Stomach torsion with the dog

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Introduction

Stomach torsion is a life-threatening illness of the large dog. There exists only little clarity about the causes. However, dog owners and veterinary surgeons have a good understanding of how the disease progresses after the torsion. Measures during the emergency care of the patients are also well-known, so that in most cases the dogs not only survive a stomach torsion incident, but will not suffer a second time.

The following overview focuses first on the various and contradicting theories to the pathogenesis that attempt to explain the occurrence of the stomach torsion. From these, conclusions for prevention are drawn. Next, the article covers the successful cornerstones during the initial treatment of the dogs that can lead to a survival rate as high as possible. Finally, the veterinary measures used in treatment are described.

Pathogenesis

First of all, there is no study that can point out clearly why stomach torsion occurs. In fact, many reports and investigations that support one theory are immediately reversed by other studies. There appears to be several different risks. The body size has a crucial influence. Large dogs and giant breeds have a proven higher risk for stomach torsion than small dogs (Glickman et al., 1997). As rule of thumb, dogs with a weight less than 20 kg do not get a stomach torsion. Also, it is believed that a dog that is blood related with another that has already experienced a stomach torsion has clearly a higher risk to get a stomach torsion itself (Glickman et al. 2000). Among the high risk breeds are Bloodhounds, Great Danes, St. Bernards, Setters, Retrievers, Shepherd dogs, Bernese Mountain dogs, and others. (Brockman et al., 1995; Eggersdotir and Moe, 1995).

Further, it is proven that dogs with a narrow and high thorax are more inclined to get a stomach torsion than others (Schaible et al. 1997; Schellenberg et al., 1998). To this group belong Borzois, Afghan Hounds, Irish Wolfhounds, Rhodesian Ridgebacks, plus those already mentioned before. But the risk analyses remains open about why these breeds are predisposed to stomach torsion, although it is assumed that the special body shape is a factor.

There are some statistics that are breed-specific. We know for example that large breeds are at risk for stomach torsion on the average 2.3% per year and for giant breeds, the risk is 2.6% per year. If you project these percentages over entire life spans, the risk for the Bloodhound or the Great Dane is approximately 30%, large sight hounds or collies about 20%, Irish Wolfhounds about 18%, and the Newfoundlander about 8%. Similarly, the St. Bernard is about 6% and the Rottweiler 4%. Of course, we have to treat these numbers with great caution. In addition, we know the risk of a stomach torsion rises with increasing age (Glickman et al., 2000).

Initially, studies identified nutrition as a cause for stomach torsion. Some studies connected the particle size, food composition, number of rations, and time of the feeding with stomach torsion

(Burrows et al., 1985; Kruiningen et al., 1974; Theyse et al., 1998). These studies have resulted in recommendations to portion the daily food quantity into minimum 3 rations and to avoid exercises directly after feeding. One study assumed that large food quantities could provoke the stomach into torsion by intensive body movement. From today's view and under critical aspects of the epidemiology, we must regard these studies as disproved (Van Kruiningen et al., 1987; Kelsey et a., 1996). However it has been found that there are certain risks associated with a dog's eating behaviour. Specifically, dogs that eat greedily and gasp for breath while eating seem to be more susceptible for stomach torsion that dogs that do not (Van Kruinigen et al., 1974; Glickman et al., 2000).

It also seems there may be a relationship with pre-existing diseases. There are case reports about spleen enlargements, diaphragm fissures, pylorus stenosis, and general results of accidents, which consequently led to stomach torsion (Caywood et al., 1977; Baumberger et al., 1983; Hall, 1989; Millis et al., 1995). But generally, we have not been able to derive valid rules unless we consider the factor of stress. The most current studies are concerned with the behaviour of the dogs. A "happy" character reduces the risk of stomach torsions. It is postulated that anxious dogs have a different gastric motility and thus promote stomach torsion (Glickman et al., 2000). Finally, some have suspected the stomach hormone "gastrin" as a causal factor because gastrin retards the emptying of the stomach and increases the muscle tonus at the pylorus, which could be leading factors for stomach torsion.

Some scientists have examined the influence of the weather as they've noted several stomach torsions are often registered in the same night. They've also noted a tendency for stomach torsions to occur in the summertime (Dennler et al., 2005). However, increases and decreases of atmospheric pressure, such as observed during rapid changes in the weather or before thunderstorms, as well as the phases of the moon do not show any correlation with the occurrence of stomach torsions.

In summary it must be said that there is no proved cause for the occurrence of stomach torsions with the dog. Rather one must speak of predispositions. At risk are large dogs, which have a narrow thorax and are stress-prone.

Pathophysiology

Despite an unclear cause, there is wide concurrence among scientists that a stomach torsion incident begins with the stomach widening (dilatation) (Blackburn et al., 1944; Wingfield et al., 1997). It is only after the stomach dilates, does it rotate clockwise around its longitudinal axis. All turns up to about 360 degrees are possible. The degree of the turn is usually connected with the severity of the symptoms. It often happens that a stomach spontaneously turns back. Those cases are usually misdiagnosed.

During the torsion the dog swallows air, which afterwards cannot be expelled. The changed positions and strangulated stomach entrance and lower oesophagus and pylorus into the small intestine result in unsuccessful retching. During the complete torsion parts of the stomach-end (antrum) and the duodenum move upward (dorsal) and are well visible on the radiograph when filled with air and when the patient is bedded with view from the right. Direct consequences of the turn are severed blood vessels and damages from the pressure to the gastric wall and the spleen. The direct blood loss is not life-threatening. However the tissue damage can quickly lead to necrosis. At that time, toxins from the stomach or intestine escape into the blood vessels, the

abdominal cavity, and thus the body. There are even a few cases in which the stomach burst as consequence of the tension and the weakened tissues. In these situations, aid is already too late.

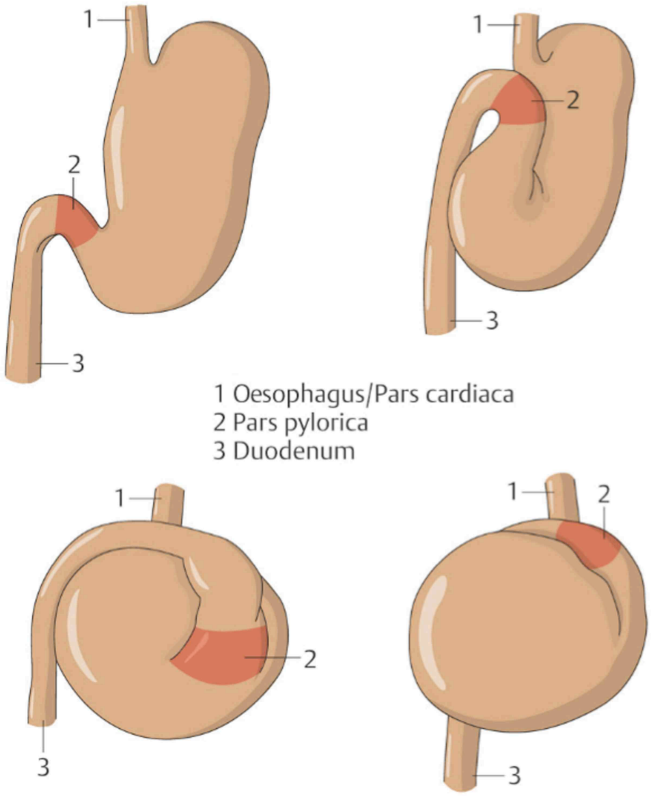

Figure 1: Pathogenesis of a stomach torsion. The stomach bloats and turns clockwise (drawing by Enke, Stuttgart)

The stomach torsion and -dilatation have far-reaching and life-threatening consequences. First, the stomach presses on the cava and prevents an adequate venous return of the blood to the heart. The blood stays in the rear part the body. Later the cardiac output diminishes and the dog goes rapidly into shock with all its dramatic consequences. If the myocardial muscle does not receive sufficient blood for the pumping activity, parts of it can die. This and the toxins present lead to heart rhythm disturbances, which can be seen on an electrocardiogram. Heart rhythm disturbances can begin even hours after a successful therapy (Muir, 1982) was done. The huge stomach continues to press on the diaphragm and the lung, preventing the correct gas exchange due to the resulting restriction in breathing. A further undersupply of oxygen for the total body is an additional effect. As a consequence of the reduced blood circulation, tissue damages occur in all organs. For example, the kidney functions flow, producing less urine and by the oxygen- and blood undersupply, the dog's consciousness becomes clouded.

Naturally the consequences of stomach torsion are not always identical. There are dogs that will die due to untreated shock within few hours. In addition, partial torsions and spontaneous back turns can evolve into a disease process that lasts hours or even days (Rasmussen, 2003).

Typical clinical pictures and diagnostics

The clinical picture of stomach torsion is very typical and arises often some hours after feeding. The most remarkable sign is a massive tightened abdomen. An immense bulge can be seen on both sides of affected dogs. If you thump their sides, it sounds like a moderately tight drum. The dogs are usually very weak and already suffer from the first consequences of shock. Their rapidly worsening general condition is accompanied by unproductive vomiting or retching, drooling, and heavy respiration. From time to time the dogs take the so called “prayer position”. Obviously this provides some relief for the abdomen.

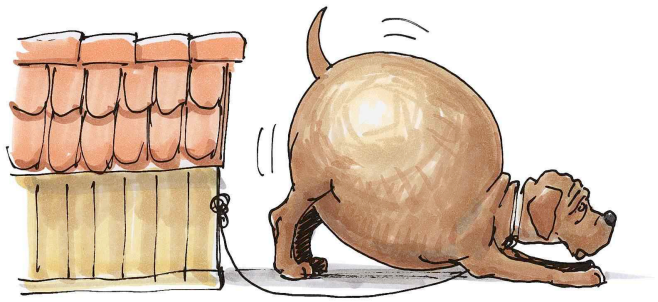

Figure 2: Typical clinical appearance after gastric torsion
with distended abdomen (drawing by Matthias Haab, University Zurich)

It is crucial for prognosis and life expectancy that one consults a veterinary immediately. It has proved that more dogs survive if they are treated by surgery within the first 6 hours after the occurrence of the first symptoms (Beck et al., 2006) that if the treatment occurs later. The veterinary will diagnose the degree of the shock and take an x-ray to prove the problem is stomach torsion and exclude other possible causes such as stomach overloading or tumours. Since the findings of the x-ray are usually clear, very little time is lost, and he can begin therapeutic emergency procedures right away.

Emergency procedures during stomach torsion

The first main problem the veterinarian must deal with is the circulatory shock. For this reason one intravenous access is set (sometimes two), by which the veterinarian gives the animal infusion solutions in high doses. For example, a Great Dane of 70 kilograms gets approximately 7 litres of balance physiological fluids. Analgesics and antibiotics are given as well. With hydration, the flow of blood to the tissue is improved, the blood pressure rises, and the kidneys begin to detoxify.

The second emergency procedure the veterinarian will take is decompression of the distended stomach. After rapid aseptic preparation, a cannula is inserted by puncturing the lateral abdominal wall, enabling the air to escape from the stomach. In this way, he reduces the tensions on the gastric wall and improves the crucial blood flow of the body.

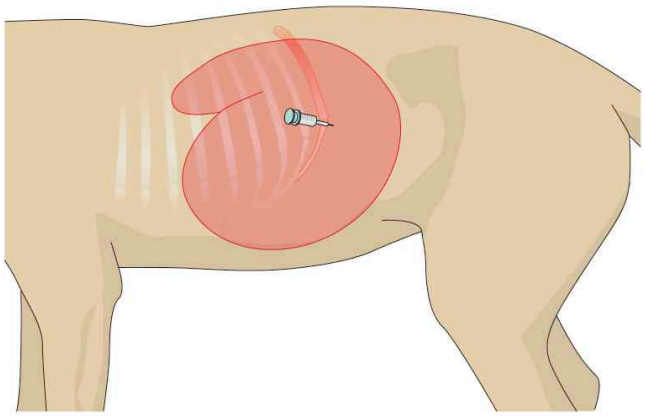

Figure 3: Decompression of the stomach with a canula (drawing be Enke, Stuttgart)

Even if the veterinary surgeon who makes the initial therapy doesn't want/or cannot accomplish the necessary surgery, the two first measures are important cornerstones of a successful therapy. Only after the beginning of infusion and decompression should the veterarian make an x-ray of the abdomen, bedded on the right side, to confirm the diagnosis. With typical stomach torsions, one finds an abdomen that is almost completely occupied by the gas-filled stomach, much food in the stomach, a typical "jelly bag cap" form of the stomach, and lying left above and thus with gas-filled portions of the stomach-end and the duodenum in the upper third of the abdomen.

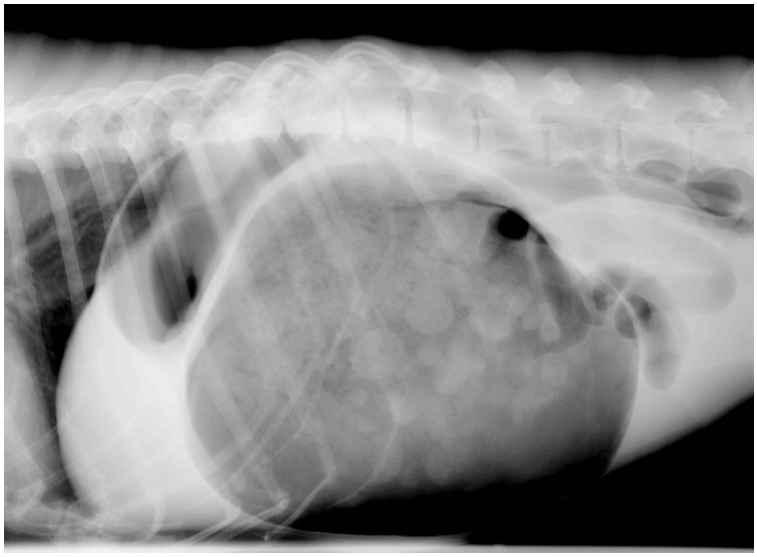

Figure 4: Radiograph of an abdomen in laterolateral projection.
The stomach fills nearly the whole abdomen. A typical "jelly bag cap"
is found in the cranial dorsal quarter.

The prognosis after the treatment of the stomach torsion depends upon the general condition at admission and the operative findings. Late admission (more than 6 hours since the first symptoms), deep shock, coma, heart rhythm and clotting disturbances (DIC), and peritoneum inflammation worsen the prognosis as will be the case if the veterinary had to remove parts of the gastric wall or the spleen with the surgery. The mortality rate of stomach torsions is about 15% to

33 % (Glickman et al., 1994; Brockman et al., 1995; Brourman et al., 1996; Glickman et al. 1998, Beck et al., 2006).

Surgical treatment of the stomach torsion

There is no way to avoid the surgery. After the dog received sufficient liquid, it is put carefully into anaesthesia. Once intubated, the veterinary surgeon should repeat the stomach decompression, as a tube with sufficient interior lumen is led through the oral cavity into the stomach. This is easier in a sitting position than in a lying position of the dog. The vet can bring out small components of fodder, liquid, and air. If necessary the procedure is repeated during the surgery.

During the actual surgery, the veterinary surgeon opens the abdominal cavity of the dog along its centerline. As the first step, the surgeon turns the stomach back into its normal position. Often at that moment, gas spontaneously escapes from the stomach by the oesophagus. If necessary, the veterinary can bring out more of the stomach contents by the tube again. Then, he carefully examines the entire abdominal cavity. If necessary, the surgeon must generously remove badly perforated and dead tissue. Sometimes this has to be done with parts of the stomach and the spleen as well.

To keep the probability of relapse as small as possible, the surgeon must sew the stomach onto the inside of the belly (gastropexy). There are different techniques for this procedure. All of them are designed to prevent the stomach from rotating and releasing again the cascade of life-threatening consequences (Wilson et al., 1996). If no gastropexy is done, the likelihood of relapse is approximately 80% (Dann, 1976). Conversely, relapses after a correctly accomplished gastropexy are only about 5% (Glickman et al., 1998). These numbers are the reason why such surgery is recommended even following a spontaneously turned back stomach.

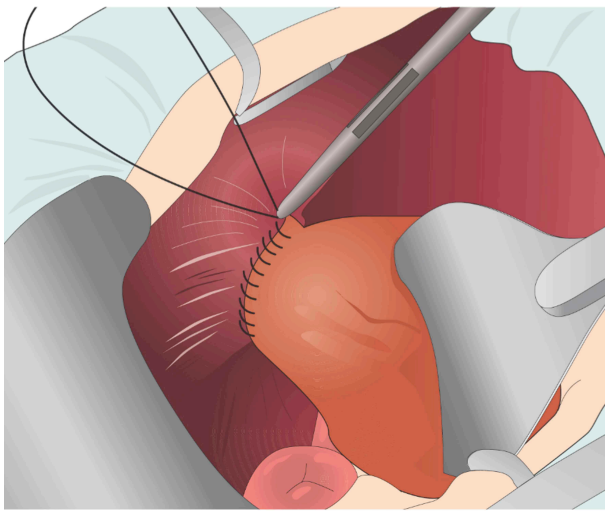

Figure 5: Fixation the the stomach at the right abdominal wall
(incisional gastropexy following Van Sluijs, 1992) (drawing by Enke, Stuttgart)

Usually the dogs remain hospitalized for subsequent treatment at least 24 hours. The consequences of the shock are alleviated with further hydration. Ventricular problems and extra systoles are seen occasionally due to impaired vascular supply during stomach torsion. Only severe tachycardia with loss of pulse sensation should be treated with lidocaine. Cardiac activity is monitored over at least 24 hours and analgesics are given. After 12 to 24 hours, the patients

will get their first food and the practice will monitor the digesting processes. The length of stay in the hospital mainly depends on the complications during and after the surgery. After the convalescence, adverse effects are not usually expected. At most, the restricted movement of the stomach may lead to some temporary vomiting (Leib et al., 1985).

Prophylaxis

Since no actual cause for the stomach torsion is known, all common recommendations regarding feeding and exercise are no guarantees for prevention of stomach torsion. Nevertheless dogs of at-risk breeds and dogs that already have had stomach torsion should be fed at least twice, preferably three times, daily. The food bowl should stand on the floor. The dogs should not be exercised immediately after feeding. Generally stress must be avoided (Whitney, 1989, Glickman et al. 2000; Rasmussen, 1993; Beck et al., 2006). If large dogs and dogs of the risk groups have routine surgery, for example sterilization, and the abdomen is opened anyway, owners should consider preventative gastropexy. The cost and possible complications are much smaller when the surgery is elective than one will find in an emergency situation. (Wilson et al., 1996).

Translation courtesy to P. Dyko & K.C. Thompson

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