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Clinical Report

Lameness and Radial Nerve Neuropathy Caused by Chondroma Tumor in a Male Dog: A Case Report

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ABSTRACT

A 5-year-old mongrel male dog with severe left forelimb lameness was referred to the veterinary clinic of Urmia University. On initial physical examination, vital signs were normal. However, a firm swelling with a history of one year progressive increasing in size was observed on the caudolateral aspect of the left shoulder. Pedal reflex was negative. On radiographic examination, a large mass with abnormal radiodensity was seen in the caudal humerus. Hypodermic needle aspiration specimen were unremarkable except large number of normal blood cells. Under general anesthesia, the tumoral mass was surgically removed via a caudolateral approach to the humerus. Pathological assessments corroborated the lobular pattern with the presence of tumor cells similar to normal chondrocytes in an amorphous, basophilic matrix that confirmed the chondroma tumor. In the postoperative follow-up, normal nerve function was returned and lameness was disappeared. Chondroma tumors should be considered in the differential diagnosis of dogs with persistent lameness and neuropathies.

Introduction

The radial nerve innervates the dorsal surface of the limb and the cranial and lateral surfaces of the antebrachium.[1] Loss of sensation beyond this area indicates a more widespread deficit. Mononeuropathy refers to a disease or an injury of a specific peripheral nerve or its nerve roots. Among the nerves of the forelimb, the radial nerve, with its lateral position in the region of the distal humerus, is the most vulnerable to damage from the initial trauma associated with fracture of this region of the humerus and other factors known to damage the radial nerve consist of iatrogenic damage during a craniolateral approach to the distal shaft of the humerus [2], In most cases, mononeuropathy of the radial nerve arise from physical injury secondary to compression, laceration, contusion or from the intramuscular injection of drugs.[3] Other causes involve radial nerve trunk injury, brachial plexus root avulsion, inflammatory, neoplastic, and most frequently, traumatic conditions, such as road traffic accidents.[4,5] Chondroma is a benign neoplasm of cartilage, but in

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veterinary medicine, the term has often been used loosely to include a benign proliferation of cartilage in several extraskeletal tissues. Primary chondromas of bones are divided into two groups: enchondromas, which is the result of the cavity of a bone, and ecchondromas, which originates from cartilage elsewhere in the skeleton.

The localization of the enchondroma reported in animal species was the proximal phalanx of a dog [6] and the distal tibia and distal fifth metatarsal of a rhesus monkey.[7] Ecchondroma occurs in flat bones more often than in long bones including turbinates and sternocostal cartilage complexes.[6] Both forms have been reported rarely in several animal species.[8,9] Enchondromas are sometimes polyostotic, in which case the syndrome is referred to as enchondromatosis. Periosteal (or juxtacortical) chondromas, which develop beneath the periosteum adjacent to the cortical surface in humans,[10] have not been reported in animals.

It is probable that many tumors diagnosed as chondromas in animals are in fact osteochondromas, low-grade chondrosarcomas, or multilobular tumors of bone, especially in cases where the pathologist is not aided by an adequate history or access to radiographs of the lesion.[11] Chondromas are not common in all animals but are reported most frequently in old dogs and sheep. Clinical signs are related to the size and location of the tumor. Although the lesions may become quite large, they are usually asymptomatic or accompanied by painless swellings.[10,12] This is the first report of Chondroma causes the severe lameness due to radial nerve entrapment by the tumor in a dog.

Case Description

A 5-year-old mongrel intact male dog weighing 30 kg of body weight with severe lameness of left forelimb and sign of radial nerve neuropathy was referred to the veterinary clinic of Urmia University. However, a firm swelling with a history of one year progressive increasing in size was observed on the caudolateral aspect of the left shoulder. The affected limb was held up, but occasionally the paw rested on the ground over the digits.

On initial physical examination, physiological parameters such as heart and respiratory rate, body temperature were whithin normal range. The extensor muscles of the antebrachium were paralyzed and had become markedly atrophied. The elbow joint was dropped and the carpus was in a flexed position (Figure 1).

The flexor muscles of the same joints were apparently functional and were reasonably well-developed. The cutaneous sensation test was negative on the dorsal aspect of the limb. Placing reflexes in the affected limb was also absent. Contralateral panniculus reflexes were present. Pedal reflex was negative and neurological examination revealed radial nerve paralysis and loss of proprioception. According to the primary owner statement, there was a possibility of abscess formation due to previous dog fight injuries, but antibiotic treatments were not effective.

The radiographic finding indicated a mixed Radiolucent-Radiopaque mass as well as some evidence of new bone formations in the caudolateral aspect of the proximal humerus. Compared to the opposite limb, bone destruction was clearly seen in the proximal region of the humerus. The lesion was attached to the surface of the bone and caused 'saucerization' with thickening of the underlying cortex (Figures 2 and 3). Chest radiographs showed no signs of metastasis. Hypodermic needle aspiration specimen was unremarkable except a large number of normal blood cells were seen on light microscopic evaluation.

Treatment and Outcome

The patient was prepared for aseptic surgery and sedated by acepromazine (0.05 mg/kg) administrated intramuscularly and after 30 minutes IV catheter was implanted and general anesthesia was induced using ketamine (5 mg/kg) and diazepam (0.3 mg/kg) intravenously. The patient was intubated and anesthesia was maintained by isoflurane.[13]

Figure 1. Location of the mass and sign of non-weight bearing lameness with dropped elbow in the dog.

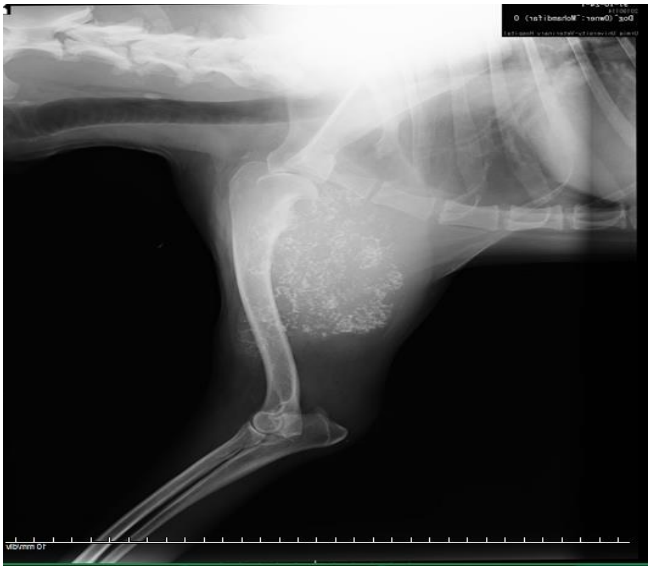

Figure 2. Lateralomedial radiographic view of the left humerus, mixed radiopaque-radiolucent appearance of the tumor with saucerization.

Figure 3. Craniocaudal radiographic view of the left humerus.

Skin incision extended from the greater tubercle of the humerus proximally, to the lateral epicondyle distally, following the craniolateral border of the humerus. Subcutaneous fat and fascia were incised on the same line and mobilized and retracted with the skin. The brachial fascia was incised along the lateral border of the brachiocephalicus muscle and distally over the cephalic vein, the cephalic vein was protected during surgery. An incision was made in the craniomedial fascia of the brachialis muscle and the insertion of the lateral head of the triceps brachii on the humerus. The muscles were atrophied and the target mass was identified in the mentioned area clearly. A firm, lobular yellowish-white mass with dimensions of 10 cm (L) × 15 cm (W) × 8 cm (H) was recognized. The mass was embedded within the approximately proximal two-thirds humerus between the muscles and over the radial nerve traveling cranial to the lateral epicondyle of the humerus. (Figures 4 and 5). En-bloc resection of the tumor was done by blunt and sharp dissection using pair of Metzenbaum scissors.

The mass was attached to the humerus in the upper region and after its removal, bone growth was obvious and there was no evidence of impairment in the joint and periarticular structures. Entrapped Radial nerve as well as the left ulnar nerve were inspected and found in normal status. Macroscopic appearance of the tumor mass is shown in (Figure 6). The surgical area was irrigated with copious saline solution and closed in

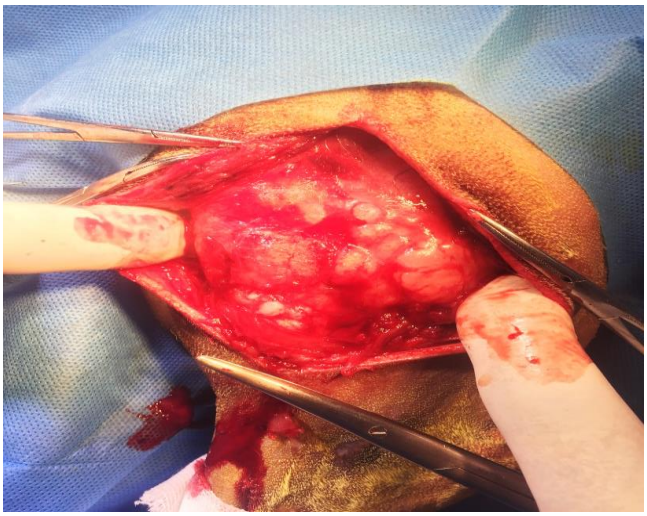

Figure 4. Intraoperative chondroma tumor appearance.

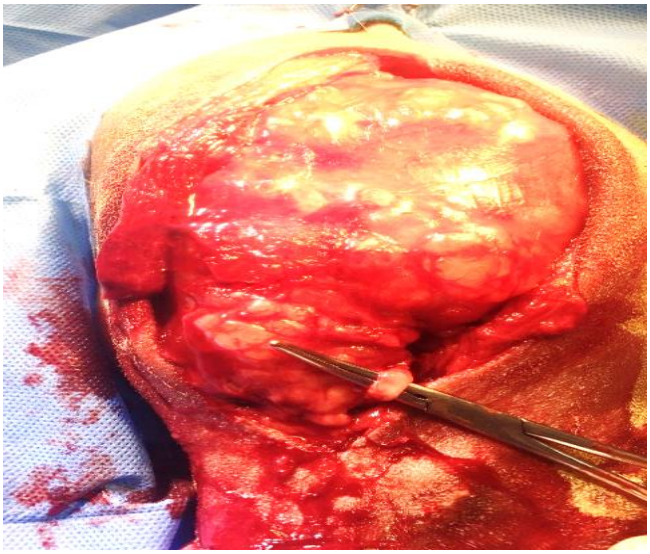

Figure 5. Identification and release of the radial nerve in its anatomical location after complete elevation of the tumor.

Figure 6. Macroscopic appearance of the tumor mass.

layers routinely. Post-operative painkillers and antibiotics were considered for 5 days.

The tissue samples from the specimen were fixed in 10% buffered formalin solution and submitted to the department of veterinary pathology for histopathological examination. The histopathologic assessments confirmed the lobular pattern with the presence of tumor cells similar to normal chondrocytes in an amorphous, basophilic matrix that confirmed the chondroma tumor (Figure 7). The tumor mass was poorly vascularized with a few foci of necrotic areas. Mitotic indices were not observed within the tumor cells.

In the postoperative follow-up, the patient's general condition revealed normal status without any sign of inflammation or tumor recurrence. Neurological assessments indicated appropriate radial nerve functioning and loss of lameness 3 and 6 months after surgical treatment. (Figure 8).

Clinical Relevance

Chondromas are much less frequently seen in domestic animals although they were observed in old dogs and sheep.[7,8,14,15] They occur most commonly in flat bones, turbinates, and sternocostal cartilage complexes. In humans, enchondromas occur most commonly in the bones of the hands, especially the

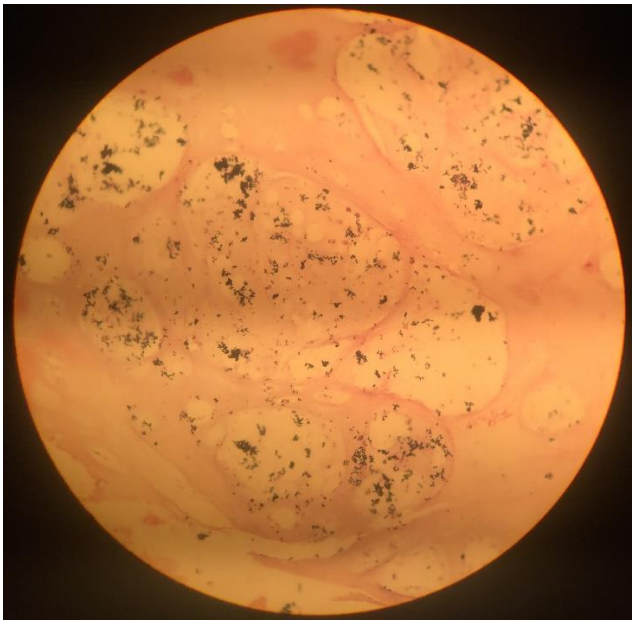

Figure 7. Well-differentiated chondrocytes.

Figure 8. Three months later appearance of the dog showing weight bearing and normal gait.

proximal phalanges.[11] Gentle growth of these tumors leads to minor bone deformations.[6,15,16] The number of case reports are very small, but sites in dogs include the proximal phalanx, cervical spine, rib,[9,17,18] vertical ramus of the mandible in a cat [14], an enchondroma in the distal tibia of a rhesus monkey.[7] In general, Chondromas are firm and have evenly contoured borders covered by a fibrous capsule. They are bluish-white to pure white on a cut surface with a multilobular structure and they differ in size. In a study, Resnick et

al declared that bones can be affected by the slow growth of these tumors. Clinical symptoms differ according to the size and location of the tumor. Although the lesions may become pretty large, they are generally without signs or accompanied by painless swellings.[10,12]

In our study, the mass was poorly noticeable in the initial examination of the forelimb and the patient was severely lame and did not respond to the routine neurological examinations. Ipsilateral paralysis of the forelimb was observed due to the radial nerve entrapment.

Chondromas result in expansile bone lesions that attenuate the cortex of the adjacent bone while maintaining a smooth but discrete border. Matrix mineralization will be associated with variable radiopacity.[19] Multiple cartilaginous exostosis is a benign bone disease of unknown origin that is characterized by multiple, cartilage capped bony protuberances that arise from the surfaces of any bone formed by endochondral ossification.[20,21] In this case, based on the appearance, the mass was firmly attached to the periosteum in the proximal humerus and the mass was stretched from the proximal to the distal part of the left humerus. This tumor which is also known as periosteal chondroma is radiographically radiolucent and occasionally mineralized. The lesions are attached to the surface of the bone and cause saucerization, a well-delineated erosion of the cortex. Periosteal chondroma is less common than enchondroma and arises most commonly from the proximal humerus.[22] In a study by Von et al., The proximal humerus bone growth plate closes in the long run relative to others.[23] To the authors, this may be the reason for the origin of the tumor from the proximal growth plate and periosteum of the humerus. It has been referred to as multiple exostosis, diaphyseal aclasis, chondroma, dyschondroplasia, hereditary deforming chondrodysplasia, hereditary multiple exostoses, osteochondromatosis, and multiple osteochondromata.[21,24, 5]

In such cases, lameness and non-weight bearing due to peripheral nerve entrapment should be differentiated into tumor-induced neuropathy between masses such as chondroma, osteochondroma, and chondrosarcoma based on histopathologic evidence. Observation of these findings in our case supports the correctness of the chondroma diagnosis.[7,8,14,15,26] Although a few papers published about chondromas in animals, the prognosis following complete mass excision is good. In one study, five dogs diagnosed with chondromas were still alive without recurrence or metastasis after at least 2 years of diagnosis or surgery which is consistent with the results of this report.[11]

According to the results of this report, tumor masses such as chondroma can be considered as the causes of lameness and neuropathy in the forelimb and can be included in the list of differential diagnoses causing lameness in dogs.

Conflict of Interest

The authors declare no conflict of interest.

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