

# An Unusual Presentation of a Giant Submuscular Lipoma in the Forearm: Presentation and Pathophysiology

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## Abstract

**Introduction:** Lipomas are most commonly found superficially and in the subcutaneous layer. We present an interesting and uncommon case of a large lipoma. Seventy five years old male presented with swelling in his left non dominant forearm investigated and diagnosed with submuscular lipoma. Clinical presentation, investigation, treatment and follow up described below.

**Case Report:** The patient presented with left non dominant forearm lump. The lump gradually increased in size for the last 6 months to a noticeable size. On examination there was a immobile palpable mass with no significant tenderness or neurological deficit distally apart of deep ache at night. The patient been referred to orthopaedic and trauma department from his local general practice doctor. The patient investigated initially with ultrasonography imaging which showed features that suggest lipoma within the deep extensor compartment of the forearm engulfing the posterior interosseous nerve (PIN) giving ultrasonic septal features. Diagnosed confirmed with contrast CT scan which also excluded malignant features. Biopsy taken post operatively confirmed the diagnosis of lipoma. The lipoma was carefully dissected and the PIN released with satisfactory outcomes.

**Conclusion:** Lipomas are common benign tumour of the soft tissue that can affect different parts of the body including upper extremities and should be part of any mass differential diagnosis. There are low cost diagnostic radiological tests like ultrasonography but Magnetic resonance imaging shows detailed high fat single and demonstrate effectively if there are any malignant features and if there are any neurological structures involved. Surgeons should anticipate any structural involvement with such mass depending on anatomical position and careful dissection always needed to avoid iatrogenic injuries.

**Keywords:** Lipoma, Sub-Muscular lipoma , soft tissue neoplasm , Giant lipoma , Upper extremity , lipomatous tumors.

## Introduction

Lipomas count for half of the benign musculoskeletal soft tissue neoplasms[1]. It affect about 2% of total population[2]. Gender does not have much influence on prevalence of solitary lipomas however male has high risk of developing multiple lipomas than females[3]. Histologically , lipomas are made of mature lipocytes[4]. In comparison to benign lipomas , histiocytomas and liposarcomas are

malignant soft tissue tumours that resemble benign lipomas radiology features and more common in lower extremities[5,6].

Studies showed that lipomas occur mainly on trunk , upper back , neck and followed by lower and upper extremities [2,7]. Lipomas classified in different way based on features capsulated or not , position superficial and deep [5, 8]. It also classified as parosteal , interosseous , visceral , inter or intra muscular. The deep lipomas usually does not produce

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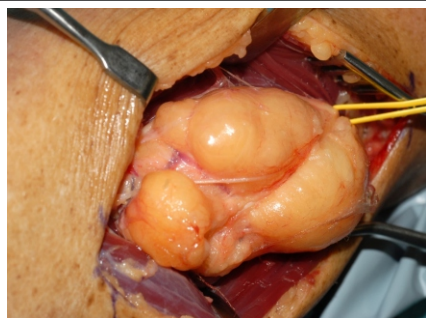
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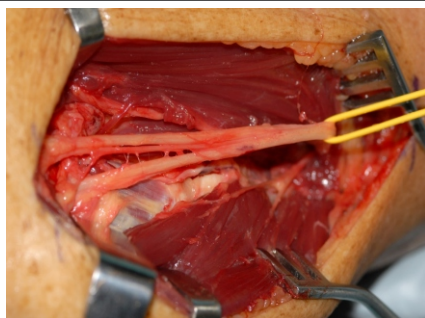
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**Figure 1.** Submuscular lipoma divided by the PIN.



**Figure 2.** PIN after careful dissection and removal of the lipoma.



**Figure 3.** Submuscular lipoma after excision.

clinical symptoms till its big enough to cause pressure or displacement of neurovascular structures nearby [9]. Therefore deep lipomas can grow to a larger size before being noticed and diagnosed [9, 10].

### Case Report

A 75 year old hypertensive gentleman was referred to the orthopaedics team with a large lump around his left elbow joint, increasing in size over the last six months associated with gradual increase dull achy pain around the area of the swelling increase by direct pressure. On orthopaedic review he denied any history of persistent left upper limb numbness, altered sensation or weakness. On clinical examination the mass was found to arise from the lateral aspect of the antecubital fossa over the extensor muscle origin of the forearm. It was well-defined, non-tender and approximately eight by six cm in size. There was no neurovascular deficit of note to suggest any pressure symptoms. Blood sciences were also normal at the time of examination.

He underwent ultrasound assessment which revealed a large forearm intra-muscular lipoma within the bulk of the brachioradialis muscle. Subsequent computed tomography (CT) scans did not show any significant capsule thickening or signs of local invasion. Contrast studies showed no enhancement within the lesion and it was therefore concluded that there were no suspicious features of any malignant change, however there was simple septation within the lump.

Surgical exploration was therefore performed under regional anaesthesia and with the application of a haemostatic tourniquet. An initial incision was made approximately one inch superolateral to the antecubital fossa and extended distally and laterally to two inches below. After opening the skin and entering the subcutaneous plane, there was no sign of a lipoma. The bulky mass appeared to be submuscular, underneath the brachioradialis muscle. Blunt dissection through muscle fibres confirmed a deep seated lipoma lying over the radiocapitellar joint. Running through the lipoma was a shiny cord-like structure, which was immediately identified as the PIN and its branches within the lipoma were most likely responsible for the septal appearances on ultrasound (Fig 1).

Surgery took over an hour and a half as the mass was carefully dissected off the PIN ensuring it was left intact (Figs 2 & 3). The mass was sent for histopathological analysis where it was confirmed to be a soft-tissue lipoma without any evidence of malignancy.

During routine follow up in the outpatients department at both one and three months after his operation the patient's wound had healed well and other than a small patch of numbness over the dorsal surface of his left forearm there was no other neurological deficit of note. The patient was discharged by the orthopaedics team at this point satisfied

with the results of surgery.

### Discussion

Lipomas are the most common benign soft tissue tumours, mainly located subcutaneously on the trunk and proximal extremities. Intermuscular and intramuscular lipomas however are uncommon with an incidence of 1.8% and 0.3% respectively. Although rare, intramuscular lipomas have a high recurrence rate at 19% after complete resection. Intermuscular lipomas have a recurrence rate of 1%. [11]

The occurrence of deep-seated lipomas on the distal extremities are particularly rare, in which case they commonly create nerve compression syndromes and a restricted range of motion. When occurring in conjunction with a rapid growth they often raise the suspicion of malignancy [3, 4].

The forearm itself is packed with a number of essential neurovascular structures. The radial nerve enters the forearm deep to the brachioradialis muscle and bifurcates into deep and superficial branches, which then go on to provide motor and sensory function respectively. The brachioradialis muscle which originates from the lateral supracondylar ridge of the humerus and inserts into the lateral surface of the distal radius is an elbow flexor, more powerful when the forearm is in the midposition between supination and pronation at the radioulnar joint. Quite remarkably, considering the size and location of the lipoma in our case in relation to these aforementioned structures there was no evidence of neurological deficit nor muscle dysfunction.

Previous literature describing lipomas of the proximal radius have almost always demonstrated positive neurological symptoms. One particular report of five cases of paraosteal lipomas of the proximal forearm showed the PIN and superficial radial nerve to be equally affected [4]. A number of other cases of PIN palsy caused by these malpositioned paraosteal lipomas can be found when reviewing the literature. They share a common conclusion in that superior imaging modalities including magnetic resonance imaging and CT are specific in diagnosis making and that prompt surgical excision is essential in ensuring optimal recovery from the nerve paralysis [6, 7, 12].

What we present is the first ever case of a completely asymptomatic gentleman despite having his PIN completely engulfed by a large submuscular lipoma as illustrated in (Fig 1). Our patient attended the orthopaedics department with a large lump posing more of an inconvenience rather than debilitating neurological symptoms, therefore it was imperative that adequate time was taken to carefully free the PIN whilst removing the mass to ensure the patient's upper limb neurological function was unaffected.

This case highlights that despite unremarkable clinical examination

patients can still have important neurovascular structures engulfed by pathological processes and therefore one must utilise superior imaging modalities to help delineate key anatomical structures whenever surgical procedures are considered in territory of this nature. In addition, surgeons must be alert to unexpected structures that can be associated or affected by such mass depending on its anatomical position in the body and take great care when undertaking these resections using fine, careful blunt and sharp dissection, which are commonly dubbed 'junior operations'. By doing so, iatrogenic injury can be avoided and patients can be discharged satisfied with results of their surgery.

### Conclusion

Lipomas are common benign tumour of the soft tissue that can affect different parts of the body including upper extremities and should be part of any mass differential diagnosis. There are low cost diagnostic

radiological tests like ultrasonography but Magnetic resonance imaging shows detailed high fat signal and demonstrate effectively if there are any malignant features and if there are any neurological structures involved. Surgeons should anticipate any structural involvement with such mass depending on anatomical position and careful dissection always needed to avoid iatrogenic injuries.

### Clinical Message

Lipoma is one of the most common soft tissue neoplasms affecting musculoskeletal system and especially upper limbs. A lot of these lipomas are asymptomatic however it can cause pain due to involvement of local structures especially surrounding nerves. MRI is more effective in identifying lesion characteristics that will help in diagnosis and also in surgical planning. During surgical excision, good understanding of local anatomy and deliberate careful dissection will help in preventing iatrogenic injuries.

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