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RECOGNIZING SHOCK

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Experienced veterinarians quickly recognize when an animal looks really ill. We sometimes use the glib acronym of ADR for “ain’t doin’ right”, but it is more appropriate to investigate and characterize just HOW ill that patient is. The term “shock” is often loosely used, but it has a specific meaning: delivery of oxygen insufficient to meet tissue demands. If tissues are not supplied with adequate oxygen, they are forced into anaerobic metabolism to generate energy. Anaerobic metabolism is inefficient and ultimately insufficient to sustain cell function. If the inadequate oxygen supply situation persists, the cells begin to fail and die, leading to persistent organ damage even if the oxygen delivery problem is later corrected. Experienced veterinarians know intuitively, and it has been shown in study after study, that morbidity and mortality rise quickly as the shock state persists. Early recognition of shock then, becomes essential. As critical care specialists, monitoring for and treating shock is fundamental to delivery of care to extremely ill patients.

Causes of shock are numerous. Most causes relate to a problem with the cardiovascular system, resulting in poor perfusion of tissues. Shock can be caused by primary cardiac failure: usually patients with this type of shock also have some degree of pulmonary edema, compounding the problem. Not only do they have poor cardiac output, the blood they are able to circulate is poorly oxygenated. These patients usually have a heart murmur and often have a history of heart disease. They appear dyspneic, have low SpO₂, hypotension and tachycardia. Less commonly, shock is caused by an arrhythmia, either a bradyarrhythmia (e.g. sick sinus syndrome) or a tachyarrhythmia (e.g. atrial fibrillation, supraventricular tachycardia), that results in poor cardiac output. Occasionally, shock is caused by pericardial tamponade. A typical clinical scenario is a large-breed, middle-aged to older dog with acute collapse, weakness, tachycardia and thready pulses. Clinical suspicion can now be quickly confirmed with the aid of a portable ultrasound unit.

More commonly, shock is caused by inadequate blood volume. Severe fluid losses can be caused by acute gastroenteritis, diabetes mellitus, renal failure, Addison's disease or other illnesses that deplete plasma volume. Hemorrhage, obviously, can also result in a rapid drop in blood volume, compromising perfusion.

Any illness causing “vasoplegia” can also cause shock. The immune response to severe infection or inflammation results in a cascade of complex interactions on the vascular system, often resulting in dysregulation of the peripheral circulation, with the resultant outcome being inappropriate distribution of blood within the body.

A common error is failure to recognize shock in an ill patient. The longer an animal is shocky, the worse the ultimate outcome, so early recognition and treatment can improve prognosis tremendously. Key exam findings are helpful. Dull mentation, pallor, tachycardia (cats often become bradycardic) and cool peripheries (feel the feet!) are hallmarks of advanced stages of shock. A quiet, ill dog lying in a kennel with a heart rate over 120 is usually not stable cardiovascularly. Patients with septic shock may have brick-red mucous membranes and warm peripheries. Measurement of blood pressure in ill patients is essential. Patients with a mean arterial pressure of 65 mm Hg or less or systolic blood pressure less than 90 mm Hg require immediate attention. Maintenance of normal blood pressure is a high priority physiologically: an animal with hypotension has reached the limit of its compensatory ability and has no further reserve. Blood lactate can also be a useful indicator, rising above normal as shock becomes severe. Venous blood-gases may show metabolic acidosis.

Treatment of shock hinges on addressing the underlying cause. Unless shock is cardiogenic, fluid therapy to improve circulating blood volume is usually a cornerstone of therapy. Corticosteroids are contraindicated in the treatment of shock, unless it is caused by an Addisonian crisis or anaphylaxis.

The most important role of the referring veterinarian in the treatment of shock is to recognize it. Initiating therapy quickly while undertaking transfer to an emergency facility with the means to provide intensive care until the animal is stabilized will result in the best outcome for your patients. A complete physical exam, with ancillary measurement of blood pressure, a lead II ECG trace and possibly lactate will help you recognize a shocky patient and offer timely, excellent care.

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