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Portosystemic Shunts Fact Sheet

Portosystemic shunts (PSS) are abnormal single or multiple blood vessels which directly join the blood supply from the intestines to the main circulation.

In a normal animal blood draining from the intestines passes immediately through the liver for nutrients to be processed and toxic substances to be removed prior to the blood entering the main circulation. In an animal with a PSS a significant volume of blood bypasses the liver entering directly into the blood flowing back to the heart where it is pumped around the body.

Different types of PSS exist. Shunts in young animals are generally congenital, i.e. they are present at birth due to abnormal development of the foetus. These shunts are usually a single blood vessel. Acquired shunts form as a result of another problem. This may be either primary liver disease, or a disease involving the normal blood vessels into the liver. This type of PSS usually causes multiple abnormal vessels to be formed. Congenital PSS are often suitable for surgical correction, whereas acquired PSS are not. Many different congenital PSS exist.

They are broadly categorized into those which are accessible outside the liver – extrahepatic, and those which pass through the substance of the liver – intrahepatic. In general terms many small breeds of dog have extrahepatic shunts, whereas large dog breeds have intrahepatic shunts. Some breeds, such as the Irish wolfhound, are now known to have hereditary PSS. We would therefore recommend that any animal with a PSS is not part of a breeding programme.

What signs does an animal with a PSS show?

Many of the clinical signs are a consequence of the blood flowing from the intestines not passing through the liver. As this blood is in effect unfiltered, high levels of substances toxic to the central nervous system are pumped directly to the brain causing the animal to show neurological signs. These neurological signs are variable but can include hyperactivity, restlessness, lethargy, apparent blindness, incoordination, stupor, coma and seizures. In many cases these signs are seen, or become worse, after feeding when higher levels of these neurotoxins are present. Other general signs can include poor condition, growth and development, vomiting, diarrhoea and cystitis.

How is it diagnosed?

Blood samples are usually taken if an animal is showing suspicious clinical signs. Routine blood biochemistry results are often suggestive of a PSS allowing further more specific blood samples determining bile acid levels to be taken before and after feeding. Ultrasound examination of the abdomen often allows the shunt to be identified, or where a shunt is not visible ultrasound can show changes consistent with a shunt. The gold standard for confirming and identifying a PSS is a portovenogram.

This is a study which is performed under general anaesthesia via a surgical approach to the abdominal cavity. A catheter is placed in a vein draining blood from the intestines and contrast media is injected allowing the blood vessels to be seen with fluoroscopy (moving X-ray images). This study is usually carried out at the beginning of the surgery to correct the shunt.

How are they treated?

PSS can be treated either medically or surgically. It is, however, now generally accepted that surgical correction is the treatment of choice where possible. Medical management is aimed a reducing the symptoms caused by the shunt rather than treating the shunt itself. Feeding these animals a diet low in protein is the mainstay of medical management. This decreases the amount of toxic substances being absorbed from the gut and entering the main circulation via the shunt. Diet selection is important to ensure animals still receive adequate ‘essential’ proteins for growth and general health. Antibiotics and lactulose are also used to lessen toxin production and absorption. Most animals are stabilised on medical management

for several weeks prior to surgery. Those animals which are not suitable for surgery, for example those with acquired PSS or older animals, can be maintained on this treatment long-term.

PSS surgery is a technically challenging and is usually carried out by specialist surgeons. We aim to find the shunt and close this down so allowing all the blood draining from the gut to be routed correctly through the liver substance for processing. However, closing the shunt completely during surgery is only possible in approximately 15% of animals. In the majority of animals the normal vessels to the liver are under-developed and are unable to cope with the additional blood flow.

Closing the shunt suddenly in these animals would cause major problems with shock and potentially death. Therefore, we usually only partially close the shunt with a silk ligature or cellophane band and then allow the animal to recover from the procedure. Over the first 3 months post-operatively there is some ongoing closure of the shunt caused by the ligature or cellophane band, and in many animals the shunt will eventually close. This is not always the case and additional surgeries may be needed. Unfortunately, some animals are not able to fully develop a normal blood supply into their liver despite surgery to close the shunt and it is not possible to close the shunting vessel. Some blood will therefore always pass through the shunt.

These animals often do very well despite this, although some do need additional medical management. To monitor the progress of the animals PSS we often ask for repeat bile acid levels to be measured before and after feeding at one and three months post-operatively.

If you have any further questions about PSS you should speak to your veterinary surgeon who will be able to discuss this with you more fully.

If you are concerned about the health of your pet you should contact your veterinary surgeon.