

DISASTER MANAGEMENT: COLLAPSED PET

Elizabeth Rozanski, DVM, DACVECC, DACVIM (SA-IM)

Tufts University, North Grafton, MA

Emergency medicine is an exciting and rewarding area of medicine. Clinicians and technicians need to be experts in almost everything. This aspect of ER can be overwhelming at times! The focus of this talk is to provide ER staff with first a standard approach to ER medicine than can be beneficial to patient care and to limiting stresses, and also to review some secrets that surround some cases.

Clinic type

Emergency clinics and hospitals tend to divide into the equivalent of “urgent care” clinics and Emergency room in human medicine, with the urgent care clinics primarily providing supportive care and immediate stabilization, with the ERs providing more definitive work-up and stabilization, often in conjunction with 24-hour hospital. Both types of clinics are valuable; but determining what your facilities’ primary goal is essential for client and referring veterinarian satisfaction. Job satisfaction for technicians often revolves around a high level of patient care, challenging technical case, and opportunities to learn and grow.

Technicians/Staffing

Adequate staffing is essential to busy emergency clinics. Exhausted staff is not good for patient care, client service or morale. In efficient practices, there should be 2-4 technicians and non-technical staff per clinician, and individuals should be cross trained in a variety of areas. More than in almost any other specialty, specially trained technicians are vital to the success of any emergency practice. It is more important to put money into paying the best trained technicians you can, than to buy expensive equipment that may sit unused much of the time. As with most relationships, the most successes will surround teams that are some comfortable together that they can “read each others minds” as to the next step in patient care. Thus, as much as possible, try to develop team relationships that help to foster the “partner in crime” mentality and to pair up those people who naturally tend to work together. Specific training modules and protocols are useful to maximize patient care. Technicians should be empowered to make as many decisions as possible, and given clear guidelines for approach to catheter replacement, anticonvulsant or dextrose therapy and the like.

IV catheters

Rapid and accurate placement of IV catheters is critical to success. ER staff should learn cut-downs for rapid intravascular access in collapsed or arrested pets. Baring the need to perform cut-down, other techniques that are often helpful is vein choice and catheter size. The jugular vein is the largest vein in the body, and often easily accessed; however, in animals with uncontrolled coagulopathy or thick or furry necks, may be more challenging for urgent placement. The modified Selinger technique is useful for placement of long-term catheters. In dogs in lateral recumbency, the DOWN distal branch of the cephalic is often the easiest to access. In cats, the medial femoral is often easy to access; although the vessel is often quite superficial and may “blow” easily. The largest catheter than can be realistically placed should be chosen. A 24 gauge catheter is only appropriate in young kittens and small breed puppies. Care should also be taken not to tape the catheter in such a fashion as require a needle going through cap, or preventing the cap from being easily traded. In critical settings, the most likely to be successful individual should place the first IV, however, newer team members should encouraged to place 2nd and 3rd IV in order to improve their skill sets.

Major body systems

The major body systems are the heart, brain and lungs. Emergency medicine is centered on ensuring stability of these systems. The clinician is encouraged to pick the system that is most abnormal, and work to help stabilize that. All deaths result from a failure of one or more of the major body systems, even those such as kidney failure

that initially affect a non-major body system. Evaluate the MBS for stability by establishing a triage protocol that assesses these systems at first arrival to the hospital, and then many times a day during treatment times.

The heart: the heart rate should be normal; tachycardia may be a marker of hypovolemia or decreased perfusion. All increases in heart rate should be considered a solid clue as to the potential for brewing trouble. Tachycardia may have other causes, such as anxiety or pain; however, it is ESSENTIAL that hypoperfusion be excluded before full doses potent or non-reversible analgesics are administered. Arrhythmia may result from cardiac disease, but it is wise to recall that ventricular ectopy is commonly associated with intra-abdominal (specifically spleen) abnormalities such as splenic masses with hemoabdomen. Bradycardia may be associated with high vagal tone, intracranial disease or hyperkalemia. Animals (particularly dogs) with weakness associated with vomiting should be placed upon continuous EKG monitoring, and efforts to prevent vomiting (eg. Cerenia) should be used, and atropine should be kept near the case, and commonly drawn up in order to be readily available in cases of arrest or severe bradycardia. Intracranial disease may be associated with bradycardia. This is most important in those cases where severe head injury or evidence of other intracranial disease is present, and individuals may be mistakenly lulled into a sense of security due to the “normal” heart rate. In animals with increased intracranial pressure, the blood pressure is often markedly increased and should be measured. In general, blood pressure is not part of the initial part stabilization or re-assessment, as in companion animals, blood pressure is classically maintained until the “bitter end”. Bradycardia may also been associated with hyperkalemia from renal or post-renal etiologies. Bradycardia may also be a sign of cardiac conduction abnormalities, such as 3rd degree AV block or sick sinus syndrome; affected dogs may present to the emergency service with syncope or suspected seizures.

The brain: The patient should be alert and oriented to the hospital. Hospitalized patients should be easily rousable and respond appropriately to environmental stimuli. New paralysis or weakness should be promptly addressed. Paralysis associated with IVDD is rarely life-threatening (myelomalacia being the one exception), but the loss of deep pain sensation may be more likely associated with euthanasia, and thus animals with ANY neurological impairment (paresis) should be promptly referred to a facility with decompressive capability. Seizures should be controlled, and consideration should be given to either mannitol or steroids for those patients with suspected intracranial mass lesions (eg. the dull older Labrador with new onset status). Cats with seizures may often be harder to detect to the new clinician or technician than dogs. Cats may have focal seizures (often affecting the ears) and the only outward sign of seizures may be hyperthermia.

The lungs: Respiratory distress of any source is associated with increased mortality. Patients should be treated with caution, but rapidly assessed as to the source. Loud breathing is typically upper airway in origin, with typical examples including laryngeal paralysis or brachycephalic airway syndrome. Long expiration and/or wheezing is commonly associated with bronchial disease, while short or shallow breathing is likely to represent pleural space disease. Upper airway obstructions may respond to cooling (if warranted) and sedation, but the clinician should be prepared to sedate and intubate affected animals in a timely fashion. Suspected lower airway disease often benefits from steroids, although secondary infections may also occur. Animals with pleural space disease should have thoracocentesis performed in a timely fashion, with samples saved for cytological and culture (as warranted). Animals with parenchymal disease should be assessed to determine if the cause is cardiogenic, non-cardiogenic, infectious, allergic or neoplastic.

If the stability of the major body systems is established, the next step is to determine if the patient is ‘sick or not sick’, and if sick, are they “sick enough to stay in the hospital”. Further diagnostics and therapy should be directed at steps to determine what the underlying disease is, and steps to make the pet feel better. The extent of the diagnostic tests may be determined on some level by the type of E-clinic, but no severe disease or injury should be left untreated until the primary care veterinarian is available.

Secrets

Things you can do with a glucometer

- 1) Measure glucose of effusions. The glucose level of abdominal effusions associated with septic processes is typically at least 20 mg/dl lower than the blood. This is a very useful ancillary test to cytological interpretation, but should not replace cytology. In our practice, following collection of fluid with abdominocentesis, a drop is promptly placed on a glucometer, and an anticoagulated (heparin or EDTA)

sample is spun for a dif-quick cytology evaluation. In most animals with intra-abdominal sepsis, the abdominal glucose is actually “lo” and this finding should prompt a more enthusiastic search for intracellular bacteria. The glucose content of thoracic effusion has been less helpful and the incidence of septic pericarditis is so rare it had precluded any evaluation. In one, unpublished in-house assessment of joint effusions, the glucose of septic joints was often “lo” as well. The mechanism behind the hypoglycemia is unclear, but may be either consumption by bacteria or increased white blood cells.

- 2) Evaluate suspected thromboembolism. The blood glucose value in a vein draining a muscle bed that has had limited blood flow will be lower than those of normally perfused limbs. In most cases, the diagnosis of thromboembolism is fairly straightforward, but this test may be useful in animals with unclear signs, such as dogs, or cats with a right front limb thrombus.

Getting the most of the PCV/TS

In-house determination of packed cell volume and total solids is available in all emergency facilities. One of the most important steps to recall is that in cases of acute blood loss, particularly in dogs, the total solids will be disproportionately low compared with the PCV. All dogs with a total solids of ≤ 6.0 gm/dl without a known underlying cause should be rechecked frequently, including reassessing the major body systems and rechecking a PCV/TS in order to catch significant hemorrhage before it may progress to life-threatening.

Getting a film of a respiratory distress cat

Remember, in cats with respiratory distress, your goal is to sort out does the kitty have pleural effusion, a giant heart, a mass or infiltrates. Cats are often easier to radiograph in several trips. For the cat that is pretty short of breath, a DV film will actually be quite helpful with minimal cat stress/anger. Using a table top technique, set the cat on top of the cassette. Poke at him a bit until sort of straight, then shoot the image. Clearly, diagnostic quality films should be repeated at as soon as the cat’s stability dictates, but it more important to have a live cat, than perfect films. Additionally, the mantra “he was too stressed for films” is really only okay for 15 minutes or so, as if there is large volume pleural effusion or other lesion, the sooner is sorted out , the better. T-FAST Scans are helpful if ultrasound is readily available.

Unblocking male dogs with urethral calculi

A polypropylene or other stiff catheter will be much more likely to be successfully passed than a red rubber or other catheter. We typically will try for < 5 minutes with mild sedation, then if unsuccessful, rapidly move onto general anesthesia, trying to include a diazepam (or midazolam) into the protocol. Retropulsion of stones is often more successful with transrectal occlusion of the urethra and copious flushing. Remember that the post-cystotomy radiograph is required for assurance that all stones have been removed.

Sneaky diseases

- 1) Rolled over in driveway- this injury commonly affects older animals with limited mobility. They are typically sleeping behind the car, and are then backed over. These injuries often have high emotional stakes. Additionally, due to the slower speed during a roll-over, there is a greater likelihood of a ruptured bladder or diaphragmatic hernia, as the intrabdominal or intravesical pressures may rapidly exceed the point of rupture. Repair is certainly warranted, but long recovery times may be anticipated and early physical therapy may be very useful.
- 2) Urosepsis after recurrent urinary obstruction in cats. Cats with urethral obstruction typically have sterile urine and antibiotic therapy is contraindicated. Bacteria is commonly introduced to the bladder during the un-obstruction processes. This bacteria is promptly flushed out after restoring urethral patency. However, in those cats that immediately or within a short order re-obstruct there is high possibility of urosepsis, and in these cats, infection should be sought and treated empirically.
- 3) Pericardial effusion is a very common cause of collapse in large breed dogs. Importantly, intermittent vomiting often precedes collapse or weakness. Pericardial effusion may be appreciated in almost all cases by careful physical examination, which will document muffled heart sounds, pulsus paradoxus, and

jugular vein distension. If possible, ultrasonography is ideal to confirm effusion, but effusion is typically visible of survey films as well.

- 4) Iatrogenic pneumothorax is relatively common in cats and to a lesser extent dogs with chronic effusions. In traumatic pneumothorax, it is [almost] impossible to further injure the lung by thoracocentesis. However, due to the thickening of the pleura that occurs secondarily to chronic effusion, any slight tear into the lung will not seal quickly and significant volumes of air may be lost.
- 5) Recurrent foreign bodies are common. The dog that has had a surgical abdomen in the past appears to be at much higher risk for development of another foreign body. It is not clear that adhesions are responsible for this, but it is prudent to treat previously obstructed dogs as if they have another obstruction, rather than giving them the benefit of doubt.