Trauma Assessment

CenCan Conference 2020

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Objectives

1) To describe the purpose of the primary survey of a trauma patient
2) To apply the information gained during the primary survey to help stabilize the patient
3) To select appropriate diagnostics to provide you with additional information quickly
4) To recognize the scoring systems used for trauma but also state their limitations

Trauma, whether blunt or penetrating, is something that occurs frequently in veterinary medicine, whether it is trauma due to another animal, a vehicle or due to animals doing bizarre things. Sometimes the traumatic injuries are minor and can be addressed quickly; other times the trauma can affect multiple body systems. Assessing these patients in a similar way each time will help you recognize life threatening injuries so they can be addressed first and the animal can be stabilized. There are also several scoring systems that can be used to track progress.

Primary survey

A primary survey is the initial exam that the doctor performs on the animal presenting for an emergency; this examines the patient for life threatening injuries that need to be addressed quickly. Although a blatant fracture or large wound may draw your attention, these are unlikely to pose a life-threatening concern to the patient (unless into a body cavity or if there is marked hemorrhage). This primary survey should take less than 2 minutes and includes an assessment of the patient's respiratory system (airway and breathing), cardiovascular system, nervous system abdomen assessment and other (major hemorrhage).

Respiratory system

During the assessment of the respiratory system you should ensure that the patient has a patent airway. Trauma can sometimes cause a lot of swelling or could damage the larynx or trachea which could lead to an obstruction. When there is an upper airway obstruction you typically see increased inspiratory effort and there is often a noise to the respiration (stridor or stertor pending location). You should also evaluate the respiratory rate and the effort. Trauma can lead to a lot of damage within the thorax including a pneumothorax or hemothorax, rib fractures, contusions and a diaphragmatic hernia. When auscultating the thorax close attention should be made to lung sounds; ensure that these are present and that they can be heard on both sides equally.

Some initial diagnostics may include a thoracic focused assessment sonographically for trauma (TFAST) or an SPO_2 of the patient (note: if a patient is cyanotic, they have an SPO_2 <67% or a PaO2 <40 mmHg). If concerns for respiration, oxygen should be provided until proven otherwise. This can be done with flow-by or the use of a mask, an oxygen cage or nasal cannula or catheter (note do not put anything in the nostrils if concerned for a traumatic brain injury because sneezing will increase the intracranial pressure). The use of pain medications and sometimes sedatives and oxygen therapy if concerns for hypoxemia, may assist patients suffering from damage to their respiratory system.

Cardiovascular system

When evaluating the cardiovascular system, you should be assessing the patient for concerns of poor perfusion or cardiovascular collapse. In addition to auscultating for heart rate and rhythm, you should also be palpating the pulse at the same time to evaluate for pulse quality and for pulse deficits. You should be feeling the peripheral limbs for temperature and evaluating mucous membrane colour and capillary refill time.

Some other diagnostics may include an ECG or a blood pressure measurement. Treatment therapies may include a ¼ shock bolus of fluids if concerned for hypovolemic shock. (Total shock bolus in dogs = 90 ml/kg, total shock bolus in cats = 60 ml/kg.) After giving a bolus, always reassess (heart rate, blood pressure, MM, mentation etc) before giving an additional bolus. Antiarrhythmics or the use of vasopressors can be considered.

Nervous system

The nervous system can be a difficult system to assess with trauma as there are multiple factors that could be affecting it including primary trauma to the nervous system, shock and pain. However, it is important to have a baseline so that you can monitor trends. This includes documenting their mentation, taking note of their cranial nerve exam (in particular pupil symmetry and pupillary light reflex), as well as their spinal reflexes, spinal pain and if they are ambulatory. If there is any concern of a spinal fracture due to spinal pain, spinal deformities on palpation or changes in spinal reflexes, the animal should have radiographs performed before they are manipulated further.

If there are concerns for traumatic brain injury, be sure to measure heart rate and blood pressure to assess for Cushing's reflex. The Cushing's reflex is characterized by an increased blood pressure and a low heart rate. If this is noted with a change in mentation, you should consider giving an osmotic agent to try to remove fluid from the brain tissue and decrease intracranial pressure. You could consider mannitol (0.5-1 gm/kg given over 20 minutes with a filter) or hypertonic saline 7.2% (3-5 ml/kg over 5-10 minutes). The patient should be reassessed for improvement after it is given but it may take 30 min-1 hour to see changes. Additional treatment should include elevating the head by 15-30^{o}, no pressure on the jugulars veins, rotate sides, hygiene management (consider a U-catheter if not moving), lubricating eyes, antibiotics (ex. If bite wounds present), pain management (start with lower doses), anti-convulsant (see below), and frequent neurologic assessments (q 4-6 hours or more frequently).

I do not start anti-seizure medications unless the patient has a seizure. If the patient has a seizure, I will start them on phenobarbital (unless comorbidities such as liver disease, note in US where IV Keppra was more available that was my first choice). If I decide to load them on phenobarbital, I will give 4 mg/kg q 4 hours for 4 doses IV or orally (IV preferred). This will affect their mentation assessment (they will get sedate). If they get very sedate, I will spread out the doses. If controlled after 6 months you could consider tapering them off anti-convulsants.

Abdomen

A quick abdominal palpation should be performed to assess for pain, distention and a fluid wave. With trauma, abdominal trauma could include splenic or liver damage leading to a hemoabdomen, bladder rupture and less likely rupture of the GI tract. All trauma patients should have an AFAST performed to look for free fluid. If free fluid is seen and there is a large enough pocket to aspirate it should be. The fluid should then be tested with a PCV/TP, cytology for bacteria and possibly a potassium level and creatinine level to rule out a uroabdomen. If there is not enough fluid to be aspirated, the volume of fluid should be rechecked in 2-4 hours.

Scoring systems for trauma

There is one scoring system that has been developed in animals for overall trauma assessment and for survival prediction which is the Animal Trauma Triage Score(ATT). This evaluates 6 categories that are assessed during your physical exam including perfusion, cardiac, respiratory, eye/muscle/integument, skeletal, and neurological. A low number is associated with fewer injuries. An ATT > 5 has been associated with decreased survival.

There is one scoring system that has been developed for head trauma which is the Modified Glasgow Coma Scale. The MGCS uses motor activity, brainstem reflexes and level of consciousness to assess the patients. Unlike the ATT, a high score is associated with better outcomes. In one study a MGCS <11 was associated with non-survival.

Although these scoring systems can be helpful, it is important to note that there are limitations with these scoring systems. Caution must be used when applying a score to an individual patient and for them to be used for owner decisions. Both charts can be found online if you are interested in using them in your practice.

References

1. Reineke, E L. (2019). Trauma Overview. In K.J. Drobatz et al. (Ed.), *Textbook of Small Animal Emergency Medicine (pp. 1041-1051)*. Hoboken NJ: John Wiley and son.
2. Rockar RA, Drobatz KS. Development of a scoring system for the veterinary trauma patient. J Vet Emerg Crit Care 1994;4(2):77–82.
3. Platt SR, Radaelli T, McDonnell JJ. The prognostic value of the modified Glasgow coma scale in head trauma in dogs. J Vet Intern Med 2001;15:581–584.
4. Sharma D, Holowaychuk MK. Retrospective evaluation of prognostic indicators in dogs with head trauma: 72 cases (January–March 2011). J Vet Emerg Crit Care 2015;25(5):631–639.