Swimming Puppy Syndrome in Cats

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ABSTRACT

Background: The swimmer puppy syndrome, characterized by an abnormal puppy development, is rare in cats, and commonly observed between the 2nd and 3rd week of life. The puppy affected by the syndrome has difficulty with ambulation, abduction and paresis of the hindlimbs and, occasionally, the forelimbs. The recommended treatment consists of using bandages around the affected limbs and physiotherapy while remaining on non-slip floors and soft surfaces. This paper reports the occurrence of the swimmer puppy syndrome in an entire litter of cats, emphasizing the discussion about the types of treatments for the disease.

Case: Three 11 day-old kittens of non-defined breed (NDB) were referred to the Veterinary Hospital with locomotion disability. The mother of the kittens was found on the street. Upon clinical examination, the only observed abnormality was that the kittens remained in constant sterna recumbency while the hindlimbs were extended and displaced laterally. After examination, it was decided to accompany the animals until the third week of life for re-evaluations. At 25 days old, the kittens showed less severe sternal recumbency. However, the hindlimbs remained in constant abduction and displaced laterally and caudally while producing rotational movements similar to swimming when trying to move around. The chest and pelvic radiographs detected normal bone density, and joint and bone development, as well. The swimmer puppy syndrome was diagnosed based on clinical findings and animals history. The treatment consisted of immobilizing the pelvic limbs with cuff-shaped bandages in the tarsal region to let them adduced in the anatomical position. The bandages, which were changed three times a day, consisted of a rectangular fabric¹ fixed with adhesive and masking tapes to the tarsal region. The floors of the room where they remained most of the day were covered with soft and non-slip mats fixed to the floor. The animals were also encouraged to walk once a day for ten minutes on a rough cement floor. The bandages were kept for 15 days and at 40 days old, the kittens had typical quadrupedal stance and could walk normally on any floor.

Discussion: In cats, the swimmer puppy syndrome is rare and little reported, often being observed affecting only one animal. However, in the present case the syndrome affected the entire litter, thus strengthening the possible genetic etiology. Early diagnosis and the subsequent initiation of therapy were critical factors for the successful treatment and rehabilitation of the kittens. The bandage allowed the kittens to remain with the limbs adduced in anatomical and physiological position while enabling movement, practice of physical exercises and flexion, extensions and activation of limbs coordination. The various floors were intended to avoid the appearance of skin lesions and generate different impulse forces for ambulation, increasing strength and muscle tone. Based on the findings it is concluded that although uncommon in cats, the swimmer puppy syndrome can be diagnosed in the first few days of the kitten’s life and with the appropriate bandage treatment (shape and materials) associated with soft, non-slip surfaces and regular monitoring, total rehabilitation of the anatomical function of affected limbs can be expected.

Keywords: cats, neonatal disease, diagnosis, treatment.
Descritores: felinos, doença neonatal, diagnóstico, tratamento.
INTRODUCTION

Swimmer puppy syndrome is rare in cats [2]. This syndrome consists of an abnormal development of the puppy characterized by difficulty in ambulation, with abduction and paresis of the hindlimbs and occasionally the forelimbs [4]. It affects kittens and is diagnosed between the 2nd and 3rd week of life. The etiology is still unknown and several theories have been proposed to explain the syndrome, among them genetic and hereditary factors; change of the neuromuscular synapse function; inadequate or delayed myelination of the lower motor neuron; delayed development of the skeletal muscle; kitten obesity and maintaining the newborns on smooth and slippery surfaces during development [7].

Deformities and defects such as medial patellar dislocation, chest flattening, innocent heart murmur, pectus excavatum and genu recurvatum may arise associated with or resulting from the syndrome [2,12].

The recommended treatment consists of bandaging the affected limbs as either eight or handcuff, thus keeping them in the anatomical position or even keeping them bent and attached to the abdomen [1,2]. Manual physical therapy and massages are commonly used. Animals should be kept on non-slip floors and soft surfaces [9].

There are few reports in the literature about the swimmer puppy syndrome diagnosis in cats. Therefore, the aim of this study was to describe the syndrome that affected an entire litter of kittens, emphasizing the discussion about the treatments for the disease.

CASE

Three 11 day-old kittens of non-defined breed [one female (G1) and two males (G2 and G3)] were referred to the Veterinary Hospital of the Universidade Federal de Campina Grande with abnormal locomotion. The mother of the kittens was found on the street. The clinical examination showed that the kittens’ only problem was a constant sternal recumbency and that the hindlimbs were extended and displaced laterally (Figure 1A). Upon inspection and auscultation, the kittens showed no other clinical signs that could result from the sternal recumbency. On physical examination, the systemic neurological functions were preserved while pectus excavatum or genu recurvatum were not observed. Therefore, it was decided to follow the kittens’ development until the third week of life, keeping them on soft and non-slip floor and under exclusive breast milk diet for further clinical and radiographic evaluations to complete the presumptive diagnosis of the swimmer puppy syndrome.

At 25 days old, the kittens presented less severe sternal recumbency, with normal function of the forelimbs, but the hindlimbs remained in constant abduction, displaced laterally and caudally (Figure 1B), producing rotational movements similar to swimming when trying to move around. The kittens weighed 350 g (G1), 400 g each (G2 and G3), at this time. Chest radiographs were performed in order to rule out the possibility of either pectus excavatum or other abnormalities of the thoracic skeletal development, which were normal. In addition, the pelvic region radiographs showed normal bone density and bone and joint development, as well. The syndrome was diagnosed based on clinical findings and animals history.

The immobilization therapy started immediately. The hindlimbs were immobilized with cuff-shaped bandages, adapted from Verhoeven et al. [11], in the tarsal region to let them adducted in the anatomical position. The bandages, which were changed three times a day, consisted of a rectangular fabric (70% viscose and 30% polyester)1 fixed in the tarsal region with adhesive and masking tapes at the edges. The adhesive tape fixed the bandage while the masking tape fixed the bandage edges to the skin (Figure 2).

The floors of the room, where the kittens remained for most the day during treatment, were covered with various types of soft and non-slip mats fixed to the floor. The animals were also encouraged to walk once a day for ten minutes on a rough cement floor.

It was not possible to perform conventional physiotherapy such as flexions and extensions of the limbs associated with massages, because the kittens were very active. This more active behavior caused the kittens to move a lot during the fixation of the bandages, hoping to remove them.

The bandages were kept for 15 days and at 40 days old, the kittens displayed normal quadrupedal posture (Figure 1C) and could walk normally on any floor. However, the kittens that were able to remain longer and more stable with the bandages during the day reached a better correction degree of the limbs regarding the angle and abduction of the tibial-tarsal joint, as G3, G2 and G1 kittens had proportionately greater anatomical and physiological correction of hindlimbs, respectively.
Figure 1. Observation of the swimmer puppy syndrome according to age. (A) At 11 days, when the clinical symptoms were first observed. (B) At 25 days, when the bandage treatment was instituted. (C) At 40 days, after the treatment.

Figure 2. Cuff-shaped bandage. (A) Materials used. (B) Fixation ends. (C) Fixation with adhesive tape at the center of the bandage. (D) Masking tape used to fix the bandage to the skin on the upper edges of the bandage.

DISCUSSION

The swimmer’s syndrome in dogs is well described in several countries [9,11,12] and affects several breeds at a moderate occurrence percentage [8]. In cats, however, this syndrome is rarely reported and often affects only one animal [1,6,11]. In the present case, the syndrome affected the entire litter, helping to strengthen other findings [2] that, in cats, the syndrome can affect one or more kittens of the same litter.

The animals were of non-defined breed, which is in agreement with published results [4] and reports stating that the syndrome has no racial predisposition [1,2]. It is believed that the small number of reported cases in cats precludes inferences about a possible racial predisposition, unlike dogs, in which the high number of cases allow concluding that the English and French Bulldog breeds are the most predisposed, respectively [8,9].

The affected brood had few kittens, and corroborates the findings of Cardilli et al. [2]. This author reported recently that dogs with the syndrome [8] were statistically more likely to be from a small litter (1.92 ± 1.12) compared to large litter (3.64 ± 2.24). Although there are few reports in the literature about cats, the data lead us to believe that the syndrome can also be more common in kittens of smaller litters.

The etiology is still unknown and proposed as multifactorial [7,12]. However, as Cardilli et al. [2] reported, the syndrome was also observed to affect all kittens from the litter, suggesting that genetic factors may be involved. Ramos et al. [9] showed that 62% of dogs with the syndrome were from the same litter or resulted from consanguineous crossings (between parents and children). On the other hand, Nganvongpanit & Yano [8] rejected the hypothesis of heredity, because in their study from a total of 52 puppies diagnosed with the disease, only two belonged to the same litter. In this report the parent was a stray animal and, for this reason, the occurrence of the syndrome in previous litters was not known. The other reports in the literature regarding felines also describe lack of data about the history of the parents [1,7] since they
were street kittens and in the other case [2] the mother was primiparous, hindering the research on hereditary factor for the species.

Kustritz [5] states that kittens should weigh 100 ± 10 g at birth while a minimum weight gain of 7-10 g/day should be expected. This fact indicates that the kittens’ weight was normal from the early days until the day of diagnosis and initiation of treatment. There is no data correlating overweight kittens with the syndrome [1,2,11], contrary to the hypothesis [8], which suggests that larger and heavier puppies in the litter may be more likely to develop the syndrome and/or influence the treatment.

The fact that the kittens displayed only abnormalities and weaknesses of hindlimbs corroborates most findings [1,6,11], differing from a minority which reported that the syndrome affected the four kitten limbs concomitant with a mild flattening of the chest [2]. Pectus excavatum was observed in dogs with the syndrome affecting all four limbs [9], suggesting that this abnormality of the thoracic development associated with the swimmer puppy syndrome occurs when there is loss of body support promoting ventrodorsal bending of the sternum. Although there are studies describing mild chest flattening [2], pects excavatum has not been reported in kittens with the swimmer puppy syndrome, probably because kittens have more proportional weights, and the involvement of the thoracic limbs or the four members is not sufficient to promote chest deformation.

The results suggest that the immobilization of the tarsal region with the bandage and the chosen bandage material were quite effective while the soft and flexible material recovering the floor provided good grip and mobility to the kittens. This finding differs from that proposed by [1,2] other authors, in which the bandage kept the pelvic limbs flexed and adhered to the abdomen limiting the movement of the animals. The periodical daily change of the bandages and the use of masking tape to fix the bandage to the skin avoided the appearance of edema, ischemia or skin lesions that might follow skin contact with either bandage materials or with feces and urine of the animals [11,12].

There were no problems regarding tone and motor function, probably due to bandage type, material used and regular treatment monitoring. Although Lima et al. [6] has reported on the inconvenience and damage to animal health of immobilization, in this case the bandages were instrumental in the recovery of the anatomical function of the affected limbs and caused no damage. The immobilization period varies in the literature, Cardilli et al. [2] immobilized the animals for 7 days and Bürger et al. [1] kept two types of bandages for 39 days; however, we observed that immobilization with bandages for 15 days was strictly necessary.

Longer immobilization periods provided better anatomical and functional rehabilitation of the affected limbs, which was proportional to the length of the immobilization period with the bandages. This data has not been discussed in previous studies, but it is fundamentally important when assessing the degree of success of the proposed treatment.

Various types of conventional physiotherapy (manual, hydro and thermal) associated with massage, proposed by other authors [2,6] were left out to avoid stress in the offspring. The kittens were still going through the domestication process and did not show good tolerance to several exercises involving excessive manipulation. However, the increasing strength and muscle tone, blood and lymph flow, joint flexibility and tissue extensibility [3,10] have been achieved via immobilization and by keeping the kittens on non-slip surface.

The bandage allowed the kittens to remain with the limbs adducted in anatomical and physiological position while moving around to practice physical exercises such as flexions, extensions and activation of limbs coordination. The various types of floors were intended to avoid the appearance of skin lesions and generate different impulse forces for ambulation, increasing strength and muscle tone. The relevance of different surface types is reaffirmed and corroborates other studies [2,11,12] where the importance of soft, non-slip surface to the treatment has been observed.

Early diagnosis and the subsequent initiation of therapy were key factors for the success of the rehabilitation process of the kittens [1,11]. The treatment should be established between the third and fourth week while the bones and joints are still flexible and “moldable”, thus improving therapy efficacy. The observation of symptoms at 11 days old had not been described in previous reports, and became interesting because it demonstrated the importance of waiting until the third week of the kittens’ life to diagnose the syndrome and start treatment with bandages. According to Kustritz [5], motor skills are still underdeveloped.
between 10 and 20 days in cats and between 14 and 21 days the animals take the quadrupedal stance and begin to walk. It should be emphasized that diagnosis as early as on the second week of animal life can cause misdiagnosis, and the syndrome may be confused with other myopathies while bandage immobilization in this period could affect the circulation and tissue oxygenation, as well [10].

Based on the findings it is concluded that the swimmer puppy syndrome, although uncommon in cats, may be identified in the first days of life and the treatment set at the appropriate time with appropriate bandages associated with soft, non-slip surfaces and regular monitoring, resulted in total rehabilitation of the anatomical function of affected limbs.

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Declaration of interest. The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

REFERENCES