



Separation-related disorder management through the COVID-19 pandemic: A case report

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Abstract: The closure related to the COVID-19 pandemic impacted on the management of separation-related disorder in a dog. Eight weeks before the first COVID-19 pandemic closure, the patient, an 8-year-old female neutered cross breed dog weighing 6 kg, was presented for nonstop barking when separated from her owners, 8 hours a day, 5 days each week. Before the first consultation, 4 years of training based on desensitization without medication helped the patient but never lowered the barking beyond two hours a day, which remains way too high to provide a correct quality of life to this dog. The patient welfare was at stake, and the neighborhood complains were growing. The patient was prescribed fluoxetine at 20 mg (3.3 mg/kg) PO q24 h. and trazodone PRN before separation at 25 mg (4.2 mg/kg) PO. A behavioral modification plan based on extinction and calm reinforcement was prescribed. Eight weeks after the treatment onset, just before the first COVID-19 pandemic closure, the dog improved significantly, lowered daily barking up to 15 minutes. During all the successive closures (i.e., one year), the dog was never left alone. When the closures ended, the barking relapsed, straight at the first separation event, reaching 1 to 2 hours daily, even though the fluoxetine had never been interrupted. Therefore, gabapentin was prescribed PRN before separation at 100 mg (16.6 mg/kg) in place of trazodone that triggered excitation in the patient when it was previously tried. The behavioral plan was completed with additional conditioning learning before separation. The dog improved quickly to a short tolerable time of barking (i.e., 5 to 10 minutes). This outcome remains stable by the time the paper is written i.e., 3 months after the end of the closure. The patient's evolution emphasizes two important topics in the treatment of separation-related disorder: firstly, medication is needed for most cases to lower the level of emotional reaction, and secondly, interruption in the exposition to the fearful context may have rebound effects when the context will be encountered again. The long-term effects of the COVID-19 pandemic remains unknown on both human and dog's welfare. More extensive studies should be conducted to measure its impact on separation-related disorder in dogs.

Key Words: dog, separation related disorder, COVID-19 pandemic, separation anxiety, Fluoxetine, Gabapentin, Trazodone.

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Presentation

Influence of the COVID-19 pandemic on separation related behavioral disorder in a dog and its management.

Signalment

The patient is an 8-year-old female neutered cross breed dog weighing 6 kg.

Demographic

The patient was adopted 4 years ago from a shelter. She was relinquished there a year before the adoption and her previous history or the reason for abandoning her are completely unknown to the owners. During her year spent in the shelter, she had been adopted several times. Each time, she came back to the shelter under a few weeks. The shelter staff did not provide the reasons for these returns to the current owners. The current owners live in an apartment in a large city with a two-year-old child.

Medical and behavioral history

When adopted 4 years ago, the patient was not cared of, she had diarrhea and a bad body condition. She improved within a month with a good alimentation and antibiotic treatment.

Immediately after adoption the patient was extremely fearful and for this reason most of the time inhibited. She was not playful at home and her main behavior was sleeping. It was exceedingly difficult to walk the dog in the street. She would react to all the noises of the urban surrounding by freezing or pulling back to the house direction. She was avoiding all the strangers in the street and the visitor's proximity. She showed extreme fear with shaking, panting and restlessness when exposed to thunderstorm, fireworks, or explosions. After a few months, with the resolution of her diarrhea, her body shape condition got back within the normal ranges, and her behavior improved. She got rapidly used to the urban surrounding, and progressively her signs of fear decreased. Four months after the adoption when left alone at home the patient began to bark and howl. The situation worsened rapidly and 5 months after adoption, when left alone, the patient barked non-stop until reunion with her owners, 8 hours daily. The owners got the help of four different trainers, which slightly improved the situation of fears. Four years after adoption the patient was able to walk in the street without fear, the proximity of strangers did not trigger avoidance apart from some individuals with a loud voice and rapid movement towards her. In this situation, the patient would avoid, but never reacted in an aggressive way. However, the dog never ceased barking when left alone at home. The best improvement after training reached one hour of barking on and off. The neighborhood complains increased and for this reason the owners sought the help of the behaviorist veterinarian. It was a month before the beginning of the COVID-19 pandemic.

Presenting physical and behavioral signs

The patient was friendly and not fearful at all. She approached when invited, tail and pelvis waving. She was easy to touch and pet. Her physical examination was easy to perform and revealed no abnormal findings. The patient weighed 6 kg with a good body condition score of 5/9 ("Body Condition Score," 2013). The results of the serum chemistry panel and complete blood count (CBC) were within the limits of the laboratory reference range.

Based on owner's video recordings, the main behavioral symptoms were non-stop barking and howling for 1 to 8 hours daily, five days a week when the patient was left alone. She could also scratch the apartment main door or the walls around the door. According to the owner's video recording, the patient exhibited autonomic signs (e.g., panting and shaking) and restlessness that owners also described by the time they would prepare themselves to go out. The owners also reported that the patient showed a high tendency to seek contact with them during all their preparation routine. Once the owners were out, the dog immediately started to

bark. The reunion with the owners were also highly emotional with the patient jumping, crying, and being overjoyed. Most of the time, minutes after the reunion, the dog went to drink. It seemed according to the water amount, that the patient did not drink at all for 8 hours when she was staying alone. Regularly, owners found puddles of saliva next to the main door of the apartment. When the owners were present in the house, the dog sought for the owner's proximity more than normal. She frequently asked for attention and tended to follow the owners in the flat. The separation from only one of the owners could trigger a light expression of distress for a short time, essentially crying next to the door then the dog would settle down.

The dog was overreacting to loud noises. During storm, fireworks, or alarm, she started shaking, panting, and could not settle down. In this context, she sought contact with the owners, even though their proximity did not bring any comfort, despite their tries to reassure her. The dog did not express any other phobia. She was friendly and comfortable with humans and dogs. She had never been aggressive. She could be startled by a toy and play during the consultation, but she rapidly lost interest and settled down.

Diagnosis

Based on the clinical signs and the video recording contributions (Ogi, 2018), the veterinarian using the French psychiatry model concluded to intermittent anxiety and secondary autonomy disorder due to deprivation syndrome (Mège et al., 2003). This pathology is also called separation-related disorder or separation anxiety (Denenberg, 2020; Landsberg et al., 2013; Overall, 2013) in the Anglo-Saxon literature. Immediately after adoption, the dog showed signs of severe phobias with inhibition that improved with the onset of the separation-related disorder. A secondary hyper attachment probably developed while the phobias improved (Sherman, 2008) as a compensatory strategy to cope with the fears.

Treatment

1. Behavioral modification

All the previous desensitization protocols advised by the dog trainers failed. Owners were therefore advised to simply limit their emotional expressions during their regular departure and reunion routine. To do so, before leaving for their regular activities or work, the owners were advised to delay for 20 minutes the separation from the end of their departure routine and to fill this time with neutral occupations without having any communication with the dog. The goal was to limit the effects of the previous and strong classic conditioning between the departure routine and the dog anxiety. During reunion, they were advised not to greet the dog until she was able to answer to a "sit" cue. Then they could greet her in a calm manner.

2. Medication

The dog was prescribed fluoxetine at a dose of 20 mg (3.3 mg/kg) every 24 hours (Bleuer-Elsner et al., 2021), which is above the widely recommended dosages (e.g., 1-2 mg/kg) (Landsberg et al., 2008). Additionally, the owners were asked to give the dog trazodone *PRN* at a dose of 25 mg (4.2 mg/kg) 90 minutes before departures. Trazodone was also given *PRN* at a dose of 50 mg (8.4 mg/kg) *PO* before storm, fireworks, or alarms, 90 minutes before the stressful event when it is predictable and at the event onset if not. A gap of 8 hours minimum had to be respected between 2 administrations of trazodone (Harting et al., 2018; Gruen & Sherman, 2008).

3. *Environment modification*

A safe place where the dog could feel secure was proposed. She already had a carpet. The central localization of the carpet was changed for a more peripheric one in order not to give the patient the possibility to watch her owners' movements from her resting place and therefore lower her vigilance.

A basic training using a stay cue was used to habituate the dog to be relaxed in her resting place. Toys and treats were used to increase the interest of the dog for her resting place, in order make it reassuring, even when the owners would not be at home. Finally, the owners were advised not to play, nor to pet, nor to have any interaction with the patient when she was resting on her mat. The goal was to provide a very private and secure place where the dog can settle down and be certain that she would not be disturbed.

Follow-up

The patient presented rare episodes of shaking without identified trigger one week after the treatment onset probably induced by the fluoxetine (Simpson et al., 2007). This adverse effect disappeared during the next two weeks without any dose adjustment. The barking intensity and frequency decreased significantly 2 days after the treatment onset. The dog stopped to scratch the door during the first week and the autonomic signs before separation decreased gradually during the first two weeks of treatment. During the reunion, the dog still jumped and showed overjoy but tended to settle down faster.

Six weeks after starting the treatment, a closure was just declared to prevent the spread of the COVID-19 pandemic. It was decided with the owners to perform a remote follow up consultation. Just before the closer, the patient showed a significant improvement in her behavior during the owner separation routine. She was able to keep calm, even lay on her mat without signs of hypervigilance. Panting and shaking were not observed anymore. The barking improved and stayed limited between 15 to 45 minutes daily. The salivation near the door disappeared. The reunions were easier, the dog was able to sit to be greeted after 2 to 5 minutes. Since the closure start, the separation ceased completely, the dog was never left alone. The owners stopped to give the trazodone 2 weeks before the follow up because the dog began to be too excited and was jumping a lot. When they stopped, this adverse effect ceased.

The owners reported a good influence of the treatment on the general level of the dog's fears. For this reason, it was decided to continue fluoxetine treatment daily even if the dog was not left alone. One year later, with the containment of the COVID-19 pandemic and the return to a work routine, separation situations came back. The patient worsened again immediately after the first separation. She was left alone 5 hours daily and barked randomly from 1 to 2 hours. She did not scratch the door as she did before treatment but the previous hypervigilance during the owners' preparation routine, overjoy during reunion and proximity seeking came back. The autonomic symptoms (i.e., panting and shaking) did not reappeared.

1. *Behavioral modification*

Because the owners applied the behavioral modification only a few weeks before the start of the pandemic, the veterinarian had to explain it again to be sure everything was understood.

In addition, the owners were asked to create a new ritual using a specific object, such as a colored water bottle. They were asked to put the bottle in a specific place, and make sure that the dog saw them do it. Each time the bottle was in this place, they were asked not to interact with the dog. After a few minutes, they had to hide the bottle and then the dog was allowed to interact with them. They were advised to start this training only for very short times, and once the

dog would be able to respond to it for one hour, they were allowed to get the bottle out on real departures.

2. Medication

The dog was still under fluoxetine at a dose of 20 mg (3.3 mg/kg) *PO* every 24 hours. In addition, the veterinarian prescribed gabapentin 100 mg (16.6 mg/kg) *per PO PRN* one hour and a half before separation (Piotti et al., 2019).

Ten days after the treatment onset the dog improved. The barking was limited to 10 minutes after separation. Then the dog would settle down and rest until the owners return.

At the time this paper is written, the dog is still under the same treatment. The barking did not disappear completely but are limited in time (i.e., 5 to 10 minutes). No other signs of distress are reported by the owners and the neighborhood did not complain any more.

Discussion

Separation-related disorder is a common disorder in dogs, particularly when adopted from shelters (Sargisson, 2014). Still, its etiology, its treatment, and its prevention remain elusive (Ogata, 2016). In this case, the dog's anxiety is probably the result of a hyper attachment secondary to extensive phobia. This insecure attachment (Konok et al., 2019; Solomon et al., 2019) is also a common behavioral profile in dogs adopted from shelters (McCrave, 1991).

Most of the authors agreed that the onset of separation treatment should include medication, at least for the first weeks (Takeuchi et al., 2000). The main and FDA approved drugs for this indication are fluoxetine (Landsberg et al., 2008) and clomipramine (King et al., 2000).

In the case of the patient, since the main complaint was non-stop barking, fluoxetine was preferred for its anxiolytic (Reisner, 2003) and anti-compulsive effects (Irimajiri et al., 2009). Higher dose helps the regulation of uncontrolled behaviors (Bleuer-Elsner et al., 2021), therefore fluoxetine was prescribed above its widely recommended dosages of 1-2 mg/kg.

Trazodone is an off label drug legally prescribed in dog anxiety (Chea & Giorgi, 2017) and suggested stand alone or as adjunctive (Gruen & Sherman, 2008). In this case, after a month of trazodone treatment, the dog showed symptoms of excitation. Given that trazodone is an antidepressant medication with sedative effects, this sudden adverse effect after a month of treatment might be the result of the antidepressant onset of the molecule. For this reason, and given its efficiency on acute expression of fear (Bleuer-Elsner et al., 2021), gabapentin was prescribed instead of trazodone with good results.

Since the adoption of the dog, 4 years of treatment attempts only based on desensitization and counter conditioning did not improve the patient. Systematic desensitization is indeed the standard treatment (Butler et al., 2011) with better results when coupled to counter conditioning (Poppen, 1970). The main source of difficulties is the owner's commitment. In a standard family busy day, owners lose rapidly patience and interest in such a long procedure (Takeuchi et al., 2000).

For this reason, the behavioral modifications for the patient were based on extinction and anxiety control more than on desensitization.

Learning theory tells us that the delay between an unconditional stimulus and the anticipation onset is primary to classical conditioning (Davis, 1970). Then, once the conditional and unconditioned stimulus are unlinked, the conditional behavior is extinct (Gluck et al., 2014). For those reasons, the goal of the therapy was to postpone the separation from all its cues (e.g., owners' preparation routine, closure of parts of the house).

In addition, such a delay between the conditional stimulus (i.e., preparation routine) and the unconditional one (i.e., dog left alone), helps the dog to control his own anxiety since the dog will not be left alone at the anxiety peak.

To do so, the owners were advised to end all their pre-separation routine 20 minutes before going out for their regular activities. During this time, the owners were advised to shut down all their communication channels to avoid reactivating any separation related cue.

Conditioning and anxiety are intimately linked (Carpenter et al., 2019). On one hand, an extinction protocol helps anxiety control, and on the other hand, medication that lowers vigilance and fear makes the extinction learning more efficient. In this case, this extinction protocol led to better results than the previous desensitization. But probably both would have brought improvements once the anxiety was lowered by the effectiveness of the medication.

During reunion, a protocol of calm reinforcement was preferred with a sit cue as the first condition for the dog to be greeted. This way, the patient and the owner would be more able to control their emotions.

The patient did not show any signs of disorder during the pandemic closure since owners never left the dog alone. When the closure ended and the owners got back to their work routine, the symptoms reappeared immediately, with more severity than they were after the first weeks of treatment.

This is a good illustration of the fact that a conditioned behavior cannot be erased. Extinction leaves previously conditioned association intact (Bouton & Nelson, 1998; Falls, 1998). When the environment and routine will change, retrieving a context associated with fear memory reactivates neurons in the hippocampus, amygdala, and cortex (Tayler et al., 2013). In the case of the patient, the previous extinction procedure seemed to help, then during the pandemic closure the context authorized a complete avoidance of the anxious circumstances (i.e., being left alone). With the return of the anxiogenic situation, the previous symptoms came back immediately.

After the relapse, the object-cue therapy was prescribed to replace the classical conditioning based on the owners' routine before separation, by another one with a larger context. Replacing a classical conditioning with undesirable outcome with another one that leads to a different outcome is another way of therapy (Gluck et al., 2014).

Finally, the patient seemed stabilized again. His history shows lots of vulnerability and future context change may probably cause relapse.

Conclusion

The COVID-19 pandemic is a major event of the early 21st century. Its final influence on humans and animals remains uncertain at the time this paper is being written. More and more cases of phobia and anxiety in dogs emerge that could be related to the pandemic. Indeed, due to the closure lots of fearful dogs avoided their fear-related context and their symptoms apparently disappeared. With the end of the closure and the reactivation of the fearful contexts, the symptoms may reappear with a higher intensity due to a rebound effect. This case underlines the fact that therapy of anxiety is a long process that should be primarily supported by medication, and secondarily not interrupted even if the fearful context is removed temporarily. As far as possible, a regular exposition is necessary to complete the treatment and prevent this rebound effect when back to a normal routine. These optimal conditions were not easily reached under the COVID-19 pandemic conditions and many similar cases may be seen in the months coming.

Authorship

The idea for the article was conceived by Stephane Bleuer-Elsner.

The case was handled by Stephane Bleuer-Elsner and discussed with Sylvia Masson.

The article was written by Stephane Bleuer-Elsner and Sylvia Masson.

Conflicts of interest

The authors have no conflicts of interest to declare.

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Gestione dei disturbi legati alla separazione durante la pandemia di COVID-19: un caso clinico

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Sintesi

La chiusura correlata alla pandemia COVID-19 ha avuto un impatto sulla gestione del disturbo legato alla separazione nel cane. Otto settimane prima della chiusura della prima pandemia di COVID-19, la paziente, una cagnolina meticcica, sterilizzata, di 8 anni di età e del peso di 6 kg, è stata portata alla visita comportamentale a causa dell'abbaiare ininterrottamente quando era separata dai proprietari, 8 ore al giorno, 5 giorni alla settimana.

Il cane, prima del consulto, aveva seguito, per 4 anni, corsi di addestramento basati sulla desensibilizzazione, senza l'uso di farmaci. Tali esperienze avevano ottenuto un miglioramento del paziente ma non avevano mai ridotto l'abbaiare oltre le due ore al giorno. Al paziente è stata prescritta fluoxetina alla dose di 20 mg (3,3 mg/kg) PO ogni 24 h e trazodone PRN prima della separazione alla dose di 25 mg (4,2 mg/kg) PO. È stato prescritto un piano di modificazione comportamentale, basato sull'estinzione e sul rinforzo della calma.

Otto settimane dopo l'inizio del trattamento, poco prima della fine del primo lock-down, il cane è migliorato significativamente, riducendo l'abbaiare quotidiano fino a 15 minuti. Durante tutto il successivo periodo di lock-down (cioè un anno), il cane non è mai stato lasciato solo. Terminato il lock-down, l'abbaiare si è ripresentato, proprio al primo evento di separazione, raggiungendo da 1 a 2 ore giornaliere, anche se la fluoxetina non era mai stata interrotta. Pertanto, il gabapentin è stato prescritto PRN prima della separazione alla dose di 100 mg (16,6 mg/kg) al posto del trazodone che ha innescato l'eccitazione nel paziente quando è stato precedentemente provato. Il piano comportamentale è stato completato con un condizionamento aggiuntivo prima della separazione. Il cane è migliorato rapidamente fino a un breve tempo tollerabile di abbaio (cioè da 5 a 10 minuti). Questo risultato è rimasto stabile al momento della stesura del documento, ovvero 3 mesi dopo la fine del lock-down. L'evoluzione del paziente pone l'accento su due temi importanti nel trattamento del disturbo da separazione: in primo luogo, nella maggior parte dei casi, i farmaci sono necessari per abbassare il livello di reazione emotiva e, in secondo luogo, l'interruzione dell'esposizione al contesto pauroso può avere effetti di rimbalzo quando il contesto sarà sperimentato di nuovo. Gli effetti a lungo termine della pandemia di COVID-19 rimangono sconosciuti sul benessere sia dell'uomo che del cane. Dovrebbero essere condotti studi più ampi per misurare il suo impatto sul disturbo correlato alla separazione nei cani.

