

Anatomopathological aspects of cutaneous pleomorphic liposarcoma with muscular involvement – case report in a dog

[Aspectos anatomopatológicos do lipossarcoma pleomórfico cutâneo com envolvimento muscular – relato de caso em cão]

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ABSTRACT

Given the rare occurrence, and malignant and invasive nature of pleomorphic liposarcoma and the scarcity of scientific descriptions in dogs, the objective of this study was to discuss the anatomopathological aspects of this neoplastic subtype through a case report. A Dachshund, male, 13 years old, was presented one year ago with a significant increase in skin volume in the left lateral and lumbar region, which was rounded, progressive, non-adherent, and firm. Chest x-rays did not show lung metastases, and the sites indicated an increase in soft tissue density volume with involvement of muscles. Ultrasound did not detect abdominopelvic metastases and suggested a cavitary pattern of the nodule. Surgical excision with a wide safety margin, followed by removal of part of the muscular fascia, was performed. Macroscopically, the nodule was infiltrative, brownish with irregular whitish areas, soft and heterogeneous and microscopy revealed malignant neoplasm of adipocytes with a solid arrangement formed by epithelioid cells accompanied by moderate lipoblasts, in addition to cells characterized by well-defined eosinophilic cytoplasm, to a lesser extent vacuolated. It is possible to infer that, despite being invasive and infiltrative, pleomorphic liposarcoma did not cause metastases and with surgical removal, there was no recurrence, which favored the patient's quality of life and survival.

Keywords: dog, lipoblasts, veterinary oncology, soft tissue sarcoma

RESUMO

Perante a ocorrência rara, o caráter maligno e invasivo do lipossarcoma pleomórfico e a escassez de descrições científicas em cães, o objetivo deste trabalho foi discorrer sobre os aspectos anatomopatológicos desse subtipo neoplásico, por meio de relato de caso. Um Dachshund, macho, 13 anos, apresentou significativo aumento de volume cutâneo na região lateral esquerda e lombar, arredondado, progressivo, não aderido, firme, detectado há um ano. Os raios-x de tórax não evidenciaram metástases pulmonares e os locais indicaram aumento de volume de densidade de tecidos moles com envolvimento de musculatura. O ultrassom não detectou metástases abdominopélvicas e sugeriu padrão cavitário do nódulo. A exérese cirúrgica com ampla margem de segurança, seguida de remoção de parte da fáscia muscular, foi realizada. Macroscopicamente, o nódulo era infiltrativo, acastanhado, com áreas irregulares esbranquiçadas, macio e heterogêneo, e a microscopia constatou neoplasia maligna de adipócitos com arranjo sólido formado por células epitelioides acompanhadas de moderados lipoblastos, além de células caracterizadas por citoplasma eosinofílico bem definido, em pequeno número, vacuolizado. É possível inferir que, apesar de invasivo e infiltrativo, o lipossarcoma pleomórfico não causou metástases e, com a remoção cirúrgica, não houve recidiva, o que favoreceu a qualidade de vida e a sobrevida do paciente.

Palavras-chave: cão, lipoblastos, oncologia veterinária, sarcoma de tecido mole

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INTRODUCTION

Liposarcoma is a malignant and invasive soft tissue neoplasm originating from lipoblasts. Despite being rare (Strafuss and Bozarth, 1973; Doster *et al.*, 1986; Sant'ana *et al.*, 2003), it can affect all species of domestic animals, representing only 0.2-0.5% of diagnosed neoplasms in dogs (Ackerman and Silver, 1984; Korytárová *et al.*, 2024).

The etiology of liposarcoma is unknown (Strafuss and Bozarth, 1973; Baez *et al.*, 2004), however, it predominantly affects obese female dogs and adult animals, with an increased incidence in older individuals (Sant'ana *et al.*, 2003; Dias *et al.*, 2015).

Despite being malignant and invasive, liposarcoma has a low metastatic rate (Montagna *et al.*, 2004), with the lungs, liver, spleen, and bones being the most affected sites by secondary lesions (Ackerman and Silver, 1984).

According to Ackerman and Silver (1984), liposarcomas in dogs can originate in the skin, subcutaneous tissue, abdominal cavity, or bone marrow. Macroscopically, they are similar to lipomas; however, they have a firmer consistency, are less well-defined, and more adherent to adjacent and muscular tissues. Additionally, they are more cellular and anaplastic (Sant'ana *et al.*, 2003; Baez *et al.*, 2004). Histologically, liposarcomas present with cytoplasm containing multiple small fatty vacuoles and nuclei significantly larger than those of adipocytes. They are classified into different subtypes: well-differentiated, myxoid, pleomorphic, or poorly differentiated (Tos, 2014).

In this context, pleomorphic liposarcoma is considered the rarest and most aggressive subtype, with higher metastatic potential compared to other subtypes (Sant'ana *et al.*, 2003; Nascente *et al.*, 2021). It does not typically exhibit specific immunohistochemical or molecular genetic characteristics, and the presence of lipoblasts remains the sole diagnostic criterion; however, lipoblasts can often be sparse or focal (Anderson and Jo, 2019).

The prognosis of liposarcomas is generally favorable when surgical intervention with a wide safety margin is performed (Baez *et al.*, 2004).

Given the uncommon nature combined with the high malignancy and invasiveness of pleomorphic liposarcoma in canine species, as well as the scarce scientific descriptions, the objective of this study was to discuss the main anatomopathological aspects of this neoplastic subtype through a case report involving the cutaneous region with muscular involvement.

CASE REPORT

A male Dachshund, 13 years old, weighing 7 kg, was presented to a veterinary clinic in São Joaquim da Barra, SP, with a significant increase in subcutaneous volume in the left lateral region. The mass measured approximately 14 x 9 cm in diameter, was rounded, non-ulcerated, painless, non-adherent, and firm in consistency. The owner had noticed it a year ago, with progressive growth particularly noticeable over the last three months. Additionally, there was another subcutaneous mass measuring 4 cm in diameter on the dorsal aspect of the larger mass, with soft consistency, painless, non-ulcerated, and adherent, appearing two weeks prior (Fig. 1).

The hemogram and biochemical tests were within normal limits for the species. Fine-needle aspiration biopsy of the smaller nodule revealed a significant amount of red blood cells, macrophages with abundant cytoplasm containing hemosiderin, hematoidin crystals, and fibrin, suggesting chronic hemorrhage. The biopsy of the larger nodule was inconclusive. Histopathological examination of the nodules, local and thoracic radiography, and abdominal ultrasound were recommended, but the owner did not authorize these tests.

One month after the consultation, the smaller nodule regressed; however, the larger one significantly increased in size, also involving the lumbar cutaneous region (Fig. 2). Despite this progression, the owner did not authorize further diagnostic tests.



Figure 1. Photographic image of a dog demonstrating a significant increase in skin volume on the left lateral region (*) and a smaller increase on its dorsal side (arrow).



Figure 2. Photographic image of a dog demonstrating significant growth in skin volume in the dorsal lumbar and left lateral region (*).

After six months from the return visit, the increase in subcutaneous volume ulcerated, leading to active bleeding. The owner then authorized surgical removal of the nodule, with subsequent submission of tissue fragments for histopathological examination to establish a definitive diagnosis for appropriate therapeutic management. Prior to surgery, blood tests showed no significant abnormalities. Chest X-rays did not reveal pulmonary metastases, and those of the lumbar and left lateral regions

indicated increased density of soft tissues with probable involvement of local musculature, but without signs of vertebral compromise or involvement of adjacent anatomical structures (Fig. 3A and 3B).

The ultrasound did not detect metastases in abdominal or pelvic organs and suggested a cystic pattern of the nodule, with vascularity and free fluid around it (Fig. 4).

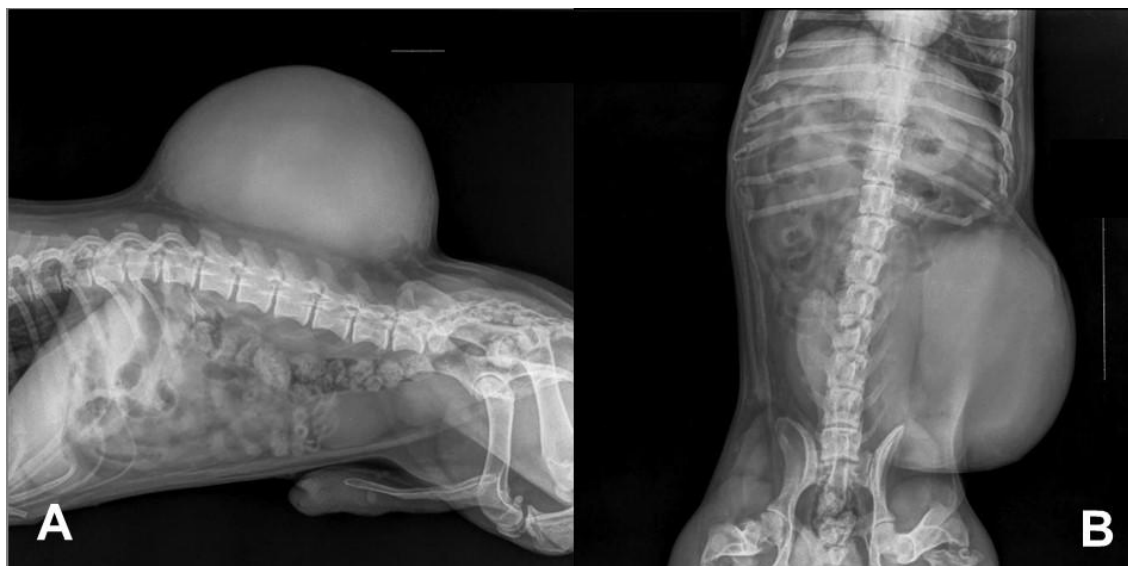


Figure 3. Radiographic images of a dog demonstrating an increase in skin volume in the lumbar region and soft tissue density with probably involvement of local muscles, but without involvement of vertebrae (A) and other adjacent anatomical structures (B).

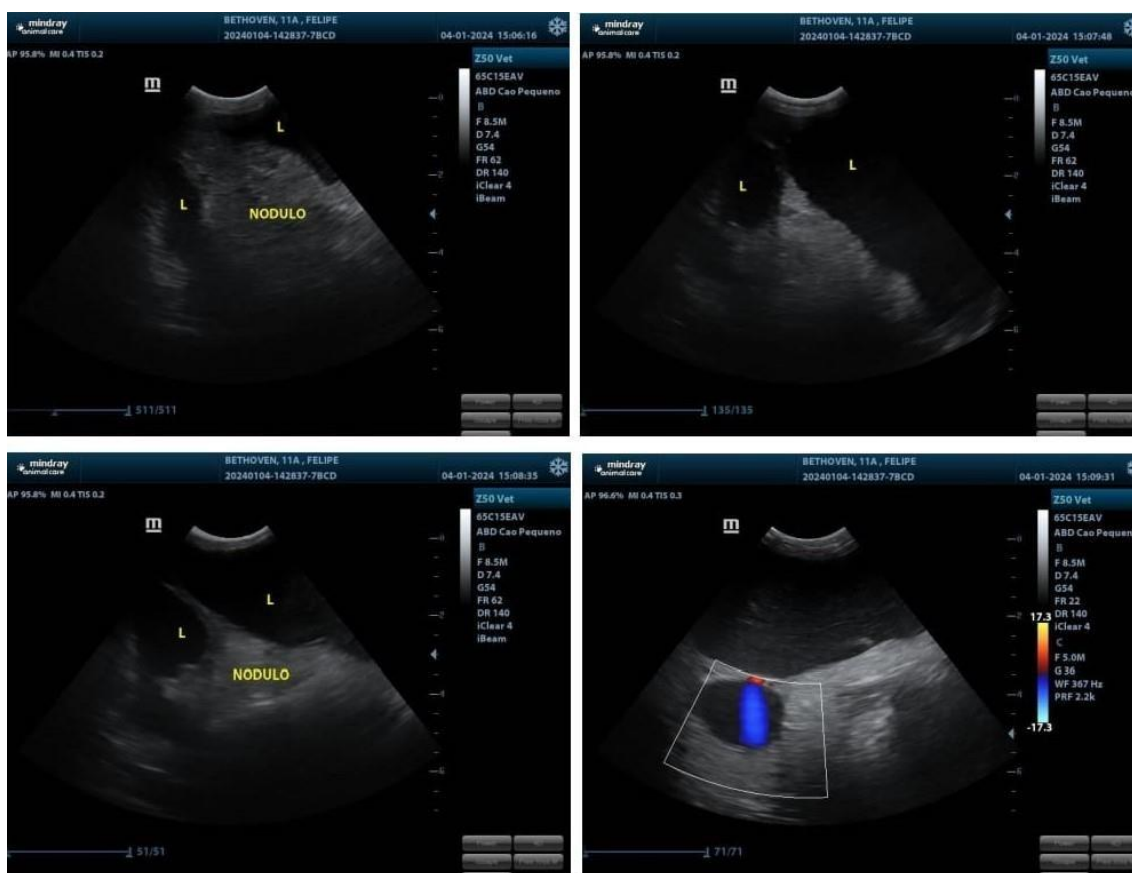


Figure 4. Ultrasound images of a dog demonstrating a skin nodule in the lumbar and left lateral region with a cavitary pattern, vascularization and free liquid in the surrounding area.

The surgical excision of the cutaneous nodule with a wide margin of safety, followed by removal of part of the muscle fascia in the region, was performed according to the recommendations of Fossum (2014), with the patient under inhalation general anesthesia.

Macroscopically, the nodule appeared well-circumscribed, infiltrative, with a dark brownish-black coloration and irregular whitish areas, soft and heterogeneous in texture. Microscopic analysis revealed a malignant neoplasm of adipocytes with a solid arrangement composed of epithelioid cells accompanied by moderate lipoblasts. Additionally, there were cells characterized by well-defined eosinophilic cytoplasm, with a smaller quantity showing

vacuolization. Furthermore, there were round nuclei with prominent macronucleoli and moderate to marked nuclear pleomorphism, including discrete multinucleated cells. Five figures of mitosis were observed in 10 high-power fields, along with extensive areas of necrosis and hemorrhage accompanied by moderate neutrophilic inflammatory infiltrate, suggestive of pleomorphic liposarcoma (Fig. 5, 6 and 7).

Postoperatively, the dog was prescribed antibiotics, anti-inflammatory medication, pain relievers, and local wound care. Ten days after the surgical procedure, the skin sutures were removed.

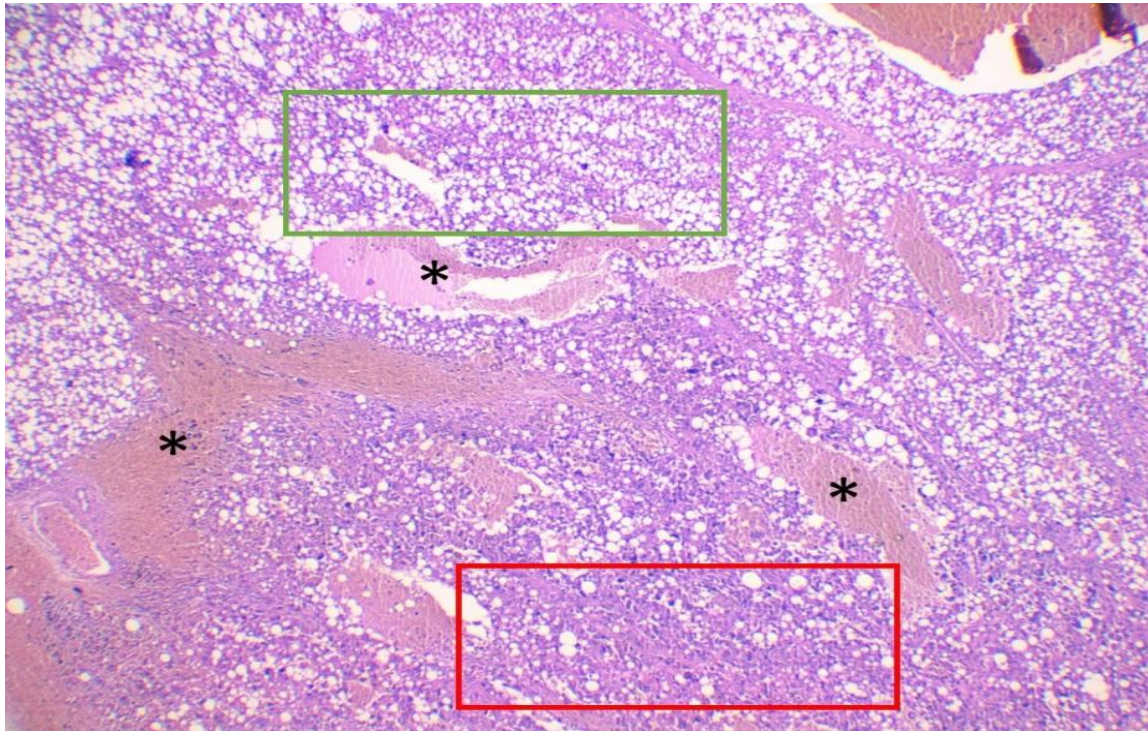


Figure 5. Photomicrograph of pleomorphic liposarcoma in a dog, demonstrating malignant neoplastic proliferation of adipocytes with well-differentiated areas (green rectangle) and dense areas of epithelioid cells (red rectangle), in addition to extensive areas of hemorrhage (asterisks). Obj. 4x. H.E.

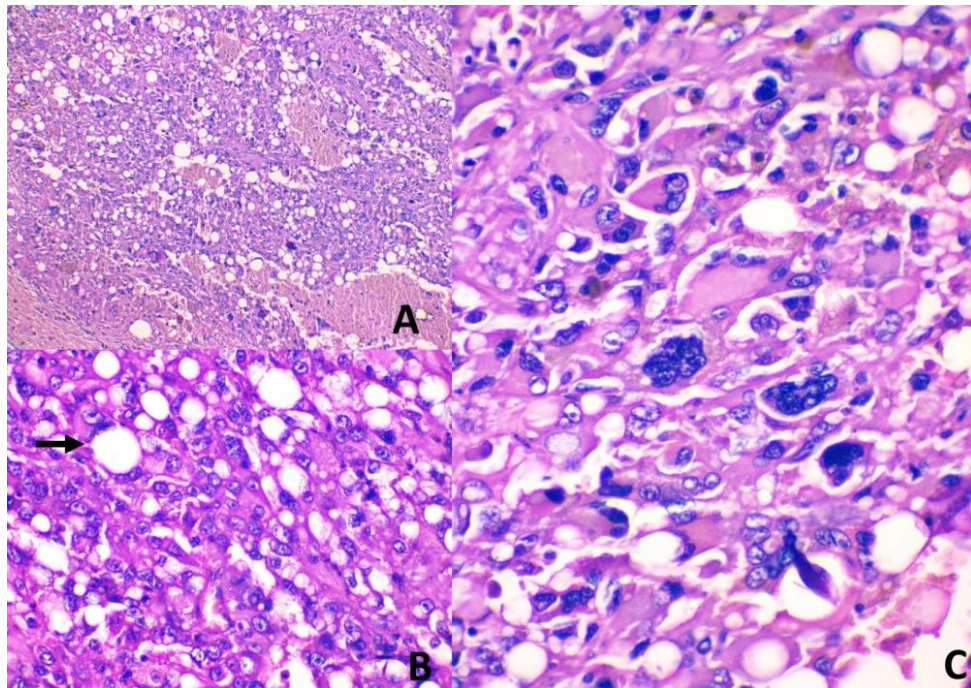


Figure 6. Photomicrographs of pleomorphic liposarcoma in a dog, demonstrating malignant neoplastic proliferation of adipocytes with variable morphology, decreased number of cells with fat vacuoles (black arrow), increased number of bizarre (yellow arrow) and multinucleated cells (red arrow). A: Obj. 10x; B and C: Obj. 40x. H.E.

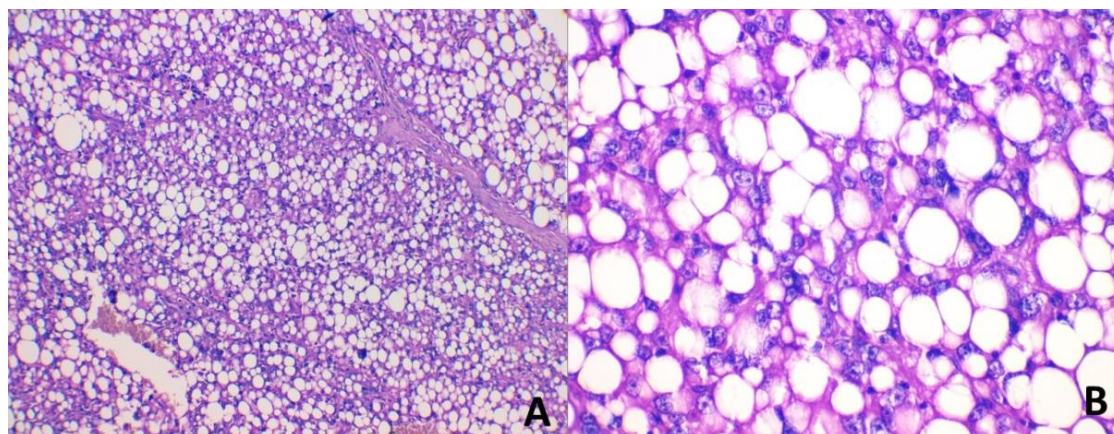


Figure 7. Photomicrographs of pleomorphic liposarcoma in a dog, demonstrating malignant neoplastic proliferation of adipocytes characterized by cytoplasm containing a large, well-defined vacuole, displacing the nucleus to the periphery. Round, vesicular nucleus, with evident macronucleolus. A: Obj. 10x; B: Obj. 40x. H.E.

Adjuvant chemotherapy sessions with doxorubicin were recommended; however, the owner opted not to proceed with this additional treatment due to potential adverse effects and the lack of guarantee of neoplastic remission, despite being aware of the possibility of recurrence. Instead, periodic follow-ups were advised for local and systemic neoplastic staging. Currently, four months after surgery, there have been no signs of recurrence or involvement of regional lymph nodes, and the patient remains in good overall condition.

DISCUSSION

Despite being uncommon (Korytářová *et al.*, 2024), liposarcomas should be considered in the differential diagnosis of other mesenchymal neoplasms, primarily due to their malignancy and invasiveness in canine species (Doster *et al.*, 1986; Sant'ana *et al.*, 2003; Nascente *et al.*, 2021). In this context, the rarity of pleomorphic liposarcoma complicates the standardization of factors such as etiology, sexual predisposition, age and breed predispositions, clinical symptoms, appropriate therapeutic approaches, prognosis, and consequently, the comparison between affected patients, limiting discussion (Tos, 2014). Furthermore, despite its rarity, the low prevalence described in the scientific literature may also be attributed to the lack of request for complementary tests by veterinary professionals and refusal by owners, diagnostic failures, and unfavorable prognosis due to the rapid progression of the neoplasm (Baez *et al.*,

2004); this underscores the importance of scientific reports such as this one.

According to Ackerman and Silver (1984), Dachshunds are predisposed to liposarcoma, which is consistent with the breed of the reported patient, as well as with the age groups of dogs described by Sant'ana *et al.* (2003) and Dias *et al.* (2015).

Similarly, Sant'ana *et al.* (2003) and Dias *et al.* (2015) also diagnosed dogs with liposarcomas in the lumbar cutaneous regions, highlighting the progressive and infiltrative nature of the neoplasm into adjacent musculature. Additionally, Baez *et al.* (2004) and Tos (2014) described the prevalence of liposarcomas in the appendicular and axial regions of this animal species. On the other hand, Galofaro *et al.* (2008) reported primary pleomorphic liposarcoma in the liver of a dog, Lepri *et al.* (2009) in the diaphragm, Montagna *et al.* (2004) and Nascente *et al.* (2021) in the spleen of the same animal species, all with substantial sizes.

The macroscopic appearance of the nodule in the reported patient coincided with those described by Nascente *et al.* (2021) in canine splenic pleomorphic liposarcoma, including focal areas of extensive necrosis and cavitary collections of varying diameters that allowed the drainage of serous reddish-brown fluid.

In the reported case, the definitive diagnosis of the patient was established solely

through histopathological examination, as immunohistochemistry typically plays a limited role in identifying pleomorphic liposarcoma, according to Anderson and Jo (2019). This subtype often exhibits a nonspecific immunologic profile and variable expression of smooth muscle actin (SMA), desmin, and CD34. Microscopically, Nascente *et al.* (2021) described findings similar to splenic pleomorphic liposarcoma in dogs, while Anderson and Jo (2019) reported similar findings in humans with this subtype of neoplasm. Histopathological examination, as emphasized by Tos (2014), also reveals the presence of complex karyotypic abnormalities, which distinguishes it from other subtypes of liposarcoma.

Surgical resection with wide safety margins, despite being challenging due to the extent of the neoplasm, was recommended for the patient in this report. According to Tos (2014), Nascente *et al.* (2021) and Korytářová *et al.* (2024), this approach is considered the treatment of choice for liposarcomas, providing a higher survival rate compared to standalone clinical protocols, including chemotherapy and radiotherapy.

Despite pleomorphic liposarcoma being considered the most aggressive and progressive subtype, with higher chances of metastasis compared to others and a lower survival rate (Anderson and Jo, 2019; Nascente *et al.*, 2021, the described patient did not show signs of recurrence or metastasis four months after the surgical procedure, even though the neoplasm had been evolving for over a year without concurrent adjuvant treatments. In this context, Baez *et al.* (2004) emphasized that the effectiveness of chemotherapy and radiotherapy in this type of neoplasm is not well-defined, and the low reported metastasis rate may be due to underreporting caused by lack of periodic patient follow-up. Additionally, Chang and Liao (2008) reported a case of a Dachshund with intestinal pleomorphic liposarcoma with intrahepatic metastases, where chemotherapy sessions with doxorubicin followed by capecitabine did not result in remission of metastatic lesions.

CONCLUSIONS

Based on the reported case, it is acknowledged that although rare, pleomorphic liposarcoma should be considered in the differential diagnosis of neoplasms presenting with similar clinical signs in dogs, including soft tissue sarcomas. Macroscopically, this subtype of liposarcoma appeared circumscribed, cystic, and dark brownish-black in color, while microscopically showing the presence of moderate lipoblasts. Despite being invasive and infiltrative into adjacent musculature, pleomorphic liposarcoma did not metastasize. Surgical excision with wide safety margins resulted in no evidence of neoplastic recurrence, thereby improving the patient's quality of life and survival.

REFERENCES

- ACKERMAN, L.J.; SILVER, J.N. Abdominal liposarcoma in a dog. *Mod. Vet. Pract.*, v.65, p.470, 1984.
- ANDERSON, W.J.; JO, V.Y. Pleomorphic liposarcoma: updates and current differential diagnosis. *Semin. Diagn. Pathol.*, v.36, p.122-128, 2019.
- BAEZ, J.L.; HENDRICK, M.J.; SHOFR, F.S.; GOLDKAMP, C.; SORENMO, K.U. Liposarcomas in dogs: 56 cases (1989-2000). *J. Am. Vet. Med. Assoc.*, v.224, p.887-891, 2004.
- CHANG, S.C.; LIAO, J.W. Mesojejunoleac liposarcoma with intrahepatic metastasis in a dog. *Surgery*, v.70, p.637-640, 2008.
- DIAS, B.M.; MARFINS, S.C.M.; MONTEIRO, B.F. *et al.* Lipossarcoma em cão: relato de caso. *Nosso Clín.*, v.18, p.24-30, 2015.
- DOSTER, A.R.; TOMLINSON, M.J.; MAHAFFEY, E.A.; JORDAN, C.W. Canine liposarcoma. *Vet. Pathol.*, v.23, p.84-87, 1986.
- FOSSUM, T.W. *Cirurgia de pequenos animais*. 4.ed. Rio de Janeiro: Elsevier, 2014. 1640p.
- GALOFARO, V.; RAPISARDA, G.; LANTERI, G.; MARINO, F. Primary pleomorphic liposarcoma of the liver in a dog. *Pol. J. Vet. Sci.*, v.11, p.385-388, 2008.

- KORYTÁROVÁ, N.; BOSCH, B.; KLASS, L.G.; SLUNSKY, P. Surgical management of urethral obstruction secondary to perineal liposarcoma in a dog: a case report. *BMC Vet. Res.*, v.20, p.1-8, 2024.
- LEPRI, E.; BRACHELENTE, C.; SFORNA, M.; CAPUCCINI, S.; DENTINI, A. Primary diaphragmatic pleomorphic liposarcoma in a dog. *J. Comp. Pathol.*, v. 141, p.295, 2009.
- MONTAGNA, M.M.C.; NICOLAU, S.B.; NAKAGE, A.P.M.; SOUZA, A.C.; ENGRACIA FILHO, J.R. Lipossarcoma esplênico em um cão. *Ciênc. Rural*, v.34, p.1957-1960, 2004.
- NASCENTE, E.P.; ADORNO, B.R.; SANTOS, A.S. et al. Lipossarcoma pleomórfico esplênico primário em uma cadela. *Acta Sci. Vet.*, v.49, p.1-6, 2021.
- SANT'ANA, F.J.F.; SERAKIDES, R.; LAVALLE, G.E. Lipossarcoma em cão: relato de dois casos. *Arq. Bras. Med. Vet. Zootec.*, v.55, p.1-7, 2003.
- STRAFUSS, A.C.; BOZARTH, A.J. Liposarcoma in dogs. *J. Am. Anim. Hosp. Assoc.*, v.9, p.183-187, 1973.
- TOS, A.P.D. Liposarcomas: diagnostic pitfalls and new insights. *Histopathology*, v.64, p.38-52, 2014.