

## **Gastric Dilation and Volvulus (GDV) in the Standard Poodle**

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One of the most frightening and fatal diseases seen in poodles of the standard variety is gastric dilatation and volvulus (GDV). This occurs when there is an accumulation of gas in the stomach causing distention, sometimes followed by displacement and torsion, or twisting of the stomach. When the stomach twists upon itself, the major blood supply to the lower half of the body, mainly the gut, is cut off. When this happens, the stomach, intestines, and spleen become oxygen deprived and begin to die. If the GDV is not corrected surgically, the dog will die, often in agonizing pain.

Clinical signs for GDV include distended abdomen (often described as the size of a basketball or bigger), difficulty breathing, white or very pale gums, intermittent retching, percussion of the abdomen (pings indicating air filled stomach instead of fluid filled), and shock leading to collapse. Upon presentation, the dog must be stabilized before attempting surgery. This includes decompressing the stomach with a tube passed down the esophagus if possible, if not than with a large bore needle through the abdominal wall, intravenous fluids, pain medications, oxygen therapy if needed, and electrocardiogram (ECG) monitoring for heart arrhythmias. Once stable, the patient can be prepped for surgery and the stomach is rotated back into place then "tacked" (known as a gastropexy) to prevent future rotation. Occasionally, portions of the stomach may need to be removed if the area has been deprived of oxygen too long, and often a splenectomy, or removal of the spleen, is also performed for the same reasons. Unfortunately, too often the GDV is not discovered in time, and too much of the gut has died to perform surgery. Even when surgical correction is attempted, at least 50% of dogs have poor recovery rates.

The genetic basis for GDV appears to be more conformational than genotypic, i.e. there has not been a discrete gene isolated for the disease. It is most common in large breed, deep-chested dogs. There have been several theories on diet, feeding habits, exercise habits, etc. related to the onset of the disease; at this time many articles have been published, some in direct contradiction of others on advice for decreasing risks for the disease. Several veterinary universities have studied GDV in a variety of breeds, including the poodle. At this time, there is no defined screening test available to determine if your dog will have GDV or produce it. It has been anecdotally noted that GDV appears to have a possible genetic basis, since some lines are more prone to producing GDV than others. It is likely that GDV is under-reported back to breeders, so one may have had bloat occur in their line and not even know about it.

As a breeder of standard poodles, GDV and its cause and heritability are definitely a concern of mine. It seems that bloat is becoming more common in the breed, and that there are no clear recommendations on prevention of the disease or breeding to prevent reproducing animals prone to the disease. In speaking of the incidence of GDV

with European and Australian breeders, it does seem as if bloat occurs more in the United States. Why is this so? What are the differences that make it more prevalent here? Is it conformation (not likely in my opinion, but certainly a possibility), diet, environmental, or some other unknown factor? Dr. Larry Glickman has published several papers concerning GDV in different breeds, including the standard poodle.

I have been breeding and showing standard poodles since the early 1990s, although my family has had standard poodles as pets since before I was born. Not one of my family pets ever bloated. Until 2007, not one of the dogs in my household had ever bloated; although some of the puppies I sold did bloat (all of those reported back to me are listed in the health section of my website). I had performed GDV surgery on several different breeds, including the most unlikely bloat candidate, an 11 year old spayed female miniature daschund that bloated and torsed while boarding in the kennel facility of the veterinary practice. She was quite lucky in that the incident occurred on a Saturday morning and the kennel staff noted she looked like she had gained 10 pounds since they had fed her an hour before (her stomach was grossly distended). She was bright and alert, no retching, walking about seemingly without discomfort, and other than a hugely distended abdomen she had no other signs. The x-ray revealed that she had bloated and torsed, yet she did not seem even slightly concerned with her precarious state. She was rushed into surgery within 15 minutes from the time she bloated, and her stomach was indeed twisted but all her abdominal organs were pink and normal looking, other than her liver. Her liver was enlarged, with multiple nodules throughout all the liver lobes and had a firm, roughened feel to it rather than the smooth edges of a normal liver. Her enlarged liver had pushed her stomach out of position and was most likely the cause of the GDV. Because of the immediate surgical intervention she did quite well, had a very smooth post operative recovery, with none of the complications of a typical bloat. Biopsies of her liver revealed benign hepatic hyperplasia (enlargement of the liver) secondary to Cushing's disease (confirmed by further diagnostics). She was successfully treated for Cushing's disease and lived another 4 years, never to bloat again (her stomach was also pexied or "tacked" to the abdominal wall during the surgery).

I bring up the daschund case in order to point out that not all dogs present with classic symptoms during a GDV episode, and that the earlier one realizes that something is "not quite right" the sooner surgical intervention can be initiated and the better the prognosis for recovery. Another example of an atypical case is that of one of my own dogs, Ch Tivin Spirit in the Sky (Dianna) who bloated and torsed in November of 2007. Dianna is 9 years old, has never had any health concerns, and has never even had an upset stomach. She is a good eater, a toy destroyer, and is otherwise an active, healthy 9 year old. She whelped several litters without incident and was spayed when she was 6 years old. She has been under anesthesia for a dental cleaning and a cutaneous mass removal, which was benign. It was to our shock and dismay when she bloated in the middle of the night in November.

It had been a regular day for Dianna – she had gone to work with me, came home and was exercised with the other dogs, and then spent the evening on the couch watching the news with us. I fed her along with the others in their crates and let them rest for 2

hours before letting them out one final time for the night. I did notice that she had snatched left over food from other dog bowls on her way in for the night, but I didn't really pay any attention since she has done this before. We all went to bed at the normal time and she appeared perfectly fine at 11 pm.

Dianna sleeps with my son Jordan on his bed with him, and the room has a swinging gate which is closed at night. Imagine my surprise when I heard the gate open in the middle of the night (I am a very light sleeper) and saw Dianna trot into my bedroom. She has never done that before and a glance at the clock showed that it was 3:30 am. I turned on the light and looked at her – she seemed uncomfortable but not yet in distress. I was not sure what bothered her, but she had never opened the gate and left Jordan's room before – I didn't even know she knew how to do it. I gave her some water, which she drank, and I tried to get her to settle into sleep on our bed. She refused to get on the bed and began pacing and looking at me as if to say – can you please help me? I did do a physical exam, but even then everything appeared normal other than that she was slightly uncomfortable on palpation of her abdomen. I went downstairs with her and took her outside and she promptly urinated and also ate some grass. So I figured she had just needed to go to the bathroom and I took her back to bed.

Again, Dianna refused to get up on the bed and she began pacing the bedroom and wretched a couple of times. Now *my* stomach dropped and I thought, oh my God I think she may be bloating. Even though I could not tell for sure, I knew never to take the chance. It was now 4 o'clock in the morning, and my practice is not a 24 hour facility. I also don't much care for the emergency facility in my area, and anyway I have never wanted anyone else to doctor my own dogs. Inside I was falling apart, imagining all the horror stories of bloat, having performed the surgery several times before, knowing the statistics of survival. Outside, I could not afford to think in any way other than positive, and immediate action was required. I called my sister, Jenn, who is a 4<sup>th</sup> year veterinary student at Tufts (yes, it runs in the family), and another veterinarian in the practice, Dr. Heather Washburn, and asked them to meet me at the hospital.

Within 15 minutes I was taking an x-ray of Dianna, and sure enough her stomach was huge, air-filled, and obviously twisted. By this time she was scared and in pain, and her eyes were begging me to help her. My sister and Dr. Heather had not arrived yet, so I began placing an IV catheter to bolus her on fluids to treat for shock, which was just beginning. I also shaved and scrubbed an area over her swollen stomach, and placed a large bore needle directly into her side, which by now was tight as a drum. Air rushed out through the needle, a horrible sibilant hissing. Tears tracked down my face and fell to the floor, and I began to shake. My sister and Dr. Heather arrived and within minutes had me get myself under control and focused. I had to think of Dianna as my patient, not as my beloved family member, and I had to save her life.

Within another 15 minutes Dianna was under anesthesia and prepped for surgery on the operating table. Jenn monitored her anesthesia and Dr. Heather assisted the surgery. I was scrubbed and gowned, and with a deep breath I placed the scalpel to her skin and cut. Upon exposure of her stomach, I could see why her bloat was not initially

obvious. Dianna is tall and very deep-chested and her stomach had nearly entirely expanded under her ribcage. I could barely fit my gloved hands between her ribs and her bloated stomach. I started to shake and tears gathered in my eyes, and again Jenn and Heather talked me through it to get me focused and detached, which is necessary for a surgeon performing a difficult procedure on their own family member. I was finally able to flip her stomach back into its normal position, and Jenn placed a lavage tube into her stomach to empty it of air and ingesta. We had been unable to place the tube earlier, because her stomach was twisted so tightly it could not be passed.

With the passing of the tube, the air rushed out of her stomach, followed by fluid, grass, and other ingested materials. Her heart rate, which had been high and irregular, nearly immediately slowed down and became steadier. My heart rate also began to slow down and steady, now that the immediate danger had passed to my beloved dog. Dianna's spleen had become discolored and distended when the blood flow was cut off, and I now evaluated that organ to determine if I should perform a splenectomy before tacking her stomach. As I watched the blood flow return to the spleen, its color changed from a ghastly purple-black hue to the typical dark maroon. Despite its distended size, I decided that the damage had been minimal, and I did not remove her spleen, knowing it would return to a more typical appearance over time. Other than her stomach and spleen, the rest of Dianna's abdominal organs appeared to be functioning within normal limits.

Dianna's stomach, now deflated like a spent balloon, was huge and flaccid. Although it was pink and had vessels pulsing in rhythm to her heart beat, it was so grossly distended that I did not know if her stomach's contractile ability had been permanently damaged. If it had, even with surgery, Dianna would die. There was no discoloration of the stomach walls, no areas that appeared compromised or otherwise indicated removal. It was just huge and had absolutely no contractile activity. I could only go on with the pexy, and hope that her stomach would begin to shrink and contract now that it was no longer twisted.

The pexy portion of the surgery requires that the surgeon visualize the correct placement of the stomach when the dog is upright (rather than on their back as they are during surgery) and then tack the stomach wall to the abdominal wall in order to prevent torsion in the future. It may seem like this is not that difficult, but when faced with an over-stretched stomach, deciding where to make the cuts and sutures is not as easy as it seems. If the surgeon makes the wrong placement, the stomach may have trouble shrinking back to its customary size and position, may contract around the suture line, or may simply break away from the sutures resulting in failure of the pexy and risk of future torsion. In Dianna's case, I estimate that her stomach was approximately five times its regular size. I evaluated the placement of her liver, spleen, and kidneys, and estimated where her stomach would normally lie. I made an incision in the outer wall of her stomach, and on the abdominal wall, and sutured the two of them together. Now all that was left was to close her up and pray.

Dianna had a bit of a rough recovery from anesthesia. She had expelled large amounts of fluid from her stomach during surgery, and there was a high risk for

aspiration pneumonia. We had to balance her pain control along with her risk for cardiac and pulmonary arrest, a fine line to navigate. She was placed on a morphine drip for continuous pain management, and on a heart monitor for evaluating her ECG, oxygenation, and pulse. At 9 years of age, her chances for a full recovery were no better than fifty-fifty and if she developed complications, she would likely die.

It was now 6:30 am and I had to work a full day that Saturday, after being up all night and going through an emotional roller-coaster, still not knowing if Dianna would live or die. Only time would tell. The first few days were difficult – while her pain was under control, x-rays revealed that her stomach was not shrinking, and ultrasound showed grainy grey pictures of swirling fluid with little to no stomach wall contractions. She had no appetite but also no vomiting, and so far no aspiration pneumonia, although she had been placed on very strong antibiotics in hopes of preventing such a complication. Her medications were adjusted, her fluids and monitoring continued. I was able to take her home, and turned my living room into an intensive care unit, so she could stay on intravenous therapy. Three days post-operatively, she was finally willing to eat a little, and seemed slightly perkier. She was still on IV medications and fluids, but she occasionally stood up and turned around, and she now appeared interested in what was going on around her. Five days post-operatively I discontinued her fluids and switched her to all oral medications. Her stomach was still quite large on x-ray, but ultrasound did show that stomach was beginning to contract.

Ultimately, Dianna did recover. She is now back to her normal self, still trying to steal food from other dog's bowls, and otherwise being the boss lady. I, however, am not sure if I will every fully recover. Every time Dianna, or any other of the dogs, makes even the slightest coughing or retching sound I run over to them to check their stomach and mucous membranes (to evaluate circulation). It is not unheard of for me to wake from a sound sleep in the middle of the night to the sound of a cough. Hopefully time will heal me as well. I don't know why Dianna bloated that night. It was not any different than dozens of other nights. I wrack my brain trying to think what I could have or should have done to prevent the circumstances from occurring. Perhaps there was nothing I could have done other than what I did.

Dianna had a severe case of GDV, with huge distention and questionable recovery. She was in surgery and her stomach untwisted within 45 minutes from the onset of her bloat, and even then she nearly did not recover. Unfortunately, many owners either are not aware of the bloat within 45 minutes, or precious time is lost getting to the hospital, getting the diagnosis, and getting the dog into surgery. The veterinarian and his/her staff can also make a difference on prognosis. An experienced staff and surgeon will have the patient diagnosed and under anesthesia immediately, while a more inexperienced or tentative doctor may not be as quick to act. I am an experienced veterinarian but even so, at home, I was unsure whether or not Dianna was truly bloating. Only the x-ray was definitive in her case, and if I had hesitated in taking her into the hospital, she would have died. How much more difficult it must be, then, for an owner in the middle of the night, without the luxury of calling in an experienced staff to their own hospital.

Bloat is a frightening, often fatal disease. It strikes without warning, sometimes without “typical” signs, and in spite of our best efforts to avoid it. Earlier in this article I mentioned that GDV is not as common an occurrence in other countries as it appears to be in the United States. I am not sure if this is because it truly does not occur as much in other countries, or if it is just under-reported. Perhaps a researcher in the future will be interested in conducting a study to determine if there is a difference, and if so what that difference is. Any information that will help standard poodle breeders in avoiding this disease will be useful, and possibly life-saving. Experiencing the pain, sadness, and uncertainty of this disease, in intimate detail, has certainly affected me. I want to extend a special thank you to my sister, Jennifer Hall (soon to be Dr. Jennifer Hall) and my colleague and friend, Dr. Heather Washburn, for being there for myself and Dianna in our time of need. Their dedication, experience, and skill were invaluable and my thanks cannot be measured.