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CLINICAL REPORT

Extradural Vertebral Chondrosarcoma in a Poodle-Terrier Dog

Ahmad Khajeh[1], Mahan Sarebani[2], Sina Mahmoudabadi ✉[2], Annahita Rezaie[3], Mahnush Kamyabnia[2], Elham Eslahi[4]

[1] Mahrooyan Veterinary Clinic, Ahvaz, Iran. [2] Department of Clinical Sciences, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran. [3] Department of Pathobiology, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran. [4] Department of Clinical Sciences, Faculty of Veterinary Medicine, Islamic Azad University of Shoushtar, Shoushtar, Iran.

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ABSTRACT

This study describes the clinical presentation, magnetic resonance imaging (MRI) features, surgical treatment, and outcome of an unusual extradural vertebral chondrosarcoma in a dog. A 6-year-old neutered male Poodle-Terrier with an extradural chondrosarcoma diagnosed at the level of the T11 vertebra, following surgical excision by dorsal laminectomy. Clinical, radiographic, MRI, histopathologic, and postoperative rehabilitation data were assessed. Following the sudden onset of pelvic limb paralysis in the dog, MRI revealed a lobulated, extradural mass at the T11 vertebra (13 × 7 mm) hyperintense on T2-weighted images, causing compression of the spinal cord. Surgical removal revealed a chondrosarcoma with a soft, pale pink to white gross appearance. Rehabilitation following surgery, including physiotherapy, hydrotherapy, and laser therapy, resulted in weight-bearing recovery within 3 months, while the dog never acquired the ability to stand without support until 9 months despite 80 sessions of physiotherapy. No metastasis was observed after surgery. This case exemplifies the diagnostic utility of MRI for detection of extradural spinal tumors and potential surgical resection for improving quality of life, but long-term prognosis can be reserved due to incomplete functional recovery and local aggressiveness of the tumor.

Introduction

Spinal cord neoplasia poses a formidable diagnostic and treatment dilemma in veterinary practice, as neoplasia may invade several anatomical spaces and remain undetected even by using advanced imaging techniques.[1] The most prevalent spinal neoplasms in dogs are extradural tumors, accounting for around 50% of them. It is followed by intradural-extramedullary and intramedullary tumors respectively at 35% and 15% of cases.[2] Chondrosarcomas, the second most common primary bone tumor in dogs, are rare in the vertebral spine, with sparse reference only in the veterinary literature.[3-5] Chondrosarcomas are graded from I to IV based on cellularity, nuclear atypia, and mitotic rate, and by World Health Organization (WHO) definition are known as mesenchymal non-meningothelial tumors.[6] These local invasive mesenchymal neoplasms are resistant to conventional chemotherapy and radiotherapy, and the golden approach is considered surgical removal, with prognosis greatly dependent on complete resection.[1]

Magnetic resonance imaging (MRI) is the gold standard method in spinal neoplasms diagnosis due to its superior contrast resolution. MRI enables precise localization and characterization of lesions.[7] However, comprehensive descriptions of vertebral chondrosarcomas' MRI features in dogs remains limited.[8,9] This case report describes the clinical presentation, MRI appearance, surgical treatment, histopathological assessment and post-surgery outcome in a Poodle-Terrier with an extradural chondrosarcoma at the T11 level.

✉ Corresponding author. Email: s-mahmoudabadi@stu.scu.ac.ir

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Case Description

A 6-year-old male neutered Poodle-Terrier weighing 11.5 kg presented to the veterinary clinic with acute onset pelvic limb paralysis and accompanying left patellar instability. The dog exhibited tremors, panting, and restlessness, with an obesity body condition score. On initial evaluation, diminished proprioceptive responses of the pelvic limbs and suspected intervertebral disc disease (IVDD) were identified.

Treatment and Outcome

Medical treatment were initiated with methylprednisolone sodium succinate (Pfizer) at a dosage of 30 mg/kg, administered by intravenous infusion once weekly for two weeks,[10] and restriction in feeding, but symptom recurrences developed within one week. Laboratory tests provided with a normal complete blood count (CBC), elevated total cholesterol (309 mg/dl; reference range: 135–270 mg/dl), alkaline phosphatase (ALP; 202 IU/l; reference range: 10–150 IU/l), and phosphorus (8.6 mg/dl; reference range: 2.5–6.1 mg/dl).[11,12]

Thoracic radiographs were not suggestive of any visible tumor findings. Thoracolumbar spine MRI showed a lobulated, solid extradural mass (13 × 7 mm) at the right side of the spinal canal at T11, with significant spinal cord compression, After MRI examination and confirmation of a mass lesion, the medical treatment was discontinued. On T2-weighted images, the mass was crescent-shaped, multilobulated, and hyperintense with increased signal intensity, filling the entire right side of the canal without vertebral bone involvement. The MRI results were initially misinterpreted as being indicative of a meningioma, but the diagnosis was later confirmed by histopathology (Figure 1).

The dog underwent dorsal laminectomy at T11. The animal was calm and did not require premedication. Anesthesia was induced with an intravenous injection of propofol 1% (6 mg/kg) and maintained using isoflurane inhalation anesthesia. The patient was positioned in sternal recumbency with the thoracic and pelvic limbs flexed. A mid-dorsal incision of approximately three vertebrae from a T11-centered incision was carried out. Fascia and subcutaneous fat were incised, and T11 fascia was dissected. Multifidus muscles were reflected with a periosteal elevator and were freed from residual muscular attachment by Metzenbaum scissors. Gelpi retractors were positioned cranially and caudally and retained in position to provide exposure for the field. T11 spinous processes were removed with a micromotor and rongeurs, and the outer cortical, cancellous, and inner cortical layers of bone were drilled out by a high-speed burr to uncover the mass. The tumor, grossly as soft (not firm) whitish to pale pink colored, was en bloc resected and submitted for histopathologic examinations (Figure 2).

Microscopic examination after hematoxylin and eosin (H&E) staining revealed a mass made up of foci of irregular hyaline cartilage matrix. Chondroid matrix separated neoplastic chondrocytes within lacunae, occurring in clusters. They had vacuolated cytoplasm and hyperchromatic nuclei, with a few of them being binucleated. Malignant spindle cells with pleomorphism surrounded the mass, having basophilic mineralization and osteoclast-like giant cells. Neovascularization was seen. All these findings reinforced the diagnosis of extradural chondrosarcoma (Figure 3).

Postoperative care consisted of Penicillin, administered intramuscularly at a dosage of 20,000 IU/kg

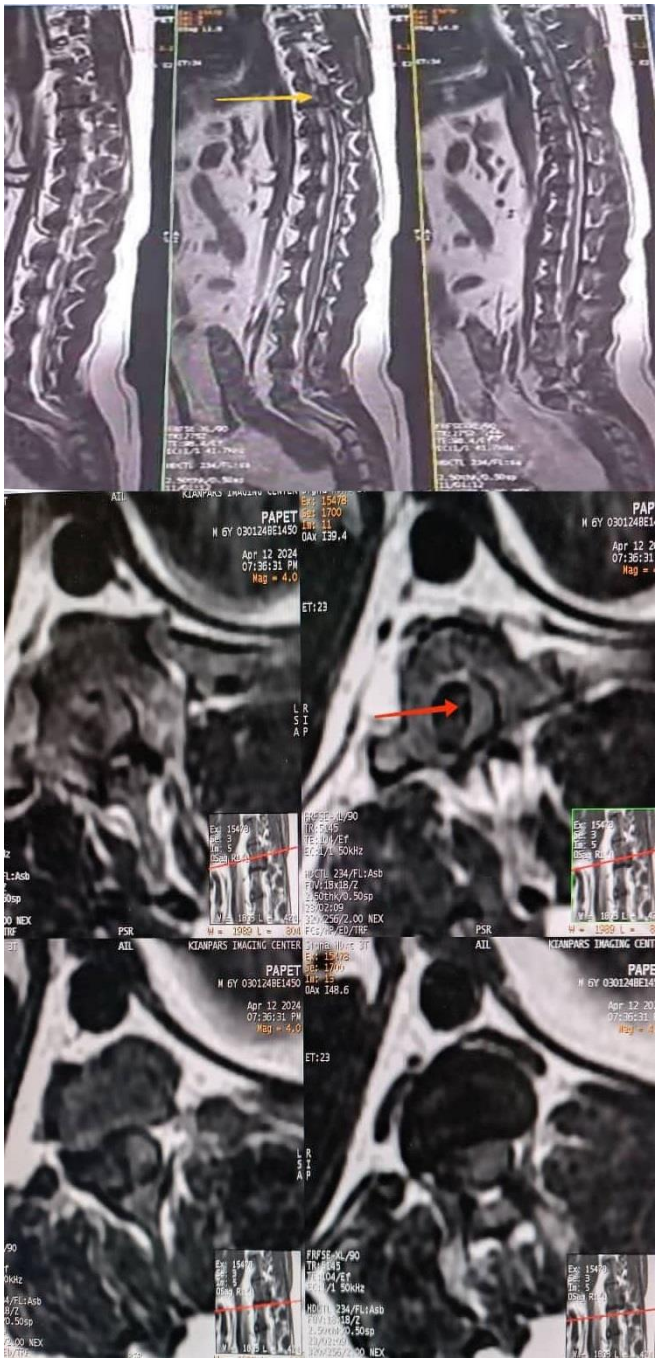

Figure 1. MRI T1 and T2-weighted image at T11, demonstrating a hyperintense, lobulated extradural mass (13 × 7 mm) compressing the spinal cord on the right side.

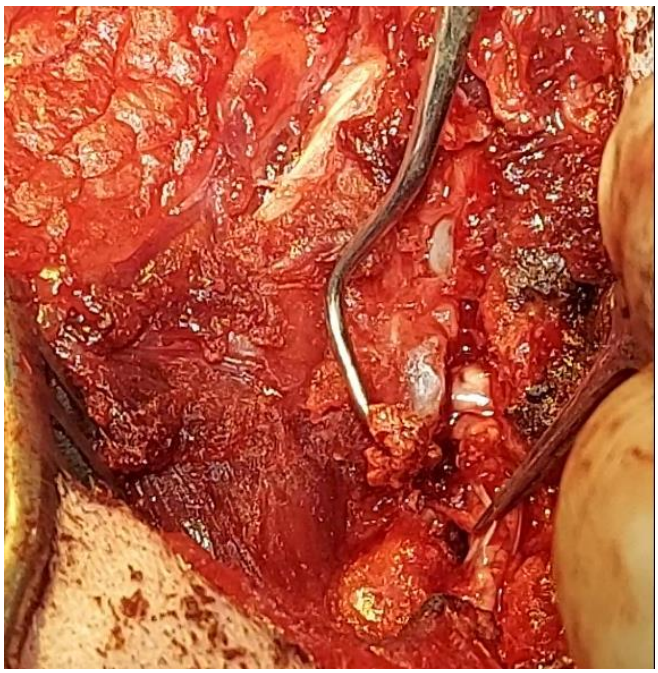

Figure 2. Gross Character of the mass.

every 48 hours, for a total of 3 doses and Tramadol tablets, administered orally at a dosage of 2 mg/kg, every 8 hours, for 4 days. Rehabilitation therapy, conducted over a period of 3 months, was performed with a combination of laser therapy, hydrotherapy, ultrasound therapy, and electrotherapy. Laser therapy sessions were conducted three times per week. Initially, the laser was applied only along the sciatic nerve pathway, and later it was also directed over the vertebral column. The parameters included a dose of 10 J/cm^2, continuous mode, wavelength of 808 nm, power output of 2W, and the laser was classified as low-level. Each limb (sciatic pathway) was irradiated for approximately two minutes, and the lumbar spine was treated for about four minutes.

Hydrotherapy was initiated about one month after surgery. At first, it involved assisted walking and sit-to-stand exercises in water, with the water level reaching the greater trochanter. Exercises were performed in sets of 30 seconds of activity with 10 seconds of rest. As muscle strength improved and muscle atrophy was partially controlled, the duration of hydrotherapy was gradually increased, and walking on an underwater treadmill was introduced. To prevent knuckling and paw injuries during hydrotherapy, braces were used.

Ultrasound therapy was also incorporated to enhance blood supply to the muscles. Each limb received treatment for seven minutes, using continuous mode (100%), a frequency of 1 MHz, and an intensity of 1.2 W/cm^2. Initially, ultrasound was applied to the hind limbs and later extended to the paraspinal lumbar muscles. Electrotherapy was introduced for the same anatomical regions, with electrode placement corresponding to the ultrasound sites.

After 9 months following surgery, the dog was able to bear weight on pelvic limb. However, despite correct stepping in deep water, it could not stand independently on solid ground. There was no recurrence or metastasis detected using follow-up radiography and clinical examination after surgery. However, due to limited access to MRI facilities in the region, postoperative MRI for recurrence assessment was not performed.

Clinical Relevance

This study describes a rare extradural chondrosarcoma at T11 in a Poodle-Terrier and emphasizes on diagnostic value of MRI and the therapeutic effect of surgery. In the dog, chondrosarcomas are the second most common primary bone tumor but are rarely encountered in the vertebrae, with thoracic localization being anecdotal.[13] The acute-onset paraparesis in this presentation is characteristic of spinal cord dysfunction, a common presentation of extradural neoplasms.[14] MRI was invaluable, demonstrating a hyperintense, lobulated T11 mass on T2-weighted images, which is accounted for by low-grade chondrosarcomas' rich water content and cartilaginous matrix.[3] The early misdiagnosis as a meningioma underscores the challenge of differentiating spinal tumors based solely on imaging, as chondrosarcomas and meningiomas may have indistinguishable MRI appearance.[7] The coarsely gross texture of the mass soft and pale pink to white varies from the firmer texture reported in some chondrosarcomas, possibly because of its extradural location and lesser grade of mineralization. Histopathology, with chondroid matrix, pleomorphic spindle cells, and mineralization, was necessary for definitive diagnosis, as described previously.[13]

Surgical excision by dorsal laminectomy relieved effectively spinal cord compression, with partial recovery in 3 months, as with extradural tumors.[1] The absence of bone involvement, unlike some reported cases,[15] and lack of metastasis post-surgery are notable, though long-term monitoring is warranted. Differential diagnoses included osteosarcoma, fibrosarcoma, and meningioma. The T2 hyperintensity and lack of calcified foci suggested a potentially benign lesion initially, but histopathology confirmed malignancy.[7] This case highlights MRI's utility in surgical planning, though its limitations in distinguishing tumor origin necessitate histopathological confirmation.

The long-term prognosis in this case was considered guarded due to the locally invasive nature of chondrosarcomas, which require wide excision and careful follow-up. The postoperative paralysis was most likely caused by tumor infiltration of neural structures, although preoperative spinal cord compression may also have contributed. This case adds to the clinical understanding of vertebral chondrosarcomas in dogs and highlights the importance of combining thorough diagnostic evaluation with tailored treatment strategies.

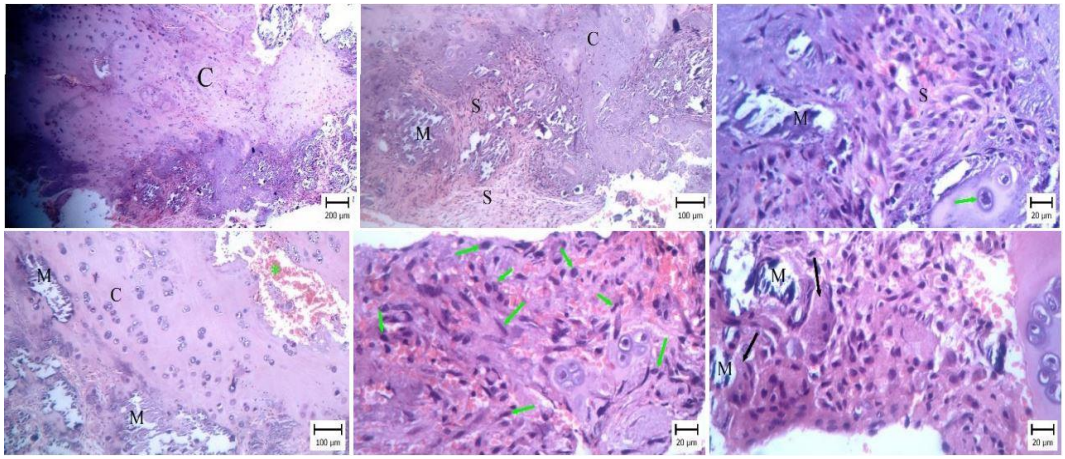

Figure 3. Histopathological image (H&E stain) showing irregular hyaline cartilage matrix (C), neoplastic spindle-shaped cells (S, green arrows), mineralized foci (M), and osteoclast-like giant cells (black arrows).

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Conflict of Interest

None to declare.

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