Animal Behavior Case of the Month

This feature is being sponsored by the American College of Veterinary Behaviorists. Readers of the JAVMA are invited to submit reports, which should include a brief description of a behavioral problem, the evaluation and treatment, and a succinct discussion of the case.

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Statement of the Problem

A dog showed periodic aggression toward the owner; sporadic, severe aggression toward other dogs in the household; fearful avoidance behavior toward strangers; and stereotypic circling when anxious. The owner sought help because the aggression toward other dogs was becoming more frequent and severe.

Signalment

The dog was a 5.5-year-old spayed American Foxhound, weighing 23 kg.

History

The dog had been adopted at approximately 6 months of age. Since that time, the household had changed with the addition of other dogs. At examination, there were 8 dogs in the household: 7 spayed females and 1 male. Not all of the females had been spayed as pups; the dog of this report had been spayed at 3 years of age. This dog had always had a slight head tilt to the right and a tendency to circle in that direction when stressed, anxious, excited, or crowded. The circling was observed at least daily, but had not changed in pattern throughout the life of the dog.

The aggressive and fearful behavior was first noticed at social maturity (approx 1.5 years of age) and, although sporadic, continued to worsen. The aggression to dogs was primarily directed toward those in the household. This dog was invariably the one that chose a bed, sleeping spot, or crate first; went out the door first; urinated first, then over the other females’ urine; and stared, lifted its lip, or placed its paw on another dog’s dorsum to gain access to food. Fights usually developed if this dog was disturbed by another while sleeping, if it was bumped by another while going through a doorway, or if a dispute involved food or toys. This dog sometimes attacked other dogs in response to a stare. This agonistic behavior ranged from growling to full-fledged fights, resulting in lacerated ears, lips, and necks on both participants. As the intensity of the fights increased, the owner's ability to abort them early and to separate the dogs decreased. The apparent stimuli for the fights became harder for the owner to anticipate. During at least 1 fight, the owner was severely bitten while trying to separate the dogs.

The owner also was being consistently challenged by the dog when the dog was corrected verbally or on leash or if the dog was disturbed while sleeping. These challenges began as growls, lip lifts, and snarls, and intensified to snapping and biting. The dog had never been outgoing with strangers, circling immediately as they looked at or approached it. This behavior was apparent even when the dog was in a cage or run; the dog would lower its head, arch its back, tuck its tail, and circle to the right. During these episodes, the dog’s pupils dilated, regardless of ambient light conditions. If reached for, the dog would stop and tremble, but did not freeze and could be encouraged to come with a stranger. The owner sought help because the increasing intensity and frequency of the aggression was posing a severe risk to the other dogs.

Physical Examination Findings

Physical examination did not reveal abnormalities, except for the slight head tilt and minor circling when released from restraint. Multiple complete neurologic examinations were unremarkable, and did not reveal information about the origin of the head tilt. Abnormal ocular or motor patterns were not attendant with the head tilt, and because it had not been progressive throughout the dog's life, the neurologists did not think that imagining techniques would be informative.

Laboratory Results

Results of repeated serum biochemical analysis, CBC, fecal examinations, and heartworm tests were normal. The dog participated in a clinical study requiring dexamethasone-suppression test evalua-
tions of serum cortisol concentration; all values were within reference limits.

**Diagnosis**

Diagnoses include interdog aggression related to social status, dominance aggression toward the owner, fearful behavior to approaches from strangers, and stereotypic circling. Interdog aggression usually begins at social maturity (mean age, 18 to 24 months).\(^1\)\(^,\)\(^2\) It can be directed toward any dogs, only foreign dogs, or only household dogs, can be offensive or defensive, and can have a variety of presenting signs.\(^1\) As the aggressive dog gains experience, the class of recipients of the aggression may change. Because it is often driven by social status, interdog aggression is commonly intrasexual, rather than intersexual. Hormonal changes attributable to estrus can facilitate interdog aggression. Status can be difficult to gauge; subtle, nonvocal behavior usually enforces status through deference, rather than aggression. Social systems based on deference may have evolved to decrease the probability of aggression and the risks attendant with fighting. Common nonvocal behavioral patterns of a dog to whom other dogs defer include, but are not restricted to, putting its head or paws on another's dorsum; laying its head over another's head; straddling; mounting; staring; going through doors, to food, or to bedding first; and lining up side-by-side while offering its lips and chin to be licked or sniffed by another dog. Such behavior was common in the dog of this report. Aggression developed primarily when other dogs in the household committed nonvocal challenges by not deferring to this dog or when they initiated the behaviors listed.

Fearful behavior is not always associated with fearful aggression. Some classes of fearful behavior seem to manifest only at social maturity. Such behavior can vary from subtle avoidance on the dog's part to total catatonia. This dog exhibited active avoidance behavior; when unable to avoid the approacher, the circling behavior worsened. Expression and worsening of such stereotypic behavior has been postulated to be caused by internal conflict and stress.\(^3\)

**Treatment and Follow-up**

Initial treatment involved behavior modification designed to teach the dog to relax in the presence of the other dogs, and to take cues about the appropriateness of its behavior from its owner.\(^4\)\(^,\)\(^5\) The dog was to sit and stay while the other dogs were fed or let out first, thereby reinforcing a higher status for the other dogs so that this dog would accept their position in the household. The dog also was prohibited from pushing on the owner and had to sleep in its crate. The behavior modification was successful in treating the dominance aggression toward the owner. If this dog was allowed to interact with the other dogs only when supervised by the owner, most bouts of interdog aggression were aborted early or avoided, but this outcome required constant, intensive surveillance. Although successful in treating the dominance aggression toward the owner, behavior modification, including desensitization to the presence of and interaction with the other dogs, was not successful in treating the interdog aggression.

Newer anxiolytic medications have been useful for treatment of human beings with anxiety associated with interaction in unfamiliar circumstances, with stereotypic behavior, and to facilitate appropriate social responses. Fluoxetine\(^6\) has been reported to relieve nonspecific anxiety attributable to depression, and aggressive outbursts associated with depressive or anxious situations in human beings.\(^6\)\(^,\)\(^7\) Accordingly, treatment with fluoxetine (20 mg, PO, q 24 h) was started in this dog.\(^8\)\(^,\)\(^9\) After 6 weeks, the aggressive behavior had lessened, but the fear of strangers had not decreased and the dog appeared more anxious in novel circumstances. Buspirone\(^\text{b}\) treatment (10 mg, PO, q 24 h)\(^8\)\(^,\)\(^9\) was started in place of the fluoxetine after a 1-week drug-free period, in an attempt to treat the increasing anxiety and render the dog less fearful and more outgoing. Buspirone has been reported to greatly ablate nonspecific anxiety in human beings, while not interfering with short-term memory, as does diazepam. Adverse effects on the gastrointestinal tract and CNS are minimal. It has proved particularly useful as an adjuvant to treatment for anxiety associated with social situations.\(^10\)

Within 3 weeks of starting the buspirone treatment, the dog was no avoiding strangers and was wagging its tail when they approached. After 4 weeks of buspirone treatment, the dog was considerably less anxious about approaches from strange human beings and greeted them by jumping up and exuberantly licking their faces. Attempts to rebuff this attention were met with immediate resolutication. The dog began to play with toys with strangers. During subsequent weeks, the dog's friendliness increased to the point where it was a pest; concurrent with the increase in friendly behavior, the circling behavior became more pronounced whenever the dog was rebuffed or ignored. If a stationary object was present, the dog would circle it; otherwise, the dog would circle the space in the immediate vicinity of people and the other dogs.

Because of the increased frequency and intensity of the circling behavior, the buspirone was gradually decreased (to 5 mg, q 24 h), while adding fluoxetine (10 mg, PO, q 24 h). During buspirone treatment, aggressive incidents with dogs or the owner had not been observed; the addition of fluoxetine was hoped to prevent the dog from regressing to prebuspirone levels of aggression and anxiety. After 3 months of combination treatment, the circling was still prevalent, so the dog was weaned from buspirone over 2 weeks.

After buspirone was withdrawn, interdog aggression increased slightly, but not to pretreatment

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levels. The fluoxetine dosage was increased to 12.5 mg (q 24 h) over the same period, in an effort to prevent recidivism of aggression, while concomitantly avoiding the increased anxiety attendant with treatment at the initial higher fluoxetine dosage. Four weeks after the last dose of buspirone, the dog's circling behavior had returned to pretreatment levels, which the owner found tolerable.

The dog has been maintained with fluoxetine treatment for 28 months, with only 1 episode of interdog aggression during that time, which was easily disrupted by vocal commands. Dominance aggression has not been observed and the owner is maintaining the behavior modification treatment, as discussed. After 12 to 14 months of treatment, the pattern of urine marking and covering had become more variable; the dog is not always the first or last to mark over other's urine and the hierarchy among the other females appears fluid and changeable. The dog is still friendly to strangers, although it no longer assaults them with its exuberance.

Since the initial treatment with fluoxetine, the dog's pupils have been consistently dilated; they are responsive to strong light, but are larger than normal. Results of ophthalmologic and neurologic consultations have been within normal limits. Serum biochemical analysis and CBC are performed bimannually and have not revealed renal or hepatic compromise resulting from the prolonged anxiolytic treatment. The dog developed fibrogenital hyperplasia, with variable lymphocytic/plasmacytic infiltration and collagen deposition, 10 months after the initial anxiolytic treatment. Such changes have not been reported with buspirone or fluoxetine administration, but excluding a potential association is impossible because of scant experience in treating dogs with anxiolytics.

To think that the key to treating every case of dominance aggression, interdog aggression, fear of strangers, or stereotypic behavior is pharmacologic intervention would be inappropriate. In this dog, however, rational pharmacologic treatment, adjusted in response to alteration in clinical signs and used in tandem with behavioral modification, resulted in acceptable behavior and lack of renal and hepatic toxicoses. The behavior in this dog had some features that distinguished it from more common problems that may respond to consistent and appropriate behavior modification. The circling behavior was most explicit during stress or anxiety situations. Positive-emission tomography and magnetic resonance imaging can reveal injury or anomaly in brain-associated stereotypes, but such methods are expensive and still uncommonly used in dogs. Although information generated by imaging techniques is highly desirable, pinpointing the lesion is not necessary to be able to attempt pharmacologic treatment.

The dominance aggression in this dog appeared primarily directed toward the owner, was fairly mild, and was responsive to behavior modification. Some forms of dominance aggression are affected by anxiety, so drug treatment might have aided in the continued treatment of this aggression.

The client reported that the interdog aggression, when first observed, resembled the classic pattern of aggression associated with social hierarchical disputes. She later reported that the aggression became more unpredictable and was in apparent response to more subtle cues. As the interdog aggression progressed prior to treatment, the latency from cue to the aggressive event decreased and the aggression ensued, regardless of response. These descriptions are all consistent with an anxious component to the interdog aggression. Because social situations among canids are largely maintained by deference, any uncertainly or anxiety experienced by an individual about its role or relative position in the system could lead to an aggressive response. Hierarchies are fluid, and stature may be relative and change with context. A dog that is already experiencing profound fear and anxiety (as indicated by the avoidance of strangers and circling behavior) in uncertain circumstances may be expected to experience anxiety in interdog situations.

Fluoxetine treatment was chosen because of this anxious component, as well as because it has been reported useful in blunting aggressive outbursts in human beings. Fluoxetine also appears to have had that effect in this dog. Fluoxetine and buspirone are thought to exert their effects through CNS serotonin activity. Fluoxetine is a serotonin agonist and is believed to act via a serotonin receptor; it appears to be particularly effective in blocking a serotonin uptake mechanism. Experimental depletion of CNS serotonin in cats leads to an increase in motor activity and aggression, thus, agents that increase serotonin activity should decrease aggression. Augmentation of fluoxetine effects by buspirone has been reported.

Buspirone may act as a partial serotonin agonist, pre- and postsynaptically, although its primary effect may be as a dopamine-receptor antagonist. Buspirone appeared to facilitate friendly interaction in this dog; that this effect persisted after withdrawal of the drug could have been attributable to its lack of effect on short-term memory. This dog may have learned that social interaction was nothing to be feared during buspirone treatment. Buspirone, particularly when paired with fluoxetine, has been reported to paradoxically increase the frequency and intensity of some obsessive-compulsive (stereotypic) behavior in human beings. Common adverse effects of buspirone and fluoxetine include gastrointestinal distress and possible impairment of renal and hepatic function.

Punishment was not used in the treatment of this dog; punishing fearful or anxious dogs can worsen the problem. Behavior modification was continued, concomitant with drug treatment. Fluoxetine and buspirone require 3 to 6 weeks of use in human beings before patients begin to experience
abatement of signs. In the author's experience, dogs do not appear to differ, and have the same gradual diminution of undesirable behavior as human beings have. Gradual diminution of behavioral problems is observed with the use of other human-label compounds that have been useful in treating stereotypies in dogs.  

References