


## Swimming Syndrome in Two Labrador Puppies

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### Summary

Swimming puppy syndrome, is an uncommon developmental abnormality observed in neonatal dogs in which the hind limbs and sometimes the front legs, are splayed laterally. Affected animals often remain in sternal recumbency exhibit swimmer like movements at the time of trying to ambulate that are more pronounced on smooth surfaces. The cause of the syndrome is unknown, although various undocumented theories have been formulated. Twenty five-day-old, two Labrador retriever littermates constituted the study material. Clinically, inability of stand or move about, extended limbs, swimming like movement on sternal recumbency and inability of adduction in the limbs were observed. Neurological examination was considered normal. Bilateral lateral patellar luxation was observed in both cases. Before starting to the treatment, a soft rug, 3 cm in thickness, was spread over the floor of the whelping box. In the treatment process, physiotherapy of both hind limbs was initiated and performed for 5 min, three times daily. Gentle passive flexion, extension and adduction of the hock, stifle and hip joints were performed. At the end of the 6<sup>th</sup> week of treatment process, functional activity of the limbs was observed in both cases. As a result it was concluded that, both puppies were able to walk as good as their littermates at the end of the 6<sup>th</sup> week of the therapy process as mentioned in the previous studies, and prognosis is good with lack of concomitant pectus excavatum.

**Keywords:** Dog, Swimming syndrome, Labrador retriever, Physiotherapy

## İki Labrador Yavrusunda Yüzme Sendromu

### Özet

Yüzme sendromu, yeni doğan köpek yavrularında genellikle arka bacaklar, ve bazen de ön bacakların laterale kayması ile karakterize olan nadir bir gelişimsel anomalidir. Yüzme sendromu gözlenen köpek yavrularının yüzüstü pozisyonda yattıkları, özellikle düz ve kaygan olan zeminlerde ayağa kalkmaya çalışırken yüzücü benzeri hareketler sergiledikleri gözlenir. Etiyolojide farklı birçok teoriden bahsedilse de, henüz tam olarak açıklığa kavuşturulmuş bir nedeni bildirilmemiştir. Çalışma materyalini 25 günlük iki adet labrador yavrusu oluşturdu. Klinik olarak, ayakta duramama ve yürüyememe, bacaklarda ekstensiyon ve addüksiyon ile yüzüstü pozisyonda yüzme benzeri hareketler gözlemlendi. Nörolojik muayenede herhangi bir anormallik gözlenmedi. Her iki olguda da bilateral lateral patellar luksasyon gözlemlendi. Sağaltıma başlamadan önce yavruların bulunduğu kutunun zeminine 3 cm kalınlığında bir halı altlık serildi. Sağaltımda, her iki ekstremiteye günde üç defa olmak üzere beşer dakikalık fizyoterapi uygulandı. Her iki ekstremitenin topuk, diz ve kalça eklemine içine alacak şekilde pasif fleksiyon, ekstensiyon ve addüksiyon hareketleri yapıldı. Altıncı haftanın sonunda her iki olguda da fonksiyonel iyileşme gözlemlendi. Sonuç olarak tedavinin altıncı haftasının sonunda her iki köpek yavrusunun da diğer kardeşleri kadar iyi yürüyebildikleri, bu bulguların literatür verileriyle uyumlu olduğu ve pektus ekskavatum yokluğunda prognozun olumlu olduğu kanısına varıldı.

**Anahtar sözcükler:** Köpek, Yüzme sendromu, Labrador retriever, Fizyoterapi

### INTRODUCTION

Swimming puppy syndrome (SPS), is an uncommon developmental abnormality observed in neonatal dogs in which the hind limbs and sometimes the front legs, are splayed laterally. Synonyms are swimmer syndrome, flat-pup syndrome, twisted legs, turtle pup, splay leg (paraparesis), splay weak (tetraparesis) and myofibrillar hypoplasia<sup>1-5</sup>. This abnormality is most commonly seen in chondrodystrophoid and

brachycephalic dog breeds that have short legs and wide thoracic cavities. English Bulldog, Basset Hound and Scottish Terriers are especially predisposed to this syndrome. Association with pectus excavatum has been previously reported<sup>5,6</sup>. Affected animals often remain in sternal recumbency exhibit swimmer like movements at the time of trying to ambulate that are more pronounced on smooth surfaces. In an other



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article these movements are defined as snake like reptation or walrus-swimming position on the belly <sup>4</sup>. The cause of the syndrome is unknown, although various undocumented theories have been formulated. These include altered neuromuscular synapse function, improper or delayed myelination of peripheral motor neurons, slow muscular development and ventral horn neuropathy <sup>2</sup>. Regardless of the cause, signs of the syndrome may be seen as early as the first week of age and the symptoms get more conspicuous by fifth to sixth week when puppies learn how to walk. A specific treatment protocol has not been documented in any literature. Although Hosgood and Hoskins <sup>7</sup> stated that affected animals begin to walk over a two-to four-week period as the muscles strengthen and the prognosis is good if therapy is begun before three to four weeks of age, three years after that study Hoskins stated that the condition is self-correcting as the muscles develop and strengthen <sup>8</sup>. But in case of severe thoracic flattening, euthanasia should be considered <sup>2</sup>. The aim of this study was to reveal the self-correcting character of SPS and the role of physiotherapy in SPS.

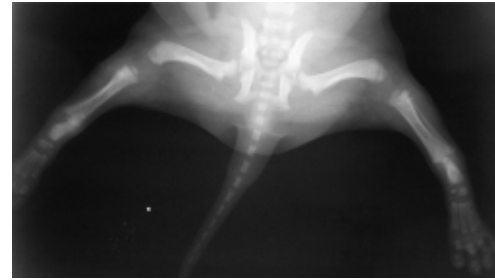
## CASE HISTORY

Twenty five-day-old, two Labrador retriever sibling puppies, weighing 2350 g (♂) and 2645 g (♀) were presented with being weak and unable to stand or move about. Extended limbs, especially in hind limbs (Fig. 1), were detected with swimming like movement on sternal recumbency. Also significant inability of adduction in the limbs were observed. Range of motion in the stifle and hock joint was severely decreased and mild contractures in these joints were identified. Pronounced external rotation and hyperextension of the hock joints were the most salient joint deformity of the hind limbs. Despite providing the standing position with manual support, after disruption of the support puppies were tend to resume their abnormal position. Joints were not painful and swollen. Neurological examination was considered normal. In the radiographic examination, bilateral, grade II lateral patellar luxation was diagnosed in both puppies (Fig. 2, 3). In the radiographic examination of the chest, no abnormality related to thorax or sternum was identified. It was observed that all four legs were located beside the body on parallel position to the floor. Because of that position, on the contact point of the body to the ground, tuber olecrani in forelimbs and anterior surface of femoral condyle in hind limbs, local alopecia and callosity formation was observed (Fig. 4). These skin lesions were more significant in the thinner male puppy.

In the heavier female puppy, wetness of the inguinal and perineal region (Fig. 5) was seen which the evidence of urinary incontinence was occurred due to the increased extrapelvic pressure on the urinary bladder. This symptom was spontaneously disappeared after achievement of ambulation.



**Fig 1.** Clinical view of the male (left) and female (right) puppies  
**Şekil 1.** Erkek (sol) ve dişi (sağ) yavrunun genel klinik görünümü



**Fig 2.** Vento-dorsal hind limb x-ray of the female puppy

**Şekil 2.** Dişi yavrunun arka ekstremitelerinin ventro-dorsal radyografisi



**Fig 3.** Medio-lateral x-ray of the stifle joint of female puppy. Patella (arrow)

**Şekil 3.** Dişi yavrunun diz ekleminin medio-lateral radyografisi. Patella (ok)

On clinical examination it was also observed that both puppies were unable to turn to sternal recumbency position after inverted manually to dorsal recumbency position, as seen in turtles. These otherwise clinically healthy puppies were nursing well and were part of a litter of eight. The other six littermates (4♂, 2♀) were clinically healthy and free of locomotor dysfunction whose body weights were 2100 g, 2480 g, 2580 g, 2658 g in males, and 2315 g, 2428 g in females. The owner had observed no abnormalities occurred during the birth of the puppies. The bitch had delivered six litters in the past,



**Fig 4.** Local alopecia and callosity formation (arrows) on the contact points of the body on dorsal recumbency

**Şekil 4.** Sirt üstü pozisyonda vücudun temas noktalarındaki lokal alopesi ve nasırlaşmanın (oklar) görünümü



**Fig 5.** Wetness of the inguinal and perineal region due to the urinary incontinence in the heavier female puppy

**Şekil 5.** Daha ağır olan dişi yavruda üriner inkontinense bağlı olarak inguinal ve perineal bölgede gözlenen ıslıklık

of which three previous litters were from the same dog. According to the owner, this was the first time that the bitch had a puppy with these kinds of clinical signs and both parents were also normal.

Before starting to the treatment, a soft rug, 3 cm in thickness, was spread over the floor of the whelping box. The rug was covered with a special patient coating in order to prevent dermatitis from scalding with urine or faeces. In the treatment process, physiotherapy of both hind limbs was initiated and performed for 5 minutes, three times daily. Gentle passive flexion, extension and adduction of the hock, stifle and hip joints was performed. Massaging of the main hind limb muscles by using thumb and index finger by gentle pressure was carried out. Also puppies were put on a rubber based table in standing position in order to promote walking. This therapy was repeated every two hours during the first week. Except the cures above, there was no additional therapeutic attempt achieved. At the end of the 3<sup>rd</sup> week of the therapy process, both puppies were able to walk short distances unsupported, but patellar luxation was still existed. But, in the clinical and radiological examination performed at the end of the 6<sup>th</sup> week of the therapy process, functional activity of all limbs with the disappearance of the lateral patellar luxation was observed. Improvement and healing period was faster in the lighter male when compared with heavier female puppy.

## DISCUSSION

Swimming puppy syndrome is an uncommon developmental abnormality with malformation of both hind legs and sometimes the front legs. Although present at birth, clinical signs become obvious about the second weeks. Normal puppies or kittens are able to stand after 10 days of age<sup>8</sup>. In affected animals the limbs are maintained in an abducted position and attempts to walk result in an paddling or walrus-swimming movements<sup>4,7</sup>. In the cases presented here, both puppies had hyper-extension of hock joints and stifle stiffness with inability in walking despite the manual support. Also both cases were unable to return to the sternal recumbency after inverted manually to dorsal recumbency position. This finding is the initial statement that has not been previously reported in the articles about SPS.

Patellar luxation is one of the most common congenital anomalies in dogs, diagnosed in 7% of puppies<sup>9</sup>. Medial patellar luxation is reported to be

seen in puppies with SPS<sup>4</sup>. In the clinical and radiographic examination of the cases, bilateral grade II lateral patellar luxation was diagnosed in both although other 6 littermates and parents were free of this developmental orthopedic disease. But, patellar luxation was disappeared spontaneously after achievement of functional limb activity. Because of that, lateral patellar luxation was assumed to be occurred due to the postural deformity during the sternal recumbency period, not a congenital limb deformity.

Pectus excavatum has been reported in animals, most frequently in cats and dogs but it is considered to be an uncommon abnormality<sup>10-12</sup>. No genetic defect has been found to be directly responsible for the development of PE<sup>11</sup>. No breed predisposition is reported<sup>12</sup>. Although the scientific term "*pectus excavatum*" is sometimes used as a synonym for the SPS, these are two entirely different conditions that can occur independently or simultaneously. Pectus excavatum is a congenital skeletal anomaly in which sternum intrudes into thoracic cage. But in SPS, the main symptom is inability to stand or walk by the normal age of three weeks. Because of the continuousness of the sternal recumbency position, pressure against sternum may cause flattening on chest. Briefly, in SPS chest flattening and related respiratory disorders are the outcomes of secondary skeletal deformity, not a primary symptom. This is why the synonym for pectus excavatum is "*funnel chest*", not "*flat chest*"<sup>1-3</sup>. In present study, pectus excavatum and related respiratory disorder was not observed in the study cases. According to present authors, the relation between pectus excavatum and SPS is an incidental finding.

In swimmer dogs regurgitation, aspiration pneumonia, and dyspnea is reported to be occurred due to the increased thoracic and abdominal pressure. This compression of the thorax causes malpositioning of the limbs in a lateral manner, so that support of the body is impossible<sup>2,5</sup>. In this study none of these symptoms were seen in any case because these were primarily related with pectus excavatum. But different from the other previously reported cases, urinary incontinence due to the pressure over the urinary bladder was observed in the female case. According to the present authors, the reason why urinary incontinence only seen in the female case was the higher body weight female case and the anatomic structure of the lower urinary tract of the females.

According to the investigators<sup>2,5,7,8</sup>, the etio-pathogenesis of the disease remains unclear and

hereditary, environmental, nutritional, neurological, and orthopedic causes are mentioned as possible underlying factors. According to suspicious etiology, many treatment options such as hobble bandaging, thoracic splinting, physiotherapy, and oral Vit E and selenium supplementation are reported<sup>2,4-8</sup>. In present study, none of these therapies except physiotherapy were performed. The aim of physiotherapy was to achieve early ambulation by strengthening the extremity muscles. But this is still unclear that the healing is completed contingent on muscle strengthening or completion of delayed peripheral myelination. According to the present authors; lack of any other neurological symptom disproof the delayed myelination theory.

As a result it was concluded that, both puppies were able to walk as good as their littermates at the end of the 6th week of the therapy process as mentioned in the previous studies, and prognosis is good with lack of concomitant pectus excavatum.

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