

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 with 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. In macroscopic and microscopic examinations, a non-encapsulated mass, with a soft, greasy consistency, containing differentiated and benign adipocytes was observed, indicating lipoma. In the examination 6 months after surgery, the patient showed no lameness and other neurological complications, and there was no sign of recurrence of the mass. Intermuscular lipoma is 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.

Case History

Adipose masses are one of the most common types of soft tissue tumors, which include benign and malignant tumors. Benign tumors include lipoma, angioliipoma, fibrolipoma, and infiltrative lipoma, and malignant tumors include 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; Huppel *et al.*, 2016; Mahaki *et al.*, 2023) The occurrence of this tumor is more prevalent in middle-aged to older, and obese dogs.(Hendrick, 2016; Huppel *et al.*, 2016) This tumor has a predilection in females and some breeds such as Doberman Pinscher, Labrador Retriever, and mixed breeds.(UNSALDI *et al.*, 2023) Superficial lipoma is generally formed in the subcutaneous tissue, but deep-seated lipoma is formed in deeper tissues such as muscles.(UNSALDI *et al.*, 2023) The intermuscular lipoma is a 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, separates muscle fibers, and causes muscle atrophy.(Kazemi and Neshat-Gharamaleki, 2021; UNSALDI *et al.*, 2023)

Canine intermuscular lipoma has been observed with greater frequency in the thigh region, between the semitendinosus and semimembranosus muscles, and with a lower frequency in the forelimb.(Case *et al.*, 2012; Kazemi and 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. In 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 normal range. Complete Blood Count (CBC) and biochemical parameters were measured, and all were within 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 Testings

Ultrasonography showed a mass with a thin hyperechoic capsule with sharp margins and thin parallel hyperechoic lines surrounding normal tissue. The stripped appearance was another finding in ultrasonography that was caused by the growth of connective tissue inside the capsule, which subsequently turns into fibrotic tissue. In the cytological examinations, well-differentiated adipocytes with clear cytoplasm and vacuoles due to the presence of fat accumulations, with

round and oval shapes and similar dimensions, were observed, and there were no signs of malignancy, either pleomorphism, mitosis, or atypia.

Computed Tomography (CT) was performed to determine the type of mass, evaluate the surrounding structures, and facilitate pre-surgery planning. In CT evaluation with intravenous contrast injection, a well-defined non-contrast enhanced mass was observed in the left axillary region with a clear and smooth margin with fat attenuation, and minimal vascularity that separated the muscle bellies from each other. This mass was reported with a high probability of lipoma. The mass was evaluated with a size of 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 by 6 mg kg⁻¹ propofol (FRESENIUS KABI Co., Homburg, Germany) intravenously, followed by tracheal intubation for inhalation anesthesia using Isoflorane (Piramal Enterprises Limited, Telangana, India). Intramuscular 4 mg kg⁻¹ tramadol (Darou Pakhsh Pharmaceutical Co., Tehran, Iran) and subcutaneous 0.10 mg kg⁻¹ meloxicam (Razak Pharmaceutical Co., Tehran, Iran) were used as analgesics, and intravenous 22.00 mg kg⁻¹ cefazolin (Daana Pharmaceutical Co., Tabriz, Iran) was used as a prophylactic antibiotic before surgery. The patient was placed on right lateral recumbency, and the left forelimb, where the mass was located, was placed upwards. The wide area around the mass, including the entire left forelimb, was prepared for surgery. An elliptical incision was made on the skin. The mass was separated and removed from the surrounding tissues between superficial pectoralis and deep pectoralis muscles by blunt dissection and bipolar electrocautery (Figure 2).

The mass, which weighed 200 grams, was observed non-encapsulated in macroscopic examination with a soft, greasy, white to yellowish color, which was indistinguishable from normal adipose tissue (Figure 3). The mass was sent for histopathological examination in a 10% neutral buffered formalin solution. After mass removal, to decrease dead space, two layers of sutures were applied in the superficial fascia of the muscles, the subcutaneous layer, and the skin were sutured, and a pressure bandage was applied for one week after surgery. Controlled

movement by leash after surgery was recommended to the owner in order to reduce the possibility of seroma formation. After surgery, cefazolin (22 mg kg⁻¹, q12hr, IV; Daana Pharmaceutical Co., Tabriz, Iran), tramadol (4 mg kg⁻¹, q8hr, orally; Rouz Darou Pharmaceutical Co., Tehran, Iran), and meloxicam (0.10 mg kg⁻¹, q24hr, orally; Jalinous Pharmaceutical Co., Tehran, Iran) were administered. One week after surgery, the patient's lameness was 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 and 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 6 months after the surgery.

Assessments

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

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

Definitive diagnosis before surgery is necessary to plan the approach of mass removal in intermuscular lipomas.(Crowley *et al.*, 2020) The best diagnostic methods for determining the type of masses, including intermuscular lipoma, are advanced imaging modalities, including CT, MRI, and ultrasonography, which are very helpful in staging the mass and its type of treatment.(Crowley *et al.*, 2020) In the CT with intravenous contrast injection, usually, a mass with fat attenuation, sharp margins with minimal vascularity, and separating the muscle bellies is reported, which is consistent with the findings of the CT in our reported case.(Crowley *et al.*, 2020) Fine-needle aspiration and histopathology examination alone cannot differentiate between types of lipoma, such as intermuscular or intramuscular; therefore, CT before surgery plays a decisive role.(Crowley *et al.*, 2020) Accordingly, performing CT was considered prior to the surgery in our case.

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, causing problems in accurate diagnosis and treatment plans.(McTighe and Chernev, 2014; Widodo *et al.*, 2020) 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 usually 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 dissection of the intermuscular lipoma in the hindlimb and the forelimb, the sciatic nerve and the brachial nerve plexus should be considered, respectively; In case of damage to these nerves, despite the complete removal of the mass, symptoms such as lameness or other neurological complications may be observed,(Case *et al.*, 2012; Sullivan *et al.*, 2021) but in the case of our report, none of the symptoms of lameness or neurological complications caused by damage to the nerves were observed in the examinations. Meticulous dissection in surgical removal can play a critical role in preventing these

complications. In conclusion, surgical removal of intermuscular lipoma is recommended due to resulting in a positive outcome for the patient.

Conflict of interest

The authors declare that they have no conflict of interest.

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تشخیص، جراحی و پیگیری یک مورد لیپوم ارتشاحی بین عضلانی بزرگ در ناحیه آگزیلاری در یک قلاده سگ

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چکیده

لیپوما یک تومور خوش خیم بافت چربی در نظر گرفته می شود که به طور معمول در بافت زیر جلدی ایجاد می شود. در حالی که این نوع تومور در سگ های مسن و چاق رایج است، لیپوم های بین عضلانی در دامپزشکی نادر است. این گزارش نشان دهنده علائم بالینی، معاینه فیزیکی و یافته های تصویربرداری تشخیصی لیپوم بین عضلانی در ناحیه زیر بغل سگ 12 ساله نر مختلط است. تست های تشخیصی شامل سونوگرافی، برش نگاری رایانه ای، و آسپیراسیون با سوزن انجام شد. سپس توده توسط کندکاری با حاشیه ای امن تحت بیهوشی عمومی برداشته شد.

یک تومور چربی بزرگ بین ماهیچه های سینه ای عمقی و سینه ای سطحی در طی عمل جراحی پیدا شد. در بررسی های ماکروسکوپی و میکروسکوپی، توده ای غیر کپسوله، با قوام نرم و چرب، حاوی سلول های چربی متمایز و خوش خیم مشاهده می شود که نشان دهنده لیپوماست. براساس یافته های سی تی، جراحی، و هیستوپاتولوژی لیپوم بین عضلانی تشخیص داده شد. در معاینه 6 ماه پس از جراحی، بیمار لنگش و سایر عوارض عصبی را نشان نداد و هیچ نشانه ای از عود مجدد توده مشاهده نشد. لیپوم

بین عضلانی در مقایسه با سایر انواع لیپومها نادرتر است و برداشتن کامل جراحی بهترین درمان برای آن است که پیش‌آگهی خوبی پس از جراحی دارد.

کلمات کلیدی: آگزیماری، برش نگاری رایانه‌ای، هیستوپاتولوژی، لیپوم بین عضلانی، لنگش.

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