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CASE REPORT

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Ultrasonographic detection of a synovial cyst adjacent to the coxofemoral joint of a dog: case report

Detecção ultrassonográfica de um cisto sinovial adjacente à articulação coxofemoral de um cão: relato de caso

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ABSTRACT: Synovial cysts have been reported in various areas of the canine spine, however, to date, there are few studies on synovial cysts in other joints of the body. This report aims to describe a novel case of a synovial cyst adjacent to the hip joint in a dog with hip dysplasia. The animal was an intact male Border Collie, 8 months old, weighing 18 kg, presenting locomotor signs consistent with bilateral hip dysplasia. Blood examination was performed, showing normal results; radiographic examination confirmed the presence of hip dysplasia; followed by ultrasound examination, revealing a cystic structure adjacent to the right hip joint. Guided fluid collection confirmed it was a synovial cyst. Subsequently, the patient underwent physiotherapy combined with medications for pain control. In the follow-up of six months, the canine showing improvement in pain and gait related to the hip joint.

Keywords: orthopedics; hip dysplasia; interventionist; canine.

RESUMO: Cistos sinoviais já foram relatados em várias regiões da coluna vertebral de cães; no entanto, até o momento, existem poucos estudos sobre cistos sinoviais em outras articulações do corpo. Este relato tem como objetivo descrever um caso inédito de cisto sinovial adjacente à articulação coxofemoral em um cão com displasia coxofemoral. O animal era um macho Border Collie não castrado, com 8 meses de idade, pesando 18 kg, apresentando sinais locomotores compatíveis com displasia coxofemoral bilateral. Foi realizado exame de sangue, cujos resultados foram normais; o exame radiográfico confirmou a presença de displasia coxofemoral; em seguida, foi realizado exame ultrassonográfico, que revelou uma estrutura cística adjacente à articulação coxofemoral direita. A punção guiada do conteúdo confirmou tratar-se de um cisto sinovial. Posteriormente, o paciente foi submetido a fisioterapia associada ao uso de medicamentos para controle da dor. No acompanhamento de seis meses, observou-se melhora da dor e da marcha relacionada à articulação coxofemoral.

Palavras-chave: ortopedia; displasia coxofemoral; intervencionista; canino.

INTRODUCTION

A synovial cyst is a fluid collection near the joint lined by synovial cells, which histologically distinguishes them from other fluid collections, especially ganglion cysts (Giard; Pineda 2014). The cyst represents a focal extension of joint fluid that may or may not communicate with the joint (Beaman; Peterson 2007). The etiopathogenesis in medicine (Giard; Pineda 2014) and veterinary medicine is not yet fully elucidated, but it is common for them to occur in the presence of joint friction and instability (Da Costa; Cook, 2016).

Patients with synovial cysts can be asymptomatic or may present clinical alterations such as paresis, pain, or joint compromise depending on the location of the lesion (Da Costa; Cook, 2016; Tzounos *et al*., 2020; Ferrarin *et al*., 2021). Diagnosis can be made with the aid of imaging exams such as ultrasonography (Giard; Pineda 2014); myelography (if the lesion is present in the spine), computed tomography, and magnetic resonance imaging (Ferreira *et al.*, 2002; Da Costa; Cook, 2016). On ultrasonographic evaluation, synovial cysts are typically anechoic, round to oval, unilocular with posterior acoustic enhancement, and surrounded by a hyperechoic capsule (Giard; Pineda, 2014).

Most references to synovial cysts in dogs relate to extradural cysts affecting the spinal column (Da Costa; Cook, 2016; Ferrarin *et al.*, 2021). However, some appendicular soft tissue cysts have been reported in cats (Craig; Krimer; O'toodle, 2020) and dogs (Havlicek; Krockenberger; Franklin, 2011; Tzounos *et al*., 2020). Treatment modalities refered in the literature are varied, including rest and immobilization, needle aspiration (Ferreira *et al.*, 2002), and surgical resection of the cyst (Bonelli; Da Costa 2019; Ferreira *et al.*, 2002).

So far, the authors are not aware of any description of a synovial cyst in the hip joint in canines. Therefore, this study aims to report a novel case of a periarticular synovial cyst in the right hip joint of a dog with hip dysplasia. The diagnosis was obtained through B-mode ultrasonography, combined with guided material collection.

CASE REPORT

A non-neutered male Border Collie, 8 months old, weighing 18 kg, was presented to the Veterinary Hospital with the main complaint of difficulty in rising with the pelvic limbs and walking in a hopping manner, resembling a rabbit, with no history of trauma.

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According to the owner, the patient had not been vaccinated and had begun to show reluctance towards physical exercise three weeks prior. The owner reported that the animal had no alterations in feces, urine, food intake, or water intake.

After the anamnesis, the patient underwent general, orthopedic, and neurological physical examinations. Pain was observed in the caudal extension of both pelvic limbs, with atrophy of the gluteal and quadriceps muscles and closer approximation of the pelvic limbs when the patient was placed in station. The dog showed no alterations in postural reactions or cranial nerves. The level of consciousness was alert. Given the history and clinical findings mentioned, presumptive diagnosis hip dysplasia.

To assist in defining the diagnosis, complementary exams were requested, including a hematological profile (complete blood count and biochemistry - albumin, ALT, creatinine, alkaline phosphatase, total proteins, and urea) No abnormalities were observed. Further examinations such as radiography and ultrasonography of the hip region were requested and performed subsequently.

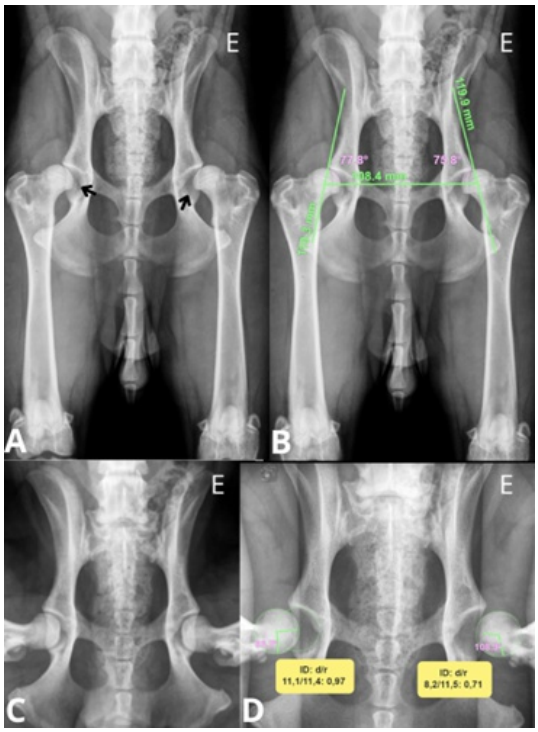
To perform the radiographic examination, the patient was sedated and received acepromazine (0.02 mg/kg), butorphanol (0.3 mg/kg), and midazolam (0.2 mg/kg) intramuscularly. After, a venous catheter with a 22 G was placed, and when necessary, an intravenous bolus of propofol was administered. Throughout the anesthetic procedure, the animal was monitored with pulse oximetry and vascular Doppler, while also receiving 100% oxygen through a facial mask. The radiographic exams were performed using a conventional radiography device. Three radiographic projections were obtained: ventrodorsal, distraction, and joint compression.

The patient's hip joint was evaluated for distraction index (DI), Norberg angle (NA), and assessment of osteoarthritis as suggested by the Orthopedic Foundation for Animals (OFA). The DI was 0.97 on the right joint and 0.71 on the left. The NA was 77.8° on the right joint and 75.8° on the left joint. Additionally, in both hip joints, an increased radiographic joint space, thickening of the femoral neck, and remodeling of the femoral head associated with the presence of osteophytes were observed, classifying it as moderate to severe degenerative joint disease by OFA standards (Figure 1).

The ultrasound examination was performed immediately following the radiographic examination with the patient still sedatedBoth hip joints were evaluated aiming to assess the periarticular muscles, joint capsule, and the bony surfaces of the femoral head and cranial acetabular rim.The patient was positioned in lateral recumbency, with the limb to be evaluated facing upward, in order to maintain comfort and the patient's neutral position. In both hip joints, the joint capsules presented a thickness of 2.2mm associated with irregularities in the surface of the femoral head and cranial acetabular rim. No alterations were observed in the musculature. On lateral inspection of the right hip joint, in the distocranial topography of the femoral head, near the acetabular labrum, a circular structure with anechoic content was visualized, delimited by a hyperechoic capsule with a thickness of approximately 2.9mm. Additionally, it had communication with the hip joint (Figure 2).

Due to the visualization of a cyst-like structure on the ultrasound examination, guided material collection was indicated. The collection was performed immediately after the B-mode examination with the dog sedated. Antisepsis of the lateral region of the right hip joint was performed, and the animal was maintained in left lateral recumbency, with the transducer positioned distocranial to the greater trochanter in a transverse position relative to the femur. After identifying the best location for material collection, a 25 x 0.7mm hypodermic needle was inserted parallel and adjacent to the probe until visible on ultrasound, and 6 ml of material was collected for further analysis. The fluid was yellowish with a cloudy appearance. It presented a density of 1.025, pH 7.00, and was positive for the mucin test (Figure 3).

Figure 1 – Hip radiograph of a dog for evaluation of hip dysplasia. A) Standard ventrodorsal projection for OFA evaluation showing in both joints: joint incongruity, femoral head remodeling, femoral neck thickening, and femoral head osteophytes (black arrows). B) Ventrodorsal projection for Norberg angle measurement. In the right joint, an angle of 77.8° is noted, and in the left joint, an angle of 75.8°. C) Ventrodorsal radiographic projection under joint compression. D) Evaluation of the distraction index in ventrodorsal projection. Right joint with an index of 0.97 and left with an index of 0.71.



Source: author's collection.

By combining the patient's history, physical examination findings, ultrasonographic and radiographic findings, and the results of the collected fluid evaluation, the animal was diagnosed with hip dysplasia and a synovial cyst adjacent to the right hip joint. After cyst drainage, the patient was referred for physiotherapy three times a week for three months, combined with medications for pain management. Dipyrone (25mg/kg, TID, PO, 5 days), tramadol hydrochloride (4mg/kg, TID, PO, 5 days), carprofen (4.4mg/kg, SID, PO, 14 days), and gabapentin (10mg/kg, SID, PO, 60 days) were prescribed. Removal of the cystic

material was recommended, but the owner declined the procedure. The patient returned six months after the initial consultation showing improvement in gait (reduction of the hopping walk), reduced hip joint pain during caudal extension of the pelvic limbs, and increased muscle mass in the muscles of the hip region. Additionally, according to the owner, there was an increase in the dog's activities, which had not been observed before.

Figure 2 – Ultrasonographic evaluation of the right hip joint of a dog. It is possible to visualize a circular anechoic structure surrounded by a hyperechoic capsule measuring approximately 2.9mm adjacent to the joint. Additionally, posterior acoustic enhancement and lateral shadowing are observed. The white arrow shows the vastus lateralis muscle, and the red arrow indicates the femoral head."

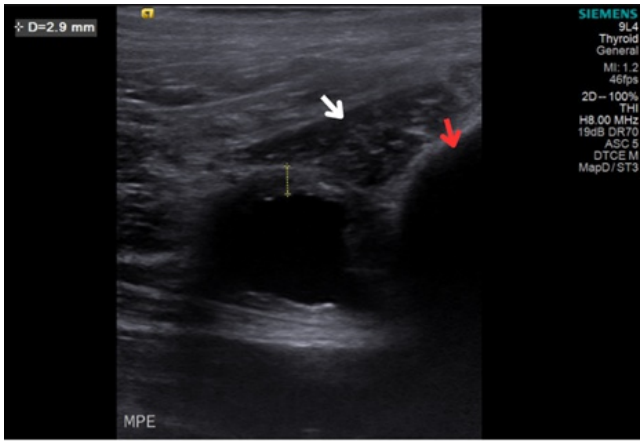


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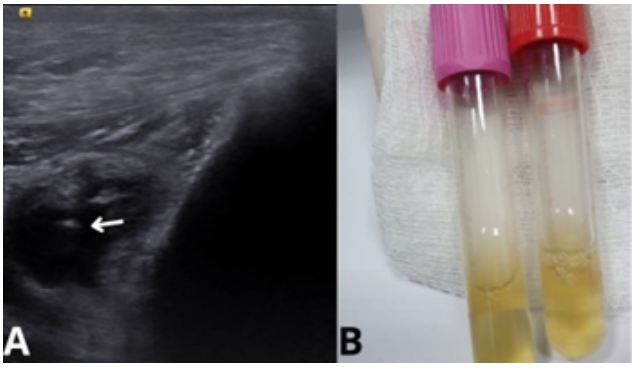
Figure 3 – Ultrasound of the hip joint of a dog for guided collection of the synovial cyst. A) Identification of the cyst and insertion of the 25 x 07mm needle (white arrow) into the anechoic region. B) Fluid collected for analysis. Tube with purple cap containing ethylenediaminetetraacetic acid (EDTA) and tube with red cap without EDTA.



Source: author's collection.

DISCUSSION

In this report, we describe a case of a synovial cyst adjacent to the hip joint of a dog. The diagnosis was primarily based on ultrasonographic examination of the hip joints. There are already studies in the literature describing the ultrasonographic approach to the hip joint (Bergamino; Etienne; Busoni, 2015; Carneiro *et al.*, 2023), as well as the ultrasonographic anatomy of the hip region (Carneiro *et al.,* 2022), which enabled us to perform a thorough evaluation of the region under study.

Radiography did not provide a conclusive diagnosis for the cystic lesion adjacent to the hip joint, due to physical limitations in the formation of the radiographic image that hinder adequate differentiation between liquid regions and soft tissues (Thrall, 2014). However, the examination allowed the identification and classification of osteoarticular changes secondary to hip dysplasia, following the criteria established by the Orthopedic Foundation for Animals (OFA) and the Distraction Index, still considered the gold standard examination for this pathology.

Ultrasonographic examination was recommended for this patient in order to provide additional information about the periarticular tissues of the hip joint. This is justified by the fact that periarticular structures can undergo changes that are not identified on radiographic examination (Carneiro *et al.*, 2023). In this context, ultrasonography played an extremely important role as a diagnostic complement. In addition to confirming irregularities in the surface of the femoral head and cranial acetabular rim of both hip joints, the ultrasonographic examination also allowed the identification of a circular, anechoic structure delimited by a hyperechoic capsule, 2.9mm thick, adjacent to the right hip joint.

The pathogenesis of synovial cysts is not yet fully understood, but these formations have been reported in animals with conditions such as cranial cruciate ligament insufficiency (Franklin; Havlicek; Krockenberger, 2011), cauda equina syndrome (Forterre *et al.*, 2006), and cervical instability (Ferrarin *et al.*, 2021). These findings support the hypothesis that the formation of synovial cysts is associated with unstable joints frequently subjected to chronic trauma (Ye *et al.*, 2019). In this patient, the authors believe that the cyst identified near the hip joint is directly related to hip dysplasia, as this condition causes significant joint instability, along with subluxations and recurrent microtraumas in the articular and periarticular structures, which may predispose to the development of synovial cysts.

In Medicine, synovial cysts involving the hip joint can cause symptoms such as edema due to vascular compression, thrombosis, pain, and nerve compression (Ye *et al.*, 2019). In the case of the patient in question, no similar alterations to those described in the medical literature were observed. However, given the uniqueness of this case, we cannot conclude whether the changes in gait and hip manipulation pain were exclusively related to hip dysplasia or if the presence of the cyst could have contributed to the clinical worsening. Therefore, we suggest that in addition to radiographic examinations performed for the diagnosis of hip dysplasia, ultrasonography be included in the routine to provide more information about possible secondary changes in the articular and periarticular tissues of the hip, assisting in the clinical management of each patient.

Magnetic resonance imaging (MRI) is generally considered the most appropriate examination for the diagnosis of synovial cysts (Ferrarin, 2021). Although it was recommended, the owner opted not to undergo the examination due to personal reasons. however, the ultrasonographic examination was able to identify the cystic structure and allowed guided material collection, which did not compromise the patient's diagnosis.

Although the definitive diagnosis depends on histological confirmation (Forterre *et al.*, 2012), ultrasound-guided aspiration enabled the identification of the presence of synovial fluid (positive for mucin) and allowed for a dynamic assessment of the reduction of the structure throughout the collection.

CONCLUSION

This case report highlights a clinical case that had not been previously documented in Veterinary Medicine to the authors' knowledge, involving a synovial cyst adjacent to the hip joint of a canine patient withhip dysplasia. Ultrasonography was of paramount importance, along with material aspiration, for the definitive diagnosis of the cystic lesion in the region. Therefore, ultrasound examination is recommended for animals presenting with hip joint instability to investigate periarticular cystic lesions.

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