



Case Report

Cerebellar metastasis of a Liposarcoma: Case report and literature review

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ABSTRACT

Background: Liposarcoma (LPS) is a rare type of tumor; they come from the adipose tissue. It is the most common type of soft-tissue sarcoma. Every type of LPS has morphological features, immunophenotypic, and molecular pathogenesis characteristics of their own. In this case, we are going to report a cerebellar metastatic disease from a well-differentiated liposarcoma (WDL) with pleomorphic component, not found in our literature research.

Case Description: A 72-year-old woman with progressive pain and inflammation in the left knee with functional limitation when climbing stairs. MRI shows a tumor in the vastus medialis of the left thigh. Pathology result was pleomorphic and WDL, Stage III and negative for MDM2 and CDK4. Extension study was carried out, finding nodular lesion in the right cerebellar hemisphere with mass effect and partial obliteration of the fourth ventricle, suspicious of distant disease.

Conclusion: Cerebellar metastasis of LPS is uncommon; there are only a few cases reports with the literature reviews describing orbital or skull base metastases, but not in the cerebellum. Our case allows us to remember that neurological symptoms, no matter how subtle, in patients diagnosed with LPS, a secondary affection of the central nervous system must be ruled out, even though it is a rare location. The findings of distant disease in LPSs, allow planning oncological treatment options and targeted radiotherapeutic.

Keywords: Adipose tissue, Cerebellum, Liposarcoma, Metastatic dissemination, Radiotherapy

INTRODUCTION

Liposarcoma (LPS) is a rare of tumor; they come from the adipose tissue. It is the most common type of soft-tissue sarcoma. Comprises about 20% of malignant mesenchymal neoplasms.^[3,21] LPS has a prevalence of <1% of all adult malignancies and 12% of pediatric cancers^[13,17] and approximately 80% of new cases of sarcoma originate from soft tissue.^[6] They usually affect older patients and reproduces in extremities and retroperitoneum, involving deep tissues; with relatively frequency invades chest and lungs. LPS may contain both well differentiated mature adipocytes and initial undifferentiated cells.

According to the World Health Organization is divided in: well-differentiated/dedifferentiated liposarcoma (WDL/DDL), myxoid/round-cell LPS, and pleomorphic liposarcoma (PLS).^[8] The

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most common type is the WDL/DDL subgroups, accounting around 40% of all LPSs.

Every type of LPS has morphological features, immunophenotypic, and molecular pathogenesis characteristics of their own. In this case, we are going to report a cerebellar metastatic disease from a WDL LPS, a rare possibility, not found in our literature research.

CASE DESCRIPTION

A 72-year-old woman, with the previous conditions of hypertension, diabetes, dyslipidemia, and chronic obstructive pulmonary disease, consulted for pain and progressive inflammation in the left knee with functional limitation when climbing stairs. Knee and thigh MRI [Figures 1 and 2] reports a supra-rotulian tumor, in the vast intermediate of the left thigh, with signals alterations of adipose tissue in the superior pole of the lesion.

Thick needle biopsy was made on the left femoral quadriceps, obtaining as result a WDL, MDM2, and CDK4 negative.

A wide surgical resection of left vastus lateralis muscle and vastus intermedius muscle was performed, with clear margins of resection. Pathology reports a high grade sarcoma (Grade 3) With a combined score 7 of the French system (FNCLCC) including: tumor differentiation 3, mitosis 3–50 mitosis in 10 CGA, necrosis 1). Cellularity with Dedifferentiation of pleomorphic and WDL. Histochemical study with MDM2 and CDK4 results negative for tumoral cells. Final staging: pT2b Nx Mx [Figure 3]. Patient did not receive any other oncologic treatment, neither chemotherapy nor radiotherapy (RT), for being a soft-tissue sarcoma with radical resection and free margins. She started the follow-up according oncology protocols after surgery.

Two months after surgery, the patient complains of continuous headache, a head MRI was performed, finding a single nodular lesion in the right cerebellar hemisphere of approximately 4 x 3.5 cm, with mass effect in the posterior fossa and partial obliteration of the fourth ventricle. The lesion presents minimal edema in the medial region, peripheral restriction in diffusion sequences, and peripheral contrast uptake with cystic / necrotic central area. ADC minimum 0.8 mm² /s. It presents a relative cerebral blood volume increase in perfusion sequence of 3.14. The dynamic perfusion curve shows a very significant recovery, above the baseline. Proposing a cerebellar metastasis as the first option [Figure 4].

A right retromastoid craniotomy was performed, with findings of a whitish tumor with a friable texture, suggestive of metastasis, proceeding to peripheral dissection of the tumor and alternated with internal tumor decompression until complete removal was achieved; the postoperative period was uneventful.

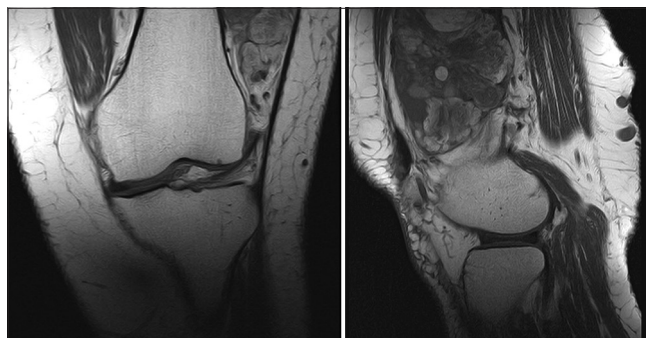


Figure 1: Knee MRI. T1w- coronal and sagittal planes.

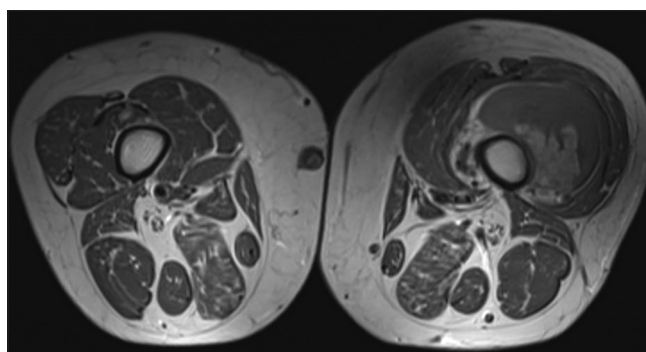


Figure 2: Thigh MRI. T1-weighted-axial plane.

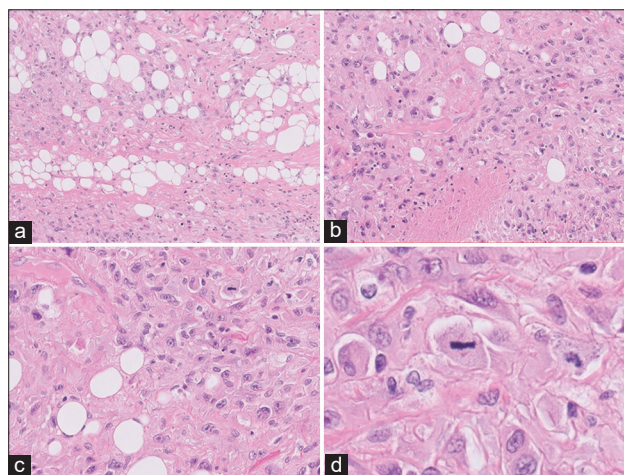


Figure 3: Left thigh tumor pathology: (a) HE ×10: different areas were observed in the histological sections, some with a storiform pattern constituted with spindle, atypical, and polymorphic cells; also absence of differentiation and extensive necrosis. (b) HE ×20: atypical lipogenic cells were found in neoplastic cells, constituting a component of pleomorphic liposarcoma. (c) HE ×40 and (d) HE ×60: they continued with well-differentiated liposarcoma cells, with desmoplastic stroma, abundant lipoblastic cells, and hyperchromatic and pleomorphic nuclei and presence of numerous mitoses. Diagnosis: high-grade sarcoma (Grade 3. French system combined score 7 (FNCLCC): tumor differentiation 3, mitosis 3–50 mitoses in 10 CGA -, necrosis 1). (Dedifferentiation of pleomorphic and well-differentiated liposarcoma).

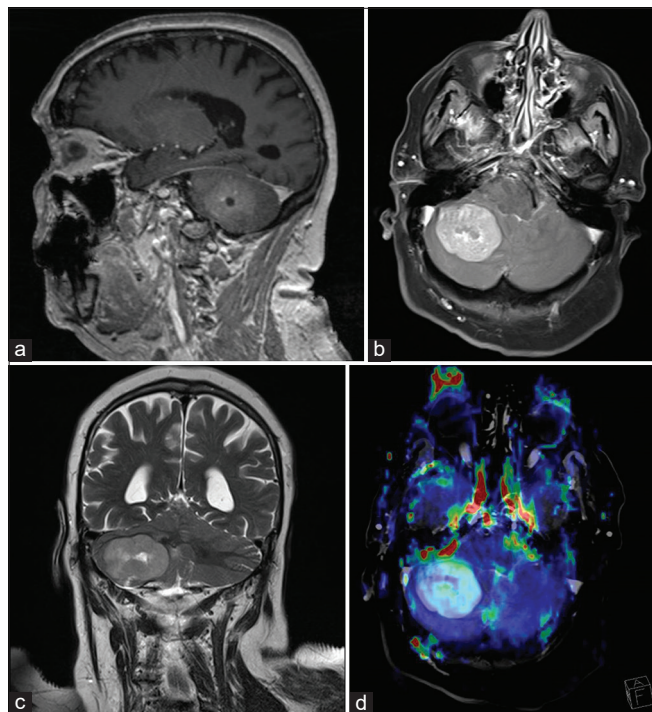


Figure 4: (a) T1w with gadolinium-sagittal, (b) T1w with gadolinium-axial. (c) T2w coronal. (d) Diffusion sequence.

Regarding the cerebellar lesion, pathology reports a dedifferentiated tumor metastasis, sarcomatous aspect with fusiform pattern, marked nuclear atypia, high mitotic rate, and compatible with previous tumor metastasis [Figure 5]. After evaluation in the neuro-oncology committee, treatment with whole brain RT (WBRT) was decided because it was agreed that it was a disease progression to the central nervous system (CNS); not receiving conventional treatment of CNS metastases with stereotactic radiosurgery (SRS), as first adjuvant treatment. Patient dies 4 months after the past surgery, due medical complications of esophageal perforation.

DISCUSSION

LPS are the most common type of soft-tissue sarcomas in adults. These tumors are typically detected in elderly people and appear especially in the lower extremities, abdomen, and shoulders.^[3,21] WDL represents approximately 40–45% of all LPS and tends to occur equally in the retroperitoneum or the limbs.^[2] Histologically, WDL type has poor invasive capacity, being rare in these cases a metastatic dissemination; they are rarely found at CNS as a metastatic dissemination. We have not found any case report or literature review of these kind of metastasis.

LPS can contain both well-differentiated mature adipocytes and initial undifferentiated cells; when they have more

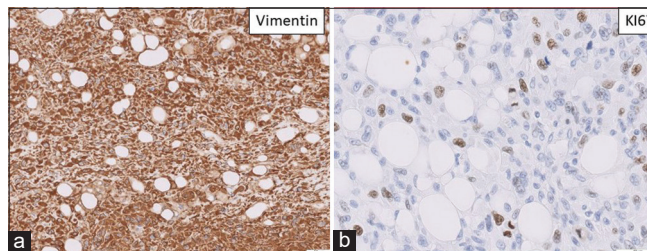


Figure 5: (a) Vimentin 20X (b) KI67 40X. Cerebellar tumor: Dedifferentiated tumor metastasis, sarcomatous in appearance with a fusiform pattern, marked nuclear atypia, high mitotic rate, compatible with previous tumor metastasis. In the immunohistochemical study, it only expresses vimentin, with the absence of expression of the S100 protein and also the gliofibrillar protein and liposarcoma markers.

cells in earlier stages of differentiation, they behave more aggressive, and metastasize more frequently. However, the WDL can be dedifferentiated and be converted to DDL, achieving stronger invasive ability with potential local recurrence and distant metastasis. This dedifferentiation occurs in 10% of WDL.^[3,11]

In case of LPS subtype WDL/DDL, there is no statistic describing the invasion of the CNS. There has been reported six patients with nonlymphomatous sarcoma metastatic to the brain,^[12,21] four of them has a primary tumor in the thigh, one on the shoulder and one in the heart; nevertheless, five of them were myxoid type and one pleomorphic; in our case, the primary LPS was WDL/DDL [Table 1]; we also find a few reviews, reporting a case of a metastatic LPS of the orbit and brain in which dedifferentiated transformation occurred from the primary tumor (myxoid LPS from the thigh).^[20]

Prognosis is different for each type of cancer. Soft-tissue sarcomas, the prognosis is highly dependent on the tumor's histological type.^[6,16] High grade myxoid and PLS types demonstrate high levels of metastasis, corresponding to a survival rate of only 20–40%.^[4,19] Well-differentiated and myxoid type tumors have a better prognosis, with a 5-year survival rate of 80–90%.

In addition to the histological result, the primary tumor must be radically resected with clean margins before adjuvant cancer treatment.^[14] In our case, a wide resection with clean margins was made in left vastus lateralis muscle and vastus intermedius muscle. Regarding the cerebellar metastasis, also a radical resection was achieved; the postoperative MRI reveals complete resection without tumor remains.

RT has a role after brain metastases resection, either WBRT or SRS depending on the case; but in soft-tissue sarcomas, studies report adjuvant RT reduces the rate of local recurrences. However, the effectiveness of adjuvant RT in treating LPSs (DDL in particular) is still controversial;

Table 1: Case reports of LPS with metastases in the central nervous system.

Author	Primary tumor	Pathology	Metastases	Age/Gender
Haft and Wang ^[7]	Thigh	Myxoid	Temporoparietal lobe	52/male
Paraf <i>et al.</i> ^[15]	Heart	Myxoid	Parietal lobe	27/male
Arepally <i>et al.</i> ^[1]	Thigh	Pleomorphic	Temporal lobe	56/male
Fitzpatrick <i>et al.</i> ^[5]	Thigh	Myxoid	Parietal lobe	74/female
Kumar and Teasdale ^[10]	Thigh	Myxoid	Temporoparietal lobe	73/female
Zagzoog <i>et al.</i> ^[21]	Shoulder	Myxoid	Skull base: clivus	43/female
Silva <i>et al.</i>	Thigh	WDL/DDL	Cerebellar	72/female

LPS: Liposarcoma, WDL: Well-differentiated liposarcoma, DDL: Dedifferentiated liposarcoma

mostly because it does not modify the overall survival or the rate of metastasis.^[5,9,18]

MRI of the total spine should be considered for myxoid/round cell LPS due to the higher risk of metastasis to the spine compared to other soft-tissue sarcomas. CNS MRI (or CT if MRI is contraindicated) should be considered for patients with alveolar soft part sarcoma and angiosarcoma.^[14] However, there is no systematic monitoring of disease progression to the CNS due to the rare spread to the brain and spine. If there is evidence of spread, if possible, metastasectomy should be performed with or without chemotherapy/radiation therapy.

According to NCCN guidelines, recommended follow-ups for soft-tissue sarcomas in patients with no radiographic evidence of disease must be: chest-abdominal and pelvic CT (or abdominal-pelvis MRI) every 3–6 months for 2–3 years; after the third year, the CT or MRI must be done every 6 months for the next 2 years; and after 5 years of follow-up, annually.

CONCLUSION

Cerebellar metastases secondary to a WDL LPS are infrequent; we did not find case reports or literature reviews. Our case recalls that appearance of neurological symptoms, no matter how subtle, in patients diagnosed with a soft-tissue sarcoma, a radiological image must be done. We consider that brain CT/MRI should be performed in patients with a previous diagnosis of LPS (regardless of whether the symptoms remit with medication) who present

with headache, nausea/vomiting, neurological focality, seizure, and to rule out distant disease in the CNS. A quick diagnosis allows to plan early options for oncologic and multidisciplinary treatment.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest.

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