

Portosystemic shunt (PSS)

Overview:

A portosystemic shunt (PSS) is an abnormal vessel that allows blood to bypass the liver. Normally, blood from the abdominal organs/intestines joins together into one big vessel, the portal vein, which carries the blood to the liver for it to be filtered. This bypass of blood flow also causes the liver to remain small.

Portosystemic shunts are reported less commonly in cats than in dogs. Shunts can be located outside the liver (extra hepatic), or inside the liver (intrahepatic); and can be something that the animal was born with (congenital), or something that develops due to liver disease (acquired). The PSSs that are treated surgically are those that are outside the liver, and congenital. Intrahepatic shunts are treated interventionally.

Preoperative workup and other diagnostics PSSs:

Animals with liver disease, abnormal growth, or other systemic issues that could be caused by a PSS are most commonly seen and diagnosed by the small animal medicine service. The diagnostic work up can differ based on the signs & complaints, but commonly will include:

- General physical examination
- Preoperative laboratory work & imaging:
 - Mostly done prior to referral to the soft tissue surgery service
 - Full bloodwork, liver function tests, urinalysis & other lab analyses (such as coagulation profile)
 - Imaging: while shunts can be visualized on abdominal ultrasound, for full characterization of the vessels in the abdomen (belly) a CT with contrast is preferred.

Procedures:

Surgical treatment of PSSs is by placing a device or material around the shunt that will slowly close the shunt. Immediate closure of the shunt is not recommended, as the body and the vascular system needs to adapt to the rerouting of blood.

Devices commonly used are: *Ameroid Constrictor* (a rigid outer ring, and a material on the inside that will swell up over time and compress the vessel), cellophane/thin film band. The *cellophane/thin film band* option relies on inflammation and scar tissue to form around the shunt/vessel. Both options have a good success rate, and one might be preferred over the other based on the location of the vessel, the size of the patient, the size of the vessel, or surgeon preference.

Surgery:

A full abdominal exploratory surgery is performed through a midline incision. During this exploratory surgery, the surgeon will visually assess all abdominal organs prior to localizing the shunting vessel/abnormal vessel. The portal vein is assessed for size as well, and if there is any concern about the size (and its ability to accommodate more bloodflow), we might measure blood pressures while temporarily closing the shunt. If these pressures become very high while closing the shunt, it might not be safe to move forward with the surgical (gradual) closure of the shunt.



An area around the shunt is opened up to allow either the Ameroid Constrictor or cellophane/thin film band to be placed around the shunt.

Complications:

Potential problems that can be present even before surgery include coagulopathies.

- Anesthesia: as with any surgical procedure, there are always risks associated with general anesthesia. For otherwise healthy pets, these risks are usually low, but the risks are significantly increased in animals with systemic illness.
- Surgical site complications: this can range from a local dehiscence, to a fluid pocket (seroma) that will resolve on its own, or can be a local abscess that might need to be treated surgically.
- portal hypertension: this is a life threatening situation, and typically caused by immediate/acute closure of the shunting vessel. While we try to avoid this by not closing the vessel, but rather placing devices that slowly close, we still closely observe patients postoperatively for any signs.
- seizures: postoperative seizures, in some cases status epilepticus, is a commonly described complication after surgery, especially when a full, immediate closure of the vessel was attempted. While the incidence is lower when using slowly occluding devices, it might still occur.
- failure of the shunt to fully close: with gradual occlusion devices it normally takes 6 weeks (ameroid constrictor) to 3 months (thin film band) to fully close, but if bloodwork abnormalities persist for longer postoperatively, it might be that there still is flow through the vessel. We might recommend imaging to further investigate this.
- development of other shunting vessels: this is more commonly seen if the liver (or vessel) cannot fully adapt to the new amount of blood, and the body adapts by making new vessels (that function as pop off valves) to lower the pressure. Signs and bloodwork abnormalities might be similar to persistent shunting, and imaging might be recommended to further define between the two.

Your surgeon will discuss these complications in more detail during your pet's visit.

In hospital care:

- Hospitalization in intensive care is typically needed postoperatively to recover from surgery, and to monitor for signs of portal hypertension and seizures.
- Incision care: this includes keeping the incision dry and clean, as well as wearing an E-collar as long as the incision is still healing (first 10-14 days postoperatively). Patients may require transfusions, nutritional support, and will have frequent bloodwork performed to monitor their progress.

At home care:

- Exercise restriction: leash walks/exercise restriction for the first 10-14 days after surgery to allow all the incisions to heal.
- Incision care: this includes keeping the incision dry and clean, as well as wearing an E-collar as long as the incision is still healing (first 10-14 days postoperatively).

- Follow up bloodwork to monitor closure of the shunt. Based on this bloodwork and your pet's progress, we will recommend discontinuing medications.
If your pet has had no seizures or neurologic issues prior or after surgery, we would discontinue the anticonvulsant medications (keppra) first – typically at suture removal.

Prognosis:

Good with gradual & full closure of the shunt