DataSavant

Risk factors for canine pancreatitis

By Hugh Bilson Lewis, BVMS, MRCVS, DACVP
Contributing Author

Pancreatitis in the dog can be difficult to diagnose. The disease can be either acute or chronic and may be mild and transient, recurrent or severe with major systemic complications. The clinical and laboratory signs are, therefore, highly variable, and most findings such as vomiting and anorexia are also common to many other conditions involving the gastrointestinal tract. There are no pathognomic signs and, up until the recent introduction of the canine pancreatic lipase immunoreactivity (PLI) test (SNAP cPL test–IDEXX Laboratories), no reliable in-house diagnostic tests. Many–perhaps the majority–of cases are subclinical and never diagnosed.

Pancreatitis has been reported to be more prevalent in several breeds, such as Miniature Schnauzers and certain Terrier breeds. Other identified risk factors include age (the disease is more prevalent in middle age to older dogs), obesity, concurrent endocrine disease, high-fat diets, trauma and use of certain pharmaceuticals.[1,2] In this article, DataSavant looks at the Banfield population to determine the overall prevalence of the disease as well as whether these known risk factors hold true for dogs seen in our hospitals. Knowing the risk factors that are associated with pancreatitis can help veterinarians have an appropriate index of suspicion for the disease in high-risk patients.

Methods of analysis

For our case series, we selected canine inpatients seen at Banfield hospitals during 2006, identified by both a diagnosis of pancreatitis and supporting clinical and

Evidence-Based Medicine Toolkit

Parametric vs. nonparametric methods: Parametric tests are those used to analyze populations that are "normally" distributed (*i.e.*, like a bell-shaped curve). However, samples for certain variables in a study may be distributed less like a bell and more like, for example, a pair of bookends (*i.e.*, distribution skewed toward extremes, as with diseases that target both the very young and the very old) or a ski ramp. Samples such as these require different statistical methods called nonparametric tests.

Under-reporting: A term often used to describe results from systems for disease surveillance. Under-reporting refers to the decreased (as compared to actual) prevalence of a disease or condition reported from study. Reasons for under-reporting are important to understand in the interpretation of results for potential bias.

DataSavant

DataSavant's mission is to:
- Explore the health and well-being of Pet populations
- Evaluate new clinical treatments
- Monitor Pets as sentinels of zoonotic disease in family environments
- Transform Pet medical data into knowledge, *i.e.*, open new windows into Pet health care using the Banfield medical caseload and database.

DataSavant

Table 1: Clinical Signs Seen in Dogs with Pancreatitis Vs. Controls*

Group	Total number	Vomiting		Diarrhea		Fever		Anorexia	
		Number	%	Number	%	Number	%	Number	%
Pancreatitis	2,738	2,101	76.7	2,027	74.0	276	5.5	936	34.2
Control I**	5,000	41	0.8	40	0.8	290	10.6	7	0.1
Control II***	5,000	308	6.2	340	6.1	246	4.9	127	2.5

*Pets seen at Banfield hospitals during 2006
**Clinically healthy dogs
***Clinically sick dogs, but no pancreatitis

Note: 10% of Control I dogs had temperatures in excess of 102.5ºF.

laboratory evidence. Dogs with a tentative diagnosis of pancreatitis, but without supporting laboratory data, were excluded from the case series. This case population data was then compared with two control sets of canine in-patients also seen at Banfield hospitals in 2006. One control group consisted of 5,000 healthy dogs selected at random (Control I); the other consisted of 5,000 dogs that had one or more other diagnoses, excluding pancreatitis (Control II). The data collected from each record included:

- Age and body condition (obese, overweight, normal) at diagnosis, breed and gender
- Any laboratory test results (*e.g.*, serum amylase, lipase and creatinine; blood urea nitrogen [BUN]; creatinine; white blood cell [WBC] and neutrophil counts)
- Concurrent or subsequent diagnoses of renal disease, diabetes mellitus, Cushing's disease or hypothyroidism seen during 2006.

Prevalence of pancreatitis in the Banfield dog population was determined in the analysis. Also, using our case and control populations, we compared the proportion of Pets evaluated with the most common clinical and laboratory signs at the time of diagnosis. Risk factors such as age group, breed, gender and obesity were evaluated using the chi-square test. The prevalence of concurrent diseases, both endocrine and renal, was also compared.

Wilcoxon two-sample test scores, a nonparametric method, were used to assess the significance of the differences between the groups' laboratory tests as the population samples were not normally distributed (*Evidence-Based Medicine Toolkit*, page 17). Statistical significance was established at $P<0.05$.

Results

There were 1,189,844 dogs seen as in-patients at Banfield hospitals during 2006. Of these, 169,936 (14.3 percent) exhibited signs of gastrointestinal disease. Pancreatitis was diagnosed in a small subset of these, 2,738 dogs, for a prevalence of 23 per 10,000 patients.

Clinical signs

The results for the most common clinical signs observed are displayed in *Table 1*. Vomiting and diarrhea were the most common signs, reported in approximately 75 percent of dogs in the pancreatitis group. Surprisingly, abdominal pain was not as common; only 15 percent of dogs with pancreatitis were reported to have this sign.

There are significant differences in some laboratory results (*Table 2*, page 20) between case and control groups. Our results are consistent with the observations of oth-

DataSavant

Table 2: Laboratory Test Data for Dogs with Pancreatitis Vs. Controls*

Lab test	Units	Pancreatitis			Control I			Control II		
		Number	Mean	Standard deviation	Number	Mean	Standard deviation	Number	Mean	Standard deviation
Amylase (1)	U/L	2,081	1,130	783	261	595	187	803	646	264
Lipase (2)	U/L	1,907	3,216	1,649	3	460	511	31	1,026	1,370
BUN (3)	mg/dl	2,403	19.2	16	277	17.7	5.2	831	18	10.6
Creatinine (4)	mg/dl	2,404	114	0.8	276	1.09	0.3	831	1.12	0.43
Neutrophils (5)	x 10^3/L	31	10	6.5	1	6.7	-	7	9.6	6.8
WBC (6)	x 10^3/L	2,379	12	15.5	275	9.3	3	849	9.7	5.4

(1) P<0.0001; (2) Too few control values for analysis; (3) Marginal significance; (4) Weakly significant against Control I; (5) No significance
(6) Significant vs. both control groups
*Pets seen at Banfield hospitals during 2006

Table 3: Age of Dogs with Pancreatitis Vs. General Population*

Age group	Count	Percentage of population	Pancreatitis	Prevalence per 10,000
< 1 year	376,958	31.7	329	8.7
1 to 3 years	339,400	28.5	720	21.2
3 to 10 years	451,604	38.0	1260	27.9
10 to 30 years	102,104	8.6	429	42.0

*Pets seen at Banfield hospitals during 2006

ers for these tests (serum amylase, lipase and creatinine; BUN; WBC and neutrophil counts); however, none of these markers are specific for pancreatitis or are thought to be very useful differentiators. The SNAP cPL test is now considered the test of choice,[3] but this test has only recently been available to Banfield hospitals and was not used during 2006.

Risk factors for pancreatitis

As *Table 3* shows, the prevalence of pancreatitis clearly increases with age in the Banfield canine population. Dogs older than 3 years are three to five times more likely to be diagnosed with pancreatitis than dogs less than 3 years old. As reflected by the range in breed-specific prevalence, Miniature and Standard Schnauzers and Yorkshire and West Highland White Terriers are more susceptible to pancreatitis than other breeds. The 20 breeds in which pancreatitis is most common can be seen in *Table 4* (page 21).

Table 5 (page 21) depicts prevalence of pancreatitis by gender and neuter status. There is a decidedly increased prevalence of pancreatitis in spayed and neutered dogs. However, the latter may to some extent reflect confounding by age because most unspayed and unneutered dogs seen at Banfield are in the juvenile age range. This age group has a much lower prevalence of pancreatitis than the older groups.

Obesity. *Table 6* (page 21) depicts the recorded prevalence of obesity in dogs with pancreatitis compared with our control groups. We do not see a marked difference between the case group and Control II in terms of the proportion evaluated as obese. There is a 10-fold difference between the pancreatitis group and Control I. This may be confounded by age and other factors

DataSavant

Table 4: Prevalence of Pancreatitis by Breed*

Breed	Number per breed in 2006	Number of cases with diagnosis of pancreatitis	Prevalence per 10,000	Breed rank
Miniature Schnauzer	15,765	92	58.4	1
Yorkshire Terrier	42,059	235	55.9	2
Standard Schnauzer	10,235	51	49.8	3
Miniature Pinscher	15,296	69	45.1	4
Boxer	31,985	144	45.0	5
West Highland Terrier	7,166	25	40.5	6
Shetland Sheepdog	9,819	38	38.7	7
Bichon Frise	15,848	59	37.2	8
Toy Poodle	11,966	38	31.8	9
Dachshund	39,382	125	31.7	10
Maltese	26,182	77	29.4	11
Standard Poodle	35,031	100	28.5	12
Fox Terrier	24,247	68	28.0	13
Pug	23,348	65	27.8	14
Pomeranian	27,697	76	27.4	15
Beagle	33,100	90	27.2	16
Jack Russell Terrier	23,156	58	25.0	17
American Cocker Spaniel	23,424	70	21.6	18
Rottweiler	23,552	44	18.7	19
Labrador Retriever	136,128	235	17.3	20

*Pets seen at Banfield hospitals during 2006

Table 5: Distribution of Gender and Spay Status Among Dogs with Pancreatitis*

Gender group	Count	Percentage of population	Pancreatitis	Prevalence per 10,000
All**	1,189,844	100	2,738	23.0
Female, intact	241,471	20.3	245	10.1
Female, spayed	380,352	32.0	1,233	32.4
Male, intact	295,970	24.9	248	8.4
Male, neutered	368,168	30.9	1,011	27.5

*Pets seen at Banfield hospitals during 2006
**Includes those of unknown or unrecorded gender

Table 6: Obesity in Dogs with Pancreatitis Vs. Controls*

Group	Total number	Number obese	Percentage obese	Average age (in years)
Pancreatitis	2,738	276	10.1	5.3
Control I	5,000	41	0.8	1.5
Control II	5,000	614	12.3	3.4

*Pets seen at Banfield hospitals during 2006

that are different between the two groups, such as neuter status.

Concurrent disease. The pancreatitis group was compared with Control II for evidence of concurrent disease during 2006 (*Table 7*). Control I contained only

DataSavant

Table 7: Prevalence of Concurrent Disease in Dogs with Pancreatitis Vs. Other Sick Canine Patients*

Group	Number	Cushing's disease	Hypothyroidism	Diabetes mellitus	Renal disease
Pancreatitis	2,738	6	44**	43**	50**
Control II	5,000	3	18	6	11

*Pets seen at Banfield hospitals during 2006
**Chi-square statistical analysis indicated significant differences for hypothyroidism, diabetes mellitus and renal disease. The numbers were too low for analysis of Cushing's disease.

healthy dogs, so it was excluded as a basis for comparison.

As noted above, there is a difference in average age for the pancreatitis group (5.3 years) vs. the Control II group (3.4 years), so some of these differences may be expected since all of these conditions are more frequently seen in middle-aged to older dogs. An age-matched control group would have provided a better basis for comparison.

Summary

A review of the Banfield database for 2006 identified 2,738 diagnoses of pancreatitis that were supported by adequate diagnostic data. This was from a population of 1,189,844 and reflected a prevalence of 23 per 10,000 dogs seen. The dominant clinical findings were vomiting, diarrhea and anorexia. Abdominal pain was variable in occurrence. Elevations in several laboratory tests (*e.g.*, serum amylase, lipase and creatinine; BUN; WBC and neutrophil counts) were common, but none were specific for differentiating pancreatitis from other conditions (apart from very high levels of serum lipase and amylase).

Our results confirm that increasing age is a risk factor for canine pancreatitis diagnosed in Banfield hospitals and that the disease has a higher prevalence in some breeds, notably Miniature Schnauzers and Yorkshire Terriers. We also found a relationship with gender that corroborates reports that middle-aged female dogs are more likely to develop acute pancreatitis than are other populations.[1] And while our analysis did not find an association of obesity with the diagnosis of pancreatitis, we may have been limited in our assessment of that risk factor because obesity is often under-reported and not consistently captured in medical records.[4] We also found that there were other diseases likely to be co-associated with pancreatitis, such as hypothyroidism, diabetes mellitus and renal failure. Our large Banfield population has provided an opportunity to confirm what has been previously reported on canine pancreatitis, as well as to generate evidence to help veterinarians identify and diagnose Pets at high risk for the disease.

References

1. Mix K, Jones C. Diagnosing acute pancreatitis in dogs. *Comp Cont Ed Pract Vet* 2006;28:226-234.
2. Whittemore JC, Campbell VL. Canine and feline pancreatitis. *Comp Cont Ed Pract Vet* 2005;27:766-776.
3. Steiner JM. Diagnosis of pancreatitis. *Vet Clin N Am Small Anim Pract* 2003;33:1181-1195.
4. Lund EM, Armstrong PJ, Kirk CA, et al. Prevalence and risk factors for obesity in adult dogs from United States private veterinary practices. *Intern J Appl Res Vet Med* 2006;4:177-186.

Hugh Bilson Lewis, BVMS, MRCVS, DACVP, is senior vice president of practice development at Banfield, The Pet Hospital, and president of DataSavant.™ Before joining Banfield in 1996, he served as dean of the School of Veterinary Medicine at Purdue University for 10 years, and before that, he was senior director of pathology and toxicology at Smith Kline & French Laboratories in Philadelphia.