Case Report

A Large Intermuscular Lipoma in the Axillary Region of a Dog: Diagnosis, Surgery and Follow-up

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ABSTRACT

Lipoma is considered a benign tumor of adipose tissue that typically develops in subcutaneous tissue. While this type of tumor is common in older and obese dogs, intermuscular lipomas are rare in veterinary medicine. This report represents the clinical signs, physical examination, and diagnostic imaging findings of intermuscular lipoma in the axillary region of a 12-year-old intact male mixed terrier dog. Diagnostic tests, including ultrasonography, computed tomography (CT) and fine-needle aspiration, were performed. The mass was removed entirely using blunt dissection with a safe margin under general anesthesia. A large fatty tumor between the deep pectoralis and superficial pectoralis muscles was found during surgery. Macroscopic and microscopic examinations revealed a non-encapsulated mass with a soft, greasy consistency, containing differentiated and benign adipocytes, indicating lipoma. During the examination six months after surgery, the patient showed no lameness and other neurological complications, and there were no signs of mass recurrence. Intermuscular lipomas are rarer than other types of lipomas. Complete surgical excision is the optimal treatment for intermuscular lipomas, yielding an excellent prognosis post-surgery.

Keywords: Axillary, Computed Tomography, Histopathology, Intermuscular lipoma, lameness

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Case History

Adipose masses are one of the most common types of soft tissue tumors, which include both benign and malignant tumors. Benign tumors include lipoma, angiolipoma, fibrolipoma, and infiltrative lipoma, while malignant tumors include various types of liposarcoma, such as well-differentiated, anaplastic and myxoid (Hendrick, 2016; Spoldi et al., 2017).

Lipoma is the most frequent benign adipose tissue tumor with well-differentiated adipocytes of mesenchymal origin, which is most reported in domestic animals, especially in dogs (Hendrick, 2016; Huppes et al., 2016; Mahaki et al., 2023). Blood vessels, lymphatics, nerves, adipose tissue and smooth muscle The occurrence of this tumor is more prevalent in middle-aged to older and obese dogs (Hendrick, 2016; Huppes et al., 2016). Blood vessels, lymphatics, nerves, adipose tissue and smooth muscle This tumor has a predilection for females and some breeds, such as the Doberman Pinscher, Labrador Retriever and mixed breeds (Unsaldi et al., 2023). Superficial lipomas generally form in the subcutaneous tissue, while deep-seated lipomas develop in deeper tissues, such as muscles (Unsaldi et al., 2023). Intermuscular lipoma is a type of deep-seated lipoma that originates from the intermuscular septum and fat tissue accumulations between the muscle bundles. It is located in the subcutaneous tissue between the muscle bellies and does not invade the surrounding tissues. However, the intramuscular lipoma penetrates deep tissues, such as muscle and connective tissue, separating muscle fibers and causing muscle atrophy (Kazemi & Neshat-Gharamaleki, 2021; Unsaldi et al., 2023).

Canine intermuscular lipomas have been observed with greater frequency in the thigh region, specifically between the semitendinosus and semimembranosus muscles, and with a lower frequency in the forelimb (Case et al., 2012; Kazemi & Neshat-Gharamaleki, 2021; Sullivan et al., 2021). This tumor can cause swelling, pain, and lameness in the affected limb and interfere with body function (Case et al., 2012; Sullivan et al., 2021). This report presents an intermuscular lipoma in an uncommon anatomic region, and the CT findings, surgical processes, and histopathological findings are described.

Clinical Presentation

A 12-year-old intact male mixed terrier dog with a mass in the axillary region was referred to the small animal hospital of the Faculty of Veterinary Medicine, University of Tehran. During the initial examination, a painful mass with a solid consistency was observed in the left axillary region, which caused lameness in the left forelimb. The heart rate, respiratory rate, and body temperature of the patient were within the normal range. A complete blood count (CBC) and biochemical parameters were measured and all were within the normal range. To accurately diagnose the mass and differentiate it from other soft tissue tumors, ultrasonography and fine needle aspiration (FNA) under ultrasonography guidance were performed.

Diagnostic Testing

Ultrasonography revealed a mass with a thin hyperechoic capsule, sharp margins, and thin parallel hyperechoic lines surrounding normal tissue. The stripped appearance observed in the ultrasonography was caused by the growth of connective tissue inside the capsule, which subsequently turned into fibrotic tissue. In the cytological examinations, well-differentiated adipocytes with clear cytoplasm and vacuoles due to the presence of fat accumulations were observed, displaying round and oval shapes of similar dimensions, with no signs of malignancy, such as pleomorphism, mitosis, or atypia.

CT was performed to determine the type of mass, evaluate the surrounding structures, and facilitate pre-surgery planning. In the CT evaluation with intravenous contrast injection, a well-defined non-contrast enhanced mass was observed in the left axillary region characterized by a clear and smooth margin with fat attenuation and minimal vascularity that separated the muscle bellies from each other. This mas was reported with a high probability of lipoma. The mass was evaluated to be approximately 6.26×8.00×10.26 cm (height/width/length) (Figure 1).

According to the diagnosis and the clinical symptoms of lameness in the patient, surgery was recommended. Anesthesia was induced with 6 mg/kg of propofol (FRESENIUS KABI Co., Homburg, Germany) administered intravenously, followed by tracheal intubation for inhalation anesthesia using isoflurane (Piramal Enterprises Limited, Telangana, India). Intramuscular 4 mg/kg of tramadol (Darou Pakhsh Pharmaceutical Co., Tehran, Iran) and subcutaneous 0.10 mg/kg of meloxicam (Razak Pharmaceutical Co., Tehran, Iran) were used as analgesics, while intravenous 22.00 mg/kg of cefazolin (Daana Pharmaceutical Co., Tabriz, Iran) was used as a prophylactic antibiotic before surgery. The patient was placed in right lateral recumbency, with the left forelimb, where the mass was located, positioned upwards. A wide area around the mass, including the entire left forelimb, was prepared for surgery. An elliptical inci-

Figure 1. Transverse image of an intermuscular lipoma. A well-defined trapezoid to ellipsoid-shaped non-contrast enhanced mass lesion with fat attenuation (HU~-40) was noted in left prescapular region (red circle)

sion was made on the skin, and the mass was separated and removed from the surrounding tissues between the superficial pectoralis and deep pectoralis muscles using blunt dissection and bipolar electrocautery (Figure 2).

The mass, which weighed 200 g, was observed to be non-encapsulated in the macroscopic examination, with a soft, greasy texture and a color ranging from white to yellowish, making it indistinguishable from normal adipose tissue (Figure 3). The mass was sent for histopathological examination in a 10% neutral buffered formalin solution. After the mass was removed, to decrease dead space, two layers of sutures were applied in the superficial fascia of the muscles and the subcutaneous layer and the skin were sutured. A pressure bandage was applied for one week after surgery. Controlled movement on a leash was recommended to the owner to reduce the possibility of seroma formation. After surgery, cefazolin (22 mg/kg, q12hr, IV; Daana Pharmaceutical Co., Tabriz, Iran), tramadol (4 mg/kg, q8hr, orally; Rouz Darou Pharmaceutical Co., Tehran, Iran) and meloxicam (0.10 mg/kg, q24hr, orally; Jalinous Pharmaceutical Co., Tehran, Iran) were administered. One week after surgery, the patient's lameness had completely resolved, and weight-bearing and walking returned to normal. The sutures were removed after 14 days.

After processing the tissue using standard histopathologic methods, tissue sections were prepared and stained with hematoxylin and eosin. In the microscopic examination, well-differentiated and benign adipocytes with large clear vacuoles that replaced the cytoplasm along with peripheralization and compression of nuclei were observed, which was indicative of lipoma (Figure 4). In the post-surgery examinations, the patient had no signs of lameness, neurological complications in the affected limb, seroma, or infection at the surgical site, and no signs of tumor recurrence or clinical symptoms were observed until six months after the surgery.

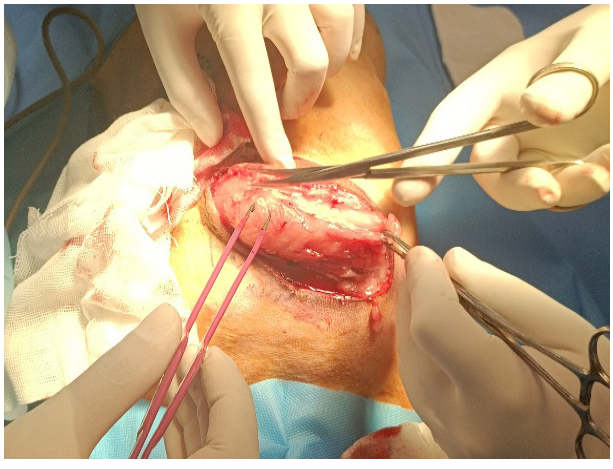

Figure 2. Surgical removal of intermuscular lipoma by blunt dissection and bipolar electrocautery

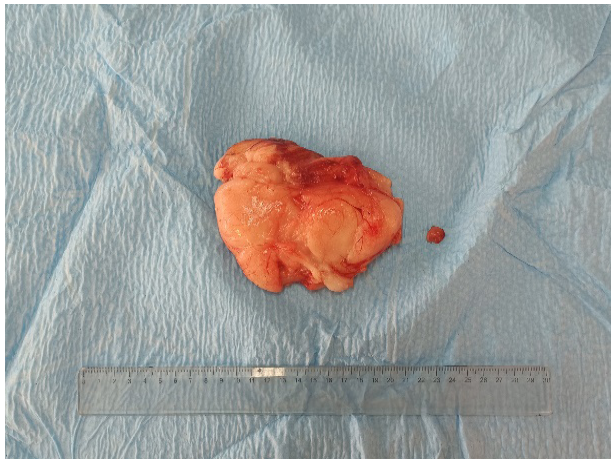

Figure 3. The resected intermuscular lipoma after surgery with a soft, greasy, white to yellowish color, which was indistinguishable from normal adipose tissue.

Assessments

This report presents a large intermuscular lipoma located in the axillary region of a dog. The clinical symptoms of this tumor include progressive growth, swelling of the area, pain, and even lameness of the affected limb. (Kazemi & Neshat-Gharamaleki, 2021).

Intermuscular lipomas, like other benign adipose tumors, are usually not concerning and have an excellent prognosis. They can be easily removed through blunt dissection following the separation of the muscular fascia surrounding the lipoma (Case et al., 2012; Sullivan et al., 2021). However, if they are large enough to interfere with the patient's daily activities, or if they are located in vital areas such as near the spine, heart, or nerve plexus, causing damage and pressure to these areas, advanced treatment plans should be considered (Ryan et al., 2012; Saha et al., 2020). In the present case, the growth of the tumor exerted pressure on the brachial plexus nerves and forelimb muscles, leading to an effect on the patient's weight-bearing and walking.

Definitive diagnosis before surgery is necessary to plan the approach for mass removal in intermuscular lipomas (Crowley et al., 2020).

The best and most effective treatment of all types of lipomas, including intermuscular lipoma, is the marginal removal of the tumor by surgery (Huppes et al., 2016). Despite the benign nature of lipoma, the preferred method of treatment is surgery because there is evidence suggesting that some lipomas are transforming tumors and can develop into liposarcoma. In addition, some liposarcomas can mimic deep-seated lipomas, such as intermuscular lipoma, in radiological examinations, which can complicate accurate diagnosis and treatment plans (McTighe & Chernev, 2014; Widodo et al., 2020).

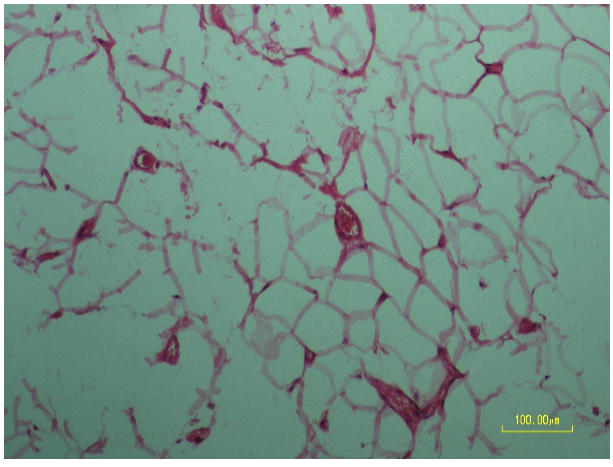

Figure 4. Histopathological characteristics of intermuscular lipoma of a dog showing well-differentiated adipocytes in which large clear vacuoles replace the cytoplasm and compress the nuclei (H & E staining, bar=100)

In marginal excision, the tumor is removed along with a margin of normal surrounding tissue to ensure that the tumor does not remain in the region. This process typically does not have life-threatening consequences. Complications of this surgery include the formation of seroma, wound infection at the surgical incision site, and damage to the nerves in the region (Huppes et al., 2016). During the dissection of the intermuscular lipoma in the hindlimb and the forelimb, the sciatic nerve and the brachial nerve plexus should be considered, respectively. In the event of damage to t vchese nerves, symptoms such as lameness or other neurological complications may be observed despite the complete removal of the mass (Case et al., 2012; Sullivan et al., 2021). However, in the case reported here, none of the symptoms of lameness or neurological complications caused by nerve damage were observed during examinations. Meticulous dissection during surgical removal can play a critical role in preventing these complications.

In conclusion, surgical removal of intermuscular lipoma is recommended due to its positive outcome for the patient.

Ethical Considerations

Compliance with ethical guidelines

The authors confirm that the ethical principles have been adhered to. No approval of research ethics committee was required as this was a clinical case under standard veterinary care

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Authors' contributions

Conceptualization, methodology and supervision: Saeed Farzad-Mohajeri; Writing the original draft: Seyedeh Fatemeh Safavi, and Saeed Farzad-Mohajeri; Validation, formal analysis, investigation, resources, visualization, review and editing: All authors.

Conflict of interest

The authors declared no conflict of interest.

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