

IMPORTANCE OF BEHAVIORAL CHANGES IN IDENTIFICATION OF CHRONIC PAIN AND ITS CAUSES IN DOGS – CASE REPORT

Mirosław Karpiński¹, Karolina Alchimowicz¹, Justyna Wojtaś¹, Anna Łojarczyk², Aleksandra Garbiec¹✉

¹Department of Animal Ethology and Wildlife Management, University of Life Science, Akademicka 13, Lublin, Poland

²Laboratory of Radiology and Ultrasonography, Department and Clinic of Animal Surgery, University of Life Science, Głęboka 30, Lublin, Poland

ABSTRACT

Chronic pain accompanying many diseases significantly impairs the quality of life and induces various changes in the behavior of animals. The present case report describes a dog with persistent chronic pain. The clinical signs demonstrated by the dog e.g. sneezing, rubbing the viscerocranium with thoracic legs, shaking the head, and avoidance of touch, clearly suggested discomfort localized in the muzzle. The final diagnosis of nasal adenocarcinoma was reached after over a year from the appearance of the first symptoms of discomfort. In retrospect, it is clear that the changes in the dog's behavior were caused by chronic pain. Presentation of new behaviors should be a signal to the owner indicating certain disturbances in the animal's well-being. There is a need for cooperation between the pet owner, veterinary doctor, and animal behaviorist in order to regard behavioral changes as a clue for the diagnosis of pain experienced by the animal and for treatment of its causes.

Key words: chronic pain, dog, diagnostics, behavior

INTRODUCTION

Behavioral disorders in animals have long been regarded as potential indicators of pain. Proper interpretation of these signs is crucial in limitation or elimination of pain. It is usually less problematic to assess the severity of acute pain, which is a result of current tissue damage associated with sensory stimulation and pronounced emotional expression [Gurney 2012]. Identification of chronic pain can be largely impeded due to not only difficulties in determination of its causes, but also failure to notice the changes in the usual behavior of the animal. Additionally, sensation of pain by animals, as in the case of humans, is related to individual sensitivity to pain. Behavioral changes caused by chronic pain can have adverse consequences in many areas of animal life and thus significantly reduce animal's behavioral comfort. Changes in the behavior depend on the intensity of pain and individual characteristics [Lush and Ijichi 2018]. Moreover, pain associated with slowly developing diseases can be only slightly uncomfortable for a long time and cause

only temporary changes in behavior. Chronic pain significantly determines animal's life and, at high intensity, may cause changes in animal psyche. Owners of dogs suffering from chronic pain often observe their reluctance to contact people and other animals, changes in the daily routine, low mood, and in extreme cases aggression towards even at the slightest attempt to touch not only the pain-affected area [Mathews et al. 2014, Reid et al. 2018].

Behavioral disorders have currently been regarded as potential pain indicators in animals [Wiseman et al. 2001]. As suggested by Wiseman-Orr et al. [2004], the changes can affect all categories of behavior, but species and breed differences should be taken into account. The repertoire of such changes may also be influenced by the location of the source of pain. Therefore, it seems advisable to focus on the most frequent changes in behavior.

Pain is always an unpleasant sensation, and chronic pain can lastingly reduce the comfort of functioning and cause unpredictable changes in behavior. Hence, the modern approach to the assessment of pain in human and veterinary medicine focuses mainly on the affective di-

✉ aleksandra.garbiec@up.lublin.pl

mension. Persistent unpleasant feelings that accompany pain are associated with suffering [Flecknell et al. 2008]. A focus on the importance of the affective component of pain can be crucial in revising the present methods for treatment of chronic or neuropathic pain.

The basic criterion for defining chronic pain is its duration, i.e. most often over 3 months. However, accurate determination of the type of pain in the case of animals is not a simple task. Chronic pain differs from the acute form also in the pathophysiology and clinical features; hence, it can be considered as an independent disease requiring individual therapeutic treatment [Brookoff 2005]. From the behavioral point of view, the most important sign is the response to pain. There are two basic responses: emotional and motoric reactions. The emotional response is described as anxiety in acute pain and as depressive reaction in chronic pain [Mathews et al. 2014]. Pain exerts an adverse impact on cognitive functions via loss of neurons in the brain and reduction of cerebral blood flow [Kreitler and Beltrutti 2007]. The cause of chronic pain in animals is usually recognized too late or remains unidentified, which significantly hinders therapeutic treatment.

The approach to the treatment of chronic pain requires verification of regimens employed in the case of acute pain. An optimal approach is the multimodal pain management comprising parallel application of pharmacotherapy, selected forms of physical therapy, and alternative methods [Burma et al. 2017]. It is also essential to manage dog's activity properly and change it into a less intensive form. Some veterinarians are skeptical about working with a behaviorist. Non-drug therapies should be used simultaneously with medical treatment. For instance, the combination of acupuncture with pharmacological therapy seems to be more effective in alleviation of pain than the sole use of drugs and can concurrently contribute to reduction of the doses of drugs, which is important in the face of their side effects [Choi et al. 2012].

Other forms of supportive therapy (aromatherapy, acupressure) also improve the life comfort in cancer patients suffering from chronic pain, although their direct analgesic effect has not been clearly confirmed. An important element in the management of pain associated with an ongoing cancer process is to provide the patient with psychological comfort during oncological treatment. Limitation of unnecessary suffering, especially in oncological and geriatric patients, is a moral duty of a physician on the one hand and a standard in holistic medicine on the other [Mathews et al. 2014]. In the case of animals, cooperation with the animal owner and the behaviorist is highly important, as it facilitates development of a new model of animal's activity.

The aim of the study was a retrospective analysis of changes in the behavior of a dog with a late diagnosis of tumor.

CASE REPORT

The case report describes an 8-year-old, weighing 40 kilograms, non-castrated Labrador-type male dog with yellow hair coat. The first changes in the dog's behavior were noticed by the owners in the autumn of 2015. These included reverse sneezing and rubbing the viscerocranium with thoracic legs (Fig. 1).

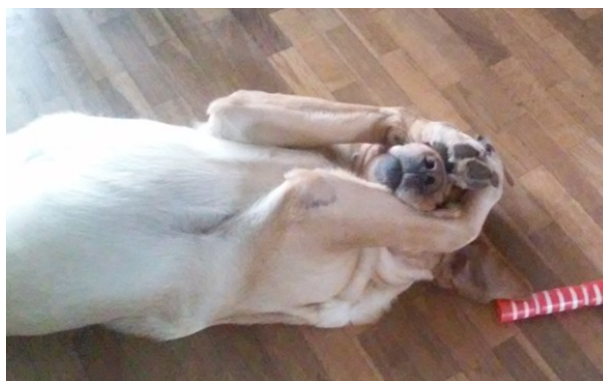


Fig. 1. Dog rubbing the viscerocranium with thoracic legs

A characteristic symptom was the intense inhalation of the air through the nares with partially open lips pulled backwards and upwards. The animal was standing on widely spaced stiffened limbs with the head at the level of the backline or slightly below. The ears were laid flat and pulled backwards. Intense work of the diaphragm, respiratory muscles, and abdomen was visible. Initially, the dog chose isolated places during the pain attack and exhibited clear signs of stress, e.g. eyes wide open, looking around, and shaking (as with wet hair coat)

Another disturbing symptom was the change in the breathing during sleep and in the lateral lying position. The evident clear breathing effort was manifested by strong work of the diaphragm, abdominal muscles, and chest. The air inspiration became loud and wheezing as in the presence of an obstacle in the airways.

Due to the non-specificity of the symptoms, the diagnosis was very difficult for the veterinarians. At that time, the symptoms were not identified as an indication of cancer development due to the very good overall health status of the dog. Loss of laryngeal and tracheal muscle tone during sleep and dysfunction of the circulatory system were suspected. Examinations and cardiological consultation excluded these suspicions and only slight bradycardia was diagnosed. The presence of endoparasites was excluded as well.

There was no improvement in the following months and the symptoms persisted. Moreover, since the wheezing and crepitant sounds accompanying sniffing became louder, they were interpreted as growling. The physical condition and efficiency of the organism still did not

deteriorate substantially, but the first clear changes in behavior were observed. Sleep disorders appeared and the dog licked the inside part of the paws compulsively, with greater intensity at night and during rest. The re-assessment of the dog's health excluded allergies or the presence of a foreign body in the respiratory tract oesophagus. The appropriateness of the dog's living conditions was evaluated and additional physical and intellectual exercises were introduced. They yielded a positive effect, i.e. the dog was more tired and hence fell asleep with less difficulty. Nevertheless, the compulsive behaviors did not completely disappear.

A breakthrough in the diagnostics was the nose-bleeding episode. The bleeding had low intensity and lasted less than 4 minutes. During the event, the dog did not present with visible signs of stress or discomfort. Puncture was suspected to have taken place during intense sniffing; therefore, the nasal vestibule was examined and local inflammation of the mucosa was detected. Immunity supporting treatment was administered.

Less than two weeks later, the bleeding from the left nostril recurred. It was much more intense and lasted approximately two hours. It was accompanied visible signs of stress and general disorientation. The dog sneezed and intensively shook the head at the level of the carpal joints or pressed the head against the ground. Additionally, each sneeze was preceded by a strong sweeping motion of the head, which very often hit against the ground thus intensifying the sensation of pain. During the sneezing and an attempt to touch the muzzle, the dog characteristically avoided the contact (turned the head away). The animal was transported to a veterinary clinic where bleeding-reducing medications were administered and x-ray imaging of the chest and head region was performed. The examination showed only enlarged mandibular lymph nodes, located on both sides of the mandible, cranially from the mandibular salivary glands. Next, blood morphology examination clearly indicated regeneration of the organism after the intense bleeding. After exclusion of blood clotting disorders, the dog was referred to rhinoscopy and computed tomography examinations. The endoscopically collected part of nasal cavity tissue for histopathological examination showed only normal epithelium of the airways, which was contrary to the result of the CT scan performed the same day. The tomography image unequivocally indicated extensive tumor. The cross-sectional CT scan showed a significant decrease in airflow in the left nasal cavity: in the nasal turbinate and posterior nostrils, with the inclusion of the left nasal passages and the left nasopharynx, and a slight decrease in the right nasopharyngeal canal. (Fig. 2, Fig. 3).

Bacteriological and mycological examination of the sampled tissue was performed. The results excluded fungal infection, but *E. coli* bacteria were detected. An antibiogram was prepared and a relevant antibiotic was pre-

scribed (enrofloxacin at a dose of 5 mg per kg body weight, once a day for ten days). The dog was administered the first dose of steroids as well (tolfenamic acid at a dose of 4mg per kg once a day for three days). In retrospective, it can be assumed that the diagnosis based on the the bacterial inoculation was wrong, as the sample may have been contaminated during collection or subsequent handling. Despite the administration of the antibiotics, the bleedings did not stop, but were less intense and had a form of serosanguineous discharge. Additionally, the condition of the dog improved significantly: the difficulties in breathing were alleviated (breathing became quieter and less strenuous) and the quality of sleep improved. The dog continued normal physical activity.

With time, the frequency of the nasal bleeding events increased; however, they exhibited low intensity, lasted up to ten minutes, and again involved only the left nasal cavity. During the bleedings, the dog was clearly restless. Due to the presence of a substantial amount of blood in the oral cavity and the bleeding from the left nasal cavity, the dog was licking the nares intensively, which may also have been a sign of stress. This was accompanied by clear signs of discomfort or even pain, as the dog was closing his eyes and breathing with the mouth open, instead of the nose. After the bleeding, he chose calm and dark places to rest and very often fell asleep.

The owners noticed that each bleeding event was preceded by specific behavioral signs evident several days earlier. The first sign was the appearance of crepitant breathing. The temperature of the upper part of the viscerocranium and the area between the eyes was evidently elevated. The dog pressed and rubbed his head against his owners' legs. He was relieved upon application of a cold compress onto this area. Apathy and aversion to activity appeared. The dog very rarely wagged his tail to show contentment, often closed his eyes, and produced characteristic long sighs. In the supine position, the dog was rubbing the viscerocranium with his thoracic legs and remained in this position for a long time. This was a new behavior, but the owners did not interpret it as a symptom of pain or discomfort. The dog had difficulty in biting hard objects and opening the oral cavity wide while yawning. After barking, he squinted and blinked rapidly. Still, there was no clear diagnosis of tumor disease. This may have been associated with the negative results of the earlier histopathological examinations and the failure to take into consideration the CT scan results and the behavioral signals. The dog's overall health status was good.

At the beginning of 2017, i.e. nearly two years after the appearance of the first symptoms, a reliable tissue sample was collected for histopathological examination during a CT scan in an anesthetized patient. The sample (tissue slices) was taken by biopsy via nasal access. It clearly showed the presence of a malignant tumor – adenocarcinoma. The palliative care was based on adminis-

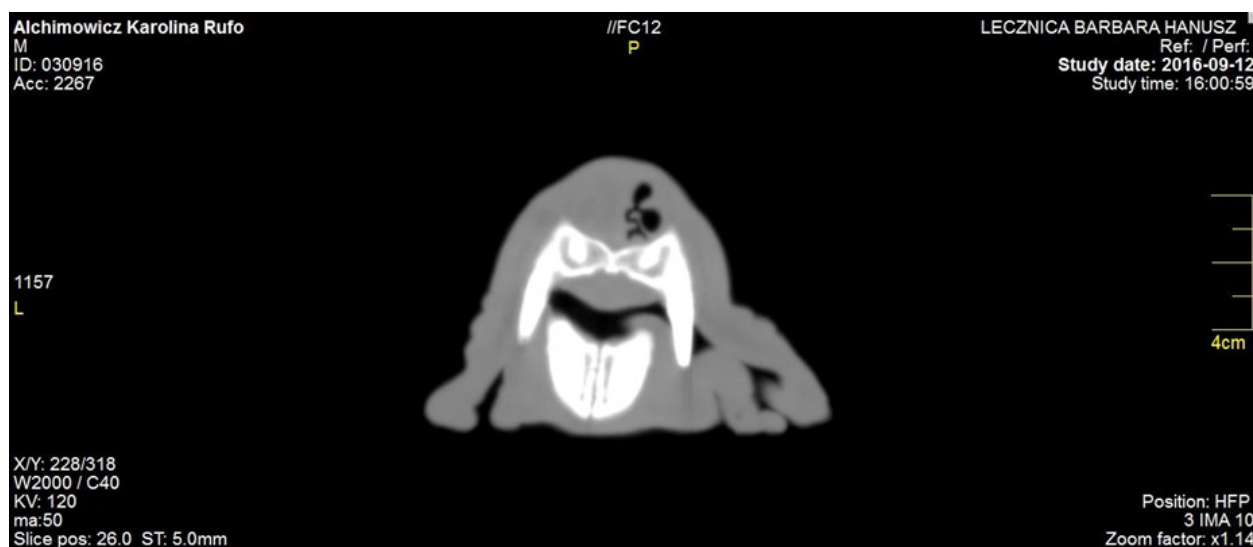


Fig. 2. The cross-sectional CT showing a significant decrease in aeration within the nasal cavity on the left side

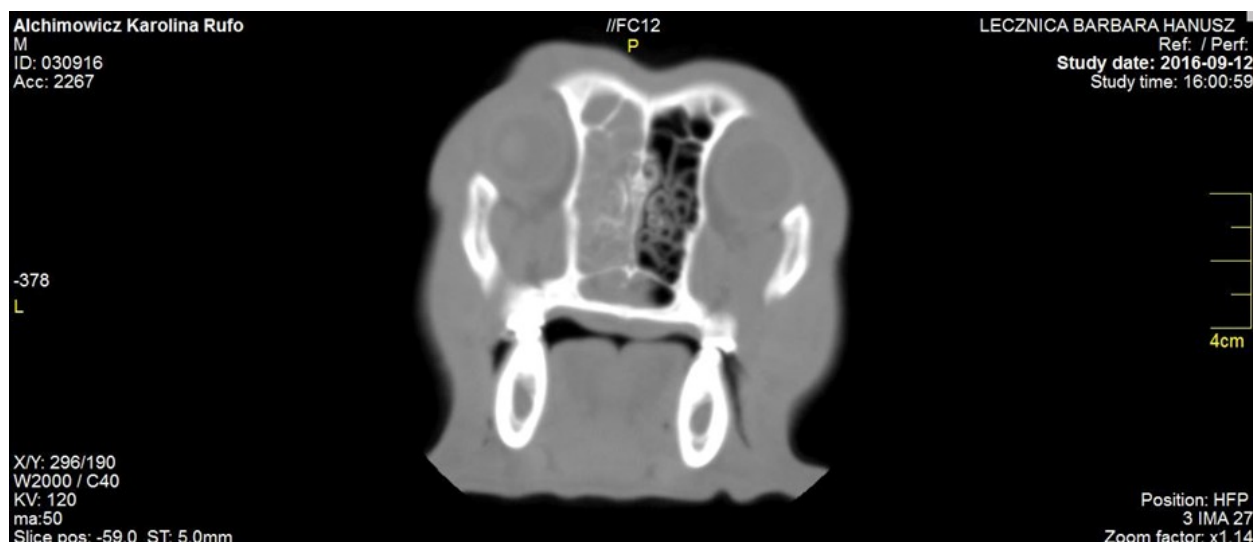


Fig. 3. The cross-sectional CT showing a significant decrease in aeration within the nasal cavity on the left side with destruction within the nasal turbinates and the surrounding skeletal system

tration of antihemorrhagic drugs and medications for improvement of immunity and the condition of blood vessels (tranexamic acid at a dose 15 mg per kg body weight twice a day orally, etamsylate at a dose 25 mg per kg body weight three times a day orally, ascorbic acid at a dose 10 mg per kg body weight once a day subcutaneously). The dog was not deprived of his routine physical activity; nevertheless, the character of the activity changed: it became more static and the walks were shorter but more diverse.

The dog began to show aggressive behavior towards other dogs (probably caused by irritation or pain). His effort tolerance declined, therefore the walking time was

shortened. In October 2017, the condition of the dog worsened substantially and euthanasia proved necessary. Motor malcoordination, lifting impairment, and absent sight were observed. The dog refused to eat. Blood shot eyes, an almost invisible pupil, and drooping eyelids were noted.

The dog was transported to the veterinary clinic. The examination showed significant deterioration of the overall health status, strong swelling of the right eye socket, absence of the menace and palpebral reflexes, dextrorotation of the head, and strong inspiratory dyspnea. Due to the unfavorable prognosis and the considerable deterioration of the quality of life, the dog was euthanized.

CONCLUSION

Chronic pain is usually a result of a long-lasting disease process that does not produce any clinical symptoms. Sensation of pain causes more or less distinct changes in animal behavior, which may often be overlooked by the owner or ignored by the veterinarian. In the case described in this report, the behavioral signs were too unusual to be clearly identified with pain, which delayed the administration of analgesics for a relatively long time. However, it should be noted that avoidance of touch of previously accepted body areas usually indicate sensation of pain. New behaviors should inform the owner about disturbance in the animal's well-being. Additionally, the behavior described in the case report may have been only a small part of all signals sent by the animal. Other less specific forms of reactivity may be overlooked due to the modifying impact of the environment. Recognition of species- and individual-specific signals of discomfort is crucial in diagnosis of pain. The difficulties in the correct interpretation of behavior that may indicate chronic pain emphasize the importance of effective cooperation between the animal owner, veterinarian, and behaviorist. Therefore, it seems advisable to develop a standard model of cooperation in this area, which will contribute to improvement of the comfort and quality of animal life.

REFERENCES

- Brookoff, D. (2005). Chronic pain as disease. In: McCarberg B. and Passik S.D. (eds): Pain management, Expert Guides, Verse Press, 1–33.
- Burma, N.E., Leduc-Pessah, H., Fan, C.Y., Trang, T. (2017). Animal models of chronic pain: advances and challenges for clinical translation. *J. Neurosci. Res.*, 95(6), 1242–1256. DOI: [10.1002/jnr.23768](https://doi.org/10.1002/jnr.23768).
- Choi, T.Y., Lee, M.S., Kim, T.H., Zaslowski, C., Ernst, E. (2012). Acupuncture for the treatment of cancer pain: a systematic review of randomised clinical trials. *Support Care Cancer*, 20, 1147–1158. DOI: [10.1007/s00520-012-1432-9](https://doi.org/10.1007/s00520-012-1432-9).
- Flecknell, P., Firth, A. M., Haldane S. L. (2008). Analgesia from a veterinary perspective. *Br. J. Anaesth.*, 101, 121–124. DOI: [10.1093/bja/aen087](https://doi.org/10.1093/bja/aen087).
- Gurney, M.A. (2012). Pharmacological options for intra-operative and early postoperative analgesia: an update. *J. Small Anim. Pract.*, 53, 377–386. DOI: [10.1111/j.1748-5827.2012.01243.x](https://doi.org/10.1111/j.1748-5827.2012.01243.x).
- Kreitler, S., Beltrutti, D. (2007). *Handbook of Chronic Pain*, Nova Science, New York.
- Lush, J., Ijichi, C. (2018). A preliminary investigation into personality and pain in dogs. *J. Vet. Behav.*, 24, 62–68. DOI: [10.1016/j.jveb.2018.01.005](https://doi.org/10.1016/j.jveb.2018.01.005).
- Mathews, K., Kronen, P.W., Lascelles, D., Nolan, A., Robertson, S., Steagall, P.V., Wright, B., Yamashita, K. (2014). Guidelines for Recognition, Assessment and Treatment of Pain. *J. Small Anim. Pract.*, 5, 10–68. DOI: [10.1111/jsap.12200](https://doi.org/10.1111/jsap.12200).
- Reid, J., Nolan, A.M., Scott, E.M. (2018). Measuring pain in dogs and cats using structured behavioural observation. *Vet. J.*, 72–79. DOI: [10.1016/j.tvjl.2018.04.013](https://doi.org/10.1016/j.tvjl.2018.04.013).
- Wiseman, M.L., Nolan, A.M., Reid, J., Scott, E.M. (2001). Preliminary study on owner reported behaviour changes associated with chronic pain in dogs. *Vet. Rec.*, 149, 423–424. DOI: [10.1136/vr.149.14.423](https://doi.org/10.1136/vr.149.14.423).
- Wiseman-Orr, M.L., Nolan, A.M., Reid, J., Scott, E.M. (2004). Development of a questionnaire to measure the effects of chronic pain on health-related quality of life in dogs. *Am. J. Vet. Res.*, 65, 1077–1084. DOI: [10.2460/ajvr.2004.65.1077](https://doi.org/10.2460/ajvr.2004.65.1077).

ZNACZENIE ZMIAN BEHAVIORALNYCH W IDENTYFIKACJI BÓLU PRZEWLEKŁEGO I JEGO PRZYCZYN U PSÓW – OPIS PRZYPADKU

STRESZCZENIE

Przewlekły ból towarzyszący wielu chorobom, w istotny sposób pogarsza jakość życia i indukuje różne zmiany w zachowaniu zwierząt. Niniejszy opis przypadku opisuje psa z uporczywym przewlekłym bólem. Znaki wykazywane przez psa, np. kichanie, pocieranie kufy łapami, potrząsanie głową i unikanie dotyku, wyraźnie wskazywało na dyskomfort zlokalizowany w pysku. Ostateczną diagnozę gruczolakoraka nosa postawiono po ponad roku od pojawienia się pierwszych objawów dyskomfortu. Z perspektywy czasu widać wyraźnie, że zmiany w zachowaniu psa były spowodowane przewlekłym bólem. Prezentacja nowych zachowań powinna być dla właściciela sygnałem wskazującym na pewne zaburzenia dobrostanu zwierzęcia. Istnieje potrzeba współpracy między właścicielem zwierzęcia, lekarzem weterynarii i behawiorystą zwierząt, aby zmiany w zachowaniu traktować jako wskazówkę do rozpoznania bólu odczuwanego przez zwierzę i leczenia jego przyczyn.

Słowa kluczowe: przewlekły ból, pies, diagnostyka, zachowanie