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CASE REPORTS

Periosteal Lipoma Compressing Peripheral Nerves

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Abstract

Introduction: Lipoma is a common benign, slow-growing soft tissue neoplasm. Periosteal lipomas of the proximal radius causing posterior interosseus nerve (PIN) palsy are the rarest.

Due to specific anatomical relationships, proximal antebrachial lipomas can easily compress PIN. We present a case report and report on the related literature.

Material and Methods: A 55-year-old female was admitted complaining of a progressively growing lump in the anterior-lateral antebrachial region near the left elbow. The recent onset of weakness in finger extension was more evident during manual work.

MRI showed a well-defined oval lesion in the dorsal aspect of the proximal radius bone with inter-muscular laying between m. supinator et extensor carpi radialis brevis of 7x5x3 cm in diameter. EMG study confirmed PIN compression syndrome.

An en-block extirpation was performed through extensor muscles. PIN and its muscular branches were well preserved. Histological examination confirmed lipoma. The postoperative course was uneventful, and a good recovery was seen within 12 days.

We revised three other similar cases operated for the same Clinical diagnosis by our team.

Pertinent literature was reported.

Discussion: Periosteal radius lipoma related to compression of PIN has rarely been reported in the literature. We say our operative series and the surgical technique. MRI and EMG are the standard diagnostic methods. The intermuscular approach is safe for total tumor removal in experienced hands.

Conclusion: Periosteal lipoma compressing PIN is a rare clinical finding. Total removal may be obtained through an intermuscular approach. Intraoperative monitoring can assist in preserving tiny PIN branches.

Keywords: periosteal, lipoma, posterior interosseus, compression

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Introduction

Richmond, D.A. first described PIN in literature in 1953. [1] Until 2009, fewer than 40 cases were reported in English literature. [2] Moon, N., and Marmor, L. first reported Periosteal lipoma as an outstanding entity in 1964. [3]

Lipoma is a common benign slow-growing soft tissue neoplasm, mainly presenting as an asymptomatic subcutaneous mass, histologically characterized by mature adipocytes lobules, with fibrous septa in 46% of periosteal lipomas cases. [4] Thus, it may go undetected or misdiagnosed. It can be presented as an intermuscular, intramuscular, submuscular, subfascial, or osseous

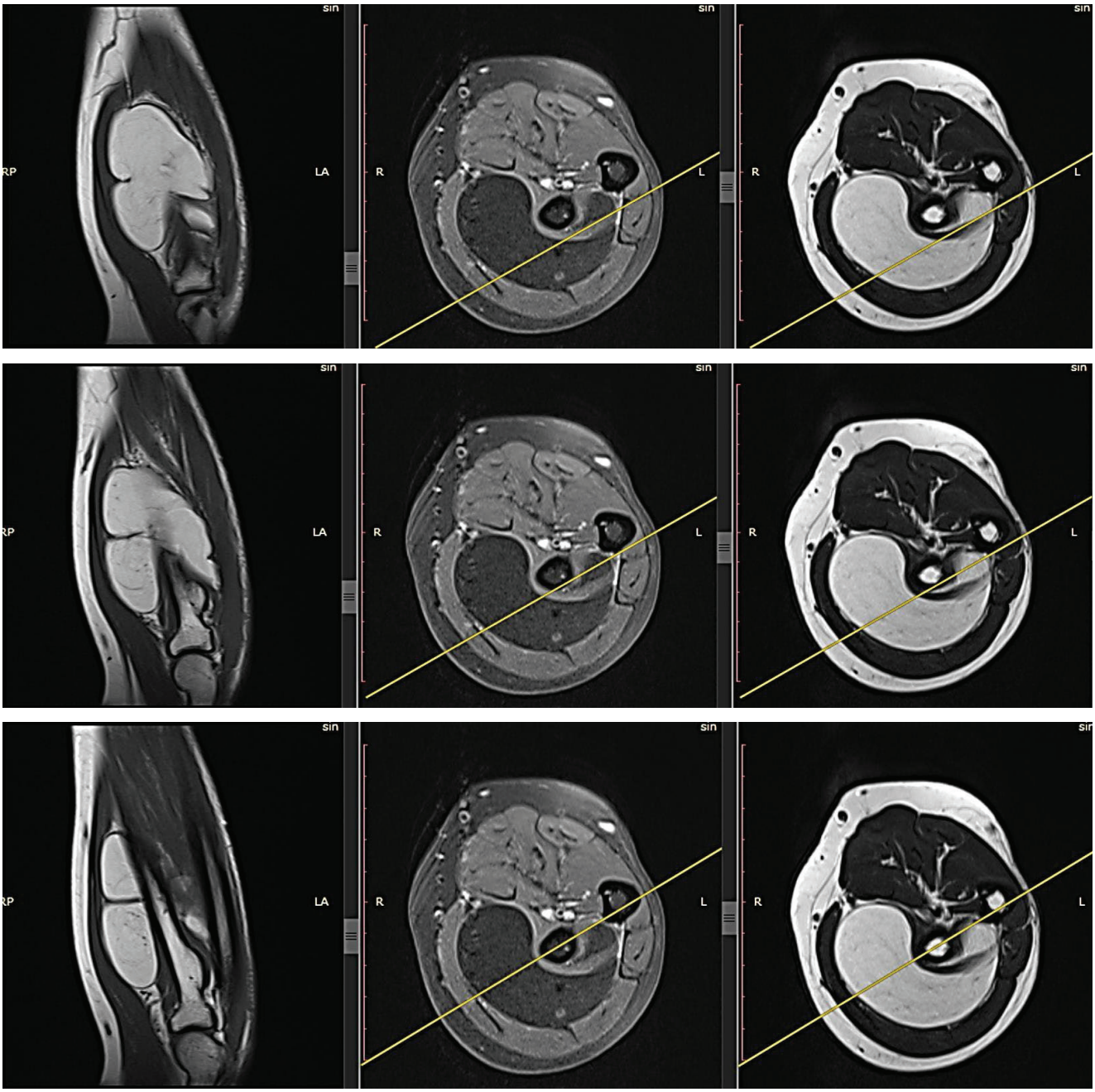
lipoma.[5] Osseous lipomas causing PIN are the rarest. They are divided into intraosseous (originating within bone) or juxtacortical (originates from the bone surface). Juxtacortical lipomas are further classified into periosteal and subperiosteal depending on the relation of the periosteum. They are almost always present as solitary lesions. [2, 6, 7, 8]

PINS has an incidence rate of approximately 3 cases per 100,000 annually. Periosteal lipoma accounts for less than 0.3% of all lipomas and 0.1% of all primary bone tumors. Periosteal lipoma causing PINS is most common in a middle-aged population. The median age of presentation of well-circumscribed subtype lipoma is approximately 47.25 years old. The reported size interval is 1-25 cm until today. [9, 10, 11]

Due to specific anatomical relationships, proximal antebrachial lipomas can easily compress the posterior interosseous nerve (PIN), a radial nerve deep motor branch that innervates the posterior compartment's forearm muscles.

This is an infrequent condition that causes weakness of the finger extensor muscles. PIN itself passes underneath m. extensor carpi radialis brevis distally continues between m. supinator superficialis et profundus. PIN is at high risk of vulnerability while passing Henry leash (a. radialis recurrent), *Frohse's Arcade* (m. supinator capitis superficialis tendon), margo superior m. extensor carpi radialis brevis and antebrachial radial tunnel fibrous bands.[12, 13]

As for the brachial region, lipoma should be considered in the differential diagnosis list in case of slow-growing



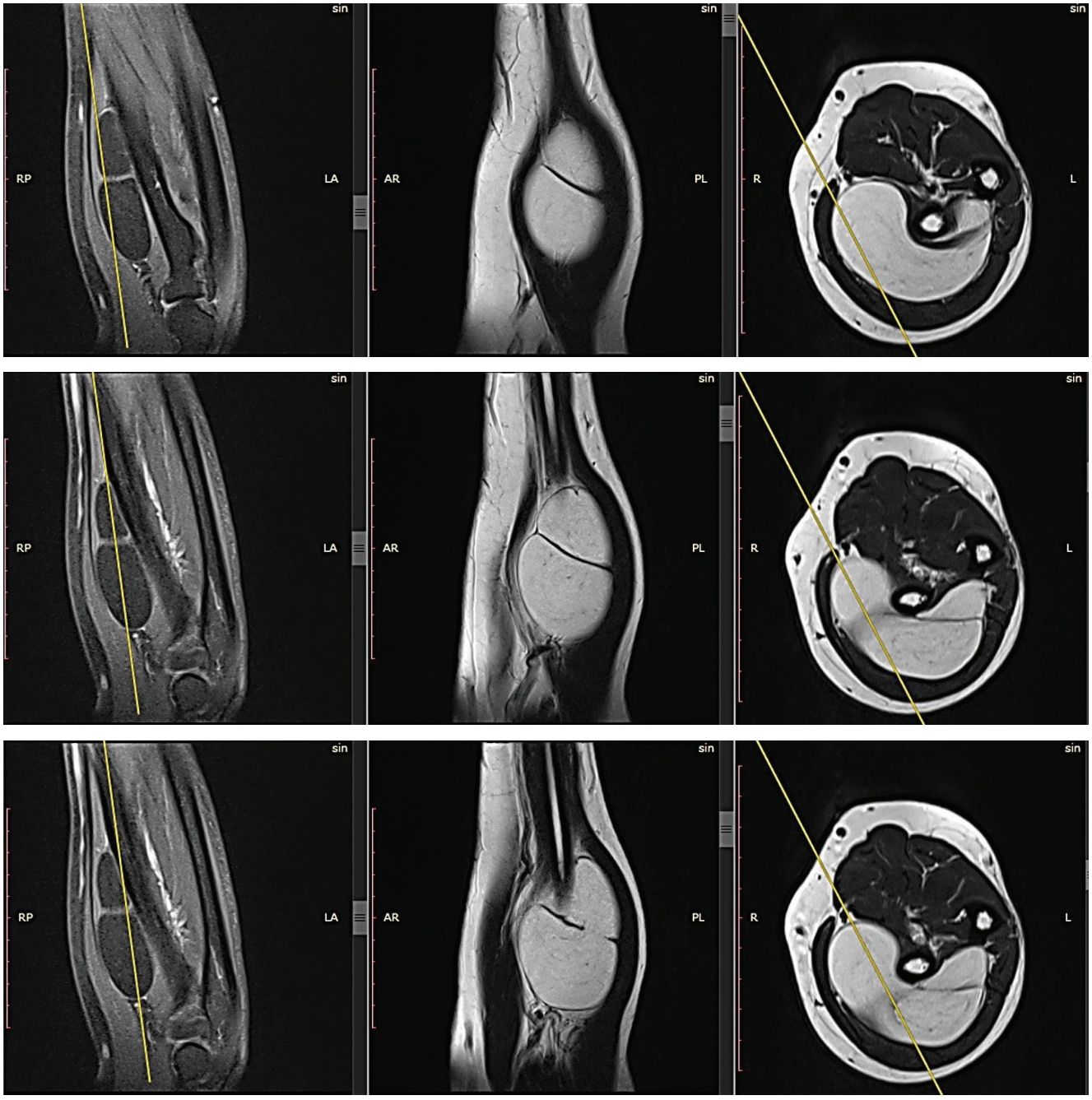


Figure 1, 2, 3, 4, 5, 6: MRI T2-radiolucent and T1-hypointense imaging, 7x5x3 cm in diameter, of well-defined fat-encapsulated-mass, adjacent to collum radii and attached distally to radius diaphysis in the anterolateral forearm, pre-operatively.

masses. When nerves are compressed and stretched, paresthesia, sensory alteration, and motor deficit may appear in the peripheral nerve(s) territory.

We present two clinical cases of periosteal lipoma of the humerus and radius-compressing peripheral nerves.

Case report nr. 1

A 55-year-old female, right-dominant hand, patient was admitted to the Neurosurgery Department complaining of a progressively growing lump in the anterior-lateral antebrachial region near the left elbow. There was a recent onset of weakness in finger extension, more evident during manual work.

The patient complained of aesthetic problems in the anterior-lateral antebrachial region near the left elbow. She referred to a gradual increase in the size of the lump during the last ten years, more evident during the previous four months.

The physical examination revealed a lump in the posterior proximal third of the forearm. It had a hard consistency in palpation and was fixed. Positive Tinel sign was elicited with paresthesia running down the back of the thumb. The patient referred to an incomplete extension of the fingers of the left hand, especially during manual work.

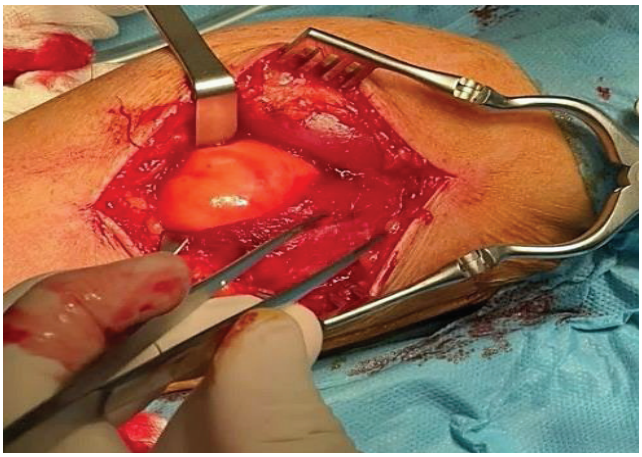
MRI showed a well-defined oval lesion in the dorsal aspect of the proximal radius bone with inter-muscular laying between m. supinator et extensor carpi radialis brevis (7x5x3 cm). Deformity of interossei neurovascular fasciae at this level was observed.

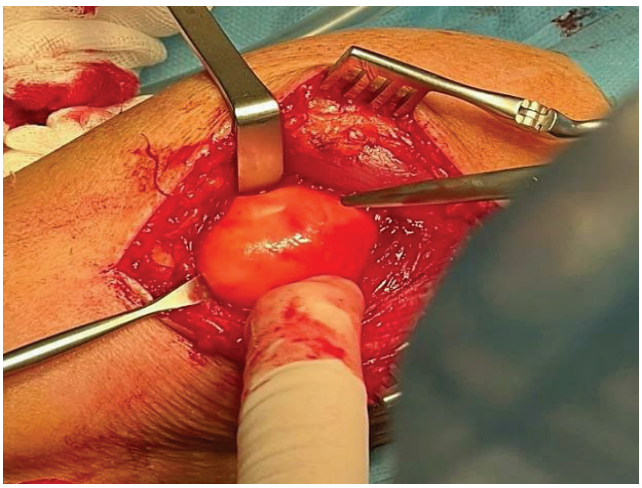
The T2-radiolucent aspect from the proximal anterolateral radial region near bicipital tuberosity suggested an intermuscular lipoma. Interarticular rapports are preserved without specific changes in nearby structures. *(Figures 1, 2, 3, 4, 5, 6)*.

An electrophysiological study revealed a conduction block of the left PIN after stimulation of the nerve below the spiral groove of the humerus and recording over the extensor indicis proprius muscle. The distal compound muscle action potential of the PIN was preserved. The sensory action potential of the superficial radial nerve was also preserved.

Concentric needle EMG showed no fibrillation potentials but reduced voluntary activity over the finger extensors in the forearm with regular recruitment over the brachioradialis muscle and C_8-innervated median and ulnar myotomes. These features were congruent with a demyelinating mononeuropathy of the PIN.

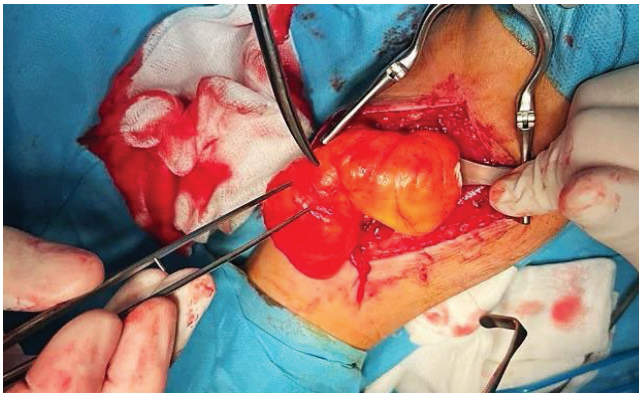
The tumor was a yellow horseshoe-shaped, encapsulated, fatty mass *(Figure 7, 8)*.

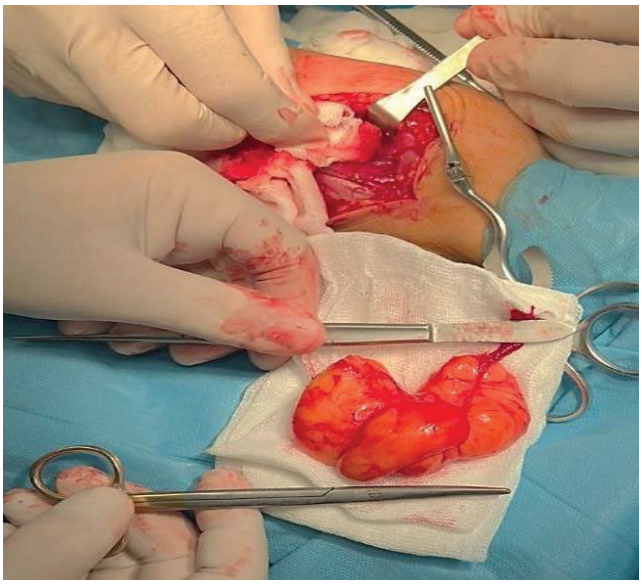




Figures 7 & 8: Yellow fatty encapsulated double-lobulated mass exposure, intermuscular location

Under general anesthesia, an en-block surgical removal of periosteal lipoma was possible through an intermuscular posterior approach *(Figure 9, 10)*.





Figures 9 & 10: En-block Exstrurpation.

The posterior interosseus nerve was dissected and decompressed through mass removal *(Figure 11)*. There was no evidence of periosteal/cortical radial changes. The histological study confirmed lipoma.

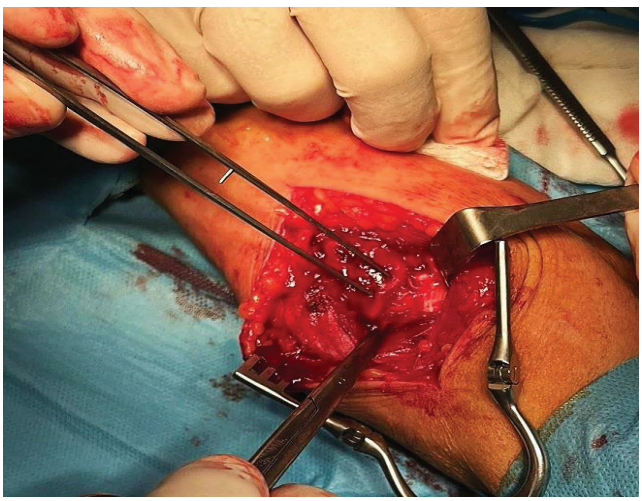


Figure 11: PIN decompression

The postoperative course was uneventful, with no sensitive alterations, access to a 115° left wrist extension, and standard articulation of the metacarpophalangeal thumb and digital extension. *(Figure 12)*.

Figure 12: Post-op wrist extension

Case report nr. 2

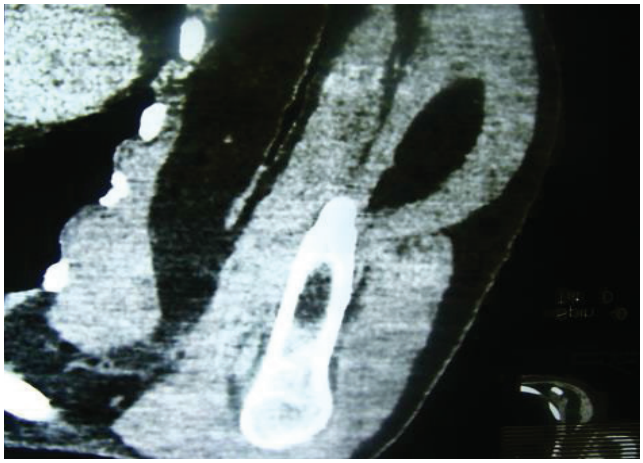
A 50-year-old male was admitted for a slowly progressively growing lump in the posterior-median brachial region near the left axilla. There was a recent onset of weakness in fingers and hand extension. The patient complained of a medium consistency volume of occupational mass that had increased during the last year.

During physical examination, a large mass in the posterior brachial region was seen that felt hard in palpation and was fixed.

There was a weakness of the fingers and wrist extension and distal sensory alterations in the radial-innervated territories in the forearm. Moreover, the forearm flexors and paresthesia were weak in the median and ulnar environments.

Pre-operatively left brachial CT *(Figure nr. 13, 14, 15, 16)* showed a well-defined horseshoe lesion in the dorsal aspect of proximal humerus bone with inter-muscular laying between capitis longus et medialis m. Triceps brachii is measured to be 8x4x3,5 cm in diameter. It causes mass effects over anterior and posterior muscular structures and neurovascular fasciae due to its volume.

CT hypodense lesion around the humerus neck suggests a periosteal lipoma. The electrophysiological study revealed reduced amplitudes of the radial nerve with concomitant reduction of conduction velocities of the radial nerve in the segment between the axilla and above the spiral groove and relieved SNAP of the superficial radial nerve. We have reduced motor and sensory amplitudes of the median and



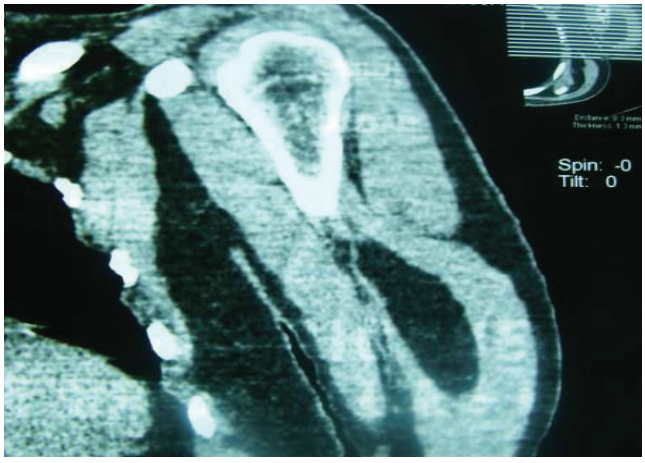
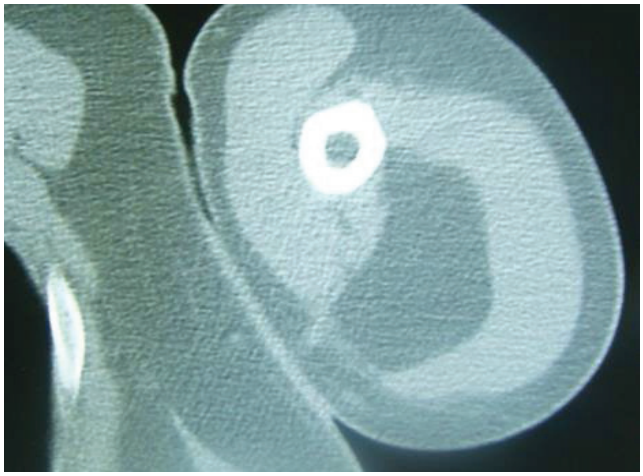
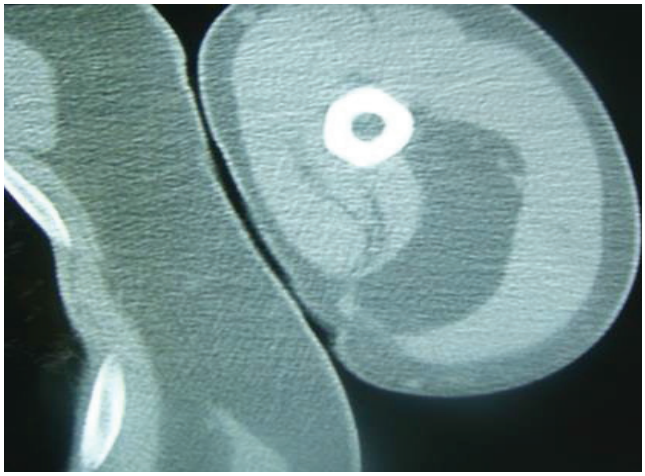
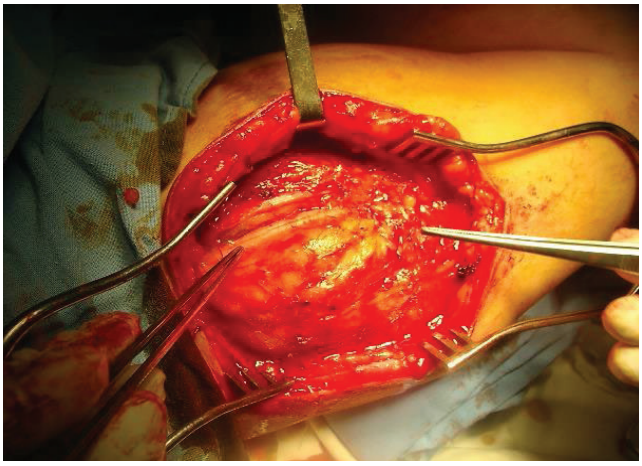
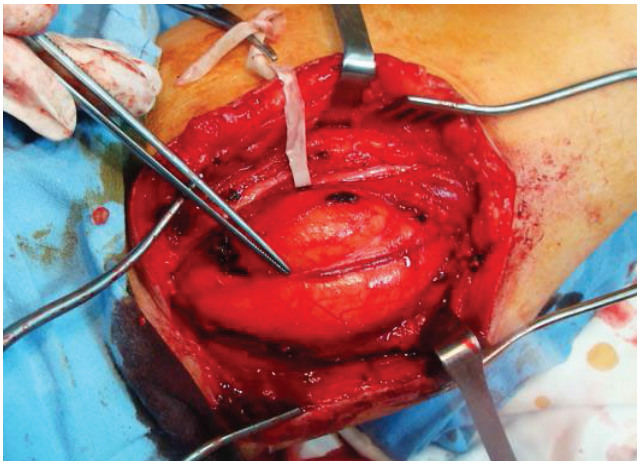


Figure 13 & 14: Coronal CT view of 1/3 proximal humeral hypodense mass.

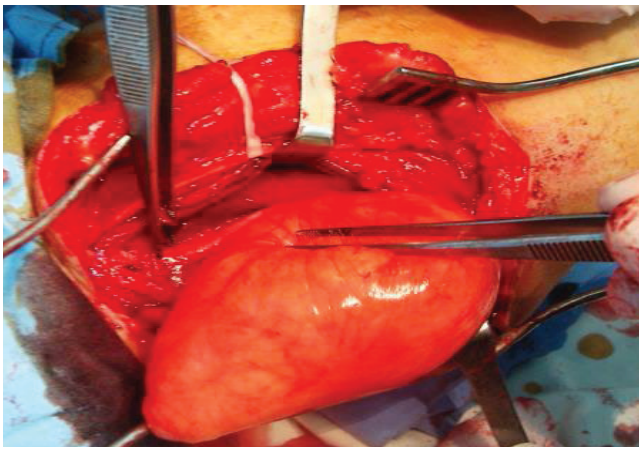
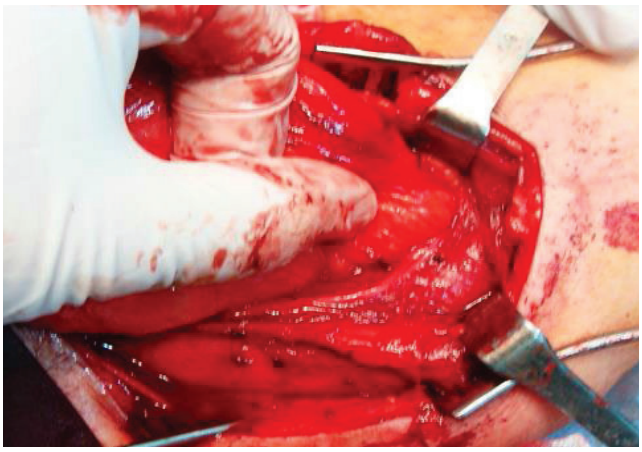




Figures 15 & 16: Axial CT view of a horseshoe-shaped hypodense periosteal mass.

Figures 17 & 18: Intra-op view of fatty vascularized mass under median & ulnar nerve.

Figures 19 & 20: Mass en-block extirpation.

ulnar nerve. Concentric needle EMG confirmed a chronic neurogenic pattern in the forearm extensors and flexors mimicking an axonal lower/middle trunk plexopathy or multiple demyelinating and secondary axonal compressive mononeuropathies.

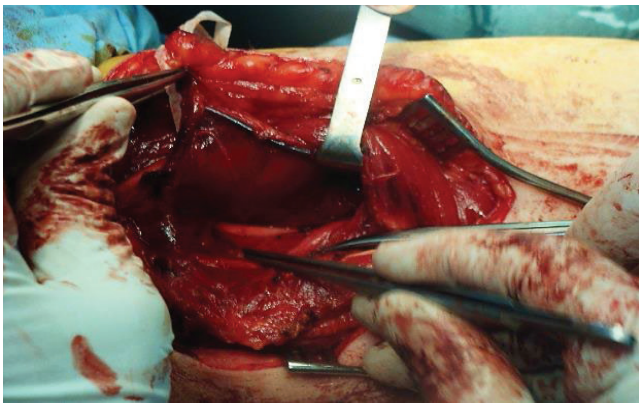
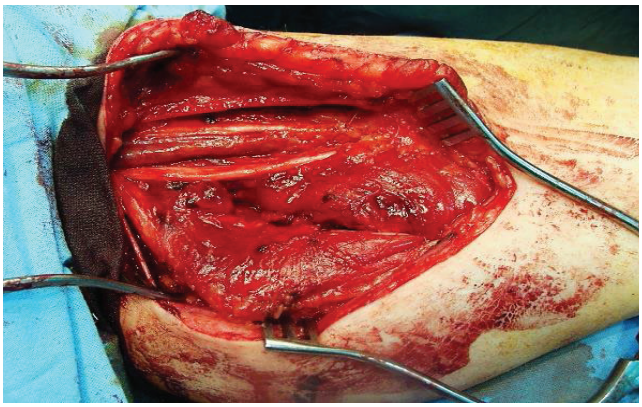
Intraoperatively, an en-block lipoma resection is done, and plexus extirpation in 1/3 proximal left humerus via intermuscular extensor ways *(Figure nr. 17, 18)*.

Surgery exposed a yellow fatty encapsulated mass *(Figures 19, 20, 23, 24)*. Median and ulnar nerves, as well as brachial vessels, were dissected free from the tumor.

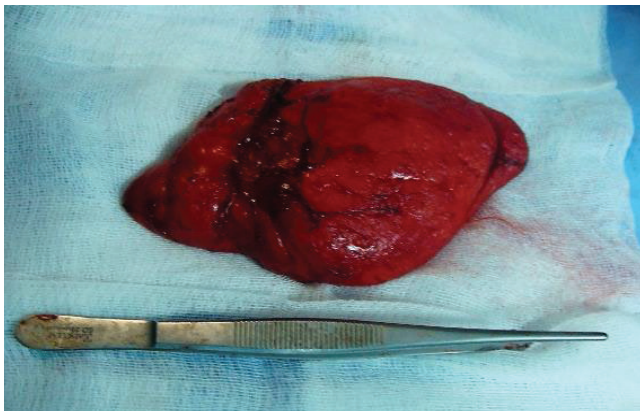
They were deformed and compressed from the tumor *(Figure nr. 21, 22)*.

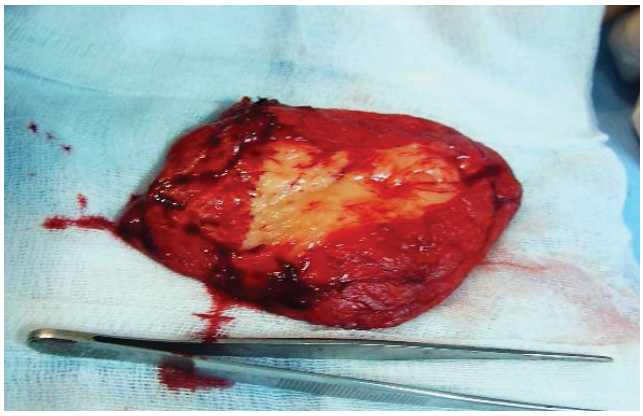
Complete en-block removal was possible, conserving all the neuro-vascular structures *(Figure 23, 24)*.

There was no evidence of periosteal/cortical humeral changes. Histological examination confirmed periosteal lipoma. The immediate postoperative state is promising. The patient shows no sensitive alterations, motor flection, or extension muscle force gain during follow-up.

Figures 21 & 22: Median, ulnar, radial nerves decompression, released tissues





Figures 23 & 24: Fatty horseshoe-shaped mass extirpated en-block.

Discussions

Lipoma represents one of the most prevalent tumors of mesenchymal origin, but it is a rare cause of peripheral nerve(s) dysfunction due to compression. It might be multiple in 5-15 % of patients.[8]

The differential diagnosis includes hematoma, muscle herniation, fibrous myositis, chondroma, myxoma, pseudogout, fibroma, ganglion, and rheumatoid synovial cyst.

We presented two clinical cases of periosteal lipoma associated with peripheral nerve compression syndrome.

Some authors prescribe a relationship between obesity, high BMI, and fatty neoplasm frequency; others suggest that a 5 cm diameter is the size limit of suspicion for malignancy.

These authors suggest that any large tumor deep under the fascia should be treated as sarcoma until proven otherwise. However, size matters: 10% of malignant are less than 5 cm, and more than 50% of benign masses are more than 5 cm in diameter. [7, 11]

Neoplastic pathogenesis is based on direct origin from multipotent mesenchymal cell precursors. It has also proven the role of reactive pathogenesis, trauma, chronic irritation, development disorders, and genetic, dysmetabolic, and endocrine factors to provoke lipoma growth. [8]

Although generally presented as asymptomatic lesions, alerting signs for clinicians include cramping, increasing size, decreased range of motion, and persistent severe forearm pain radiating into the back and neck, associated with limb heaviness sensation.

Occasionally, a superficial radial nerve might show a sensory deficit caused by a combined involvement.

ENMG helps confirm the pattern of involvement and other nerve involvement that is not apparent during the physical examination and suggests demyelinating, axonal, or mixed participation. These may help confirm surgical planning and subsequent prognosis.

Ultrasonography and CT are helpful in diagnosis. However, MRI is the gold standard for studying lipoma, extension, and important neurovascular structures near the tumor.

Surgery is the recommended treatment. Lipoma excision offers optimal nerve recovery after decompression. Recurrence is very rarely reported in the literature and without malignant transformation. Prognosis is tightly related to symptom duration and neurological deficits present. Twenty-four months is the total recovery time in the most extended symptom duration case. [11]

Moon, N., and Marmor, L. reviewed 20 cases in 1981;[3] all women followed up for 19 years, 2/3 of which had neurologic involvement, which resulted in complete recovery after surgery. [14]

Conclusions

Nerve decompression and total removal of periosteal lipoma is the recommended treatment whenever there is an initial neurological deficit or due to the esthetic effect of a progressively growing mass in the extremity. Needle biopsy may proceed with surgical removal. Fine needle aspiration cytology is recommended in deeper neoplasms. [8, 12, 14]

Careful dissection is necessary to avoid nerve damage. Intraoperatively frozen biopsy is done in doubt of malignancy. [15]

Neurological recovery might commence in the immediate postoperative period due to nerve decompression. Physiotherapy should follow mass excision to gain back upper extremity function rapidly.

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