Portosystemic Shunt (PSS)

A portosystemic shunt (PSS, portasystemic shunt, portocaval shunt, portacaval shunt, or porto-systemic vascular anomaly) happens when a pet’s venous blood from the intestine bypasses the liver. The pet can be born with the shunt (congenital) or can get it later (acquired). About three-quarters of the cases are congenital, although sometimes a pet can have both types.

During pregnancy, the portal blood vessel in the fetus bypasses the liver (i.e., the mother’s liver filters out toxins for the fetus). Normally this shunt closes within three days after birth. In affected animals, the shunt doesn’t close and the blood continues to bypass the liver. Because the liver filters toxins, if the liver is bypassed, the toxins build up in the body. This results in the puppy or kitten having slow or nonexistent growth (failure to thrive). If left untreated, puppies and kittens are not likely to survive. Congenital shunts seem to happen more in purebreds than in mixed breeds. Breeds with increased risk of PSS include Cairn terriers, Maltese, Yorkshire Terriers, Irish Wolfhounds, Himalayans, and Persians.

An acquired liver shunt is usually caused by liver problems (due to poisons, hepatitis, and inflammation, etc.) that resulted in the body routing blood through whatever blood vessels are available, even if it means bypassing the liver. (It would be like taking side streets to your final destination, instead of using the interstate highway.) As happens with congenital shunts, the liver can’t filter what doesn’t pass through it, so toxins build up in the body.

Signs
Signs include stunted growth, not gaining weight, losing weight, vomiting, diarrhea, lethargy, unresponsiveness, temporary blindness, seizures, spasticity (staring into space), disorientation, circling, poor skin and coat, excessive drinking, excessive urination, etc. Sometimes the pet will just act odd after eating or pace around or press its head against the wall. The signs you will see depend on the location of the shunt and how many toxins have built up in the body. Some pets will only have one sign, while others could have several.

Diagnosis
Blood tests, urinalysis, and imaging tests (e.g., radiographs, ultrasound images, portograms [an image of the blood vessels to the liver], or nuclear scintigraphy [a nuclear scan that measures blood flow]) can be used for diagnosis. Blood bile acids are elevated after a meal, so the before-meal and after-meal bile acid levels will be compared. Despite the variety of tests available, a confirmed diagnosis may not be available until surgery is done.

Treatment
Some pets with liver shunts can do well with medical management. However, some of those pets will eventually be euthanized when dealing with the neurologic problems becomes too much for an owner to cope with. In some pets, a change of diet can be enough to control the signs. A typical diet would involve low-protein, low-magnesium, high zinc, and high Vitamin E, in addition to lactulose. Medical management is more a matter of avoiding certain things (diuretics, NSAIDs, barbiturates, infections, etc.).

Surgical repair of the shunt is common, particularly for congenital shunts, but it seems to be more successful in dogs than in cats. Before surgery, the veterinarian will try to stabilize your pet as much as possible with a low-protein diet and antibiotics. Post-operative antibiotics will also be administered. After surgery, once the pet has normal bile acid levels, he can usually return to a normal diet.

It takes about two weeks after surgery before the pet will feel better. During that time, many pets will be anorexic (off their feed). Owners may have to coax their pets to eat, feed canned or strained meat diets, etc. Your veterinarian will have suggestions for stimulating your pet’s appetite.

Prognosis
How well the pet does with medical management or surgery depends on many factors, such as where the shunt is located, if the pet has both acquired and congenital shunts, etc. The overall success rate is about 85%. Complete surgical ligation of the shunt has a very good prognosis. A partial ligation will provide some level of improvement, but will have a less positive long-term prognosis. Some animals will not respond to any treatment, and will have to be euthanized.

Treated cats don’t do as well as treated dogs. Sometimes cats will still have neurologic signs after surgery and may need continuing medical treatment. Some cats may respond to a second surgery one month after the first one. Only a third of the cats who have the shunt ligation surgery do well long term. With dogs, the prognosis really depends on where the shunt is located. Unfortunately, over half of the dogs who don’t have surgery and are treated medically are eventually euthanized, typically within 10 months of diagnosis. This is because of neurologic difficulties or continued liver damage. Dogs that do best with long-term medical management are usually older at the time of diagnosis and aren’t as severely affected. Surgery is usually, but not always, the best option for a normal life span.

Affected pets should never be bred because it is too much strain on the body and because this condition runs in families.