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Extrahepatic congenital portosystemic shunt in a maltese dog

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ABSTRACT: A portosystemic shunt is an abnormal connection between the portal and systemic veins, either congenital or acquired, with extrahepatic types being common in small breeds. This case report describes an 10-month-old intact female Maltese presenting with frequent vomiting, drooling, and disorientation. Physical examination revealed that the dog was underweight, and abdominal radiography revealed microhepatica. Blood tests revealed elevated ammonia levels, confirming the diagnosis of a congenital portosystemic shunt. Surgical ligation of the shunt was performed successfully, leading to recovery of the dog, marked by normalised ammonia levels and weight gain.

Keywords:
portosystemic shunt, congenital portosystemic shunt, extrahepatic, dog, ligation surgery

■ INTRODUCTION

Portosystemic vascular anomalies or portosystemic shunts (PSS) are abnormal connections between the portal and systemic circulation. It can be congenital or acquired (Konstantinidis *et al*. 2023). Congenital PSS occurs when the portal vein communicates directly with the systemic blood flow, bypassing the liver. These macroscopic malformations connect the portal vein or its branches to the caudal vena cava, azygos vein, or other systemic veins, allowing portal blood to circumvent the liver. Congenital PSSs are classified as intrahepatic or extrahepatic, based on their anatomical location, and are usually single shunts, although multiple shunts can also occur (Cote *et al*. 2019). In contrast, acquired PSSs (APSSs) are typically multiple extrahepatic shunts that develop in response to portal hypertension (Tilley *et al*. 2021). However, the occurrence of PSS in dogs in Indonesia has yet to be reported, making case references challenging to find. As our research indicates, this is the first case report to be documented in Indonesia. This case report describes the diagnostic and therapeutic techniques used for PSS in a dog that was successfully treated at the GloriaVet Pet Health Solution Animal Clinic in Bandung, West Java, Indonesia.

■ CASE

Signalment and Anamnesis: A ten-month-old female Maltese patient presented with symptoms of frequent vomiting, drooling, and disorientation. **Physical Examination**: The dog was notably underweight, with a body condition score of 3/9, and exhibited signs of slight dehydration, ptyalism, and abnormal mentation. The clinical signs persisted despite attempts to stabilise the patient's condition through hydration correction and dietary adjustments. **Additional Diagnostic Tests**: A comprehensive serum biochemical profile was obtained, along with measurements of blood ammonia levels and abdominal radiographs. Serum biochemistry typically shows normal to elevated levels of liver enzymes (alanine aminotransferase [ALT], alkaline phosphatase [ALP], gamma-glutamyl transferase [GGT]), reduced blood urea nitrogen (BUN), hypocholesterolemia, hypoalbuminaemia, and occasional hypoglycaemia. Blood ammonia levels are often elevated, indicating the hepatic encephalopathy. Abdominal radiography revealed a condition known as microhepatica. **Treatment**: Surgical intervention to ligate the shunt was performed to reduce abnormal blood flow and alleviate the symptoms.

■ RESULTS AND DISCUSSION

A liver occupying fewer than two intercostal spaces on a radiograph is typically considered small. In the lateral view, the caudoventral edge of the liver does not extend to the costal arch, as illustrated in Figure 1. Although small, the hepatic margins remain even and well defined on radiographs. An abnormal liver size, termed as microhepatica, was identified on abdominal radiography.

Serum biochemistry showed several anomalies: a glucose level slightly below average at 71 mg/dL (normal range: 74-143 mg/dL), total protein at 4.8 g/dL (normal range: 5.2-8.2 g/dL), albumin at 1.8 g/dL (normal range: 2.3-4.0 g/dL), and an elevated blood ammonia level of 310 µmol/L (normal range: 0-98 µmol/L).

Given these findings and clinical signs, the diagnosis was likely extrahepatic congenital portosystemic shunt. Extrahepatic PSSs are more commonly observed in small purebred dogs, including Yorkshire Terriers, Maltese, Cairn Terriers, Norfolk Terriers, Dachshunds, Pugs, Havanese, Miniature Poodles, Dandie Dinmont Terriers, Skye Terriers, Miniature

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Schnauzers, Chihuahuas, and Scottish Deerhounds. In contrast, intrahepatic shunts typically occur in larger breeds, such as Irish Wolfhounds, Labrador Retrievers, Golden Retrievers, Australian Cattle Dogs, and Australian Shepherds (Cote *et al*. 2019).

Extrahepatic shunts can be localized to either portocaval or porto-azygous regions. Dogs with porto-azygous shunts typically exhibit milder clinical signs, which may delay the onset of symptoms and consequently the age of diagnosis compared to dogs with portocaval shunts. In porto-azygous shunts, less blood bypasses the liver than in portocaval shunts because the azygous vein has a smaller diameter, offering more resistance than the abdominal vena cava. Another contributing factor may be that respiration-induced diaphragmatic compression intermittently closes the shunt, potentially enhancing liver function and reducing the severity of hepatic encephalopathy in these dogs (Van den Bossche *et al*. 2012).

Advanced imaging techniques such as abdominal ultrasound and computed tomography (CT) with contrast angiography are employed for definitive diagnosis. CT with contrast angiography has emerged as the preferred method for noninvasively confirming PSS, as it elucidates the location and number of shunts and can reveal calculi or other concurrent abnormalities (Cote *et al*. 2019).

Congenital PSSs are treatable through surgical intervention. Immediate management of acute hepatic encephalopathy involves the administration of lactulose orally or by enema and antibiotics. Hypoglycemia must also be corrected when present (Cote *et al*. 2019). Antibiotics, such as beta-lactams, metronidazole, or neomycin, aim to reduce ammonia production by intestinal urease-producing bacteria. Lactulose administration facilitates the acidification of the colon, leading to ammonia trapping as ammonium, thereby reducing its absorption (Mullins 2019).

Surgical approaches typically offer an excellent long-term prognosis. In this case, partial shunt ligation was performed using thin cellophane banding and polypropylene. Immediate complete occlusion of the shunt is avoided to prevent life-threatening hypertension; instead, the shunt is partially closed with a ligature that allows for gradual occlusion over the postoperative period (White *et al*. 2018). Perioperative mortality rates for extrahepatic shunt surgery are lower than those for intrahepatic shunts (Mullins 2019).

Post-surgery, the dog showed significant improvement with no recurrent vomiting or hypersalivation and gained weight. Periodic blood tests to monitor liver function and ammonia levels indicated a return to normal ammonia levels 17 days post-surgery.

■ CONCLUSION

The Maltese breed is predisposed to extrahepatic congenital portosystemic shunt (PSS). Fortunately, congenital PSSs in this case report can be effectively managed through surgical correction, offering a favourable prognosis for the affected dogs.

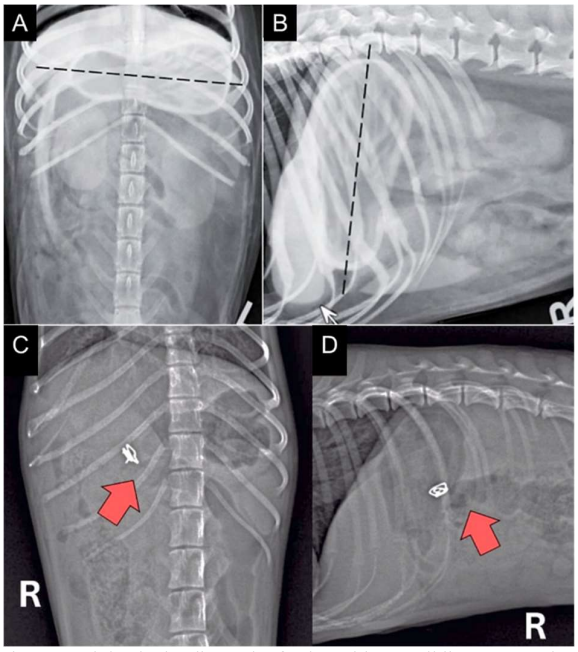

Figure 1. Abdominal radiograph of a dog with a small liver. Ventrodorsal (A) and lateral views (B) of a dog's abdomen, illustrating a small liver characterised by fewer than two intercostal spaces between the stomach and diaphragm and the caudoventral edge of the liver (indicated by a white arrow) not extending to the costal arch. The lateral view also shows the gastric axis sloping from caudodorsal to cranioven-tral (black dotted line) as described by Muhlbauer and Kneller (2024). Subsequent images (C and D), taken two months post-surgery clearly show the ligature at the shunt area remaining in place (highlighted with a red arrow).

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■ REFERENCES

Konstantinidis AO, Patsikas MN, Papazoglou LG, Adamama-Moraitou KK. 2023. Congenital portosystemic shunts in dogs and cats: Classification, pathophysiology, clinical presentation and diagnosis. Veterinary sciences. 10(2):160.

Cote E, Cohn LA. 2019. Cote's Clinical Veterinary Advisor Dogs and Cats 4th Edition. Missouri: Elsevier.

Muhlbauer MC, Kneller SK. 2024. Radiography of the Dog and Cat: guide to making and interpreting radiographs. John Wiley & Sons.

Mullins RA. 2019. Canine portosystemic shunts: Part 2. Veterinary Ireland Journal. 9(7): 370-375.

Tilley LP, Smith FWK Jr, Sleeper MM, Brainard BM. 2021. Blackwell's Five-Minute Veterinary Consult: Canine and Feline 7th Edition. New Jersey: J Wiley.

Van den Bossche L, van Steenbeek FG, Favier RP, Kummeling A, Leegwater PAJ, Rothuizen J. 2012. Distribution of extrahepatic congenital portosystemic shunt morphology in predisposed dog breeds. BMC Veterinary Research. 8(112): 1-6.

White RN, Parry AT, Shales C. 2018. Implications of shunt morphology for the surgical management of extrahepatic portosystemic shunts. Australian Veterinary Journal. 96(11): 433-441.