

## What Is an Intrahepatic Portosystemic Shunt?

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An intrahepatic portosystemic shunt (IHPSS) is an abnormal blood vessel that allows blood draining from the intestines to bypass the liver and enter the general circulation directly. Normally, this blood is filtered by the liver before reaching the rest of the body. This is a condition the animal is born with (congenital).

When the liver is bypassed, byproducts such as ammonia and bile acids are not properly filtered and can be absorbed by other organs, including the brain, leading to neurologic signs. Because blood flow to the liver is significantly reduced, the liver itself is often small and under-developed, which can contribute to additional bloodwork abnormalities. These patients are at an increased risk of bladder stones and/or infections due to the shunt.

A portosystemic shunt can be suspected based on clinical signs and changes on routine bloodwork such as low red blood cell count (anemia), and low liver function parameters. Your veterinarian may perform additional testing such as bile acids and/or an ammonia level as part of the work up. A portosystemic shunt will be identified using a computed tomography (CT). This allows for accurate diagnosis and allows the veterinarian to determine the exact location and anatomy of the shunt to recommend the most appropriate treatment.

## Medical Management

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Medications will be recommended to reduce clinical signs. However, this treatment will not address the shunt itself. Some of the medications and the reasons they are prescribed are listed below. This is not an exhaustive list and additional medications may be suggested based on the severity of clinical signs.

| Medication              | Reason                                                                                                                                        |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| Low protein diet        | Reduces the amount of protein breakdown product (ammonia) that causes neurologic signs                                                        |
| Lactulose               | Acidifies the colon to trap ammonia in the stool.<br>Shortens gastrointestinal transit time, expelling bacteria and toxins before absorption. |
| Omeprazole (Prilosec)   | Prevents gastrointestinal ulceration and bleeding.                                                                                            |
| Anti-seizure medication | Controls and/or prevents seizures                                                                                                             |

## The PTCE Procedure

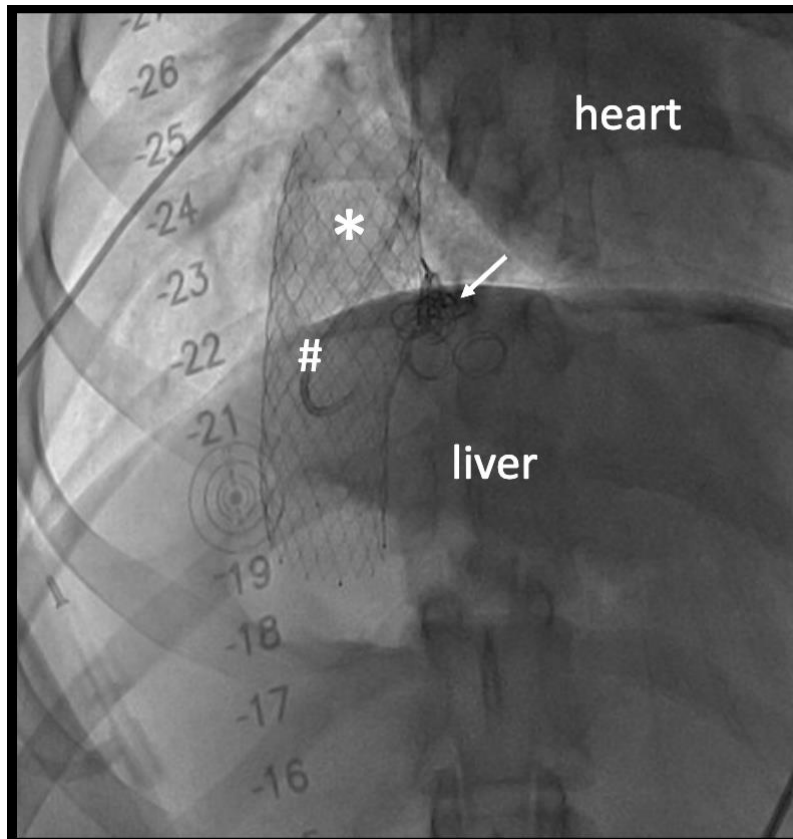
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Percutaneous transvenous coil embolization (PTCE) is an interventional (catheter-based) technique used to treat dogs with an intrahepatic portosystemic shunt, performed by our cardiology team in the catheterization laboratory. It is important for your pet to be **at least 6 months old to undergo this procedure** to reduce the risk the stent becomes too small over time as your pet grows.

### During the procedure:

- Catheters are placed in the jugular veins and advanced into the caudal vena cava and the shunting vessel.
- A stent is placed in the caudal vena cava to maintain normal blood flow.
- Coils are then deployed into the shunting vessel to gradually occlude abnormal blood flow.
- The number of coils needed varies by patient and is guided by the body's response to coil placement in real time.

This procedure is considered successful in approximately 80–85% of dogs. In the remaining 15–20% of cases, a dog may need an additional procedure over time to place further coils, or may require lifelong medical management. This procedure has also been performed in small dogs and cats! The goal of PTCE is to reduce clinical signs; however, in some patients this may not be fully achievable if the coils are not tolerated (due to portal hypertension) or if additional shunting vessels develop.



*Fluoroscopic image showing stent and coil placement during a PTCE procedure. There is a stent guide measuring tool to guide placement of the stent (\*) within the caudal vena cava. There are seven thrombogenic coils (arrow) deployed through the catheter (#) into the portal shunt vessel.*

## Anticipated Cost of Procedure

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In general, the estimate is around \$10,000. Final cost estimates will be discussed in detail during your pet's consultation and are tailored to each patient's specific needs. The cost estimate will include the stent and coils, anesthesia, procedure equipment, hospitalization for 36 hours, and in-hospital medications. To schedule the PTCE procedure, a \$2,000 deposit is required so the stent can be ordered.

## Possible Complications

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### General Anesthesia

- Pneumonia secondary to aspiration of stomach contents
- Changes to heart rhythm and blood pressure
- Uncommonly, death

## **Interventional Procedure / Surgery**

- Portal hypertension (increased blood pressure behind the shunt vessel) — life threatening
- Arrhythmias and low blood pressure with deoxygenation
- Pericardial effusion or vessel trauma
- Stent fracture or migration
- Thrombus (blood clot) formation and embolization
- Infection

## **After the Procedure**

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- Pets are typically hospitalized for approximately 24–48 hours after the procedure for continued monitoring and recovery from anesthesia.
- Detailed aftercare and recheck instructions are provided at discharge.
- Follow-up monitoring and care is coordinated with the referring veterinarian and/or our Internal Medicine team, typically including fasted bloodwork in the weeks following the procedure.

## **At-Home Care**

- No neck collars or leads for 5–7 days after the procedure, to allow the jugular vein to heal.
- Moderate activity restriction for 2 weeks while the vessel fully heals.
- Typical recheck schedule includes a 1–2 month recheck with the MU Veterinary Health Center or a local internist/veterinarian for physical exam and bloodwork, with additional rechecks and medical therapy as recommended by the clinician.