

# **Baby with a Twist**

A Case Report of Splenic Torsion and Gastric Dilatation-Volvulus in the Canine

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## **Introduction:**

Splenic torsion is an emergent and life-threatening condition where the twisting of the spleen's vascular pedicle leads to splenic infarction, portal hypertension and bleeding. It commonly occurs in large and giant breed dogs such as Great Danes and German Shepherds whom are deep chested; however, this can occur in other breeds as well. This condition seems to be more prevalent in males than females. Splenic torsion may occur in combination with gastric dilatation-volvulus (GDV).<sup>1,7</sup> The common clinical signs, which could be acute or chronic, include abdominal pain, pale mucous membranes, dehydration, vomiting, weakness, and inappetence. A valuable tool in diagnosing splenic torsion is abdominal ultrasonography with color-flow Doppler, this will identify the need of surgical intervention. Prognosis of a splenic torsion is generally good if the patient is stabilized and a splenectomy is performed. However, complications of splenic torsion and post-operative splenectomy can include cardiac arrhythmias, coagulation disorders, possible GDV and hemorrhage.<sup>1,8</sup> This report is outlining a case of a Great Dane that had a splenic torsion with a partial GDV and will illustrate the importance of diagnostic imaging when diagnosing a splenic torsion.

## **History and Presentation:**

Baby is a 3-year-old female Great Dane that was presented to the MSU-CVM Emergency service the night of August 17, 2017 for acute lateral recumbency and inappetence. At that time, her owners reported that Baby had been inappetent for approximately 16 hours. She had whelped her second litter of puppies approximately 4 weeks before presentation; her labor lasted approximately 30 hours with 11 live puppies and 1 stillborn puppy. The morning of August 17, the owners noted that Baby was noticeably lethargic and inappetent, being normal and playful

the day before. By 4pm that afternoon, Baby had become laterally recumbent and would not respond to the owners.

Upon presentation, Baby was depressed, but alert and responsive. Baby was normothermic (temperature 102.1 F), mildly tachycardic (pulse rate: 148 beats per minute), and eupneic (respiratory rate: 32 breaths per minute). Baby weighed 50.1 kg (110 lb.) and was assigned a body condition score of 3/9. Her mucous membranes were pale and tacky with a capillary refill time of 3 seconds. There were normal bronchovesicular sounds auscultated bilaterally with a grade 4/6 pansystolic murmur auscultate on both sides. On abdominal palpation her abdomen was significantly distended, and pain was elicited. No other abnormalities were noted on Baby's physical exam.

### **Diagnostic Approach**

Diagnosis of a splenic torsion is difficult without imaging. Differential diagnoses include neoplasia (lymphosarcoma or hemangiosarcoma), hematoma (trauma), immune-mediated diseases (hemolytic anemia), splenic torsion, gastric dilatation-volvulus (GDV), abscess, tick-borne disease such as Ehrlichiosis, Rocky Mountain Spotted Fever, and Babesiosis. The normal routine imaging modalities of a splenic torsion are abdominal radiography and ultrasonography. Radiography is another diagnostic modality that can be performed to determine if the spleen is normal, enlarged, or small. The most common findings on radiographs are the decrease in visceral detail with peritoneal effusion and displacement of the small intestine because of the spleen being enlarged. When the head or body of the spleen is not in its normal position and cannot be observed, a splenic torsion is usually indicated. <sup>1</sup>

Color Doppler is needed because it provides evidence of the absence of hemodynamic flow of blood with splenic torsions, it contributes to the definitive diagnosis of this condition. On

ultrasound, the parenchyma of the spleen may be normal, hypoechoic, or anechoic.<sup>1</sup> The pattern of a splenic torsion reveals the spleen to be significantly enlarged which is diffusely hypoechoic with anechoic areas throughout. Free fluid adjacent to the spleen can be found concurrent with splenic torsions as well.<sup>5</sup>

Focused assessment with sonography for trauma (FAST) is a 4-point scan of the abdomen to evaluate the presence of free fluid in the abdominal, pericardial, and pleural cavities. The 4-points begin with the patient in right lateral recumbency beginning at the diaphragmatico-hepatic (DH) view, followed by the spleno-renal view (SR), then to the cysto-colic view (CC), and finally to the hepato-renal view (HR).<sup>3,5</sup>

In this case, an abdominal FAST scan was performed, and 4/4 free fluid was noted along with generalized splenomegaly. Upon palpation of her abdomen, a fluid wave could be elicited. The bladder was seen and intact on the FAST, with red/brown-tinged fluid pulled via cystocentesis. Abdominocentesis revealed a hemoabdomen, with the PCV of 19% (peripheral PCV at this time was 28%). The lactate of the abdominal fluid was 5.7 mmol/L compared to blood lactate at 3.8 mmol/L. Abdominal radiographs revealed complete loss of serosal detail due to free fluid, dorsolateral deviation of intestines with evidence of splenomegaly suggest the presence of a splenic torsion. An abdominal ultrasound was performed which revealed evidence of a splenic torsion.

### **Pathophysiology**

Splenic torsion is the twisting/rotating of the spleen on its vascular pedicle which prevents blood from draining, this causes enlargement of the spleen. The etiology of how a splenic torsion occurs is currently unclear. It has been hypothesized that a splenic torsion could occur from congenital abnormalities or disruption from trauma of the gastrosplenic or

splenocolic ligaments which normally stabilize the spleen, occurrence can also be from a partial gastric torsion.<sup>1,6</sup> There can be other causes as well, such as, vomiting, exercise, rolling, previous surgery, or trauma; these can all increase the risk of the spleen to move, resulting in a rotation/twisting of the spleen. Another cause may be non-specific abdominal muscle laxity and laxity resulting from the hormonal effects of pregnancy. There are two different forms of splenic torsion: acute and chronic forms. Shock can be seen in the acute form, there is marked acute abdominal pain within a couple of hours after the spleen has twisted. Clinical signs of shock are tachycardia, hypotension, and parameters of poor perfusion. Signs of shock and cardiovascular collapse will be visible because the spleen basically consumes the blood that comes from the body; therefore, if there is a twist, the blood can initially enter but cannot leave spleen, this then leads to shock. The chronic form is different because the clinical signs are vague and intermittent, and it is very difficult to diagnose due to the likelihood of it being a partial twist of the spleen and an incomplete cut-off of blood flow.<sup>6</sup>

### **Treatment and Management**

Initial treatment of a splenic torsion is stabilization and supportive therapy, then a splenectomy needed to be performed. Baby was approximately 8-10% dehydrated upon initial stabilization. An intravenous cephalic catheter was placed, then Baby was started on and stabilized with 2000 mL of an isotonic fluid infusion (Lactated Ringers Solution) and 375 mL of Hetastarch. The night of presentation, Baby was anesthetized for an exploratory laparotomy in hopes of performing a possible splenectomy.<sup>3</sup> Upon opening the abdomen, the spleen was grossly abnormal and severely enlarged. The parenchyma was rounded, red colored, and had numerous omental adhesions. A complete twist of more than 360 degrees of the splenic veins and arteries were noted, a total splenectomy was performed. The spleen should not be untwisted

since this can cause a release of toxins, microemboli, or bacteria into the bloodstream causing septic shock in the patient. The splenic vessels should be ligated as close to the spleen as possible. In this case, Baby's splenic arteries were mobilized and then ligated with a ligating and dividing stapler (LDS) close to the spleen to prevent occluding the pancreatic vascular supply.<sup>1,8</sup> The entire spleen was submitted for histopathological evaluation.

Gastric dilation volvulus commonly occurs secondary to a splenic torsion and post-operative splenectomy.<sup>8</sup> In this case, Baby's stomach was partially twisted with the spleen as well. After the removal of the spleen, a prophylactic incisional gastropexy was performed where the stomach was sutured to the left body wall. The remaining abdominal organs appeared normal.<sup>4,5</sup>

Ventricular arrhythmias occur very frequently in association with a splenectomy and can be seen with splenic torsion as well; therefore, the patient needed to be monitored before and after surgery. The majority of the time, the tachyarrhythmias do not require any intervention since they are asymptomatic; however, in rare occasions, they can progress to be fatal. Close monitoring of post-operative splenectomy patients is recommended with continuous electrocardiography to see the degree and occurrence of the tachyarrhythmias.<sup>7,8</sup> Antiarrhythmic drugs such as lidocaine should only be used if there is an arrhythmia which is life threatening and is causing poor perfusion. In this case, Baby was evaluated every 4 hours post-operative splenectomy for ventricular premature contractions (VPCs) to monitor the multiform complexes (runs), ventricular tachycardia, or R on T noted, a bolus of lidocaine would have been given. Ventricular premature contractions were noted once and lasted approximately 1 minute; therefore, lidocaine was not administered.<sup>2,4</sup>

Hemorrhage is another complication that can occur post-operative splenectomy. Packed cell volume (PCV) and total protein measurements are an easy way to measure blood loss very quickly; however, this is not completely accurate because with acute blood loss, the PCV and TP will be normal. A PCV/TP should be checked post-operatively and monitored for the next 24 hours then checked as needed. Clinical signs of hemorrhage include light pink to pale mucous membranes, increased heart rate, decreased blood pressure, weakness, collapse, and possibly death. Baby's initial PCV/TP demonstrated a moderately severe anemia (PCV 28%; reference range: 37% to 55% and TP 7.2 gm/dL; reference range: 5.0-7.4 gm/dL). During surgery, Baby continued to have blood loss and pooling of blood in her abdomen. Ten 60mL syringes were used to collect blood from the abdomen in order to auto-transfuse blood back into the patient. Baby's PCV/TP was 24% and 5.4 post-operatively monitored every 6 hours there after to make sure a blood transfusion was not necessary. A whole blood transfusion is warranted when the hematocrit falls below 20%.<sup>1,4</sup>

### **Case Outcome**

Biopsy results from Baby's spleen revealed marked congestion of the red pulp that obscured the white pulp in all sections that were examined, . There was no evidence of neoplasia noted. In the adhered omentum, there was vascular congestion with hyperemia of blood vessels. Surrounding the blood vessels was fibrin, edema, macrophages and cellular debris. Multiple vessels contained small fibrin thrombi along with margined neutrophils. There were locally extensive areas of hemorrhage with the adipose tissue; therefore, the histologic findings within the spleen and adjacent omentum were consistent with venous congestion secondary to a splenic torsion with no evidence of neoplasia of sections that were examined.

Baby recovered without any issues and was sent home 3 days post-operative with Tylenol-4 (60mg tablet PO q8hr) and carprofen (100mg tablet PO q12hr). She was instructed to recover with strict kennel rest, controlled leash walks, and gradual return to activity. At 2 weeks post-operative, Baby was to return for her skin staple removal and recheck; however, she went to her referring veterinarian and was reported to be recovering very well and returning to normal activity. Aside from a splenectomy and gastropexy, Baby has been doing well since her surgery in August 2017. Baby's owners report that she has not been this active since she was a puppy and have decided to have her spayed so as to not breed her again.

## References

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