

Survival times of and prognostic indicators for dogs with heart base masses: 25 cases (1986–1999)

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Objective—To determine survival times of and prognostic indicators for dogs with heart base masses.

Design—Retrospective study.

Animals—25 dogs.

Procedure—Medical records were reviewed to obtain information regarding signalment; initial complaint; results of physical examination, radiography, electrocardiography, and echocardiography; surgical findings; medical and surgical treatment; outcome; necropsy findings; survival time; and cause of death.

Results—Survival time ranged from 0 to 1,096 days (mean, 213 days; median, 57 days). None of the variables examined, including initial complaints and results of physical examination, radiography, electrocardiography, and echocardiography, were associated with survival time. However, dogs that underwent pericardectomy had a significantly longer mean survival time (mean \pm SD, 661 \pm 170 days) than did dogs that were treated medically (129 \pm 51 days).

Conclusions and Clinical Relevance—Results suggest that dogs with heart base masses that undergo pericardectomy may survive longer than those that receive medical treatment alone. (*J Am Vet Med Assoc* 2001;219:485–487)

The term “heart base mass” is a general term used to designate any mass located at the base of the heart in association with the ascending aorta and pulmonary trunk but without right atrial involvement.^{1,2,a} Chemodectomas of the aortic body are the most common heart base masses in dogs,^{1,3–5} but ectopic thyroid and parathyroid masses can also develop at the heart base.³ Most often, heart base masses in dogs are recognized because of invasion into the pericardial sac resulting in pericardial effusion and signs of right-sided heart failure. The diagnosis of a heart base mass is made on the basis of history; clinical signs; and results of physical examination, thoracic radiography, electrocardiography, and echocardiography. Unfortunately, cytologic evaluation of pericardial fluid and fine-needle aspirates is generally not helpful in the diagnosis of heart base masses, because most of these masses do not exfoliate cells easily,³ and ultimately, surgical biopsy is required to make a definitive

diagnosis.⁵ For owners of dogs with heart base masses, however, the decision to pursue surgery is difficult, because studies of survival times of dogs with heart base masses are not available. Therefore, the purpose of the study reported here was to determine survival times of and prognostic indicators for dogs with heart base masses.

Criteria for Selection of Cases

Medical records of the Veterinary Hospital of the University of Pennsylvania were searched, and records of all dogs examined between March 1985 and March 1999 in which a heart base mass had been identified were reviewed. Dogs were included in the study only if the diagnosis of a heart base mass had been made on the basis of results of echocardiography,¹ exploratory thoracotomy, or necropsy.

Procedures

Information obtained from the medical records included signalment (breed, age, and sex), initial complaints (abdominal distention, weight loss, signs of respiratory tract disease [eg, cough, dyspnea, or tachypnea], anorexia or inappetence, signs of gastrointestinal tract disease [eg, vomiting or diarrhea], lethargy or weakness, exercise intolerance, and other), duration of clinical signs, physical examination findings (muffled heart sounds, abdominal effusion, respiratory distress or cough, weak pulses, and other), results of electrocardiography (electrical alternans, normal sinus rhythm), results of thoracic radiography (enlarged cardiac silhouette, pulmonary edema, pleural effusion), results of echocardiography (pericardial effusion, tamponade, location of the mass), treatment (none, administration of diuretics, chemotherapy, pericardiocentesis, pericardectomy), and survival time (time from initial identification of the mass to the date of death). When date of death was not available, referring veterinarians and owners were interviewed by telephone.

Statistical analysis—Categorical data (eg, breed and sex) were summarized as frequencies and percentages; continuous data (eg, age and survival time) were summarized as mean \pm SD. Student *t*-tests were used to determine whether survival time was associated with initial complaint, physical examination findings, treatment, or results of electrocardiography, thoracic radiography, or echocardiography. Analyses were repeated for the subset of dogs initially examined because of signs of right-sided congestive heart failure (defined as 1 or more of the following signs with no other identifiable cause: ascites, hepatic venous congestion, pleural effusion, and pul-

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monary edema) to determine whether prognosis for these dogs was different from the prognosis for dogs without signs of right-sided heart failure. All analyses were performed with commercial software⁶; values of $P \leq 0.05$ were considered significant.

Results

Twenty-five dogs met the criteria for inclusion in the study. Mean age at the time a heart base mass was identified was 10.3 years (range, 5.2 to 14.5 years). Eleven (44%) dogs were sexually intact males, 3 (12%) were castrated males, 10 (40%) were spayed females, and 1 (4%) was a sexually intact female. There were 7 (28%) dogs of mixed breeding, 5 (20%) Boxers, 4 (16%) Labrador Retrievers, 2 (8%) Golden Retrievers, and 1 (4%) each of the following breeds: Boston Terrier, Brittany Spaniel, Bulldog, Doberman Pinscher, German Shepherd Dog, Old English Sheepdog, and Rottweiler. Boxers were overrepresented, compared with the hospital population during the same period (Boxers represented only 1.2% of the hospital population).

Information on initial complaints was available for all 25 dogs. Initial complaints included abdominal distension (12 dogs; 48%), weight loss (5; 20%), signs of respiratory tract disease (13; 52%), anorexia or inappetence (12; 48%), signs of gastrointestinal tract disease (7; 28%), lethargy (10; 40%), collapse (3; 12%), and other (5; 20%). Duration of clinical signs of disease prior to examination at the veterinary teaching hospital was recorded for 22 dogs; mean duration of clinical signs was 26 days (range, 0 to 150 days).

Two dogs only underwent necropsy; results of physical examination were available for the remaining 23 dogs. Physical examination findings included muffled heart sounds (15 dogs; 65%), abdominal effusion (14; 60%), signs of respiratory tract disease (17; 73%), weak peripheral pulses (15; 65%), and other (8; 34%). Fifteen (65%) dogs had signs of right-sided congestive heart failure at the time of initial examination.

Results of electrocardiography were available for 21 dogs. Seven (33%) had electrical alternans, but none of the dogs had any other arrhythmias. Results of thoracic radiography were available for 21 dogs, and 18 (86%) had an enlarged cardiac silhouette, 9 (43%) had radiographic evidence of pulmonary edema, and 8 (38%) had pleural effusion. Overall, 7 of the 25 dogs had evidence of metastatic disease, including 1 of the 2 dogs that only underwent necropsy. Results of echocardiography were available for 21 dogs; 17 (81%) had pericardial effusion, and 11 (52%) had cardiac tamponade.

Eight of the 23 (35%) dogs that were alive at the time of initial examination did not receive any treatment; the remaining 15 all received some type of treatment. Nine (39%) dogs were treated with diuretics. Thirteen (57%) dogs underwent pericardiocentesis; 6 of the 13 underwent pericardiocentesis a single time, and 7 underwent pericardiocentesis 2 or more times. One (4%) dog was treated with doxorubicin and cyclophosphamide. Five (22%) dogs underwent pericardectomy via a lateral thoracotomy (3 dogs) or median sternotomy (2).

Survival time after identification of a heart base mass ranged from 0 to 1,096 days (mean, 213 days; median, 57 days). None of the variables examined, including initial complaint and results of physical examination, thoracic radiography, electrocardiography, and echocardiography, were associated with survival time. However, mean survival time for dogs that underwent pericardectomy (mean \pm SD, 661 \pm 170 days) was significantly ($P = 0.033$) longer than mean survival time for dogs that were treated medically (129 \pm 51 days).

Of the 7 dogs that underwent necropsy, 3 had evidence of metastasis of the heart base mass, but in 2 of the 3, metastasis had not been identified prior to death. Two dogs had a secondary endocrine tumor found at necropsy, and 4 dogs had an unrelated neoplasm. Overall, tissue specimens from 8 of the 25 dogs included in the study were available for histologic evaluation. All 8 dogs had an aortic body tumor.

Discussion

Results of the present study suggested that initial complaints and results of routine diagnostic testing (physical examination, thoracic radiography, electrocardiography, echocardiography) were not associated with survival time in dogs with heart base masses. However, dogs that underwent pericardectomy had a significantly longer survival time than did dogs that were treated medically.

One drawback of the present study was that a definitive histologic diagnosis was obtained in only 8 of the 25 (32%) dogs. However, most heart base masses in dogs are neoplasms.^{3,5} In addition, obtaining a definitive diagnosis in dogs with heart base masses requires surgical biopsy, and owners of affected dogs are, therefore, forced to make treatment decisions without knowing the definitive diagnosis. For these reasons, we believe that it was reasonable to group all dogs with heart base masses together in the present study, even though a definitive diagnosis was not obtained in all dogs.

Reports of aortic body tumors in dogs have most frequently involved brachycephalic breeds, including Boxers, Boston Terriers, and Bulldogs.^{3,5} In the present study, Boxers were overrepresented, compared with the hospital population, but with only 1 Boston Terrier and 1 Bulldog in the present study, it is difficult to make statements about these other brachycephalic breeds. Our results do support other reports that these masses develop most often in dogs between 10 and 15 years old, as mean age of dogs in the present study was 10.3 years. In the literature,^{3,4} more males than females have been described, and in the present study, there were more males than females as well. However, males were not overrepresented, compared with the hospital population during the same period, suggesting that there may not be any sex predilection for heart base masses.

Aortic body neoplasms tend to be benign and non-functional and cause clinical signs primarily as a result of their space-occupying nature.³ Thus, clinical signs and physical examination findings at initial examination are most often related to effusion within the pericardium and signs of right-sided congestive heart fail-

ure secondary to pressure from the mass on the atrium or vena cava.^{5,7} Clinical signs reported for dogs in the present study were consistent with those reported in the literature; some dogs were examined because of acute collapse, and others had had nonspecific signs for several months before examination. Signs of respiratory tract disease, abdominal distension, and inappetence were the most common reasons for examination of the dogs in the present study, and signs of respiratory tract disease, weak peripheral pulses, muffled heart sounds, and abdominal effusion were the most common findings on initial physical examination.

In the present study, echocardiography was the primary method used to differentiate heart base masses from other cardiac tumors, particularly tumors of the right atrium. Two-dimensional echocardiography, performed systematically and using multiple imaging planes, allows accurate detection and localization of cardiac and pericardial masses in dogs.¹ For dogs in the present study, an echocardiographic diagnosis of a heart base mass was made when a mass arising from the ascending aorta or pulmonary trunk was visualized. Heart base masses may partially surround the major arterial trunks at the base of the heart without right atrial involvement.^{1,5}

Because aortic body tumor cells do not easily exfoliate, cytologic evaluation of pericardial fluid and fine-needle aspirates, when performed, did not yield a diagnosis. Nonsurgical biopsy was considered dangerous and was not performed in any of these dogs.

There is little information in the literature regarding treatment options for dogs with heart base masses. Most reports describe medical management of dogs with chemodectomas, and most dogs in the present study were treated medically with diuretics and pericardiocentesis. In humans, aortic body tumors are reported to be radiosensitive, and radiation therapy has been used in a limited number of dogs with inconsis-

tent results.⁵ Surgical resection may carry substantial risks because of the position and vascularity of these masses. When heart base masses are not resectable and pericardial effusion and tamponade are causing clinical signs, pericardectomy may be palliative. In the present study, dogs that underwent pericardectomy had significantly longer survival times, compared with times for dogs treated medically.

According to the literature, most heart base masses are benign, with adenomas being more common than carcinomas.^{3,5} Malignant heart base masses tend to invade local vessels or lymphatics and less frequently establish distant metastatic sites.³ In the present study, 7 (28%) dogs had evidence of metastatic disease, but whether dogs had metastatic disease was not associated with survival time, and dogs died or were euthanized because of the effects of the primary mass, rather than metastatic disease.

⁴Breznock EM. Thoracic thymomas and heart base tumors: surgical vs nonsurgical treatment (abstr). *Vet Surg* 1988;17:30.

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