

Evaluation of treatments for separation anxiety in dogs

Yukari Takeuchi, DVM, PhD; Katherine A. Houpt, VMD, PhD, DACVB; Janet M. Scarlett, DVM, MPH, PhD

Objective—To evaluate treatment outcome in dogs with separation anxiety and owner compliance with and perception of effectiveness of discharge instructions.

Design—Cohort study.

Animals—52 dogs with separation anxiety.

Procedure—Sex, age at which the owner obtained the dog, age at which separation anxiety was first noticed, age at behavioral examination, and discharge instructions were obtained from medical records of each dog. Between 6 and 64 months after the behavioral examination, owners were contacted by telephone and questioned about the outcome of treatment, their compliance with discharge instructions, and their perception of the effectiveness of each instruction.

Results—Thirty-two (62%) dogs had improved, whereas 20 were the same, were worse, or had been euthanatized or given away. Mixed-breed dogs were significantly less likely to improve than purebred dogs. Compliance varied according to discharge instruction. Significantly fewer dogs with owners that were given > 5 instructions improved or were cured, compared with those with owners given fewer instructions. Twenty-seven dogs were also treated with amitriptyline or other medication; 15 (56%) improved.

Conclusions and Clinical Relevance—Owners complied with instructions that involved little time such as omitting punishment and providing a chew toy at the time of departure. Owners were also willing to increase the dog's exercise but were not willing to uncouple the cues of departure from real departures or desensitize the dog to impending departure. Administration of psychoactive medication may be necessary to augment behavior modification techniques designed to reduce separation anxiety in dogs. (*J Am Vet Med Assoc* 2000;217:342–345)

Separation anxiety, defined as excessive vocalization, inappropriate elimination, and destruction associated with the owner's absence, is the second most common behavioral problem in dogs at referral behavioral practices; the first is aggression.¹⁻⁸ In severe cases, separation anxiety also induces physiologic responses such as vomiting, salivation, urination, defecation, and, more rarely, diarrhea or self-injury. It is believed

From the Laboratory of Veterinary Ethology, Veterinary Medical Science, The University of Tokyo, Tokyo 113-8657, Japan (Takeuchi); and the Animal Behavior Clinic (Houpt) and Department of Population Medicine and Diagnostic Services (Scarlett), College of Veterinary Medicine, Cornell University, Ithaca, NY 14853.

The authors thank Veronique Messier and Glen J. Golden for technical assistance.

that in dogs, separation anxiety is derived from over-attachment to or over-dependency on the owner with underlying anxiety. Often, the owner may aggravate the undesired behavior by emotional departures and returns, including punishment long after the dog misbehaved.

Treatment plans such as behavior modification with medication have been established by many behaviorists.¹⁻⁸ The purpose of the study reported here was to analyze outcome and owner compliance with the suggested treatment as a first step in assessing the efficacy of treatment for separation anxiety. The results of this type of survey depend on the subjective response of the owner rather than quantitative data (eg, amount of destruction or number of vocalizations). Nevertheless, information on owners' opinions should be made available to clinicians in an attempt to reduce the number of dogs euthanatized as a result of this problem behavior.

Materials and Methods

Criteria for selection of cases—Medical records of all dogs (n = 110) for which a diagnosis of separation anxiety was made at the Cornell University Animal Behavior Clinic from 1993 to 1997 were reviewed. Included in the medical records were discharge instructions, follow-up information, and a questionnaire that owners had completed at the time of evaluation regarding general information and behavior history of their dogs.

Procedure—Sex and age at which the owner obtained the dog, age at which separation anxiety was first noticed by the owner (age of onset), and age at behavioral examination were obtained from the medical records. For each age category, dogs were assigned to 1 of the 4 following groups: < 6 months old, ≥ 6 months but < 1 year old, ≥ 1 year but ≤ 3 years old, and > 3 years old.

Discharge instructions, obtained from the medical records, were individualized for each dog. There were several instructions provided to a large percentage of owners, including the following: do not punish the dog if it is caught in the act (no punishment); increase exercise to reduce the dog's energy level and provide the dog an opportunity to eliminate (increase exercise); provide regular relaxation training to reduce anxiety (sit-stay protocol); crate train to teach the dog that the crate is a safe place during the owner's absence (crating); reduce the dog's excitement at owner's departure and return (downplay departure); give a special toy when leaving to allow the dog to associate the owner's departure with anticipation of pleasure (special toy); dissociate the cues of departure, such as picking up keys, putting on shoes, and turning off lights, by performing cues without leaving (uncoupling cues); desensitize the dog to owner's departure and absence by leaving for many short periods (desensitization); and medicate the dog to facilitate the behavior modification.

Six or more months after the behavioral consultation, owners were contacted by telephone and asked about the

outcome of the treatment. These questions included the owner's perception of general outcome (ie, dog's behavior was not improved [euthanatized, given away, worse, or same] or was improved [better or cured]), owner's compliance with each discharge instruction, and owner's perception of the effectiveness of each discharge instruction. If medication had been prescribed, the owners were asked whether they felt the medication was effective in improving the dog's behavior. If an owner was not contacted at the first call, 1 to 3 additional calls were made at different times of the day and on different days of the week.

Statistical analyses—Sex distribution was compared to an expected 50:50 ratio by use of the χ^2 goodness-of-fit test. Proportions were compared between or among groups by use of the χ^2 test of independence.⁹ Differences in the number of dogs improved were evaluated by use of a χ^2 test between mixed-breed and purebred dogs, between dogs in the original or a different home, between dogs whose owners were given ≤ 5 instructions and those given > 5 instructions, and between dogs given amitriptyline and those treated with behavior modification alone. Values of $P \leq 0.05$ were considered significant.

Results

Fifty-two of 110 (47%) owners were contacted by telephone; only information from these owners and the medical records of their dogs were included in this study. Among the dogs whose owners were contacted, there were 37 males (71%; 3 sexually intact and 34 castrated) and 15 females (29%; 2 sexually intact and 13 spayed). Males comprised significantly more than 50% of the study population. During the same period (1993 to 1997), 12,634 (52%) female and 11,754 (48%) male dogs were evaluated at the Veterinary Medical Teaching Hospital at Cornell University. Twenty-five of the 52 (48%) dogs were purebred, and 27 (52%) were mixed-breed dogs.

Mean (\pm SD) age at which dogs were obtained was 12.1 ± 18.0 months (range, 1 to 72 months). Mean ages at which purebred and mixed-breed dogs were obtained were 8.0 and 15.8 months, respectively. Mean age of onset of the behavior problem was typically > 1 year (31.5 ± 35.9 months; range, 1 to 144 months; Table 1). Age at time dogs were examined was 52.8 ± 39.6 months (range, 4 to 159 months), and time from examination to follow-up telephone interview was 29.7 ± 17.8 months (range, 6 to 64 months).

Of the 52 dogs, 6 (12%) had been euthanatized, and 4 (8%) had been given away by the time that telephone interviews were conducted. Of 42 owners who still had their dogs, 3 (6%) believed that their dogs were worse, 7 (13%) believed that their dogs were the same, 24 (46%) believed that their dogs had improved,

Table 1—Distribution of 52 dogs with separation anxiety on the basis of age when obtained, age when owners first noticed problem behavior (at onset), and age when first examined at a veterinary behavior clinic (at examination)

Age	No. of dogs		
	When obtained	At onset	At examination
< 6 months	29	14	1
≥ 6 months and < 1 year	9	9	4
≥ 1 year and < 3 years	9	13	20
≥ 3 years	5	16	27

and 8 (15%) believed that their dogs were cured. However, when outcomes were categorized into 2 groups (not improved and improved), 32 of 52 (62%) owners (95% confidence interval, 49 to 75%) believed that their dogs had improved.

Using the results of the behavioral questionnaire completed at the time of initial examination and the follow-up telephone interview, associations between the owner's assessment of improvement and the dog's sex, breed, and age, number of instructions given to the owner, and owner's compliance with instructions were evaluated (Table 2). Significantly fewer mixed-breed dogs had improved (13/27; 48%) at the time of the follow-up interview, compared with purebred dogs (19/25; 76%). Eighteen of 25 (72%) mixed-breed dogs were obtained as strays or from shelters, whereas only 3 of 22 (14%) purebred dogs were obtained as strays or from shelters. The source of 4 dogs was not recorded. Significantly fewer dogs obtained from shelters or as strays had improved (9/21; 43%), compared with dogs obtained from breeders, pet shops, or friends (21/27; 77%). Male dogs, dogs obtained at > 6 months of age, dogs that were > 1 year old at onset of the problem behavior, and dogs > 3 years old at time of examination were more likely not to improve; however, differences between groups were not significant.

Mean (\pm SD) number of discharge instructions each owner received was 5.1 ± 2.0 , but owners complied with only 3.1 ± 2.1 of the instructions for more than 1 month. When dogs were assigned to 2 groups on the basis of number of instructions that owners received, significantly fewer dogs of owners that received > 5 instructions improved or were cured,

Table 2—Treatment outcome obtained via telephone interviews with owners of 52 dogs with separation anxiety between 6 and 64 months after initial behavioral examination

Group (n)	Outcome	
	No. of dogs improved (%) [*]	No. of dogs not improved (%) [†]
Sex		
Male (37)	24 (65)	13 (35)
Female (15)	8 (53)	7 (47)
Breed		
Pure (25)	19 (76)	6 (24)
Mixed (27)	13 (48) ^a	14 (52) ^a
Age obtained		
< 6 months (29)	20 (69)	9 (31)
≥ 6 months (23)	12 (52)	11 (48)
Age at onset		
< 1 year (23)	16 (70)	7 (30)
≥ 1 year (29)	16 (55)	13 (45)
Age at examination		
≤ 3 years (25)	18 (72)	7 (28)
> 3 years (27)	14 (52)	13 (48)
No. of instructions [‡]		
≤ 5 (30)	24 (80)	6 (20)
> 5 (19)	8 (42) ^b	11 (58) ^b
Compliance [§]		
≤ 3 (27)	18 (67)	9 (33)
> 3 (22)	14 (64)	8 (36)

^{*}Includes dogs considered cured or improved. [†]Includes dogs considered the same or worse or that were euthanatized or given away. [‡]Discharge instructions. [§]Number of discharge instructions with which owners complied for > 1 month.

^aSignificantly ($P < 0.05$) different from percentage of purebred dogs.

^bSignificantly ($P < 0.05$) different from percentage of dogs with owners that received ≤ 5 instructions.

compared with those of owners that received ≤ 5 instructions (Table 2). However, outcome was not different regardless of the instructions with which the owner complied. A higher percentage of owners complied with no punishment (79%), increase exercise (78%), and special toy (69%) for > 1 month, whereas a lower percentage complied with desensitization (43%) and uncoupling cues (35%; Fig 1).

When the owner's perception of the effectiveness of each instruction was evaluated, 25 of 34 (74%) owners believed that downplay departure had some kind of effect on their dogs' behavior (Fig 2). The sit-stay relaxation protocol was believed to affect behavior to a great degree by 12 of 26 (46%) owners. In addition, there were several other instructions that owners believed were effective, but the number of owners given these instructions was small ($n = 3$ to 8). These instructions included: provide a dog sitter (5/8 owners believed this was effective), ignore undesired behavior (2/5), use a head halter (2/6), keep a radio or television playing during owner's absence (2/3), and apply the denning method (2/3). Denning is a regime in which the dog is caged all the time for 2 weeks except for elimination, obedience training, and exercise. After 2 weeks, the dog is caged at all times for an additional 2

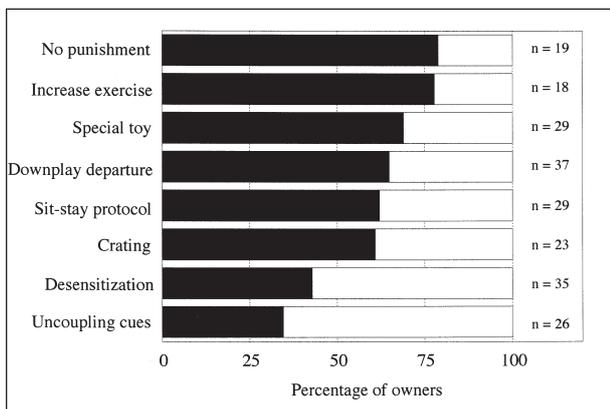


Figure 1—Bar graph indicating percentage of owners of 52 dogs with separation anxiety that complied with specific discharge instructions for < 1 month (open bar) or ≥ 1 month (solid bar).

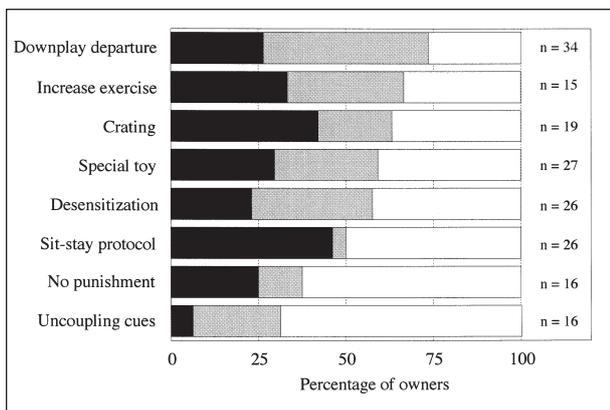


Figure 2—Bar graph indicating percentage of owners of 52 dogs with separation anxiety that believed a specific discharge instruction was very effective (solid bar), slightly effective (shaded bar), or not effective (open bar) at modifying their dogs' behaviors.

weeks except when the owner is at home and awake, and then the dog is caged for 2 weeks only when the owner is away. After these 6 weeks, the cage door is left open, and the dog is free to come and go at will.

In combination with behavioral therapy, 15 dogs were medicated with amitriptyline^a (2 mg/kg, [1 mg/lb] of body weight, PO, q 24 h) for more than 1 month. Two dogs were treated for less than 1 month. Two owners complained of adverse effects such as lethargy. Nine of 15 (60%) dogs treated with amitriptyline were improved, although only 7 owners believed the medications were effective. Although a combination of drugs was not used initially, a benzodiazepine (clonazepam^b or alprazolam^c) or buspirone^d was administered alone or in combination with amitriptyline to 10 dogs. Twenty-three dogs were treated with medication for more than 1 month; 12 (52%) had improved by the time of follow-up telephone interviews. Seventeen of 25 (68%) dogs treated with behavioral therapy alone had improved.

Discussion

Results of several studies have implicated a home different from the original home or time spent at a shelter as a factor in separation anxiety in dogs.^{4,8,10} Our results indicating that dogs obtained from a shelter or as strays were less likely to respond to treatment than dogs obtained from breeders, pet shops, or friends support that finding. Significantly fewer mixed-breed dogs and fewer dogs from shelters were improved by treatment. Methods of minimizing the effects of changing homes and of treating separation anxiety in shelter dogs should be given priority by shelter workers and veterinary behaviorists.

Although aggression toward the owner develops more often in male dogs than females, a sex difference has not been consistently observed in cases of separation anxiety.^{4,7,8,11,12} However, we found that male dogs significantly outnumbered females in this study. Our results were the same when we evaluated the sex of all 110 dogs examined for separation anxiety from 1993 to 1997. In contrast, 117 dogs (61 males [52%], 56 females [48%]) with separation anxiety were examined at the Behavior Clinic of the Veterinary Medical Teaching Hospital at the University of California during the same period. In the present study from New York and in previous studies by Borchelt and Voith from Pennsylvania⁸ and by Podberscek et al from the United Kingdom,¹³ significantly more male dogs than females were examined because of separation problems, whereas Wright and Neselrote from Georgia found no sex difference.¹⁴ There may be an interaction between sex and climate, particularly if male dogs that display destructive behavior indoors can be kept outdoors in warmer areas.

Although most (47/52; 90%) dogs were > 1 year old when initially examined, signs of separation anxiety were also noticed in younger dogs. It has been suggested that separation anxiety develops in dogs that have had several owners or been subjected to prolonged periods of confinement.^{4,5,7,8} We did not ask owners about confinement. However, clinicians should be aware that separation anxiety may develop in young dogs.

Significantly fewer dogs of owners who received > 5 discharge instructions had improved by the time that telephone interviews were conducted, compared with those of owners who received fewer instructions. However, degree of owner compliance was not related to outcome. This implies that owners who received many instructions may have been confused or reluctant to comply, or that more instructions were given when separation anxiety was severe. A high percentage of owners complied with easy instructions such as no punishment, increase exercise, or special toy for > 1 month. Instructions such as downplay departure, sit-stay protocol, crate training, desensitization, or uncoupling cues were apparently more difficult tasks for owners, but these behavior modification techniques remain important methods for treatment of separation anxiety.¹⁻⁸ Therefore, to improve compliance, veterinary behaviorists should carefully explain the importance of these difficult behavior modification techniques to owners. Moreover, it is important that owners recognize the necessity of combining a special toy with desensitization, because a special toy alone may make the problem worse should the dog associate the toy with anxiety.^{1,8}

It was difficult to evaluate the effect of each discharge instruction on the basis of information gathered during interviews, because owners' impressions were subjective, and more than 1 instruction was given to each owner. In addition, the prolonged duration between treatment and follow-up in some cases (as much as 64 months) diminishes reliability of owners' recollections of compliance and treatment success. Nevertheless, an owner determines whether their dog improves or whether their dog cannot remain in the household; therefore, the owner's opinion is important in determining treatment outcome for separation anxiety and other behavior problems. Most (25/34; 73.5%) owners believed that the downplay departure instruction had some effect on separation anxiety, and 12 of 26 (46%) owners believed that the sit-stay protocol had a considerable effect on the problem behavior. An objective assessment of the signs of separation anxiety (eg, damage done per day, vocalizations per day) is necessary to determine efficacy of treatment.

Although 9 of 17 dogs treated with amitriptyline were improved, only 7 owners felt that the medication was effective. Recently, clomipramine, another tricyclic antidepressant, has been evaluated for treatment of separation anxiety in dogs; good results were seen in one placebo-controlled trial¹⁵ but not another,¹³ suggesting that tailoring the dosage of clomipramine and the time of administration to correspond to the time

when a dog is most likely to be destructive increases efficacy. However, it is our experience, based on videotaped records, that most dogs begin displaying signs of separation anxiety within 30 minutes of the owner's departure, and they alternate bouts of destructive behavior and barking with bouts of resting every 40 to 60 minutes.

There were several reasons why drugs were not prescribed for all dogs in the present study. Some owners were opposed to drug use, some could not afford to purchase drugs, and in some dogs, the behavior was not severe, so medication was not considered necessary.

^aGeneva Generics, Geneva Pharmaceuticals Inc, Broomfield, Colo.

^bTranxene, Abbott Laboratories, North Chicago, Ill.

^cBuspar, Bristol-Myers Squibb, Princeton, NJ.

^dXanax, Pharmacia & Upjohn Inc, Kalamazoo, Mich.

References

1. Borchelt PL, Voith VL. Diagnosis and treatment of separation-related behavior problems in dogs. *Vet Clin North Am Small Anim Pract* 1982;12:625-635.
2. Landsberg GM, Hunthausen L, Ackerman L. *Handbook of behavior problems of the dog and cat*. Oxford, England: Butterworth-Heinemann, 1997;97-106.
3. Machum M. Separation anxiety. *Can Vet J* 1991;32:618.
4. McCrave EA. Diagnostic criteria for separation anxiety in the dog. *Vet Clin North Am Small Anim Pract* 1991;21:247-255.
5. McElroy L. Separation anxiety in dogs. *Vet Technol* 1989;10:391-394.
6. Overall KL. *Clinical behavioral medicine for small animals*. St Louis: CV Mosby Co, 1997;215-218.
7. Polin DM. Canine separation anxiety. *Vet Technol* 1992;13:403-405.
8. Voith VL, Borchelt PL. Separation anxiety in dogs. In: Voith VL, Borchelt PL, eds. *Readings in companion animal behavior*. Trenton, NJ: Veterinary Learning Systems, 1996;124-139.
9. Snedecor GW, Cochran WG. *Statistical methods*. 8th ed. Ames, Iowa: Iowa State University Press, 1989;124-129.
10. Serpell J, Jagoe JA. Early experience and development of behavior. In: Serpell J, ed. *The domestic dog: its evolution, behaviour, and interactions with people*. Cambridge, England: Cambridge University Press, 1995;79-102.
11. Borchelt PL. Aggressive behavior of dogs kept as companion animals: classification and influence of sex, reproductive status and breed. *Appl Anim Ethol* 1983;10:45-61.
12. Line S, Voith VL. Dominance aggression of dogs towards people: behavior profile and response to treatment. *Appl Anim Behav Sci* 1986;16:77-83.
13. Podberscek AL, Hsu Y, Serpell JA. Evaluation of clomipramine as an adjunct to behavioural therapy in the treatment of separation-related problems in dogs. *Vet Rec* 1999;145:365-369.
14. Wright JC, Neselrote MS. Classification of behavior problems in dogs: distribution of age, breed, sex, and reproductive status. *Appl Anim Behav Sci* 1988;19:169-178.
15. CLOCSA study group. Treatment of separation anxiety in dogs with clomipramine. Results from a prospective, randomized, double-blind, placebo-controlled, parallel-group, multi-centered clinical trial. *Appl Anim Behav Sci* 2000;67:255-275.