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Trauma Patient: Initial Assessment, Catheter Placement, and Stabilization

Eric Hilton
ehilton@utk.edu

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The Trauma Patient: Initial Assessment, Catheter Placement And Stabilization

Eric Hilton, BS, LVMT – ehilton@utk.edu

- Mantra Of Emergency Medicine – BE PREPARED! – Preparation is critical for the possibility of a positive outcome in an emergency situation
  - It is important to have “All hands on deck” in an emergent situation.
    - Many “activities” need to be occurring at once (i.e. – obtaining vitals, IV catheter placement, recording of vitals, etc)
  - Supplies to have in a central location (crash cart, catheter cart, etc) –
    - Selection of IV catheters, clippers, non-sterile gloves, scrub solution, alcohol, dry gauze, catheter/bandage tape, t-pieces, saline flush
    - Supplemental oxygen source – drop-down lines are preferred over portable anesthetic machines
      - Even after flushing (scavenging) the line, anesthetic “particles” remain in the system
    - Syringes and tubes for blood sample collection
      - If in house blood analysis is possible, collect enough blood for CBC, Chemistry, Electrolytes and Coagulation Panel
    - Doppler or Oscillometric blood pressure
      - Doppler is preferred method for small animals, especially cats
    - Selection of Crystalloid IV fluids
      - Sodium Chloride, Plasma-Lyte or Normasol-R, Lactated Ringers Solution
        - 500 ml bags for animals less than 10 kg, 1 Liter bags for animals greater than 10 kg
    - Endotracheal tubes and appropriately-sized laryngoscope
      - Will also need a tie to secure endotracheal tube in place as well as a syringe to inflate the cuff
    - Emergency drugs and syringes
      - Epinephrine, Atropine, etc

- Initial Assessment of the Patient
  - Signs that the patient needs to be triaged immediately and assessed by a doctor:
    - Bleeding profusely
    - Having trouble breathing
    - Laterally recumbent and/or minimally responsive
    - Seizing
    - Have any penetrating wounds in to chest or abdomen
    - Showing signs of poor tissue perfusion (Pale mucus membranes, prolonged capillary refill time, poor/weak pulses)
IV Catheter Selection and Placement
  o If possible, IV catheter should be placed in thoracic limb
  o Select the largest bore catheter and shortest catheter possible! (16- or 18-gauge in large breed dogs, 20-gauge in smaller dogs and cats). Shorter IV catheters will decrease resistance
  o Selecting a large-bore catheter allows for a larger amount of fluid to be administered quickly during fluid resuscitation.
  o Start as distal (low) as possible. If catheter placement is unsuccessful, placement can be pursued more proximally (higher up)

Quick Assessment Tests (QATs)
  o Packed Cell Volume (PCV)/Total Solids (TS)
    ▪ Useful in assessing signs of internal or excessive external hemorrhage as well as hydration status
    ▪ Normal PCV for dogs – 35-55%. Normal for cats – 25-45%
    ▪ Normal Total solids for dogs – 5.5-7.0. Normal for cats – 6.0-8.0
    ▪ NOTE – Assessing total solids is necessary to monitor for signs of blood loss. A patient can have a normal PCV with decreased total solids due to splenic contraction!
  o Blood Glucose
    ▪ Useful in assessing patient for signs of sepsis
    ▪ Normal BG for dogs – 70-120. Normal BG for cats – 70-140
  o Blood Lactate
    ▪ Useful in assessing patient for signs of poor tissue perfusion
    ▪ Normal Lactate for dogs - < 2.0
    ▪ Normal lactate for cats - < 1.7

Obtain the patient's **initial** vitals – Important to obtain **serial** vitals as well!!
  o Weight
    ▪ Obtaining an accurate weight is important for fluid calculations as well and drug calculations
      ▪ Shock dose of crystalloid fluids – 90 ml/kg.
      ▪ Administer ¼ shock dose of fluids and reassess vitals
  o Overall mentation – BAR, QAR, anxious, dull/obtunded, comatose?
  o Temperature – Important for assessing pain and warming/cooling strategy. If head trauma is present, thermoregulatory mechanism can also be affected (hypothalamus)
    ▪ Normal Dog – 100.0°F-102.5°F
    ▪ Normal Cat – 101.0°F-102.5°F
    ▪ Hypothermia can be corrected with external heat support such as warm water bottles, bear hugger, hot dog, warmed IV fluids, etc
      ▪ Discontinue active warming when temperature reaches 100.0°F
    ▪ Hyperthermia can be corrected with room temperature IV fluids, Running IV fluid line through cold water, wetting the patient, etc
      ▪ Discontinue active cooling when temperature reaches 103.0°F
Heart rate/Pulse Rate
- Normal Dog – 70-160. Normal Cat – 120-240
  - Does the heart rate match the pulse rate? If not, an electrocardiogram (ECG) may be beneficial.
  - Tachycardia can be indicative of hypotension, hyperthermia, hypoventilation (panting heavily) or pain
  - Bradycardia can be indicative of end stages of shock, CNS abnormalities (head trauma), electrolyte imbalances, etc

Pulse Quality
- Bounding pulses – Can be indicative of anemia, pain or fever
- Weak/Poor pulses – Can be indicative of shock
  - Hypovolemic shock – Severe fluid loss
  - Cardiogenic shock – Weakened heart is not able to pump enough blood
  - Cardiac Tamponade – fluid accumulation in the pericardial space
- Absent pulses
  - Shock or tamponade

Blood Pressure Monitoring
- Normal blood pressure – 120-140/80 MAP - 100
- Causes of hypotension – hypovolemia, decreased cardiac output, shock (hypovolemic, cardiogenic)
- Causes of hypertension – Anxiety or pain
- Oscillometric or Doppler blood pressure
- Oscillometric used for larger patients. Doppler used for small patients (especially cats)
- Measuring for proper cuff size
  - Cuff width should be one-half to 2/3 the circumference of the limb
- Should be obtained on thoracic limb due to closer proximity to the heart

Mucus Membrane Color
- Pale mucus membranes – can be indicative of poor tissue perfusion or anemia
- Red mucus membranes – Can be indicative of hyperthermia or sepsis

Capillary Refill Time (CRT)
- Prolonged (>2 sec) CRT can indicate poor tissue perfusion (hypothermia, hypovolemia, shock)
- Fast/Quick (<1 second) CRT – Can indicate hyperthermia or sepsis

Respiratory Rate and Effort
- Provide supplemental oxygen to trauma patients
- Causes of abnormal respiratory signs
• Poor cardiac output due to trauma, pulmonary contusions, pulmonary edema, pneumothorax, hemothorax, penetrating chest wounds, trauma to the respiratory center of the brain (medulla oblongata, Pons)
  ▪ Classify respiratory rate and respiratory effort
    • Dyspnea – Difficulty breathing
      o Can be due to obstructed airway, chest/lung trauma, pneumothorax (air in the pleural space)
    • Tachypnea – Rapid breathing
      o Can cause hypoventilation (poor gas exchange)
      o Can be due to pain, anxiety, hyperthermia, lung injury, anemia, hypovolemia
    • Bradypnea – Abnormally slow respiratory rate
      o Can be seen in respiratory decompensation or CNS trauma

❖ Pain Assessment and Management
  o Pain assessment and management are imperative for trauma cases
  o What works/is appropriate for one patient may not be for another patient
  o It is important to consider both short-term and long-term pain management
    ▪ Use of short-acting and longer-acting opioids – Fentanyl (half life of about 10 minutes) vs. Hydromorphone (half-life of >2 hours)
  o Pain management is an effective tool in patient assessment as pain can cause hyperthermia, tachycardia, hypertension, tachypnea, red/injected mucus membranes, fast CRT
  o Multimodal analgesia – Decreases the dose of the drugs while simultaneously increasing efficacy of the drugs
  o Try to avoid alpha-2 agonists (dexametomidine) and phenothiazines (acepromazine) due to their adverse cardiovascular effects (Severe bradycardia and vasodilation, respectively)
  o Be your patient’s advocate!
  o Pain management is essential for adequate patient care and will make obtaining further diagnostics less stressful on the patient as well as the staff