

Malignant Peripheral Nerve Sheath Tumor in Brachial Plexus in Dog

Ingrid Bulhões Pimenta¹, Davy Manatta Vasconcelos², Erika Tayná Ratis Santos²,
Janaina Caldas dos Santos¹, Rafaela Samile Santos Rodrigues de Souza¹, Francisco de Assis Dórea Neto³,
Tiago da Cunha Peixoto³ & Paula Vellozo Leal³

ABSTRACT

Background: Malignant peripheral nerve sheath tumors are rare neoplasms which may be found in many regions of the body. Cases involving the limbs may present a clinical picture of lameness and unilateral atrophy. The diagnosis starts with the detection of increased volume in soft tissues through ultrasound examination. The best delimitation is done using magnetic resonance imaging and computed tomography. The definitive diagnosis is obtained through histopathological examination. This study aims to report a case of malignant peripheral nerve sheath tumor in brachial plexus in dog, highlighting the tomographic and anatomopathological aspects.

Case: A 5-year-old male mixed race dog, weighing 22.4 kg, with complaints of lameness in the left thoracic limb. The owner reported that 6 months before the animal presented paralysis of the limb, with an x-ray being performed where no noteworthy radiographic alterations were observed. During the physical examination, severe muscular atrophy of the left thoracic limb was noted, with increased nodular volume on its internal side and involving the brachial plexus. A tomography of the cervical segment of the spine was requested (C1-T2). The exam revealed asymmetry of the intervertebral foramina in C7-T1 with widening of the left foramen. At this region, occupying the respective epidural space in the region of the ventrolateral nerve root, slightly hyperdense image of the spinal cord in the pre-contrast phase, which after intravenous injection of contrast becomes isocaptant to the medullary parenchyma and hypocaptant to the adjacent musculature. It extends in the topography of the brachial plexus, measuring up to approximately 1.65 cm in diameter, up to the proximal region of the left thoracic limb. Reduction in the volume of the referred limb's musculature-atrophy. With the progression of the condition associated with a reserved prognosis, the tutors opted for the animal's euthanasia, and so it was sent for necropsy examination. Necropsy findings showed thickening of the C7 intervertebral space with increased volume of the nerve branch originating from C7 in the brachial plexus in association with regular and firm-elastic nodular formation, in addition to severe atrophy of the limb secondary to denervation. Fragments of the increased volume of the nerve branch that leaves the brachial plexus were collected, fixed in 10% formalin and subjected to histological processing. Histological examination showed expansive proliferation composed of moderately pleomorphic spindle cells arranged in intertwined bundles and supported by fibrovascular stroma. Rare mitotic figures were observed.

Discussion: The diagnosis of malignant peripheral nerve sheath tumor in the brachial plexus of the left thoracic limb was suspected due to the clinical presentation, reinforced by the findings highlighted in the tomography and confirmed with the histopathological examination. Tomography was of great importance since diagnosis, surgical planning and even suggesting the patient's staging and prognosis. The prognosis may be unfavorable due to the high chances of recurrence with possible metastases depending on the size, location and degree of malignancy of the neoformation. In conclusion, peripheral nerve sheath tumor is a tumor of questionable casuistry due to difficulties in diagnosis leading to probable underreporting. As it is a neoformation of soft tissue, more accurate imaging tests, such as computed tomography, can be a key part of the investigation and histopathological examination in the diagnostic confirmation.

Keywords: neoplasms, sarcoma, schwannomas, neurofibrosarcomas, histopathology, tomography, canine.

DOI: 10.22456/1679-9216.144393

Received: 5 April 2025

Accepted: 25 August 2025

Published: 24 September 2025

¹School of Veterinary Medicine and Animal Science; ²Veterinary Pathology Laboratory (LPV), Prof. Renato Rodenburg de Medeiros Neto Veterinary Medicine Hospital (HOSPMEV) & ³Department of Anatomy, Pathology and Veterinary Clinics, Federal University of Bahia (UFBA), Salvador, BA, Brazil. Correspondence: P.V. Leal [paula.leal@ufba.br]. Department of Anatomy, Pathology and Veterinary Clinics - UFBA. Av. Milton Santos n. 500. Ondina. CEP 40170-110 Salvador, BA, Brazil.

INTRODUCTION

Malignant peripheral nerve sheath tumors are infrequent neoplasms that can be located in various parts of the body; therefore, the symptoms and prognosis are directly related to their location [1,6]. They are named according to their cellular origin, such as schwannomas, when originating in Schwann cells, or neurofibrosarcomas, when composed of fibroblasts present in the endo or epineurium [8].

The clinical history in cases involving the limbs may present unilateral lameness and atrophy [5], with diagnosis beginning through ultrasound by detecting increased volume in soft tissues, with better delimitations being established by magnetic resonance imaging and computed tomography, and confirmation from histopathological examination [3]. The present study aims to report a case of malignant peripheral nerve sheath tumor in the brachial plexus in a dog, highlighting the tomographic and anatomopathological aspects.

CASE

A 5-year and 2-month-old male, mixed-breed dog, weighing 22.4 kg, with complaints of lameness in the left thoracic limb was treated in the Small Animal Surgical Clinic sector of the Hospital of Veterinary Medicine at the Federal University of Bahia (UFBA), Salvador, Brazil. In the anamnesis, the owner reported that 6 months before, the animal had paralysis of the limb, and an X-ray was performed in which no noteworthy radiographic changes were observed.

During the physical examination, severe muscular atrophy of the left thoracic limb was noted with increased nodular volume on the internal surface of the limb involving the brachial plexus. After this

evaluation, a tomography of the cervical segment of the spine (C1-T2) was requested.

Computed tomography was performed on the cervical segment of the spine (C1-T2), with helical acquisition of multiple detectors, and a slice thickness of 1.0 mm, before and after the administration of non-ionic iodinated contrast, intravenously, under general anesthesia, without complications. The volumes were reconstructed in the dorsal, sagittal and transverse planes and the images interpreted in the soft tissue and bone windows, images are shown in Figure 1 (A to C).

Asymmetry of the intervertebral foramina in C7-T1 was observed during the examination, with widening of the left foramen. In this region, occupying the respective epidural space in the region of the ventrolateral nerve root, a slightly hyperdense image of the spinal cord in the pre-contrast phase can be observed, which after intravenous injection of the contrast becomes isocaptant to the medullary parenchyma and hypocaptant to the adjacent muscles. It extends in the topography of the brachial plexus, measuring up to approximately 1.65 cm in diameter, up to the proximal region of the left thoracic limb. Reduction in the volume of the muscles of the aforementioned limb - atrophy.

With the progression of the condition associated with the reserved prognosis, the animal's owners opted to euthanize the animal and it was sent for a necropsy examination at the Veterinary Pathology Laboratory (LPV) of the UFBA. The necropsy findings showed thickening of the C7 intervertebral space with increased volume of the nerve branch starting from C7 in the brachial plexus associated with a nodular formation of 3.2 x 2.0 x 1.8 cm regular and firm-elastic.

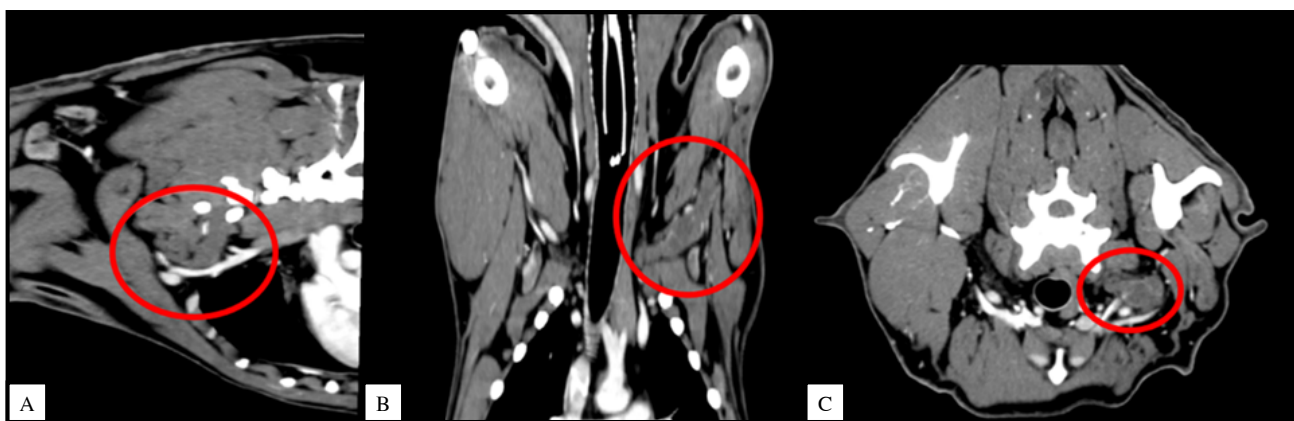


Figure 1. Computed tomography images in sagittal plane reconstruction (A), dorsal plane reconstruction (B) and transverse plane reconstruction (C), in soft tissue window, in which the thickening of the nerve in the C7-T1 intervertebral foramen (A) and the left brachial plexus associated with marked ipsilateral muscular atrophy (B and C) are highlighted.

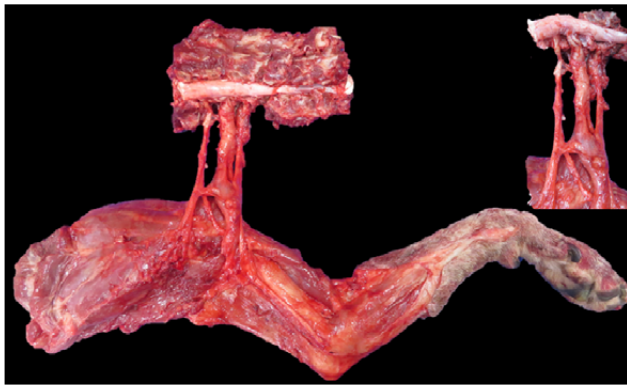


Figure 2. Malignant peripheral nerve sheath tumor in the brachial plexus of the left thoracic limb in a 5-year-old male mixed race dog. Thickening of the C7 intervertebral space with increased volume of the nerve branch originating from C7 in the brachial plexus associated with nodular formation. Highlighted in the upper right corner.

When cut, compact, regular and whitish (Figure 2) and severe atrophy of the limb secondary to denervation.

Fragments of the swelling in a nerve branch that originates from the brachial plexus were collected, fixed in 10% formalin, submitted to routine histological processing and stained with hematoxylin and eosin (HE). Histopathological examination showed expansive proliferation composed of moderately pleomorphic spindle cells arranged in intertwined bundles and supported by fibrovascular stroma (Figure 3). Rare mitotic figures were observed.

DISCUSSION

The diagnosis of malignant peripheral nerve sheath tumor in the brachial plexus of the left thoracic limb in a canine was suspected following the clinical picture, reinforced by the findings highlighted in the

tomography and confirmed with the histopathological examination

In a study of 43 schwannomas in dogs, an epidemiological profile was obtained for adult animals aged 5 to 12 years with an average age of 8 years [10], which is in agreement with the data presented. Although the Golden Retriever breed has been indicated as predisposed to the development of malignant peripheral nerve tumors [7], other studies have shown that neoplasms originating in the peripheral nervous system may not present predilection for breed or sex [9], however they are more prevalent in older dogs, especially in large breeds [6].

Malignant myelin sheath neoplasms may involve nerves outside the brain as well as groups of plexuses [4]. A case of schwannoma in the brachial plexus of a 7-year-old male poodle dog in the left thoracic limb and the radiographic findings of the affected limb did not show osteoarticular changes [2], similar to those highlighted in the present study. The only change that could be detected on radiography would be thickening of the C7 intervertebral space, but the incidence that would include this portion was not investigated in both the data presented by Araújo *et al.* [2] and in the present article.

The development of this type of tumor is slow and progressive, ranging from 0.5 cm to 12.0 cm in diameter [12], in which the present report is within the dimensions mentioned.

The prognosis may be unfavorable, according to Ramos Neto *et al.* [11] who reports high chances of recurrence with possible metastases depending on the size, location and degree of malignancy of the neoformation

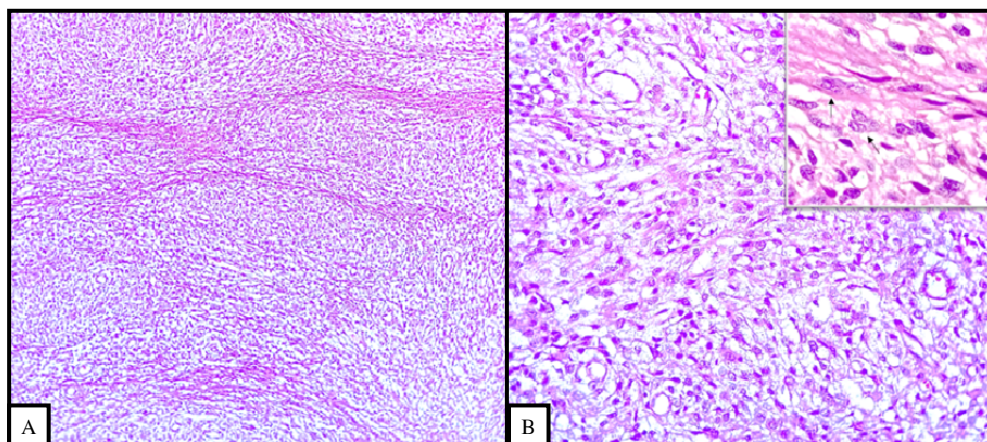


Figure 3. Photomicrograph of malignant peripheral nerve sheath tumor in the brachial plexus of the left thoracic limb in a 5-year-old male mixed race dog. A- Proliferation of spindle cells arranged in intertwined bundles [HE; Obj.20x]. B- High cell density. [HE; Obj.40x]. Highlight in the upper right corner for moderate pleomorphism with multinucleations (arrows) [HE; Obj.100x].

Tomography was of great importance from diagnosis, surgical planning to suggestion of staging and prognosis of the patient [3] and when presented to those responsible, they opted for euthanasia of the animal.

Treatment may be ineffective, especially in cases where there is thickening of the intervertebral spaces revealing progression to the spinal cord and requiring an aggressive resection. The scarce reports triggered by difficulties in diagnosis directly compromise studies regarding treatment and prognosis [12].

In conclusion, peripheral nerve sheath tumor is a tumor of questionable casuistry due to difficulties in diagnosis leading to probable underreporting. We

reiterate that radiographic evidence may be limited when considering only incidences of the affected limb, in a which there may be ascending involvement also involving the intervertebral spaces of the segments responsible for the innervation of the site, requiring studies that understand the same. Since it is a neofor- mation of soft tissues, more accurate imaging tests, such as computed tomography, can be a key part of the investigation and histopathological examination in the diagnostic confirmation.

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

REFERENCES

- 1 Aoyama Y., Miyamoto A., Fujii T., Fujimori S., Tamaoka M. & Takai D. 2022. Primary bronchial schwannoma: A case report. *Medicine (Baltimore)*. 101: 1-5. DOI: 10.1097/MD.00000000000031062.
- 2 Araujo B.M., Kemper B., Figueiredo M. L., Chioratto R., Marques N. B. & Tudury E.A. 2008. Schwannoma do plexo braquial em cão – relato de caso. *Medicina Veterinária*. 2: 45-49.
- 3 Basa R.M., Crowley A.M. & Johnson M.A. 2018. Neurofibroma of the ulnar nerve in the carpal canal in a dog: treatment by marginal neurectomy. *Journal of Small Animal Practice*. 61: 512-515. DOI: 10.1111/jsap.12945
- 4 Boss G.S., Bassuino D.M., Wurster F., Castro N.B., Watanabe T.T.N., Silva G.S.S., Sonne L. & Driemeier D. 2015. Retrospective canine skin peripheral nerve sheath tumors data with emphasis on histologic, immunohistochemical and prognostic factors. *Pesquisa Veterinária Brasileira*. 35: 965-974. DOI: 10.1590/S0100-736X2015001200005
- 5 Brehm D.M., Vite C.H., Steinberg H.S., Haviland J. & Van Winkle T. 1995. A retrospective evaluation of 51 cases of peripheral nerve sheath tumors in the dog. *Journal of the American Animal Hospital Association*. 31: 349-359. DOI: 10.5326/15473317-31-4-349
- 6 Cavalcanti E.B.O., Salvador A.Z., Vieira L.F., Oliveira M.P., Veroneze Á.S., Maciel N.S., Baiotto G.C. & Pereira C.M. 2024. Intramedullary malignant peripheral nerve sheath tumor at C3 level in a dog. *Acta Scientiae Veterinariae*. 52: 1-6. DOI: 10.22456/1679-9216.134744
- 7 Goldschmidt M. H. & Hendrick M.J. 2002. Tumors of the skin and soft tissues. In: Meuten J. (Ed). *Tumors in domestic animals*. 4th edn. Ames: Blackwell Publishing Company, pp.95-96.
- 8 Hendrick M.J. 2016. Mesenchymal tumors of the skin and soft tissues. In: Meuten D.J. (Ed). *Tumors in Domestic Animals*. 4th edn. Ames: John Wiley & Sons, pp.142-175.
- 9 Koestner A. & Higgins R.J. 2002. Tumors of the nervous system. In: Meuten D.J. (Ed). *Tumors of Domestic Animals*. 4th edn. Ames: Iowa State Press, pp.882-886.
- 10 LeCouter R.A. 2001. Tumors of the nervous system. In: Withrow S. J. & MacEwen E. G. (Eds). *Small Clinical Oncology*. 3rd edn. Philadelphia: W.B. Saunders, pp.500-531.
- 11 Ramos Neto M.A., Lemos A.A.F., Berwanger C., Procópio C.C., Pinto G.A., Silva M.T.F., Carvalho M.M.D., Puerari Jr. M., Macorin R.A., Carvalho R.S., Silva V.C. & Romanini Jr. V. 2020. Tumor maligno da bainha do nervo periférico (TMBNP): relato de caso. *ConnectionLine - Revista Eletrônica do Univag*. 22: 153-157. DOI: 10.18312/connectionline.v0i22.1532
- 12 Tournier M.L., Correa T.A., Minto B.W., Hespanha A.C.V., Silva M.H.D. & Silva G.M. 2021. Schwannoma maligno em face de cão - relato de caso. *Ars Veterinaria*. 37: 105-111. DOI: 10.15361/2175-0106.2021v37n2p105-111