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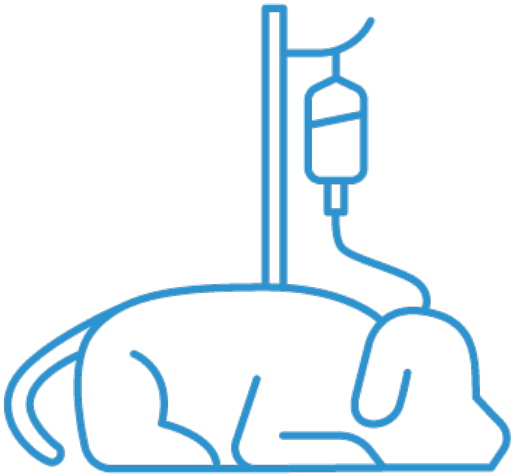

Shock

DRIP 2

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I like seeing responses like this where we are kind of split, so let's talk about it. That justifies moving on to our little picture because I think we're all visual people. So of the four major types of shock, hypovolemic, cardiogenic, obstructive, and distributive, we're really talking about only distributive shock being characterized as hyperdynamic.

And that's because, as we'll talk about, distributive shock is associated with a loss of systemic vascular resistance. So let's make sure we're all comfortable with that. But before we move into these four basic types, which is what I'm most eager for you to understand, recognize that there are a couple of subtypes to all of these. For example, there are subtypes to distributive shock. But let's dive into the four basics.

The most common, of course, is hypovolemic shock. There's a loss of circulatory volume. The pipes are not full. To use the picture on the right-hand side of your screen, you've got the heart. And you've got that almost complete oval representing the blood supply. And in this case, there's a very narrow blood supply because the pipes aren't full. There's body cavity effusions or hemorrhage causing a loss of intravascular volume.

When we're dealing with cardiogenic shock, there's nothing wrong with the pipes. The problem is the pump, and because the pump is dysfunctional, there is a reduction in cardiac output. This could be a systolic issue. This could be the result of a diastolic dysfunction like hypertrophic cardiomyopathy in cats. Certainly, dysrhythmias can affect cardiac contractility and cardiac output as well.

Obstructive shock is a scenario where blood can't make it back to the heart to be circulated. There's actual obstruction of blood flow outside of the heart so that blood can't get back to the heart. So the classic canine scenario is GDV, gastric dilatation and volvulus. Very common scenario in cats is our feline saddle thrombus or feline aortic thromboembolism.

And then lastly of the four is, again, that distributive shock definition where the pump is fine. In terms of the pipes, the pipes are actually flabby. So even if there's an adequate volume under normal circumstances, when the pipes get flabby, that effective volume is actually reduced, and so tissues aren't perfused. The classic example in the emergency room is sepsis. And again, I mentioned earlier that there are some subtypes of shock. And sepsis is actually a subtype of distributive shock. And just to keep everybody on their toes, there is a sub-subtype. There's a subtype of sepsis, a sub-subtype of distributive shock.

In case you look through some textbooks that use this terminology, you'll also see shock occasionally classified based on functionality. So there's a metabolic issue or a hypoxemic issue, and those definitions are self-explanatory.

And so I wanted to provide you this chart, goes through triage of patients in shock as well as what you can expect with physical exam findings and some of the emergency interventions for these shock-type patients that we're going to review as we go through our discussion this evening. Wanted you to have this resource that Dr. Sabrina Haney provided for us.

In terms of diagnostic testing, first important diagnostic tests are your patient history and your physical exam. But when a patient is presented to you in shock, remember, that's not when we do our complete physical exam. We do things that are called a primary survey. These are your A, B, C, Ds like we saw in that previous graphic, airway, breathing, circulation, et cetera.

We also want to evaluate our patient's perfusion status. Remember, that's essentially what's gone awry in shock, all the four major types. Oxygen delivery is not happening the way it's supposed to, so tissues are hypoperfused. And then you're going to do some of the more common tests that we're all familiar with, trying to figure out what put our patient into shock in the first place.

Some of the monitoring tools that we use in the emergency room in the critical care setting are probably all very, very familiar to most of you. But I want to spend a minute talking to you about mixed venous oxygen saturation because it's something that you will read about if you like to dive into shock.

This is really measured because it's a really good reflection of global tissue oxygenation. But it requires the placement of a pulmonary arterial catheter because of where we need to sample the blood from. And placement of a pulmonary arterial catheter just isn't practical for everyday practice. It's not even practical really in referral practices because it's so technically demanding.

And good thing is medicine advances, and it's actually kind of fallen out of favor. But to know where we've progressed requires knowing where we came from. But you can just place a central venous catheter through the jugular vein and measure something called the central venous oxygen saturation.

It's disproportionately affected by changes in the cranial portion of the body. So usually, because it's not reflective of the entire body, we say that the central venous oxygen saturation is usually approximately five percentage points lower than central venous oxygenation, which has to be placed without pulmonary arterial catheter.

So let's talk about the good stuff-- how we treat these guys, how we get them home to their families. And so if you don't do a good diagnostic investigation to figure out what caused this shock state to happen in the first place, you're not going to be really successful. You're going to do these point-of-care diagnostics to try and figure out, is this a septic abdomen? Do I have a uroabdomen like we've talked about in previous presentations? And you're going to get vascular injury and begin fluid therapy in the vast majority of the shock types.

Cardiogenic is obviously different, but you're always going to want vascular access. And that's often harder then it seems, easier said than done. You're going to attempt venous catheterization. You want to use the shortest catheter, the largest diameter catheter you can because blood flows better through long-- through short, wide-bore tubes compared to long, narrow diameter tubes.

But sometimes, you're not going to be able to get vascular access because their vasculature is so collapsed. And so this little drill called the EZ-IO, which a lot of people have because it's cheap, and it's easy to use, is used a lot in patients with shock-- humans, infants, and now I'm going to advocate for its use in dogs and cats because we can get central access through the bone marrow in less than 10 seconds. And so I have a video that I want to show you about how this is used.