

Health & Husbandry

Liver Shunts

Some time ago, a Deerhound owner and breeder sent me a letter asking that I devote a column to liver shunts. One of her pups had a liver shunt, and she hoped I could discuss not only the nature of disorder but also its symptoms, how to test for it, and what treatment was available. As it happens, her problem is not an isolated one in our breed.

In 1994, I reprinted a paper on liver shunts in Deerhounds by Dutch veterinarian Dr. H.P. Meyer. He reported that of 125 Dutch Deerhounds screened for liver shunt, 6 (approximately 5%) were found to have the problem. Dr. Meyer also wrote that liver shunts were most probably an inherited disorder.

This month I'll revisit the subject of liver shunts to include what has been learned in the last decade.

What is a Liver Shunt?

Among the liver's many functions is to cleanse blood that is returning to the heart from the intestinal tract. While bathing the intestine, the blood absorbs all sorts of substances, from beneficial nutrients to harmful toxins. The first stop for the blood after it leaves the intestine is the liver, which acts like a sieve to harvest many of the nutrients and strain out all of the toxins. The nutrients are used or stored, while the toxins are rendered harmless or dumped right back into the intestinal tract via the bile. The blood that exits the other side of the liver on its way to the heart is substantially changed and much safer than it was before the liver did its job.

Developing fetuses in all mammals have a large blood vessel called the ductus venosus that "shunts" blood around the liver and directly into the large vein on the other side, called the vena cava. This bypassing of the fetal liver is possible because the dam's liver has already cleansed the blood of harmful substances before it ever reaches the fetus.

Normally the ductus venosus closes just before or after birth, and the fetal liver takes over the job of cleansing blood. If the ductus venosus doesn't close down fully, the resulting disorder is called a portosystemic shunt, or liver shunt for short. The term portosystemic shunt is used because the vessel bringing blood to the liver is called the portal vein, and the network of vessels on the other side that serve the rest of the body is called the systemic circulatory system.

Livers shunts that arise in this way, from persistence of the ductus venosus, are called congenital shunts, meaning they were present at birth. This distinguishes them from portosystemic shunts that develop later in life, which are

called acquired shunts.

Evidence strongly suggests that congenital liver shunts are an inherited disorder. The mode of inheritance is presumed to be autosomal recessive in all breeds. A study is currently underway to determine the mode of inheritance in Yorkshire Terriers.

Liver Shunt Symptoms

When a dog has a congenital liver shunt, some or all of the blood coming from the intestine bypasses the liver and goes straight into the systemic circulation. That allows toxins produced during digestion to reach the rest of the body, deprives the liver of nutrients and blood supply that it needs for its own growth, and reduces the amount of liver-made building blocks like amino acids needed for growth in general.

Because the shunt is present from birth, clinical signs often show up at a young age. The first thing you might notice is that the pup is a "runt"—that is, it grows more slowly and is smaller and weaker than its littermates.

The brain is especially sensitive to certain toxins, like ammonia and other digestive byproducts, so that behavioral abnormalities are common in dogs with shunts. You might notice that the dog has a quiet demeanor (which can be difficult to tell from the normal Deerhound approach to life), stares into space, is disoriented, turns in circles, presses its head against the wall, or even has seizures. Blindness also can occur. Because the substances causing these symptoms are formed during normal digestion, symptoms may be more common or more pronounced after a high-protein meal.

In dogs with partial shunts, symptoms may not develop until the dog is mature. For instance, a liver shunt may be suspected if a dog takes longer than normal to recover from its first episode of sedation or anesthesia. This happens because the liver is less efficient at extracting and/or metabolizing the sedative or anesthetic.

Certain types of urinary tract stones are more common in dogs with liver shunts. The liver normally removes urates and ammonia from the blood, so that a dog with a congenital shunt will have higher concentrations of these substances in its blood and urine. In the urine, these compounds can react to form ammonium biurate stones in the kidney and bladder.

Occasionally, dogs with congenital shunts will have mildly distended abdomens due to fluid buildup. Other possible signs are vomiting, diarrhea, or excessive salivation.