Anesthesia & Pain Management for the Critical Patient

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The role of veterinary technicians in developing an anesthetic and analgesic protocol for critical patients is a complex task. The veterinary technician must work together with the clinician and other team members to ensure that the critical patient is properly evaluated and cared for. Before administration of any anesthetic and analgesic agents, each patient must have a physical exam. This is exam should include (but is not limited to) a chest auscultation to assess cardiovascular and respiratory function, an ECG, temperature, blood pressure, femoral pulse evaluation, and pulse oximetry readings. In some cases it is also important to obtain lab values such as a PCV/TS, blood glucose, electrolyte panel, creatinine level, and blood gases. Once the clinician develops a clearer picture of overall patient status, they can assign an ASA rating, and an anesthetic and analgesic protocol can be administered. Proper protocols will change with each patient and the type of surgery or treatment needed as well as perceived pain. It is important to note that if a patient is thought to be in pain, analgesics should NOT be withheld. This lecture will discuss four common critical patients that are often in need of anesthesia and analgesia.

1. The Urethral Obstruction Patient:

Cats with urethral obstruction often present in pain and distress. They often require immediate and rapid urethral catheterization. Treatment should begin with assessing the patients’ electrolyte and hydration status and checking for any arrhythmias. Hyperkalemia is a common finding in urethral obstruction patients. This can lead to ECG changes such as a wide QRS complex and absent or flat P waves. Often the T wave is peaked or tented. (Fossum, 2007) Hyperkalemia and acidosis may require additional drug therapies such as calcium gluconate, insulin given with a concurrent dextrose drip, sodium bicarbonate (Perkowski, 2000). Although calcium gluconate does not alter potassium values, it does stabilize cell membranes, allowing time to reduce the potassium levels and minimize the cardio toxic effects of hyperkalemia. (Cummings, 2014)

An IV catheter should be placed in all critical patients, especially the urethral obstruction patient. Cats will often need analgesics as well as sedation for placement of urinary catheter. Analgesia can be achieved with buprenorphine or hydromorphone. Propofol may be used as an induction agent prior to general anesthesia. Also, if the patient is in the early stages of the disease ketamine can be used in conjunction with diazepam for induction of general anesthesia. If the patient arrives laterally recumbent or critically ill,
they may not require chemical restraint. In these patients, urethral catheterization can often be achieved with an opioid analgesic combined with a saccrococcygeal block using bupivacaine. (Campoy, 2013)

Post urethral obstruction, the patient must be monitored closely for hydration status, electrolyte imbalance, and analgesic therapy. In cats without evidence of chronic or acute kidney disease, NSAIDs can be administered to provide analgesia and decrease urethral inflammation. In cases where an NSAID is contraindicated, the clinician may use a therapeutic laser to help reduce the inflammation present post catheterization.

2. Gastric Dilatation Volvulus (GDV)

GDV is characterized by stomach distention and a clockwise rotation. This condition is considered a surgical emergency. Patients presenting with GDV are often large breed canines with deep chests. Presenting problems include restlessness, abdominal pain, unproductive vomiting, dyspnea, and distention of the abdomen. Because most GDV patients present in some form of cardiogenic shock, it is important that all team members be on hand as multiple events need to be synchronized to ensure maximum patient comfort and survival. The dilated stomach obstructs blood flow through the caudal vena cava, while the increase in gastric pressure decreases blood flow through the portal vein. (Benett, 2010) Initial treatment after physical examination will include IV fluid therapy via either a jugular catheter or large bore catheters in each cephalic vein. Gastric decompression by trocarization is recommended to improve ventilation before general anesthesia is initiated. (Bennett, 2010) Pre-medication as well as analgesia may be achieved with an opioid such as fentanyl, oxymorphone or hydromorphone. In animals that present as very ill, opioid doses can be reduced. Anesthesia can be induced using an opioid and benzodiazepine such as midazolam. Alternatively, etomidate combined with a benzodiazepine can be used. These combinations have very minimal impact on the cardiovascular system as opposed to other induction medications like propofol. Intra operatively inhalant anesthesia can be kept to a minimum by using a constant rate infusion (CRI) of fentanyl/lidocaine/ketamine. This combination will not only provide multimodal analgesia but also lidocaine has the added benefit of being an anti-arrhythmic should ventricular arrhythmias develop. The FLK CRI can be continued in the post-operative period to maintain a steady state of analgesia. Post-operatively, the patient can be transitioned to IV buprenorphine at the clinician’s discretion.

3. Hemoabdomen/Splenectomy

The hemoabdomen patient often presents with signs of hypovolemic shock (pale mucous membranes, rapid heart rate, weak or “thread” pulses, etc.). Often this can be secondary to neoplasia (or a ruptured splenic mass. Before proceeding with the splenectomy patient, attempts should be made to restore the patients’ tissue perfusion...
and oxygen delivery before general anesthesia. Hypovolemic patients often have simultaneous RBC and protein loss so colloids and other blood products are often needed preoperatively. (Cummings, 2014)

Hemoabdomen patients proceeding to surgery can be treated similar to the GDV patient. Pre-operatively an opioid will provide analgesia. Induction can be achieved with an opioid and benzodiazepine combination. The patient should also receive concurrent pre-administration of oxygen via facemask or nasal catheter. Etomidate can also be used for induction combined with a benzodiazepine. Agents such as thiopental or propofol are not recommended due to their common side effect of vasodilation.

Again as with GDV patients, a FLK CRI can be a useful adjunct to minimize inhalant anesthesia. The FLK CRI can be continued in the post-operative period to maintain a steady state of analgesia.

4. Dystocia

The patient presenting with dystocia and requiring caesarian section (CS) must be handled very carefully to ensure the safety of the dam as well as fetuses. In CS patients anesthetic requirements are often reduced because of increased progesterone levels. There is also a reduced functional residual capacity of the lungs due to the pressure of the intra-abdominal volume of the fetuses. Patients that are not overly anxious or stressed should have an IV catheter placed, abdominal shaving and pre-oxygenation before drugs are administered.

If selecting an opioid for pre-medication a mixed agonist/antagonist such as butorphanol may be preferred to minimize fetal respiratory and CNS depression. (Norkus, 2010) A longer acting pure-mu opioid can be administered upon fetus removal to provide analgesia to the mother. Induction can be achieved using a low dose benzodiazepine (<0.15mg/kg) followed by propofol or etomidate. (Norkus, 2010) Alfaxalone, has become the induction agent of choice for caesarian patients, although it is important to keep in mind Alfaxalone is not an analgesic. Mask induction is not recommended due to the side effects and exposure to the staff.

If staff are so trained, an opioid/local anesthetic epidural can be a very effective analgesic tool that can dramatically reduce the need for inhalant anesthetics.

5. Trauma

Anesthesia and pain management of the trauma patient can be most challenging to the veterinary staff. Many body systems can be affected and concurrent and multimodal therapies are often needed. For the trauma patient, anesthesia should not be initiated until vital organ function has been stabilized. The trauma patient must have a patent
The clinician should ensure that circulating blood volume is maintained in order to provide tissue perfusion and oxygen delivery to vital organs. (Wadell, 2010)

The goal with pre-medicating trauma patients is to provide analgesia as well as reduce the overall amount of induction agent needed. Agents that are reversible (opioids & benzodiazepines) are preferred to agents that are not reversible (acepromazine, ketamine). An opioid analgesic such as fentanyl is an attractive option in the trauma patient as it is rapidly cleared from the body very quickly, which can help facilitate a neurologic examination. During induction patients should be pre-oxygenated. Induction can be achieved using an opioid/benzodiazepine combination. In some cases this may not be enough to intubate and a small amount of propofol is necessary to facilitate intubation. In cases where increased intra cranial or intra ocular pressure is not a concern a ketamine/diazepam induction may be an attractive choice as it allows rapid intubation and will provide some analgesia.

Post-operatively trauma patients must have vigilant nursing care constantly assessing their cardiovascular, respiratory, and pain level. Multimodal CRIs provide constant analgesia without the “peaks and valleys” effect seen with some intermittent dosing of analgesics.

Implementing a pain scoring system can help your clinic effectively titrate analgesics to fit your patients’ needs. The University of Colorado offers a species specific color chart available for download. These handouts can be placed in recovery and treatment areas to help train technicians and staff to recognize various pain behaviors.

http://www.csuanimalcancercenter.org/assets/files/csua_acute_pain_scale_canine.pdf

Working together the veterinary team can implement an anesthesia and pain management protocol to help ensure the comfort and safety of any patient walking through your doors.

References:


Cummings, K. & Wetmore, L. Top 5 Emergencies Requiring Anesthesia Clinicians Brief, March 2014


