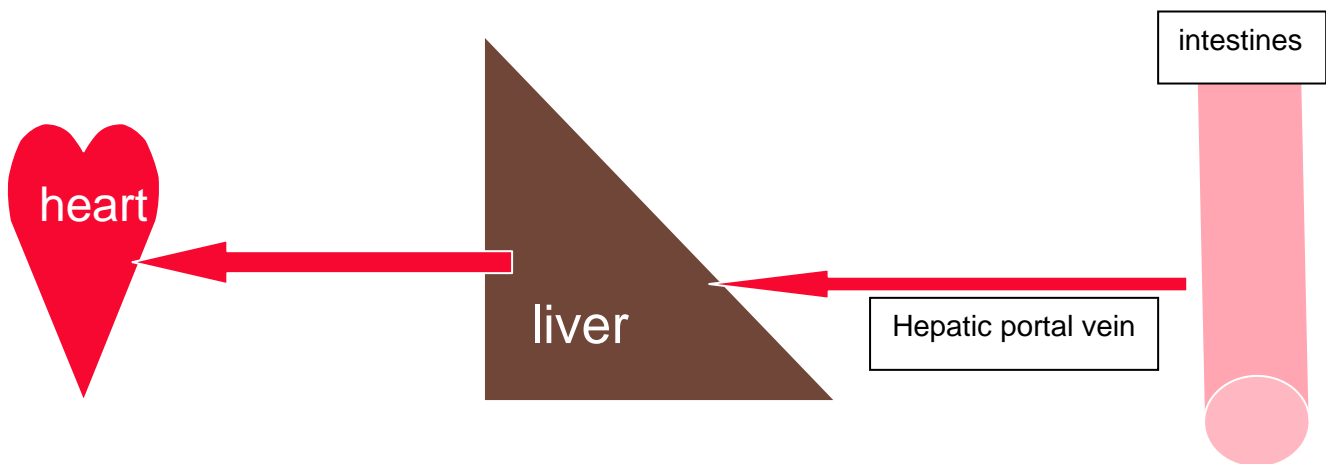


Congenital Portosystemic shunts

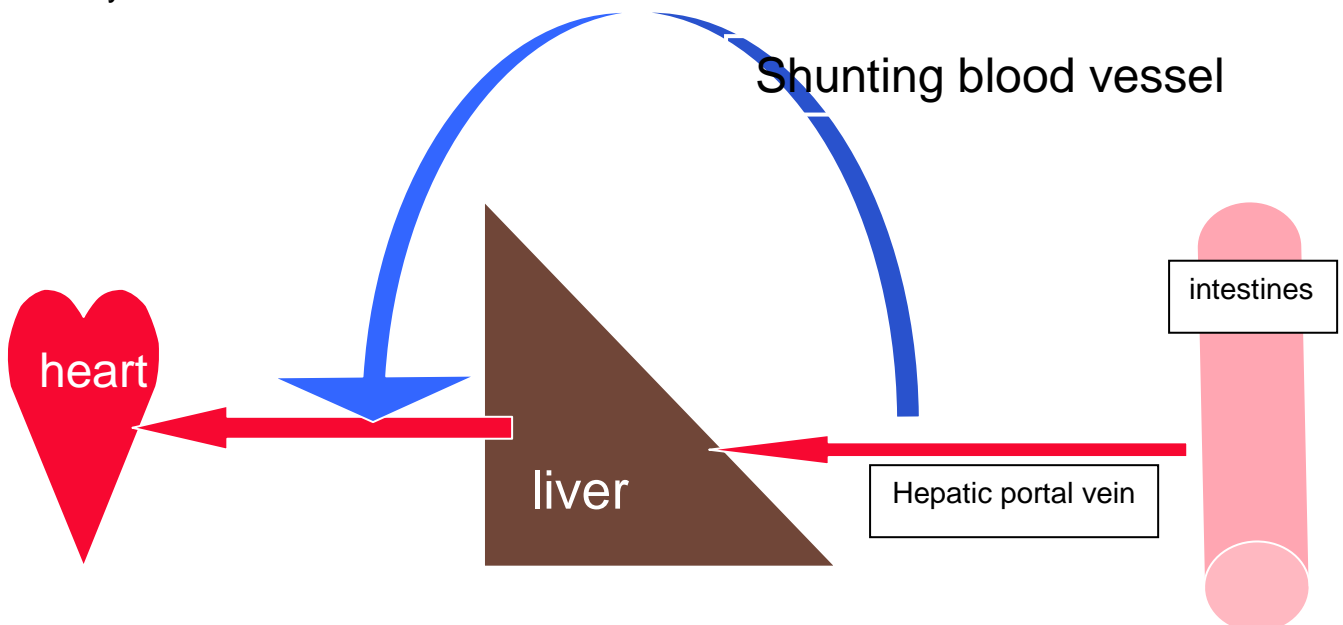
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What is a Portosystemic shunt?

This is an abnormality in the blood vessels draining the abdominal organs and passing to the liver. In the normal cat blood drains to the liver, via the hepatic portal vein, to be filtered before joining the systemic circulation.



In a cat with a shunt the blood by-passes the liver and enters directly into the systemic circulation



Portosystemic shunts (PSS) can be congenital meaning that the cat has been born with the vascular (blood vessel) anomaly. Occasionally shunts can develop later in life in association with severe liver disease, this is termed an acquired portosystemic shunt. Shunts are also classified by the location, the majority are outside of the liver, as in the diagram above (termed 'extra-hepatic'), occasionally the abnormal shunting vessel may lie within the liver itself (termed 'intra-hepatic').

What signs are associated with congenital portosystemic shunts?

Typically the disease is recognised in kittens or young cats that fail to grow normally and appear stunted. The signs are usually related to three systems and can be intermittent, sometimes relating to feeding. The systems most commonly affected are:

1. Nervous system – the signs associated with the nervous system are termed hepatic encephalopathy and arise due to increased levels of toxins in the blood stream (including ammonia), which have not been cleared by the liver. The signs seen include behavioural changes (lethargy or aggression), altered consciousness, seizures (fits), intermittent blindness, a wobbly gait, circling, hyperexcitability and tremors. Drooling of saliva (ptyalism) is also commonly seen and is a unique feature of feline hepatic encephalopathy.
2. Gastro-intestinal system - these signs are non-specific and relate to liver dysfunction. Signs include a poor appetite, vomiting, diarrhoea, constipation and weight loss.
3. Urinary system - signs include bloody urine and difficulty passing urine associated with crystal or stone formation (ammonium biurate uroliths). Increased thirst and urination (termed polydipsia and polyuria) are often seen.

Anaesthetic complications following neutering may raise suspicions of a PSS, for example prolonged recovery periods or the development of neurological signs including blindness or a wobbly gait.

What abnormalities are found on physical examination?

Patients are often thin, stunted in size and have an unkempt appearance. Some cats have copper-coloured irises but it is not known whether this is actually due to a PSS or is co-incidental. It is not unusual for the kitten to have other congenital abnormalities such as heart murmurs and cryptorchidism (undescended testicles).

How does a vet diagnose a PSS?

A tentative diagnosis of a PSS can be made based on the patient's history, physical examination, blood work and liver function tests. Confirmation of the diagnosis is made with imaging studies.

What abnormalities are found on blood tests?

Typical abnormalities include reduced levels of substances made in the liver (urea, albumin, glucose and cholesterol) and mild elevations in liver enzymes. The kitten may have a mild anaemia, which shows little signs of regenerating. Assessment of dynamic bile acids is the preferred test of liver function. Bile acids are measured following a 12-hour fast and two hours following a small

meal. High levels of bile acids are supportive of a diagnosis of a PSS (but have to be confirmed by imaging)

What abnormalities are found on analysis of urine?

Routine urinalysis may identify blood, protein and ammonium biurate crystals (the later is found in 10-33% of cases).

How is imaging used to confirm the diagnosis of a PSS?

Ultrasound is the most useful non-invasive diagnostic tool. It allows localisation and identification of the shunt in most cases; this is however highly dependent upon operator skill and equipment available. Typical findings include a small liver size and an anomalous shunting blood vessel. The bladder and kidneys should be assessed for the presence of stones. Abdominal x-rays are less useful for diagnosing a PSS.

Portovenography is the definitive method of confirming the diagnosis of a PSS. This involves placing contrast dye into one of the veins in the abdomen to highlight the shunting blood vessel. This is usually performed at surgery. This allows positive identification and localisation of the shunt vessel and can be repeated post-shunt ligation to evaluate the change in blood supply to the liver.

How is a PSS treated?

Management of a congenital PSS typically involves a period of medical treatment followed by surgery. In our experience at the Feline Centre (University of Bristol), surgery is the treatment of choice for single congenital PSS. Surgical therapy is not recommended for multiple acquired PSS.

Medical treatment involves therapies that reduce the production and absorption of toxins from the intestines

1. Diet – a restricted protein diet is recommended to decrease the production of nitrogenous wastes e.g. Hill's l/d or k/d, Royal Canin Hepatic Support diet.
2. Lactulose – a synthetic disaccharide laxative. This is effective by reducing colonic faecal transit times and acidifying colonic contents, resulting in decreased ammonia production and absorption. The dose is titrated to ensure that the cat is passing soft-formed faeces at least twice daily.
3. Oral antibiotics – to modify the gut flora and reduce the production of toxins involved in the development of hepatic encephalopathy, in particular ammonia. Suitable choices include ampicillin, amoxycillin, neomycin and metronidazole.

Medical treatment of the encephalopathic crisis.

It is not uncommon for a patient with a PSS to have an acute deterioration, for example following eating a high protein meal as a result of dietary indiscretion or an intestinal bleed. The patient may start to seizure or even fall into a coma. Emergency management involves special treatment of hepatic encephalopathy using lactulose enemas and intravenous antibiotics.

Occasionally such patients will have seizures that require additional specific drugs to control.

Surgical treatment

The goal of surgery is to 'tie off' of the shunting vessel to redirect blood back through the liver, without causing excessive blood pressure within the blood vessels of the liver (also known as the portal system-excessive pressure is called portal hypertension). At surgery the PSS is identified, usually with the aid of portovenography. The shunting vessel may be completely or partially ligated ('tied off') using suture material, a cellophane band or an ameroid constrictor. Occasionally some patients require a second surgery to completely occlude the shunt. A biopsy of the liver is usually taken at the time of surgery for pathological examination.

Kittens are usually hospitalised for several days after the operation to monitor for potential complications. We closely monitor for bleeding, seizures and portal hypertension. Fortunately serious complications are rare.

What is the prognosis for a kitten diagnosed with a PSS?

The long-term prognosis is generally related to the degree of shunt vessel occlusion achieved at surgery (Tilson et al, 2002). Around 90% of cases have a good clinical outcome following complete extra-hepatic shunt ligation (Van Gundy et al, 1990). These kittens are expected to have a relatively normal life following surgery. Partial ligation is associated with poorer success rates, with 58% of cases having a good to excellent outcome (Birchard et al, 1992). Following successful surgery supportive medical therapy is gradually withdrawn. In some cases the kittens require long-term medication, which maybe due to continued shunting or the development of multiple acquired shunts. Despite this diligent medical management may allow the cat to have a good quality of life for many years (Tilson et al, 2002).

References

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