Complete encasement of the radial nerve by a giant lipoma: illustrative case

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BACKGROUND Among the spectrum of adipose lesions associated with peripheral nerves, complete circumferential encasement of the nerve by the lesion is a very rare entity. The authors report the first case of a giant lipoma that completely and circumferentially encased the radial nerve.

OBSERVATIONS A 57-year-old woman presented with a large left-arm mass that she had noticed over a year following significant weight loss. She had hypersensitivity and dysesthesias in the left posterior arm but no weakness or other symptoms. Magnetic resonance imaging of the left upper limb demonstrated a large lipoma completely encasing the radial nerve, originating at the level of the spiral groove proximally and extending distally to the lateral epicondyle. The lesion was completely resected at surgery with total preservation of radial nerve function.

LESSONS Lipomas encasing peripheral nerves can be difficult to manage while preserving function. This case adds to the intriguing spectrum of adipose lesions associated with peripheral nerves.

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KEYWORDS giant lipoma; adipose lesions of the nerve; nerve encasement; radial nerve

Illustrative Case

History

A 57-year-old woman presented for evaluation of a large arm mass that became noticeable after 50 lbs of weight loss over a year. The patient reported hypersensitivity and dysesthesias in the posterior arm but otherwise had no weakness or other symptoms. Her history was notable for a previous lipoma in the right thigh as well as an ovarian teratoma; otherwise, there was no family history or genetic predisposition to lipomas. On examination, a palpable, firm, and mobile left-arm mass was appreciated extending from just above the elbow crease to the junction of the proximal third of the arm. There was no Tinel's sign or pain with provocative maneuvers. She had full strength and sensation in the left upper extremity. Electromyography of the upper limb was normal.

Imaging

Magnetic resonance imaging (MRI) of the left arm demonstrated a 2.8 × 3.7 × 12.7–cm deep lipomatosus mass surrounding the radial nerve and the adjacent profunda brachii artery in the mid to lower left arm.

ABBREVIATION MRI = magnetic resonance imaging.

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The mass originated at the level of the spiral groove proximally and extended distally to about the lateral epicondyle. It was centered between the brachialis and the lateral head of the triceps in the mid-arm and between the brachialis and brachioradialis in the distal arm. At its origin proximally, the mass completely encased the radial nerve but displaced the nerve anteriorly toward the distal end. Of note, thin, wispy, nonenhancing septations were identical to subcutaneous fat within the mass. The visualized radial nerve appeared radiographically normal, and there was no nerve infiltration by the mass. The postcontrast images demonstrated thin peripheral enhancement surrounding the nerve, suggesting entrapment or mechanical irritation of the nerve along the distal portion of the mass with surrounding soft tissue edema and/or fat necrosis (Fig. 1H). These radiological features favored a large benign intermuscular lipoma.

Surgery
With the patient under general anesthesia and positioned supine with the entire left arm prepped circumferentially, a long-curved incision was made extending from the antecubital fossa to the proximal mid-arm posteriorly to improve the exposure to the nerve and mass. The radial nerve was first identified distally in the interval between the brachioradialis and the brachialis at the level of the antecubital fossa and then was dissected and mobilized proximally toward the mass (Fig. 2A). The mass appeared to be a large extraneural lipoma intimately associated with the nerve. Meticulous circumferential dissection was performed to mobilize and free the nerve from the mass. This was possible for only about 5 cm of the radial nerve that lay on the superficial surface of the lipoma as the nerve dove into the mass and became encased entirely by it. Next, proximal control of the radial nerve was achieved after the lateral intermuscular septum was released 11 cm above the elbow joint (Fig. 2B). With the nerve completely mobilized at both ends of the mass, a combination of distal-to-proximal and later proximal-to-distal dissection was performed to dissect the radial nerve from the anterior portion of the tumor. In the proximal region where the lipoma was completely encasing the nerve, the lipoma was sharply divided anteriorly and then was swept away posteriorly to separate the nerve and vessels (Fig. 2C). Following tumor resection, the radial nerve was stimulated with a normal response. The resected tumor was grossly bilobed, measuring 11 cm in length (Fig. 2D), and was a benign lipoma on pathological examination.

Postoperative Course
There were no complications during surgery, and the patient was discharged home the same day. She had normal radial nerve function in the immediate postoperative period (Fig. 2F). At 1 month’s follow-up, she returned to normal activities without limitations and continued to have full radial nerve function without any deficits or pain.

Patient Informed Consent
The necessary patient informed consent was obtained in this study.

Discussion
Observations
In the presented case of a giant lipoma’s complete circumferential encasement of the radial nerve, we encountered a rare manifestation among adipose lesions associated with peripheral nerves. The literature reports only two such cases. Unlike previous instances where compressive neuropathy prompted a clinical investigation, this was primarily asymptomatic in nature and only revealed as a palpable mass and dysesthesias after significant weight loss by the patient.
The pathogenesis of such complete nerve encasement remains enigmatic. The two predominant theories include the development of a primary extraneural lipoma that subsequently surrounds the nerve and the formation of a lipoma within the subparaneural space, which we favor in this instance. The latter is supported in this case by the absence of septations in the mass on imaging, suggesting a lack of secondary encasement. As posited in our prior work, the subparaneural compartment acts as a virtual pathway facilitating extension along the nerve. However, given their rarity, these circumferential lesions challenge our existing classification system, requiring help in neatly categorizing them as either intraneural or extraneural.

The workup and management of adipose lesions associated with peripheral nerves was reviewed in our previous paper. The management of circumferential lesions is complex due to the intricate anatomical involvement, as the complete encasement of the nerve complicates the surgical intervention due to the heightened risk of nerve damage. Many lipomas are removed by surgeons who may not be aware of the existence of this pathoanatomy, which in this case could have easily led to inadvertent transection of the radial nerve. An awareness of the challenges associated with the circumferential encasement of nerves has enabled us to identify this condition in two additional patients. The first patient presented with an increasing proximal medial arm mass after the removal of a lipoma in the distal arm elsewhere, which was encasing the radial nerve, similar to the case described in this report. The lack of complete MRI of the entire nerve prior to the initial surgery resulted in a failure to identify an additional 10-cm lipoma in the proximal arm, also circumferentially encasing the radial nerve. Comprehensive imaging of the entire nerve is crucial in such cases to detect either the extension of the lipoma or a secondary lipoma following the same nerve. In another patient, we identified a large pelvic lesion involving the neural elements of the lumbosacral plexus, where surgery would be even more challenging due to the depth of the exposure and the complex arrangement of critical neurovascular structures and neighboring organs.

In our current case, successful gross-total resection was achieved while preserving nerve function, underscoring the efficacy of meticulous surgical planning, including proximal and distal control of the normal nerve, preserving the nerve, and intraoperative monitoring.

**Lessons**

This paper highlights complete encasement of the radial nerve by a giant lipoma, adding to the intriguing spectrum of adipose lesions associated with peripheral nerves.

**References**


**Disclosures**
The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

**Author Contributions**
Conception and design: Spinner, Bah. Acquisition of data: Spinner, Bah. Analysis and interpretation of data: all authors. Drafting the article: all authors. Critically revising the article: all authors. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Spinner. Study supervision: Spinner.

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