

Comparison of Two Surgical Treatments of Gastric Dilatation-Volvulus in Dogs

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Eggertsdóttir A. V., Ø. Stigen, L. Lønaas, Ø. Kolbjørnsen and L. Moe: Comparison of two surgical treatments of gastric dilatation-volvulus in dogs. Acta vet. scand. 1996, 37, 415-426. – The purpose of this randomized clinical study was to compare the effect of 2 surgical methods in the treatment of gastric dilatation-volvulus (GDV) in dogs. One group of dogs (group A) was treated with and one group (group B) without fixation of the stomach.

Group A consisted of 21 cases (including 2 dropouts) and group B of 10 cases. The dogs in group A received decompression, anatomical repositioning of the stomach and a circumcostal gastropexy and the dogs in group B (the control group) received the same treatment without gastropexy. Supportive treatment was the same for both groups. The randomization of the dogs in groups A and B was successful with only small differences between the 2 groups in the breed, age, sex and initial decompression methods.

At the end of the study (censoring time), the median survival times were significantly different between group A and group B, respectively 549 and 107 days. There were no recurrences in group A while in group B 3 dogs (50%) experienced a recurrence within 6 months. The overall death rates within the first year were 32% in group A and 80% in group B. The death rates caused by GDV and GDV related causes only, after one year of follow-up, were 19% and 71% for groups A and B, respectively.

This study shows that treatment that included circumcostal gastropexy significantly reduced the recurrence of GDV and prolonged the postoperative survival time compared with treatment that did not include fixation of the stomach.

torsion; syndrome; circumcostal gastropexy.

Introduction

Gastric dilatation-volvulus syndrome (GDV) is a medical and surgical emergency which predominantly occurs among large, deep-chested dogs. This syndrome represents a great challenge to the veterinary practitioner in both its acute life-threatening stage and in the prevention of its recurrence.

Retrospective studies of conservative and surgical treatment of GDV, without fixation of the stomach, have shown that the recurrence rate is

42-71% in dogs that have survived an acute attack of the disease (*Funkquist 1969, Wingfield et al. 1975, Dann 1976, Fjeld & Eggertsdóttir 1988, Eggertsdóttir & Moe 1995*). Various surgical techniques to reduce the likelihood of recurrence have therefore been advocated. Most of these techniques involve fixation of the stomach. These techniques include gastropexy (*Christie & Smith 1976*), "permanent" gastropexy (*Betts et al.*

1976), tube gastrostomy (Parks & Greene 1976, Johnson et al. 1984, Flanders & Harvey 1984, Fox 1985, Van Sluijs 1987), incisional gastropexy (MacCoy et al. 1982), muscular flap gastropexy (Schulman et al. 1986), belt-loop gastropexy (Whitney et al. 1989) and fundic gastropexy (Frendin & Funkquist 1990).

Fallah et al. (1982) described an experimental method, later called circumcostal gastropexy, in which a flap from the serosa-muscularis layer of the gastric antrum is created by stump dissection and sutured around a rib. Since this initial description several reports using this technique have been published (Fox 1985, Leib et al. 1985, Woolfson & Kostolich 1986) These studies concluded that circumcostal gastropexy has several advantages because it is relatively simple and rapid to perform, the stomach is not opened and its physiologic position is only slightly altered. However, the most important advantage of performing a circumcostal gastropexy seems to be that it is effective in preventing or reducing the recurrence of disease.

In Norway, most dogs with GDV are treated conservatively, by emptying the stomach with an orogastric tube, or surgically, with gastrostomy in the acute stage of the disease (Fjeld & Eggertsdóttir 1988, Eggertsdóttir & Moe 1995). If a tube can be passed into the stomach surgery is most often avoided, but if gastrostomy is performed and the patient is stabilized, the stomach is repositioned without fixation. Fixation of the stomach has not yet been included in the routine treatment of GDV.

To the knowledge of the authors there have not been studies on the treatment of GDV that have systematically compared fixation of the stomach with treatments that do not involve fixation. The purpose of the present study was to compare the results of 2 different surgical methods, one with and one without fixation of the stomach, in the treatment of GDV in dogs.

Materials and methods

Study design

The study was designed as an open, randomized clinical trial with 2 groups. Group A received decompression and anatomical repositioning of the stomach and a circumcostal gastropexy (treatment A) and the control group, group B, received the same treatment without gastropexy (treatment B).

The size of the treatment groups was decided on the basis of pre-study calculations that estimated the lowest acceptable difference in recurrence rate between the 2 treatments that the study should be able to determine, and took into account the time available for the study and economic limitations. It was calculated that at least 30 cases should be included and the maximum duration for the collection of cases should be 2 years.

All the dogs in the 2 groups received essentially the same physical examination, the same supportive pre- and postoperative treatment and care, and were fed the same food during the entire study period. The study was designed so that the only difference between the 2 groups should be the surgical procedure (see below).

The treatment received by a referred case, was determined by a block randomization procedure using a computerized random generator. The results of the randomization procedure were sealed in numbered envelopes. The sequence of treatments A and B was kept blind for the participating veterinarians in inclusion of cases. The owners were informed about the study and if the owner's consent was obtained, the dog was included in the study. After the patient had been prepared for surgery and anaesthetized, the envelope containing the predetermined treatment, was opened.

Otherwise the study was conducted in an open manner. Both the veterinarian performing the follow-up examinations of the dogs and usually the owner knew which treatment had been given.

Selection criteria

Only dogs that had not experienced an acute attack of GDV in the last 5 months were included in the study. All breeds, ages and both sexes were allowed. The time between the acute stage of the disease and arrival at our clinic had to be less than 10 days. All kinds of preoperative treatments were accepted before inclusion in the study.

The material consisted of 31 dogs, from 16 breeds, that were referred to the Department of Small Animal Clinical Sciences, Norwegian College of Veterinary Medicine between March 1991 and November 1992. The diagnosis of GDV was made by the referring veterinarian.

Of all the dogs included, 2 cases, numbers 7 and 12 (Table 1), had previously suffered from GDV. For both dogs this was their second occurrence of GDV. The first occurrence was 7 and 5 months earlier, respectively.

The initial gastric decompression treatment that the dogs received from the referring veterinarian is listed in Table 1. For 6 of the dogs, the initial decompression of the stomach using an orogastric tube had not been successful. In these dogs the stomach was distended on arrival and the dogs were operated upon immediately. Treatment for shock had been initiated in all the dogs by the referring veterinarians.

There were 2 dropouts in the study, cases numbers 17 and 26. These 2 dogs were euthanized during surgery due to severe gastric necrosis (Table 1).

During the study period, 5 additional dogs with GDV were treated at the clinic. These dogs were not included because they did not fulfil the selection criteria.

Statistics

Mean values were compared using a t-test, and recurrence and death rates were compared using a 2-tailed Fisher's exact test (JMP 1989; JMP, SAS Institute Inc., and Epi Info 1990 version 3). A probability of $p \leq 0.05$ was considered

to be statistically significant. Kaplan-Meier curves and Cox proportional hazard ratio were calculated using *Egret* version 0.03, *Serc & Cytel* 1991, (*Altman* 1991).

Clinical examination and laboratory analyses

On arrival, all the dogs received a general physical examination and blood samples for haematology and clinical chemistry were collected. The parameters measured included total number of red blood cells, white blood cells, platelets, neutrophils, lymphocytes, monocytes, eosinophils, basophils and measurement of haematocrit and haemoglobin^a and the determination of serum concentrations of alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, creatine kinase, total bilirubin, cholesterol, plasma proteins, urea, creatinine, calcium, inorganic phosphate, sodium, chloride, potassium, glucose, carbon dioxide^b amylase, lipase^c and bile acids^d. Blood samples for arterial acid-base values were collected from 26 dogs with a heparinized arterial blood sampler^e and analyzed^f. The haematology sample for one dog (case number 7) was not analyzed. The blood samples for 2 dogs that were euthanized during the operation (cases numbers 17 and 26), were not analyzed. There were no significant differences between the mean values of the blood-parameters in the 2 groups except for globulin and calcium. The mean values in group A were 32.7 g/l for globulin and 2.5 mmol/l for calcium while the re-

^a Technicon H*1 haematology analyzer.

^b Technicon Axon analyzing system, Technicon reagents.

^c Technicon RA 1000 analyzing system, Boehringer reagents.

^d Technicon Axon analyzing system, Nycomed reagents.

^e Gaslyte, Marquest.

^f Radiometer ABL 4.

Table 1. Clinical data and outcome for 31 dogs with gastric dilatation-volvulus (GDV) in a randomized clinical trial, comparing 2 different surgical treatments of the disease. Group A received a circumcostal gastropexy and group B an exploratory laparotomy, without fixation of the stomach.

Case no	Breed	Age (Years)	Sex	Initial decompression	Days until treatment A or B	Outcome	Follow-up (Days)
Group A (treatment A):							
1	Great Dane	6	F	Gastrostomy	4	Mammary cancer	311
2	German Shepherd	2	F	Gastrostomy	1	Alive	918
3	Doberman Pinscher	4	M	Orogastric tube	1	Alive	914
5	Greenland Dog	12	M	Gastrostomy	1	Gastric ulcer	332
8	Bullmastiff	6	F	Orogastric tube*	0	Gastric rupture	4
9	Great Dane	1	M	Gastrostomy	2	Alive	796
12	Great Dane	8	F	Orogastric tube*	0	Alive	623
13	Airedale Terrier	10	M	Orogastric tube	1	Seizures	549
14	Great Dane	6	M	None*	0	Malignant lymphoma	476
16	German Shepherd	6	M	Orogastric tube	2	Alive	531
17	Doberman Pinscher	6	F	None*	0	†	–
19	Doberman Pinscher	5	F	Orogastric tube	9	Alive	502
21	Doberman Pinscher	5	F	Orogastric tube	5	Alive	486
22	Berner Sennenhund	7	F	Exploratory laparotomy*	1	Gastric rupture	18
23	Rottweiler	6	M	Orogastric tube	1	Aggressive	371
24	Standard Schnauzer	6	M	Orogastric tube	1	Poly-arthritis	183
26	Akita Inu	7	M	None*	0	†	–
27	Flat-Coated Retriever	6	F	Exploratory laparotomy	5	Alive	397
28	German Shepherd	6	M	Exploratory laparotomy*	5	Alive #	393
29	Standard Poodle	9	M	Orogastric tube	0	Alive	376
31	Pointer	5	F	Gastrocentesis*	0	DIC □	1
Group B (treatment B):							
4	Flat-Coated Retriever	8	F	Gastrostomy	1	Alive	898
6	Doberman Pinscher	8	M	Gastrostomy	3	Aggressive §	259
7	German Shorthaired Pointer	12	F	Orogastric tube	1	Recurrence GDV §	30
10	Great Dane	9	M	None*	0	Dysuria #‡	38
11	Doberman Pinscher	8	F	Orogastric tube	0	Recurrence GDV	356
15	Bullmastiff	6	F	Orogastric tube*	0	Cardiac arrest	1
18	Gross. Schw. Sennenhund	6	F	None*	0	Aggressive	77
20	German Short-haired Pointer	5	F	Orogastric tube*	1	Alive	489
25	German Shepherd	4	M	Orogastric tube*	1	Recurrence GDV §‡	135
30	Borzoi	7	F	None*	0	Cardiac arrest	1

* General condition depressed and not stabilized.

† Euthanized during surgery due to severe gastric necrosis.

□ Disseminated intravascular coagulopathy.

Cardiac arrhythmia.

§ Autopsy was not performed.

‡ Splenectomy.

spective values in group B were 25.1 g/l and 2.3 mmol/l.

A 1×1 cm biopsy of all the ventricular layers was collected from the corpus of the stomach and fixed with 4% formaldehyde. The biopsy site was closed with interrupted sutures of polyglactin 910^g. The biopsies were stained with haematoxylin and eosin, Van Gieson, periodic acid Schiff and Martius scarlet blue reagents for histological examination.

The results of the histological examination of the biopsies taken from the stomach walls showed no differences between the 2 groups. Electrocardiography was performed on 18 dogs before the operation and on 5 dogs postoperatively. The electrocardiograms were normal for all dogs except 2 (Table 1).

Preoperative treatment

All dogs received an intravenous (i.v.) infusion of lactated Ringer's solution^h 15-30 ml/kg/h, depending on the status of the patient and ampicillinⁱ 50 mg/kg i.v. The dogs that were operated on immediately also received flumethasone^j 0.5 mg/kg i.v. The dogs were anaesthetized with propofol^k 4 mg/kg i.v. Further anaesthesia was maintained with a mixture of isoflurane^l and oxygen. Nitrous oxide gas was only used after drainage from the stomach had been achieved during surgery. Case number 28 received antiarrhythmic therapy before surgery with propranolol tablets^m 0.5 mg/kg orally.

The general condition prior to surgery was not stabilized in 6 dogs (32%) (excluding 2 drop-outs) that received treatment A and in 6 dogs (60%) that received treatment B (Table 1).

Surgical treatment

In both groups a standard midline abdominal incision was performed. If the dogs had received a gastrostomy for gastric decompression in the acute stage of the disease, the gastrostomy operation site was first closed routinely.

As for the dogs that had received an exploratory laparotomy in the acute stage, the same midline incision was used to enter the abdominal cavity. The abdominal cavity and organs were examined for abnormalities and the stomach was repositioned. If needed, the stomach was emptied with an orogastric tube or by gastrostomy if the food remains did not pass through the tube. Splenectomy was performed in cases numbers 10 and 25 because of severe congestion and traumatic haemorrhage, respectively. The dogs included in treatment B received no further operative treatment, while in the dogs receiving treatment A, a slight modification of the method for circumcostal gastropexy as described by *Fallah et al.* (1982) was performed (Fig. 1). Traction sutures were placed approximately 10 cm apart on the ventral pyloric antrum. The sutures were held by an assistant. Two 2-3 cm long incisions were made with scissors, 2 cm apart, penetrating the serosal and muscular layers only. Both incisions were parallel with the long axis of the antrum. Cutting blood vessels was avoided as much as possible. The muscle layers between the incisions were undermined with scissors and cut with a scalpel to create 2 flaps, that were large enough to be joined around a rib without excessive tension. The 11th or 12th rib on the right side was used for costal fixation. One of these 2 costal arches was exposed by incising and reflecting the musculature for approximately 5 cm at the costo-

^g 00 Vicryl, Ethicon, Inc. Sommerville, New Jersey.

^h Ringerlactat[®], Pharmacia AB, Stockholm, Sweden.V

ⁱ Doctacillin[®], AB Astra, Södertälje, Sweden.

^j Fluvet vet.[®], Leo, Løvens kemiske Fabrik, København, Ballerup, Danmark.

^k Rapinovet vet.[®], Pitman-Moore, Harefield, Uxbridge, Middlesex, England.

^l Forene[®], Abbott Laboratories, USA.

^m Inderal[®], Zeneca Ltd., Macclesfield, Cheshire, England.

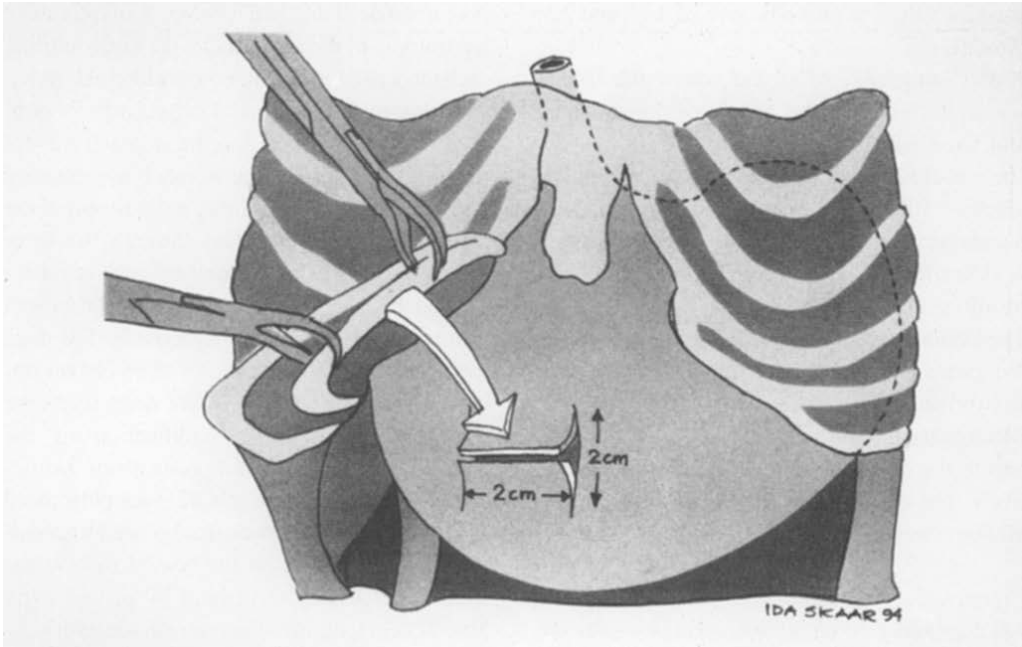


Figure 1. Illustration of the circumcostal gastropexy flap technique used in the treatment of dogs with GDV in group A (see Table 1)

chondral junction. Care was taken to remain caudal to diaphragmatic attachments. Stay sutures were placed through all stomach layers at each corner where the cranial flap attached to the stomach. These stay sutures were to assist in bringing the flap around the exposed rib. The suture ends were passed around the exposed rib and the stomach was pulled against the right abdominal wall. The cranial flap was carefully passed around the rib using Allis tissue forceps. The 2 flaps were then sutured to each other with simple interrupted sutures (polypropyleneⁿ) and the stay sutures were removed.

Twenty-three dogs were operated upon within

one day and the remaining dogs between 2 and 9 days after the acute appearance of the disease. The median time between the initial gastric decompression and the final operation was 1.0 days (mean 1.9 days) in group A and 0.5 days (mean 0.7 days) in group B (Table 1).

Postoperative treatment

After the operation the dogs were monitored closely in the intensive care unit. An intravenous infusion of lactated Ringer's solution (60 ml/kg/day) was maintained for 2 days and on the third day the dogs were allowed for the first time to drink water (50 ml/kg/day) and eat small amounts of a high fibre diet^o. The amount of food was initially limited to 10% of their estimated daily food intake and then to 30% on the fourth day and to 60% on the fifth day. Ampicillin was given intravenously for 6 days (25

ⁿ 00 Prolene, Ethicon, Inc., Sommerville, New Jersey.

^o Hill's w/d diet, Hill's pet products Inc., Topeka, Kansas, USA.

mg/kg, twice daily). Blood samples for haematology, clinical chemistry and arterial acid-base values were collected for haematology and clinical chemistry one or 2 days after the operation. Complications were treated immediately, thus case number 10 received antiarrhythmic therapy with lidocaine^P 4 mg/kg i.v. as a slow bolus injection. This case and case number 28, received further treatment with propranolol tablets, 0.5 mg/kg, 3 times daily for 10 days post-operatively.

If there were no signs of complications, the patients were released after a week. All the dogs were fed a high fibre diet for a minimum of 6 months and the food was supplied by the clinic, to encourage the owners' compliance. For the first 4 weeks after the operation, the dogs were fed 3 times a day and after that twice a day. Written instructions were given to the owners with calculations of the daily food and water intake for their dog. The owners were advised to contact the clinic immediately if their dogs' condition deteriorated. A routine clinical follow-up examination was performed 3 times during the first year, with the first examination occurring one to 3 months after the operation. In addition to breed, age, sex distribution and follow-up time, the number and the date of recurrence of GDV were recorded. The number and date of death caused by GDV, GDV related causes or other causes were also recorded in both groups. In addition, any gastrointestinal problems following the surgery were recorded.

Results

There were 2 dropouts in the study and 5 dogs died 1-18 days postoperatively due to GDV-related complications (Table 1). Thus 24 dogs were available for follow-up evaluation.

The follow-up time together with the breed, age

and sex distribution are listed in Table 1. The study ended on November 1st 1993 (censoring time) and the median follow-up time for group A was 397 days (mean 430 days) and 106 days (mean 228 days) for group B.

The outcome for the dogs in the study is listed in Table 1. At the end of the study 10 dogs were alive in group A and 2 dogs in group B. In group A, 3 dogs died due to GDV-related complications. Two of these had ruptures in the fundus part of the stomach whereas one dog died as a result of a chronic gastric ulcer that perforated 11 months after surgery. The latter dog had been treated with corticosteroids because of coxarthrosis and the ulcer was discovered at necropsy. Five dogs were euthanized in this group because of allergy and polyarthrosis, mammary cancer, aggressiveness, malignant lymphoma and seizures. In group B, 2 dogs died from GDV-related complications. One dog was euthanized because of dysuria and 2 dogs were euthanized because of aggressive behaviour.

The non-recurrence probability within 6 months is shown in Fig. 2. It was unchanged after one year of follow-up. The recurrence rates within 6 months were significantly different between the 2 groups with 0 (0/16) recurrences in group A and 50% (3/6) in group B (Fisher exact test $p = 0.01$). Three dogs in group A and 4 dogs in group B died within 6 months (withdrawals) and were not available for calculation of the recurrence rate (Table 1).

The overall death rates within the first year were 32% (6/19) in group A and 80% (8/10) in group B (Fisher exact test $p = 0.02$). The death rates caused by GDV and GDV-related causes only, after one year of follow-up, were 19% (3/16) and 71% (5/7) for groups A and B respectively (Fisher exact test $p = 0.02$). Three dogs in both groups died within one year (withdrawals) from causes not related to GDV and were not available for calculation of the death rate due to GDV-related causes (Table 1).

^P Xylocard[®], AB Hässle, Göteborg, Sweden.

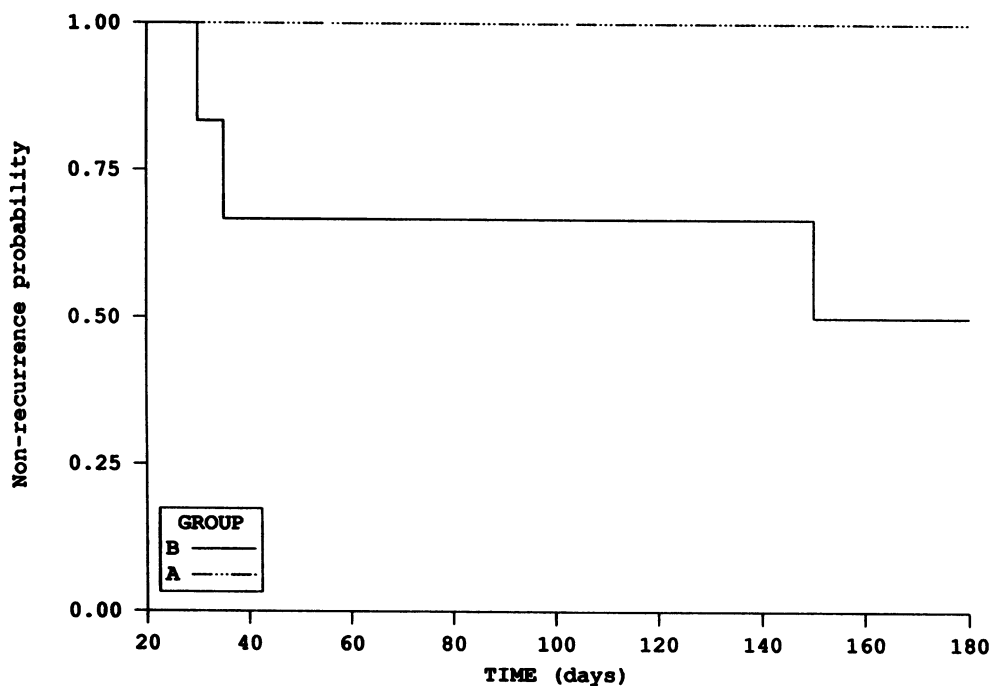


Figure 2. Kaplan-Meier non-recurrence curves for dogs with GDV (see Table 1) in group A ($n = 16$) and in group B ($n = 6$). Withdrawals are not indicated on the figure.

The survival probability including all causes of death is shown in Fig. 3. The median survival times were 549 days in group A and 107 days in group B. The estimated hazard ratio calculation ($R = 0.36$ (95% confidence interval 0.14–0.95); $p = 0.04$) showed that the relative survival for group A was significantly longer than for group B.

Since 5 dogs died postoperatively from GDV-related complications, the median follow-up time from treatment until death for the remaining 12 dogs was 351 days (mean 370 days) for the dogs that received treatment A and 106 days (mean 149 days) for the dogs that received treatment B.

Three owners complained that their dogs had gastrointestinal problems after treatment A (cases numbers 5,9,19). The dogs were placed

on different diets. Two of these dogs regained normal gastrointestinal function, but case number 5 continued to have occasional vomiting problems.

Discussion

There is much historical information about the results of treatment of GDV without fixation of the stomach (treatment B), and the aim of the present study was to investigate the effect of treatment that included fixation (treatment A). From the literature and preliminary data we expected treatment that included fixation to be better in preventing recurrence of disease, than the treatment that did not include fixation. Under these circumstances it seemed unethical to have too large a control group. It was there-

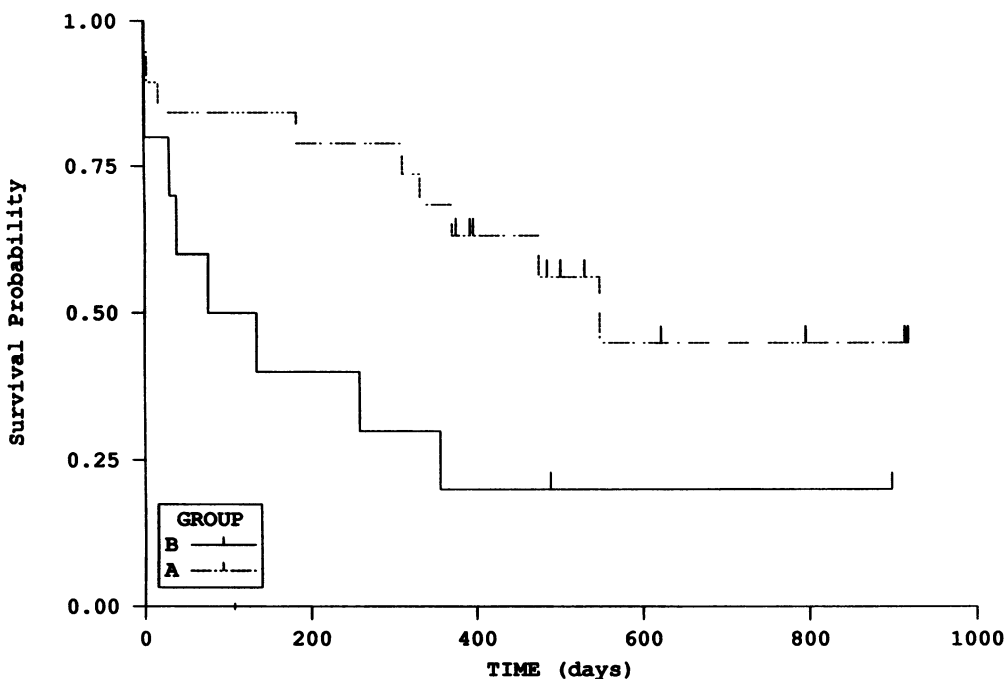


Figure 3. Kaplan-Meier survival curves for dogs with GDV (see Table 1) in group A ($n = 19$) and in group B ($n = 10$). All causes of death are included. A vertical bar indicates dogs that were alive at the end of the study (censoring time).

fore decided to allow twice as many cases to receive treatment A as received the control treatment B. Therefore the groups are unbalanced. In the present study a comparable distribution of the dogs in group A and B was achieved by the randomization procedure. There were only small differences in the breed, age, sex and initial decompression methods between the 2 groups. Thus, the randomization reduced selection biases and improved the reliability of comparisons between the 2 groups.

The difference between the 2 groups was the surgical method and there were no recurrences in group A whereas the recurrence rate in group B was 50%. The values in both groups are similar to or better than other recurrence rates that have been reported following surgical repositioning without fixation of the stomach (*Wing-*

field et al. 1975, *Dann* 1976, *Fjeld & Eggerts-dóttir* 1988) However, it is well recognised that the results of a clinical trial are often better than would be expected from historical data. This is partly explained by the controlled conditions in clinical trials that are not achieved in the normal clinical situation. Nevertheless the significant difference identified between the 2 groups in the present study indicates that for the prevention of recurrence of GDV, a circumcostal gastropexy (treatment A) is better than no fixation of the stomach (treatment B).

Other studies have reported low recurrence rates (0%-6.9%) following identical or comparable gastropexy methods (*Leib et al.* 1985, *Schulman et al.* 1986, *Woolfson & Kostolich* 1986, *Whitney et al.* 1989, *Frendin & Funkquist* 1990). These studies, however, were not ran-

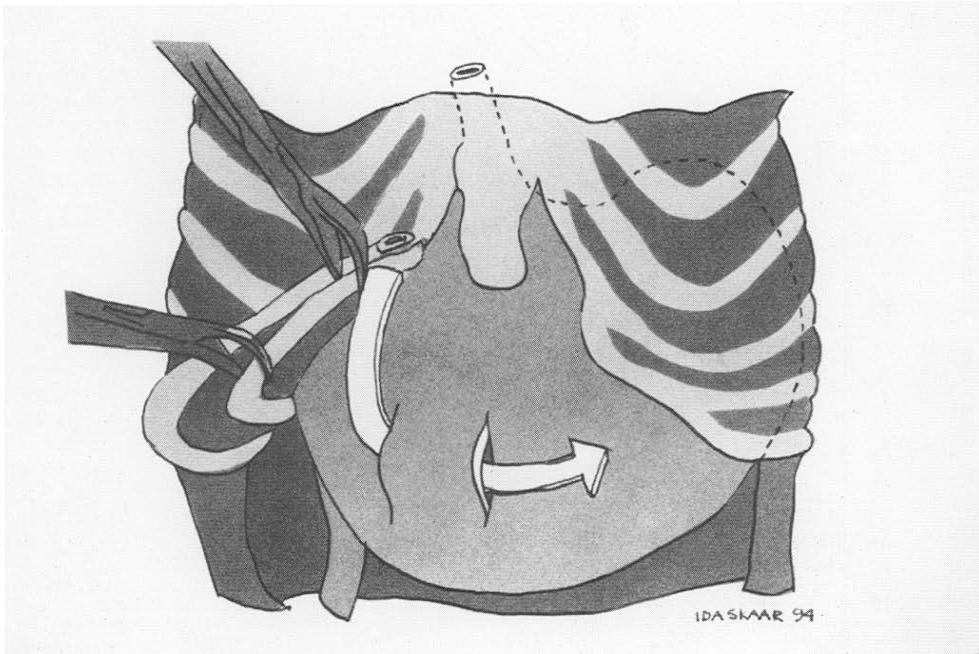


Figure 4. Illustration of the modified circumcostal gastropexy technique that was developed instead of the traditional circumcostal gastropexy with 2 flaps.

domized clinical trials, and so may have been subject to biased selection.

A problem in this study, as in many clinical studies, was the early withdrawals that reduced the median follow-up time considerably. Nevertheless the dogs in group A did not experience any recurrences during the median follow-up time, which was about 3 times longer than the median follow-up time for the dogs in group B. The results would have been more reliable if more cases had been included in the study. However, the presence of recurrences only in the group that received treatment B and the demonstration of statistically significant differences between the 2 groups, justified the decision to limit the size of the study.

Despite the successful result of the randomization, there were differences in the presurgical condition between the 2 groups. In group B,

60% of the dogs had a depressed general condition that was not stabilized before surgery. Among the dogs in group A only 32% belonged to this category. This difference may partly explain why the death rate from all causes and also the death rate from GDV-related causes only, were much higher in group B than in group A. However there were no differences between the 2 groups in the number of dogs that died from causes not related to GDV. Thus the main difference in the survival time between the 2 groups (546 days in group A versus 104 days in group B) (Fig. 3) can probably be attributed to the difference between the 2 treatments. Since the median survival time was about 5 times longer in group A than in group B, a circumcostal gastropexy (treatment A) is found to be better than no fixation (treatment B) in prolonging postoperative survival time.

The dogs in this study were all fed the same high fibre diet for 6 months postoperatively. All the dogs did well on the diet, except for 2 dogs that had pre-existing gastrointestinal problems and one male Great Dane, that was still growing. A diet high in fibre was used instead of more easily digestible food, because the high fibre content reduces the gastrointestinal transit time and probably increases gastric emptying and motility. These effects of a high fibre diet may partly explain the low recurrence rate in the present study. Still, there are wide individual differences among dogs and some investigators have questioned whether diet influences the outcome of GDV (*Burrows et al.* 1982, *Van Kruiningen et al.* 1987, *Burrows & Ignaszewski* 1990).

Addendum

After the clinical trial was ended, an additional modification of the circumcostal procedure was developed.⁹ Instead of creating 2 flaps, a tunnel was made at the same operation site on the ventral pyloric antrum. Then the ventral half of the 11th or 12th rib on the right side was exposed and cut with a scalpel at the costochondral junction and pulled through the tunnel (Fig. 4). The rib, together with the stomach, is placed back to its natural position without any additional fixation at the costochondral junction. The exposed rib is covered by suturing the incised parietal peritoneum and muscle with interrupted sutures.

In our experience this procedure is less time-consuming and easier to perform than the traditional circumcostal gastropexy with 2 flaps.

Acknowledgements

The authors thank the Central Laboratory, Department of Biochemistry, Physiology and Nutrition, Norwegian College of Veterinary Medicine for analyzing the blood samples and the Department of Morphology, Genetics and Aquatic Biology for performing the autopsies and our colleagues W Bredal, S.I. Thoresen, E Skjerve and I Skaar for their assistance, constructive criticism and support.

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Sammendrag

Sammenligning av to kirurgiske behandlingsmetoder av ventrikkedilatasjons/torsjons-syndromet hos hund.

Hensikten med denne prospektive randomiserte kliniske undersøkelsen var å sammenligne to kirurgiske metoder i behandlingen av ventrikkedilatasjon/torsjon (VDT) hos hund. En gruppe hunder (gruppe A) ble behandlet med fiksering av ventrikkelen (gastropeksi) og en gruppe (gruppe B) uten fiksering. I gruppe A var det 21 hunder (Hvorav to "dropouts") og i gruppe B var det 10 hunder. Behandlingen av hundene i gruppe A bestod av dekomprimering av ventrikkelen, korrigering av ventrikkelens leie og gastropeksi. Hundene i gruppe B fikk samme behandling, uten gastropeksi. Støtteterapien var den samme for begge gruppene. Randomiseringen av hundene i gruppe A og B var vellykket idet det var liten forskjell mellom de to gruppene med henblikk på rase, alder, kjønn og dekomprimeringsmetode i akutfasen. Da undersøkelsen ble avsluttet (censoring time) var det statistisk signifikant forskjell på gjennomsnittlig overlevelsestid (median) i gruppe A og B, henholdsvis 549 og 107 dager. Det var ingen hunder som fikk residiv i gruppe A, men i gruppe B var det tre hunder (50%) som fikk residiv innen seks måneder. Mortaliteten i løpet av ett år var 32% i gruppe A og 80% i gruppe B. Etter ett års oppfølgingstid var 19% av hundene i gruppe A og 71% av hundene i gruppe B døde som følge av VDT eller VDT-relaterte årsaker. Undersøkelsen viser en signifikant forskjell på behandling som inkluderer "circumcostal" gastropeksi og at den fører til færre residiv og forlenger den postoperative overlevelsestiden sammenlignet med behandling uten gastropeksi.

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