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A Rare Presentation of Cervical Infiltrating Lipoma with Spinal Cord Compression and without Bone Erosion. A Case Report and Literature Review

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Cervical lipoma; Compressive myelopathy; Spinal canal infiltration

1. Abstract

1.1. Background

Lipomas, the most frequent benign soft tissue tumors, typically present as subcutaneous masses and are rarely symptomatic. However, in critical areas the neoplastic mass may be symptomatic due to compression of structures. This report describes a rare case of a cervical soft tissue lipoma causing compressive cervical myelopathy due to its unusual infiltration into the spinal canal through cervical interlaminar spaces without bone erosion. The uniqueness of this case lies in the tumor's biological behavior and its significant impact on the patient's neurological function.

1.2. Case Presentation

We report a case of a 60-year-old male with a cervical soft tissue lipoma initially diagnosed in 2014 and managed conservatively with regular follow-ups. The patient presented in early 2019 with progressive neurological impairment. Imaging studies revealed a homogenous posterior mass extending from C2 to C7, infiltrating the spinal canal at C4 and causing spinal cord compression and dislocation. Surgical intervention was performed to excise the lipoma and decompress the spinal cord, followed by a C3-C6 posterior instrumented fusion. Histopathological evaluation and molecular biological analysis confirmed the diagnosis of a benign lipoma. Postoperative recovery was significant, with the patient exhibiting complete neurological recovery and no recurrence at the four-year follow-up.

1.3. Conclusions

We presented a rare case of an extra-spinal lipoma causing compressive myelopathy due to its intra-canal extension through the cervical interlaminar spaces. This case underscores the importance of thorough diagnostic imaging and surgical planning in managing cervical lipomas with unusual presentations, due to potential for compressive myelopathy, even in benign tumors.

2. Introduction

Lipomas are the most frequent soft tissue tumor, usually presenting in the fifth to seventh decades of life [1]. They are benign mesenchymal tumors containing neoplastic adipose cells. However, they may also contain cells from other mesenchimal lines differentiating into angiolipoma, fibrolipoma, chondrolipoma, and osteolipoma [2]. These are typical lesions of young adults usually located in the trunk and lower limbs, and the majority of these lesions present as a subcutaneous mobile and elastic mass. They can affect the head and neck region in 15-20% of cases [3,4]. A smaller amount of lipomas arise within skeletal muscles or on the surface of bones, leading to delayed mass presentation and thus to later diagnosis and bigger extension of the tumor, that sometimes can grow up to more than 20 centimeters. Approximatively 5% of lipomas present with multiple localizations. Lipomas are usually asymptomatic benign lesions, often diagnosed occasionally by the appearance of visible indolent mass. However, in critical areas the neoplastic mass may be symptomatic due to compression of structures, as abdominal content, vessels or neurological tissue. We

present in this case report a rare case of soft tissue lipoma posterior to the cervical spine that resulted in symptomatic compressive cervical myelopathy.

3. Case Presentation

We present the case of a 60-year-old man with a cervical soft tissue lipoma, biopsied in 2014 and managed with regular radiological follow-ups and intralesional Carnitene injections. Since the beginning of 2019, the patient complained progressive increase in upper limbs paresthesia, predominantly on the left side, together with a significant impairment in subtle motor skills and a sensation of stiffness in the lower limbs. Physical examination demonstrated marked muscular atrophy, particularly in the distal muscles of the upper limbs. The neurological examination revealed bilateral minor strength deficit in the intrinsic hand muscles. The patient exhibited extreme difficulty with fine motor tasks, such as turning pages, buttoning a shirt, and writing. The examination showed hyperreflexia of the lower extremities too. Patient was unstable when asked to walk on a straight line, indicating compromised balance. X-rays showed indirect signs of soft tissue swelling posterior to the cervical spine without bony involvement. MRI of the cervical spine showed a homogenous posterior mass between C2 and C7, hyperintense in the T2-weighted and hypointense in the T1-weighted and fat-suppressed sequences, infiltrating the spinal canal at the level of C4 and determining spinal cord compression and dislocation, without radiological evidence of laminar erosion (Figure 1-2). The neoplastic mass had a sagittal length of 104 mm, an anteroposterior extension of 73 mm and a right-to-left dimension on the axial plane of 80 mm. Moreover, evoked potentials were altered, with absence of somatosensitive evoked potentials of lower limbs and of the right upper limb.

Given the clinical and radiological picture, patient was submitted to surgery with the aim of lipoma excision and spinal cord decompression. The patient was positioned prone on the surgical Jackson frame table, with the head held by a Mayfield clamp. Intraoperative SSEPs confirmed the preoperative picture, giving no response in lower limbs and right upper limb. With a median approach the entire tumor mass was exposed. The tumor appeared circumscribed by a thin capsule. The lesion showed fat characteristics and no infiltration in paravertebral muscles. The tumor was removed piecemeal, until a full exposure of cervical laminae was obtained. The tumor infiltration through interlaminar space without any bone erosion was confirmed. An extensive decompressive C3-C5 laminectomy was then performed. The spinal cord was found dislocated on the right side and compressed by the tumor, which show the same macroscopic characteristic of the extracanalar part. All the visible adipose tissue was removed piecemeal, obtaining a full decompression of the neurological structures.

At the end of the decompression phase, a C3-C6 posterior instrumented fusion was performed.

The mass was sent for histological evaluation, that confirmed the diagnosis of lipoma, without atypical cellular aspect. Considering the tumor dimension, MDM2 amplification research was performed to exclude or confirm a possible malignant nature of the lesion. Molecular biological analysis was negative, allowing us to exclude a diagnosis of liposarcoma. Post-operative CT showed (Figure 3) the extensive decompression of spinal canal and post-operative X-rays showed stable instrumentation of decompressed area (Figure 4). The patient showed a gradual but complete recovery of neurological symptoms during follow-up, with no radiological evidence of local residual tumor. At four years follow-up control, patient showed no local recurrence and a complete neurological recovery.

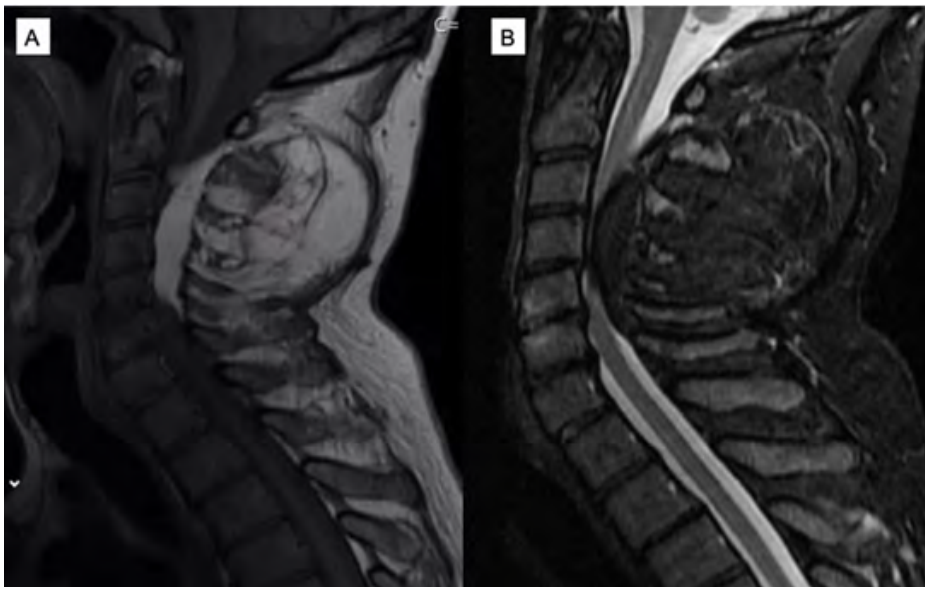


Figure 1. Pre-operative sagittal MRI; A: T1-weighted sequence; B: T2-weighted sequence.

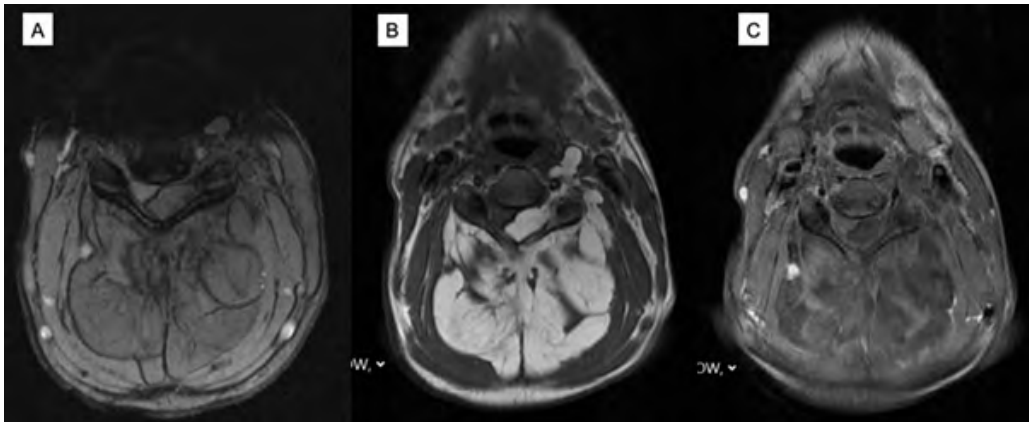


Figure 2. Pre-operative axial MRI; A: T1-weighted sequence; B: T2-weighted sequence; C: Fat-suppressed sequence.

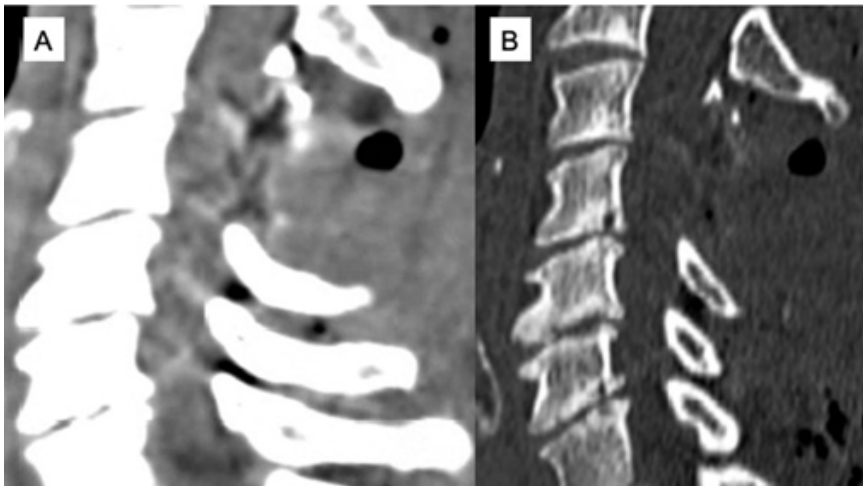
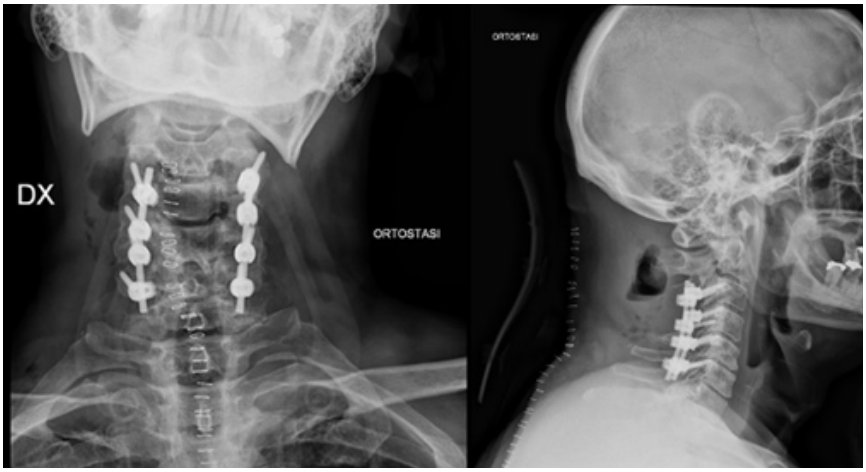


Figure 3. Post-operative CT-scan; A: Soft-tissue window; B: Bone window.



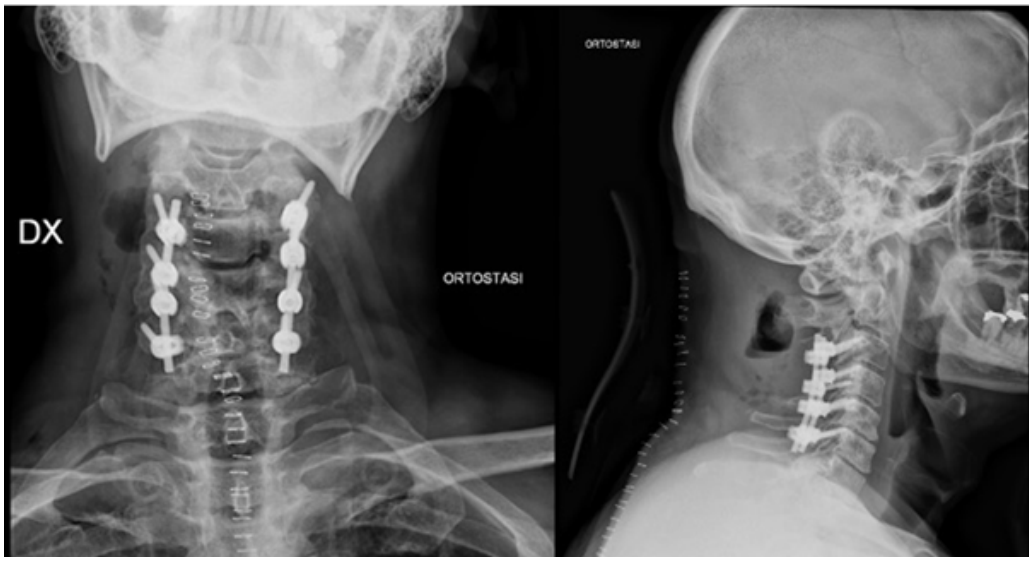


Figure 4. Post-operative X-Rays.

4. Discussion and Conclusion

Lipomas affect the neck and cervical region in 15 to 20% of cases, and usually present with an elastic and mobile painless mass. When growing in deep paravertebral tissues, below the muscular layers, it can reach huge dimensions, in some cases of more than 20 centimeters. Here we describe a rare case of a cervical soft tissue lipoma that infiltrated the spinal canal and compressed the spinal cord. The peculiarity of this clinical case lies in the tumor's biological behavior, as it invades the spinal canal through the cervical interlaminar spaces without eroding the cervical laminae, despite its volumetric increase. In a review of the literature, many cases of spinal lipomas are reported (Table 1), as this tumor typically localizes either in paravertebral soft tissues or the intracanal-extradural space. Cases of lipomas exhibiting both intra-canal and extra-canal extension are seldom reported. Sharma et al. [5]. Describe a case of posterior cervical angiolipoma in a 14-year-old patient that infiltrates the spinal canal through the space between the posterior arch of C1 and the foramen magnum occipitalis.

Similarly, Quinn et al. [6]. Present a case of a 12-year-old patient with extracanal lipoma extending into the spinal canal, although in this instance, the tumor eroded the bone to gain access. Some authors [7-10]. Describe cases of lipoma with both intra-canal and extra-canal extension. Park et al. and Cheng et al. documented lipomas extending into the spinal canal via the neuroforamen. Additionally, Duhaime et al. [11] and O'Brien et al. [12]. Described cases where cervical lipoblastomatosis extended intraspinally and necessitated surgical intervention. In all these instances, the tumors used the neuroforamen as a gateway to the spinal canal. Our case is particularly unique because the lipoma infiltrated the spinal canal through the cervical interlaminar spaces without eroding the bone, but abrading the yellow ligaments [13-16]. This behavior suggests a different pathophysiological mechanism, maybe related to the volumetric expansion of the tumor and the viscoelastic characteristics of the mass. Diagnosing intraspinal lipomas involves a combination of clinical evaluation, imaging studies, and histopathological examination. Imaging modalities such as MRI and CT scans are crucial in identifying the extent and characteristics of the lipoma, differentiating it from other soft tissue masses, and planning the surgical approach.

Surgical excision remains the primary treatment modality for symptomatic spinal lipomas. Moreover, the presence of a mass with expansive potential at the level of the medullary canal or neurological compressive symptoms makes cervical decompression mandatory. The goals of surgery include complete removal of the tumor, allowed by natural cleavage between neurological structures and tumor, to alleviate compression symptoms and prevent recurrence while preserving neurological function [17-20]. Being a benign tumor (Enneking stage 2), an intralesional resection is considered as an appropriate surgical treatment, and was the selected treatment of this case. This also because of the infiltrating pattern of this lipoma, with an extra-canal component and an intra-canal one. Recurrence rate of lipomas is generally below 5%, but sub-fascial lipomas, given their relations with surrounding structures and their usually bigger size, show a higher recurrence rate. In our case no local recurrence occurred at a 4-year follow-up, confirming the correct surgical indication and technique [20-24].

In conclusion, we presented a rare case of an extra-spinal lipoma causing compressive myelopathy due to its intra-canal extension through the cervical interlaminar spaces. Despite the benign nature of such tumors, prompt surgical removal and spinal cord decompression are imperative to mitigate the risk of permanent and progressive neurological impairment. This case underscores the importance of thorough diagnostic imaging and surgical planning in managing cervical lipomas with unusual presentations. The potential for compressive myelopathy, even in benign tumors, mandates timely intervention to prevent irreversible neurological deficits.

Table 1. Literature Overview.

Article	Age of patients	Location	Characteristic
Guirro et al[11]	66 y/o	Posterior to C3-T1	Extracanal osteolipoma
Liebeskind et al[12]	From 2 y/0 to 31 y/o	Cervical	Fuor cases of intradural lipoma and one case of extradural intracanal lipoma
Sharma et al[5]	14 y/o	C2	Extracanal infiltrating (through the space between C1 and foramen magnus) angiolipoma
Sener et al[13]	1 y/o	Thoracolumbar spine	Diffuse epidural lipomatosis
Quinn et al[6]	12 y/o	C6-T2	Extracanal infiltrating (eroding bone) lipoma
Park et al[7]	60 y/o	C5-C6	Epidural-extracanl lipoma (through neuroforamen)
Blanshard et al[14]	40 y/o	Cervical	Retrofaringeal ossifying lipoma
Bohm et al[3]	15 y/o	Anterior to C1-C2	Ossifying lipoma
Choi et al[4]	55 y/o	Posterior aspect of the neck	Giant lipoma
Marks et al[15]	From 43 y/o to 62 y/0	Lumbosacral region	Three cases of epidural lipomas
Aiyer et al[2]	61 y/o	C5	Epidural osteolipoma
Maier et al[16]	17 m/o	T7	Epidural lipoma infiltrating thorax
Lin et al[17]	20 y/o	Cervical	Epidural lipoma
Joubert et al[18]	19 y/o	C3-T1	Intradural lipoma
Yang et al[1]	51 y/o	Posterior to C2-C6	Pure intramuscolar lipoma
Jaiswal et al[19]	8 y/o	Posterior lumbar area	Subcutaneous lipoma with intraspinal extension (through spinal defect)
Haddad et al[20]	22 y/o; 34 y/o	T5; T10	Two cases of epidural lipomas
Dattolo et al[21]	41 y/o	Cervical	Infiltrating intramuscolar lipoma
Cheng et al[8]	5 y/o	C5-C6	Epidural-extracanl lipoma (through neuroforamen)
Butti et al[22]	44 y/o; 50 y/o	C5-T1; L4-L5	Two cases of epidural lipomas
Brones at al[23]	21 m/o	Posterior cervical	Ossifying extracanl lipoma
Duhaime et al[9]	4 y/o	C4-C6	Epidural-extracanl lipoma (through neuroforamen)
Schizas et al[24]	80 y/o	Lower lumbar region	Epidural lipoma
O'Brien et al[10]	10 m/o	C3-C7	Epidural-extracanl lipoma (through neuroforamen)

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