Intraneural lipoma of the common peroneal nerve: A case report and review of the literature

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Abstract

Intraneural lipomas are rare hamartomas, encompassed within the spectrum of fatty lesions associated with peripheral nerves. More commonly associated with nerves of the upper limb, there are few reports of intraneural lipomas associated with nerves of the lower limb. In these cases they are usually found around the foot and ankle, or more proximally in the upper thigh or hip.

We report a case of an intraneural lipoma associated with the common peroneal nerve: the presenting features, diagnosis and subsequent management. We give a concise review of fatty lesions associated with peripheral nerves, and in particular, intraneural lipomas.

Key words: lipoma, intraneural lipoma, common peroneal, compression neuropathy, fibrolipoma

Introduction

Benign fatty lesions of peripheral nerves are uncommon, and when they occur, typically affect the nerves of the upper limb. There are only a handful of reports describing cases in the lower limb, and these are mostly confined to distal branches of the superficial peroneal nerve at the foot and ankle.

Due to its rare occurrence, we report a case of an intraneural lipoma associated with the common peroneal nerve (CPN), presenting as a compression neuropathy.

Case report

A 25-year-old female patient presented with a 12-month history of progressive pain in the lateral aspect of her right leg. She had associated numbness over the fourth toe running proximally up to the fibula head for five months. There were no associated constitutional symptoms, and she was otherwise well.

Clinical examination demonstrated full, painless movement of her lumbar spine and hip. Straight leg raise test was negative, and there was no gross lower limb malalignment. Local examination of the knee revealed no skin abnormalities. A vague swelling around the lateral aspect of the knee was noted, extending 5 cm below the level of the fibular head. It was tender over the area of the fibular head and slightly more distally. Local percussion along the common peroneal nerve reproduced her neurological symptoms.

There was some paraesthesia in an area extending from the fibula head down to the fourth toe. There was very mild weakness with power graded 4+ in the right tibialis anterior and extensor hallucis longus muscles. Neurological examination of the upper limbs and the left lower limb revealed no abnormality.

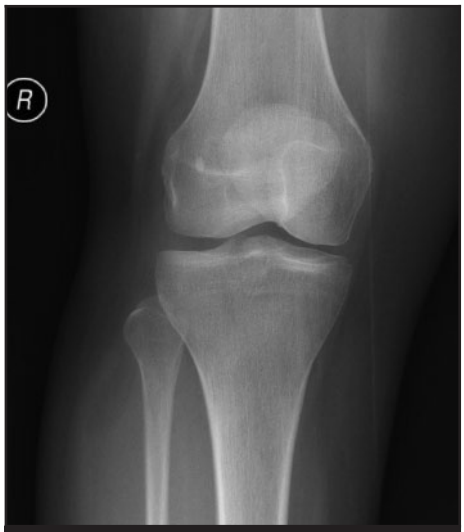

Figure 1. AP X-ray of knee demonstrating mild soft tissue swelling lateral to fibula

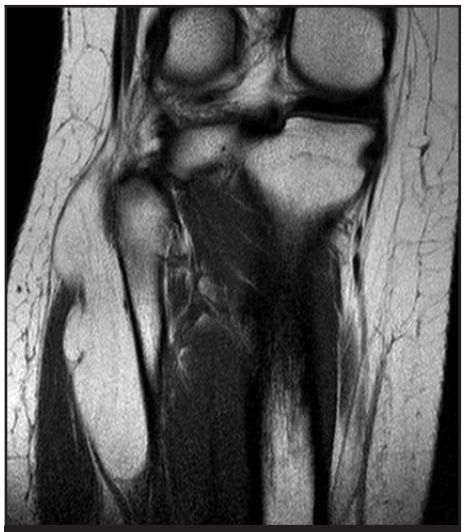

Figure 2. Coronal T1 weighted MRI demonstrating lipoma along common peroneal nerve

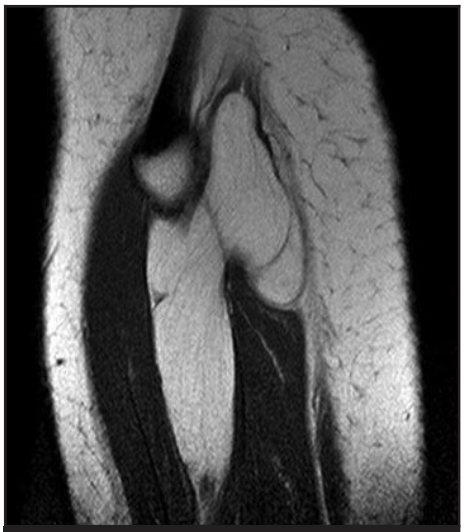

Figure 3. Sagittal T1 weighted MRI showing lobulation of lipoma

Plain radiographs of the affected limb (*Figure 1*) revealed a slight increase in the local soft tissue shadow with no underlying bony abnormality. Magnetic resonance imaging (MRI) (*Figures 2 to 4*) revealed a benign-appearing tumour, most likely a lipoma, with iso-intensity to normal fat on T1 and fat-suppressed sequences. The lesion originated at the level of the knee joint, and followed the common peroneal nerve distally, around the neck of the fibula and into the antero-lateral calf. In view of the progressive nature of her symptoms, and the radiological appearance of an evolving compressive neuropathy, the patient was offered operative intervention.

At surgery, a curvilinear incision was utilised, beginning 7 cm above the knee joint line on the lateral side, and extending to the antero-lateral aspect at the upper-calf level. The common peroneal nerve was identified proximally under the hamstring tendon (*Figure 5*), and followed distally. The proximal extent of the lesion was identified intraneurally (*Figure 6*), and an interfascicular dissection of the tumour from the nerve was continued distally (*Figure 7*) to below the level of the fibular neck, with care taken not to injure branches of the CPN (*Figure 8*). The excised tumour measured 11 cm × 6 cm × 3 cm, and macroscopically resembled lipomatous tissue, with a homogenous yellow colour, firm consistency and lobulation (*Figure 9*).

Histological evaluation showed features consistent with a benign fatty lesion with well-encapsulated mature adipose tissue. There were no associated chondroid elements, and a histological diagnosis of a benign lipoma was made.

The patient had an uneventful post-operative course. There was no neurological complication, and at nine-week follow-up, the patient had regained full strength in the antero-lateral calf musculature, and normal sensation had returned to the antero-lateral calf and toe.

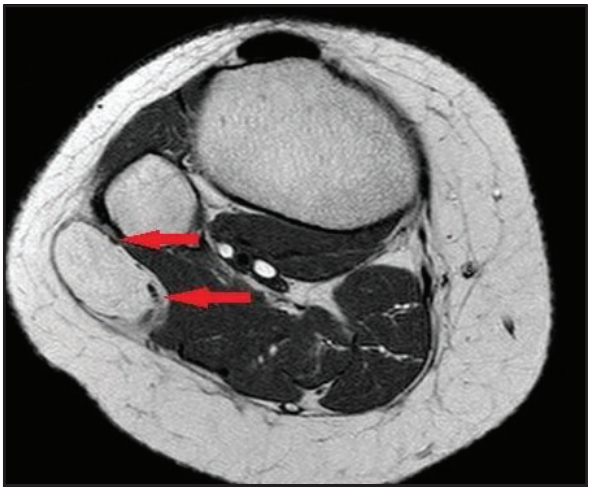

Figure 4. Axial T1 weighted MRI. Note the individual nerve fascicles which have been separated and displaced towards the periphery of the lesion.

Discussion

While adipose tissue is a normal constituent of epineural and perineural tissue, lipomatous lesions associated with peripheral nerves are rare. They may be classified according to their location: intraneural versus extraneural; their pathological activity: infiltrating (lipomatous) or not (lipoma); and by their histological contents: whether they contain fibrous or chondroid elements.

Lipomatous lesions associated with peripheral nerves are rare

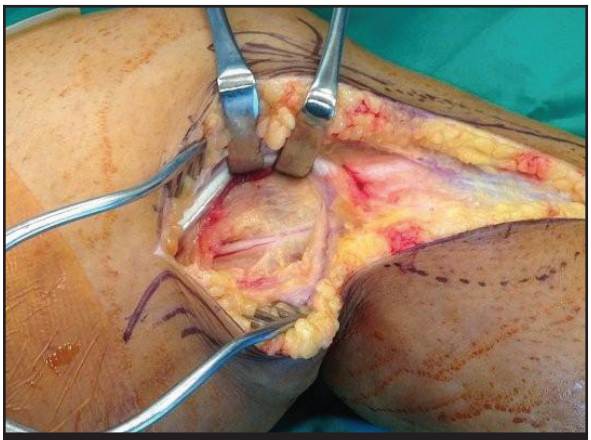

Figure 5. Common peroneal nerve identified proximally

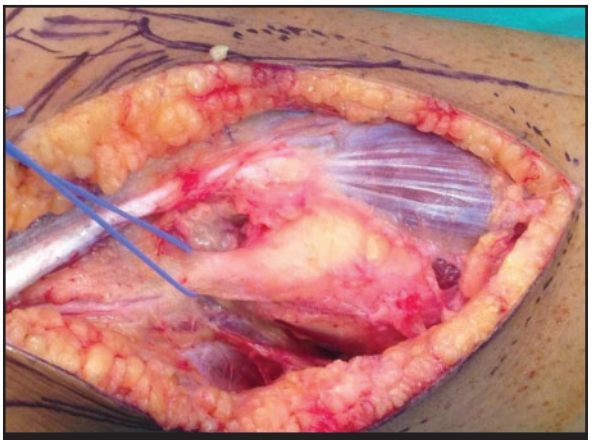

Figure 6. Proximal extent of lipoma seen to occupy an intraneural position

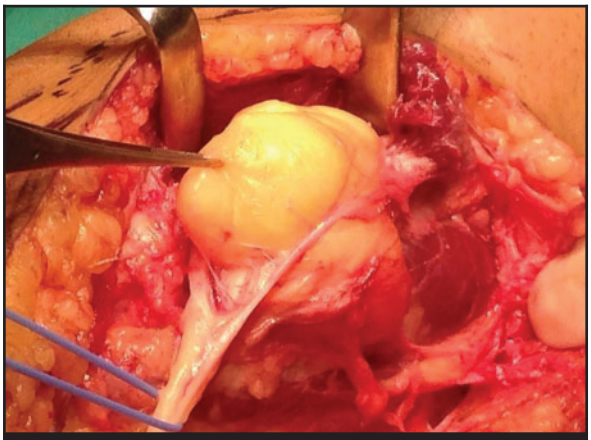

Figure 7. Interfascicular dissection of the lipoma from surrounding nerve fascicles

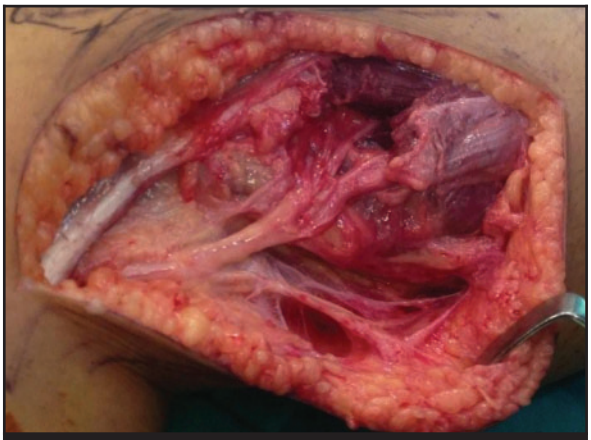

Figure 8. Post excision with the branches of CPN intact

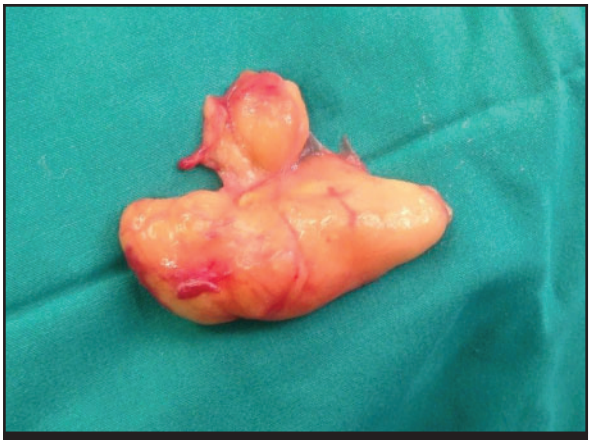

Figure 9. Macroscopic appearance of the excised lipoma

Lipomas have a benign clinical course

Lipomatosis refers to an infiltration of fatty tissue intimately involved with a nerve. It may be associated with a local increase in mesenchymal growth, or focal gigantism. In these cases the term 'macrodystrophia lipomatosa' may be used. In extreme cases it may be more generalised and associated with syndromes such as Proteus and Klippel-Trenaunay.[1-3] Surgical excision of the lipomatous tissue inevitably involves damage to, or excision of the associated nerve, and surgical debulking of distal hypertrophied tissues may be required.

In contrast, lipomas have a much more benign clinical course. They are hamartomas arising from the normal epineural fat tissue, and may be intraneural or extra-neural. They are focal, well demarcated and tend to displace rather than invade or surround nerve fascicles,[3] as seen in this case. They are not associated with local bone and tissue overgrowth.

Historically the terminology for these lesions has had little conformity. Terms included intraneural lipoma, neural fibrolipoma, lipofibromatous hamartoma, perineural lipoma, macrodystrophia lipomatosa, lipomatosis of nerve, fibrolipomatous hamartoma, and fatty infiltration of nerve.

Recently, in an attempt to clarify the nomenclature, Spinner *et al.*[3] divided the lesions into two groups:

- Group 1 included the basic lesions of lipomas and lipomatosis as separate entities, which could occupy either an intraneural or extraneural position.
- Group 2 contained combined lesions. These combined lesions could be:
  - A single basic lesion (e.g. lipoma or lipomatosis) in both an intraneural and extraneural position.
  - Both basic lesions in a single position, e.g. intraneural lipoma with associated intraneural lipomatosis
  - Combined lesions in differing positions.

The authors further emphasised the concept that these adipose lesions form a broad yet interrelated spectrum of pathology.

Intraneural lipomas most commonly affect the nerves of the upper limb. The median nerve[4-9] is the most frequent, but they have been described in the ulnar,[8,10] radial,[11] musculocutaneous,[8] and axillary nerves,[8] as well as in the brachial plexus.[8,12]

In the lower limb, the majority arise from small branches of the common peroneal nerve around the ankle and foot,[13,14] and others arise more proximally from the sciatic nerve.[8,15,16]

There are few reports of intraneural lipomas affecting the CPN. One paper describes an intraneural chondroid lipoma of the CPN[17] which had similar clinical and MRI features, but varying histological characteristics, and a single other case in the Italian literature describes a giant lipoma of the sciatico-popliteal nerve.[18]

Severe pain should be a warning sign, as intraneural lipomas are typically painless, or cause only minor discomfort

Three papers report on cases of compression of the CPN by extraneural lipomas,[19-21] i.e. the origin of the fat cells was not of neural tissue.

Diagnosis of intraneural lipoma may be suspected on clinical grounds. Sabapathy *et al.*[14] highlight the features of mass consistency, association with a cord-like structure, free medial to lateral mobility with little longitudinal mobility, and no association with tendon movement as key clinical features. They do, however, suggest further imaging by MRI scan should the diagnosis be less clear, or on the suspicion of possible malignancy. Severe pain should be a warning sign, as intraneural lipomas are typically painless, or cause only minor discomfort.[6,10,13] Typical MRI findings include tissue with signal characteristics identical to subcutaneous fat: bright signal on T1 and dark signal on fat-suppressed images.

Two reports[19,20] highlight the usefulness of ultrasound imaging over MRI scanning in the diagnosis of compression neuropathies of superficial nerves by lipomas. However, despite this and other advantages such as cost and availability, operator dependence still remains a concern.

In most instances, surgical management yields excellent results, and recurrence or malignant change are rare.[13] Preservation of distal neurologic function may be achieved with careful dissection of neural structures. This may, however, not be necessary in cases where the involvement is that of a distal sensory nerve alone, where sacrifice of the nerve and en-bloc resection is an acceptable option.[14]

In our case, the position of the lipoma within the CPN resulted in the splaying of the numerous nerve divisions over the mass. This required meticulous dissection aided by magnification. Fortunately, there was no neurological complication; however, pre-operative patient counselling regarding potential neurological fallout cannot be overemphasised.

Summary

Intraneural lipomas are rare lesions, but should be considered in the differential diagnosis of patients presenting with compressive neurological symptoms. Clinical suspicion aided by relevant investigations make diagnosis relatively straightforward. Surgical excision with care taken of neurological structures gives excellent results.

The content of the article is the sole work of the authors. No benefits of any form have been or are to be received from a commercial party related directly or indirectly to the subject of the article. The patient gave consent for the use of clinical records and radiographic materials.

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