  - Brain - confusion, agitation or coma
  - Heart - worsening hypotension, ischaemic changes on the ECG
  - Kidneys - falling urine output, acute renal failure
  - Liver - worsening liver function tests
  - Bowel - evidence of ischaemia, with pain, tenderness, even frank leakage of air & fluid leading to peritonitis
  - Skin - cool, pale, clammy, even cyanosis peripherally; later centrally also

Signs of Shock & Related Problems

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

Cardiovascular Measurements (1)

- HR - regular, irregular, slow-rising, hyperdynamic
- BP - can be measured in many different ways:
  - by palpation
  - by auscultation
  - by automated measuring device
  - by intra-arterial line
  - by inference from presence of certain pulses or from the pulse oximeter wave height
  - initially increased/widened pulse pressure, SBP-DBP
  - taken by palpation is of limited use, since the DBP & MAP are also very import
- Manual measurements will depend on:
  - Person taking the measurement
  - Size of cuff vs circumference of patient's arm
  - Limb being used
  - Posture of the patient during the measurement (sitting, lying, standing)
  - Age, sex, weight, body habitus of the patient

Cardiovascular Measurements (2)

- Capillary refill - in a non-bitten limb; normal <2s
- JVP - low in haemorrhagic shock
- ECG - shows rate, rhythm, signs of ischaemia or hyperkalemia
- Urine output - must always be measured hourly with an IDC if there is neurotoxicity, shock, acute renal failure, true coma

Causes of Shock after Snake Bite in Cambodia

- In a snake bite patient, shock can occur because of:
  - Severe hypoxia
  - Large blood loss, internal or external (RV, MPV)
  - Widespread oedema (loss of intravascular volume)(RV, MPV)
  - Direct cardiac effects?
  - Severe dehydration
  - Laying a patient in late pregnancy supine (compressing the inferior vena cava)
  - Anaphylaxis to antivenom or other drugs
  - Septic shock
  - Hyperkalemia in acute renal failure

Possible Haemorrhagic Shock

Treatment of Shock (1)

- Specific treatments
  - Assess for & treat **A**irway or **B**reathing problem
  - Obtain good, large-bore IV access, if not available
  - 20ml/kg crystalloid, saline or Ringer's, as fast as possible
    - eg. a 50kg person should be given 20x50=1000ml
    - eg. a 15kg child should be given 20x15=300ml
  - Repeat the vital signs frequently, eg. every 10 minutes
  - Give high flow oxygen (6-15l/min)
  - Repeat the infusion if the patient is still unstable
  - Give antivenom, if available
    - Consider whole blood replacement after 40ml/kg of crystalloid, if there is heavy bleeding & no antivenom is available (see Lecture 10)

Treatment of Shock (2)

- Specific Treatments
  - Treat obvious cause
    - If cause is antivenom reaction (adrenaline, promethazine, hydrocortisone)
    - If septic shock, give broad spectrum IV antibiotics
    - Treatment hyperkalemia (see next section)
  - Atropine 5-20mcg/kg for bradycardia
  - Consider dopamine (5-20mcg/kg/min)

Treatment of Shock (3)

- Intravenous access
  - Try to be successful as soon as possible
  - As large an IV cannula as possible
  - Ideally 2 lines
  - Use femoral, long saphenous or external jugular if necessary
  - Avoid causing another site of bleeding
  - Consider using ultrasound to find a vein
  - Intraosseus, especially in child, if no IV access in first few minutes

Monitoring Effect of Resuscitation

- Monitor vital signs frequently
- Monitor skin perfusion
- Monitor mental state
- Monitor urine output
  - If low, increase fluid to obtain minimum of
    - Adult - 0.5-1ml/kg/hr
    - Child - 1-2ml/kg/hr
  - Ensure IDC is functioning properly
  - Care if evidence of renal failure & pulmonary oedema
  - Aim for 1-2ml/kg/hr if rhabdomyolysis

Summary - Key Points

- A knowledge of the clinical features of shock is essential
- The first step in treatment of shock is to treat **A**irway & **B**reathing problems
- Then obtain large-bore IV access (consider interosseus in children)
- Start with IV crystalloid 20ml/kg
- Look for & treat cause of shock
- Monitor
  - vital signs, peripheral perfusion, mental state, urine output
  - effect of treatments