

Case Report

Intradural Involvement of Multicentric Myxoid Liposarcoma

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Liposarcomas are malignant tumors of the soft tissue, with myxoid liposarcoma being the second most common subtype, tending to occur in the limbs, particularly in the thighs. Myxoid liposarcomas have an intermediate prognosis between well-differentiated and pleomorphic tumors. Spinal metastasis is usual but intradural involvement is extremely rare. We present an unusual case of a multicentric myxoid liposarcoma with intradural involvement. A 41-year-old woman complained of tingling sensation on her left arm. Radiological evaluation revealed multiple masses in her cervical spine, abdominal wall, liver, heart and right thigh, all of which were resected. She was histologically diagnosed with small round cell myxoid sarcoma and underwent adjuvant chemotherapy. However, magnetic resonance imaging analysis after 1 year revealed a large metastatic mass with bony invasion at the C6-T1 level. This mass consisted of extradural and intradural components causing severe compression of the spinal cord. She underwent resection via a posterior facetectomy of C6-7 and an anterior C7 corpectomy. However, the patient died of multiple metastases 18 months after the first diagnosis.

KEY WORDS : Cervical spine · Intradural · Multicentric · Myxoid liposarcoma · Metastasis.

INTRODUCTION

Liposarcoma, the most common soft tissue sarcoma in adults, can be classified into five distinct histological types, well-differentiated, dedifferentiated, myxoid, round cell, and pleomorphic (Table 1)^{2,5}. Myxoid liposarcoma is the second most common subtype, occurring more frequently during the fourth and fifth decades of life⁹. The most frequent sites of myxoid liposarcomas are the buttocks, retroperitoneum, trunk, ankle and proximal limb girdle^{1,11}. Although most soft tissue sarcomas metastasize to the lung, myxoid liposarcomas have a propensity to metastasize to extrapulmonary sites^{7,10}. These tumors can metastasize to the spine, but intradural involvement is very rare. We describe here a patient with multicentric myxoid liposarcoma with intradural metastatic involvement, which showed a very aggressive

clinical course leading to death.

CASE REPORT

History and examination

A 41-year-old woman presented with a 1-month history of tingling sensation in her left arm. Radiological evaluation revealed multiple masses in the epidural space at the C6-T1 level, as well as in the abdominal wall and liver. Magnetic resonance imaging (MRI) of the cervical spine showed a well defined homogeneous extradural mass, extending from the left neural foramen of C6 and C7 (Fig. 1). The patient underwent excisional biopsy of at another institution. Histopathological examination showed small round cell malig-

Table 1. World Health Organization classification of liposarcoma (1994)

Type	Subtype
Well differentiated liposarcoma	Adipocyte (lipoma-like)
	Sclerosing
	Inflammatory
Dedifferentiated liposarcoma	
Myxoid liposarcoma	
Round cell liposarcoma	
Pleomorphic liposarcoma	

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nancy with myxoid background. After surgery, the patient was referred to the Department of Oncology at our institution for further evaluation. On admission, she complained only of a tingling sensation in her left arm, and a neurological examination revealed no neurological deficits. Positron emission tomography/computed tomography (PET-CT) showed suspicious metastatic lesions at the C4-T1 area, right cardiophrenic angle and liver. MRI of her lower extremities, was done to evaluate a palpable left thigh mass, showed a well-margined enhancing solid soft tissue mass in the left vastus medialis (Fig. 2). All metastatic lesions except the cervical spine mass were removed surgically and histopathology analysis confirmed high grade myxoid sarcoma with round cell components. For cervical lesion, we did not perform local treatment because MRI showed fluid containing cavitary lesion that was considered postoperative change rather than recurrent tumor. We initiated adjuvant chemotherapy, consisting of five cycles of ifosfamide, doxorubicin and dacarbazine. Follow-up abdominal and chest CT scans and a bone scan showed no evidence of disease recurrence or distant metastasis. One year later, however, the patient reported a progressive tingling sensation in her left arm and a gradually worsening general condition. Neurological examination revealed weakness of the left elbow extension, hand grasp and hypesthesia along the C7 and C8 dermatome. MRI of the cervical spine showed a large metastatic mass, measuring $2.2 \times 1.4 \times 1.7$ cm, with intradural and extradural components at the C6-T1 level. We also observed bony invasion of the C7 vertebral body (Fig. 3). The mass, which was hypointense on T1-weighted images (T1WI) and hyperintense on T2-weighted images, extended from the left neural foramen of C6, 7 to the spinal canal and was compressing the spinal cord to the right lateral side. Contrast-enhanced T1WI showed strong homogeneous enhancement of intradural and extradural lesions. The patient was scheduled to undergo surgery, which had to be delayed owing to neutropenic fever due to chemotherapy. Two months later, her white blood cell count was normalized and she underwent preoperative MRI, which showed that the size of the intradural component of the large metastatic mass at the C6-7 level had increased, causing nearly complete encasement with severe compression of the spinal cord. There was no significant change in the bony invasion of C7 or in the extradural extension through the left foramen of C6, 7 (Fig. 4A).

Operation

Tumor resection was performed via a posterior approach. Following C6, 7 facetectomy, the intradural and extraforaminal tumors were removed. We performed lateral mass screw fixation at C5, 6 and pedicle screw fixation at T1, 2.

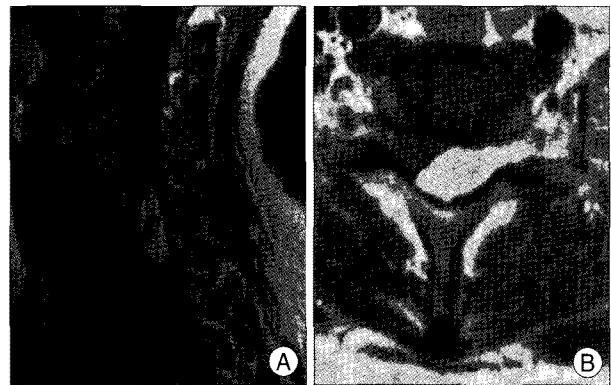


Fig. 1. Gadolinium enhanced T1-weighted magnetic resonance images obtained initially show extradural mass at C6-7 in sagittal (A) and axial (B) images.

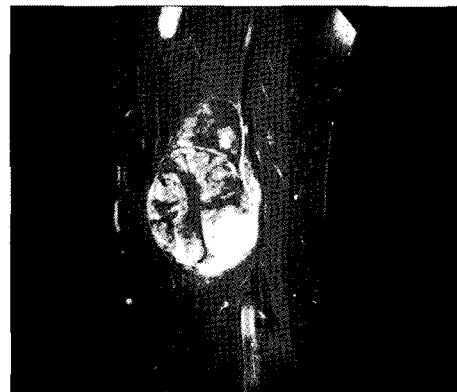


Fig. 2. The patient complained a palpable mass in the left thigh at her first admission. Gadolinium enhanced T1-weighted MR images show a strongly enhanced solid mass in the left thigh.



Fig. 3. Gadolinium enhanced T1-weighted MR images obtained at one year after initial diagnosis show a large intradural mass at C6-T1 level that extends extradurally and invades the C7 vertebral body.

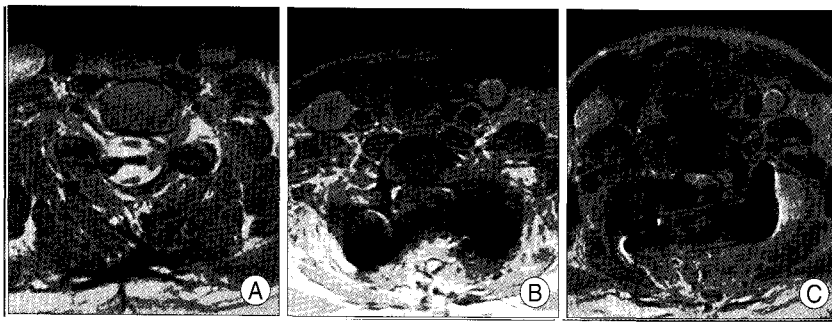


Fig. 4. Gadolinium enhanced axial T1-weighted MR images were obtained serially. A : Before tumor resection, MR shows strongly enhanced lesion that involves intradural and extradural space. B : Five days after resection, MR shows tumor was completely resected. C : One month after resection, MR shows recurrence.

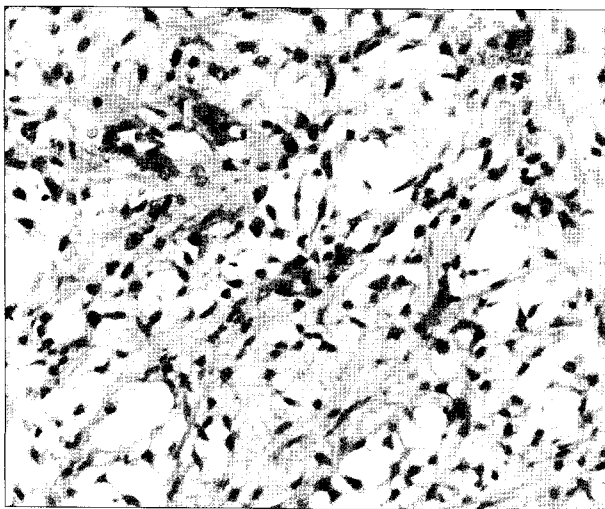


Fig. 5. Microscopic view of tumoral tissue from epidural mass shows spindle cells and many signet-ring lipoblasts with multivacuolated cytoplasm in myxoid stroma. (H&E, $\times 100$)

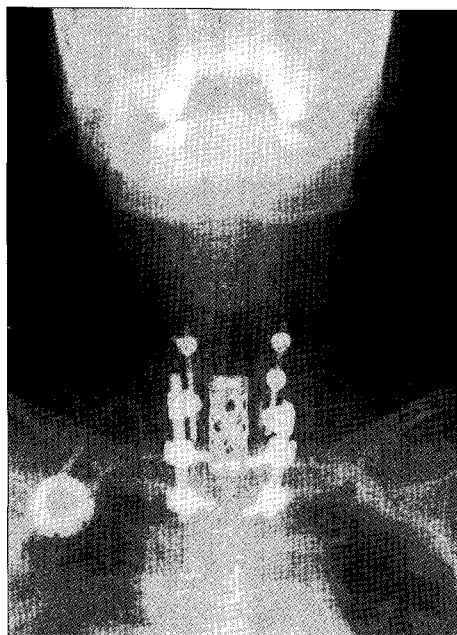


Fig. 6. This is the plain X-ray image that was obtained after C7 corpectomy and plate fixation were done.

The removed tumor was brownish-gray in color. Histopathological examination revealed malignant myxoid liposarcoma (Fig. 5). Seven days after the surgery, the patient underwent anterior C7 corpectomy and plate fixation via the transmanubrial approach for the removal of remnant tumors (Fig. 6). Pathological examination of the C7 vertebral body, however, revealed no evidence of tumor.

Postoperative course

Postoperatively, the left arm tingling sensation was improved, but other neurological symptoms, including motor weakness, were similar to the preoperative state. MRI analysis performed immediately after resection revealed no demonstrable residual tumor (Fig. 4B). One month after surgery, MRI of the cervical spine showed a paraspinal mass involving the left pedicle and lateral mass at the C7-T1 level (Fig. 4C). This mass contained a small amount of intradural enhancing portion at the C6 level, partially surrounding the spinal cord. Moreover, whole-body PET analysis showed progressive tumors in the left paraaortic lymph node, right buttock, right posterior inferior pleura, abdomen, both axillae and breasts (Fig. 7). The patient was referred to a radiation oncologist, because we thought that systemic chemotherapy would be ineffective. The patient underwent palliative radiotherapy with a dose of 37 Gy at C6-T1, and 54 Gy at the left axilla. During radiotherapy, the patient complained of progressive paraparesis and voiding difficulty. Neurological examination revealed paraparesis (motor grade III/V), hypesthesia below T12 and decreased anal tone. MRI analysis of the thoracolumbar showed a 2.6 cm sized well-defined enhancing mass in the intradural location of T11-12 with small daughter nodules at T11-L5, findings indicative of tumor seeding. MRI analysis of the brain, performed to exclude brain metastases, showed multiple strong enhancing masses and nodules in the cerebellum and right medulla oblongata, findings compatible with metastatic lesions (Fig. 8). Despite radiotherapy for the brain lesion, the patient became paraplegic, and her general condition progressively worsened. She eventually died due to multiple metastases 18 months after the first diagnosis.

DISCUSSION

Liposarcoma is the most common soft tissue tumor, with a peak incidence in individuals aged 40-60 years, and tends to follow a relatively indolent clinical course. Diagnosis and classification of liposarcoma is based on histopathological

criteria established by the World Health Organization. Myxoid liposarcoma, the second most common subtype, is defined as a malignant tumor composed of uniform round to oval shaped primitive nonlipogenic mesenchymal cells and a variable number of small signet-ring lipoblasts in a prominent myxoid stroma⁴. It can also be diagnosed by the presence of distinctive pattern of capillary-sized vasculature, described as a “chickenwire” or “crows’ feet” pattern. These tumors may be composed of hypercellular areas featuring undifferentiated round cells, suggesting that myxoid and round cell liposarcomas are similar, with round cell liposarcomas being a high grade form of myxoid liposarcomas. These two subtypes have similar clinical features, with increased round cell component associated with poorer prognosis. And, both myxoid and round cell liposarcomas are characterized by a chromosomal translocation, fusing the CHOP gene on chromosome 12q13 with the FUS (or TLS) gene on chromosome 16p11 or the EWS gene on chromosome 22q12². Myxoid liposarcomas are usually located on the extremities, especially the thighs, and occur in relatively younger individuals. In contrast to other types of liposarcomas, which generally metastasize to the lungs, myxoid liposarcomas have a tendency to metastasize to extrapulmonary sites, such as soft tissue, retroperitoneum, mediastinum, chest-wall, peritoneal surface and heart, which may be due to the abundance of fat tissue at these sites^{7,9}. Therefore, the initial radiological examination should include abdominal and chest CT and bone scans. Tumors presenting with multicentric sites at diagnosis tend to affect infrequent locations and follow an aggressive clinical course³.

At initial diagnosis, our patient presented with multicentric lesions, including the spine, liver, abdominal wall and pleura, last two of which are rarely affected locations. Nevertheless, radiculopathy due to epidural metastases of the cervical spine was the only presenting symptom. The other extra-spinal tumors, which were not symptomatic at that time, were detected incidentally by radiological evaluations. Even when an intradural tumor severely compressing the spinal cord was detected on cervical MRI, the patient presented only with radiculopathic symptom. As the tumor progressed through leptomeningeal seeding, the patient developed quadriplegia and other upper motor neuron signs.

There are several case reports about spinal involvement of myxoid liposarcoma in the literature^{3,6}. Intradural involvement is extremely rare and to our knowledge, there has been only one previous report about intradural liposar-

coma of the lumbar spine presenting with cauda equina syndrome in a 45-year-old man. In that patient, intradural involvement was primary, not metastatic and the histological subtype was pleomorphic liposarcoma⁶. In the present case, cervical spinal involvement was initially limited to the epidural space. One month after resection, MRI study of the cervical spine revealed complete resection with no evidence of recurrence. One year later, however, a follow-up MRI showed tumor recurrence, which included epidural and intradural extension that follows leptomeningeal seeding. Leptomeningeal seeding of sarcoma is very rare⁸. Several possible mechanisms were proposed in literature : hematogenous, direct extension, transport through the venous plexus, extension along nerve, perineural perivascular lymphatics, escape from choroid plexus or subependymal metastases, and iatrogenic⁸. In this case, main mechanism is considered to be direct extension from concurrent epidural lesion. The median survival rate after development of leptomeningeal seeding is in range of 2-4.8 months¹². Prognosis depends on sensitivity to adjuvant therapy of primary tumor, performance status and systemic status of primary disease¹². In this case, irradiation of whole neuroaxis was possible treatment option because myxoid sarcoma is known to be very radiosensitive.

For myxoid sarcoma, radiotherapy is reported to be effec-

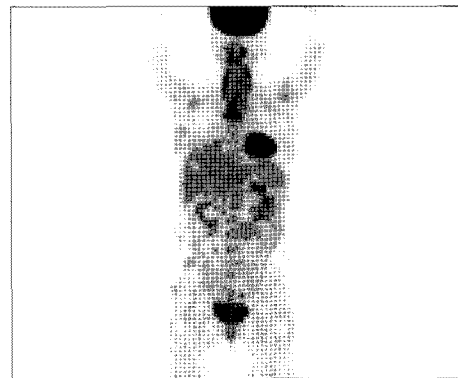


Fig. 7. After recurrent tumor was developed at cervical spine, whole-body PET analysis was obtained. It shows multiple hypermetabolic lesions that suggest metastatic tumors.

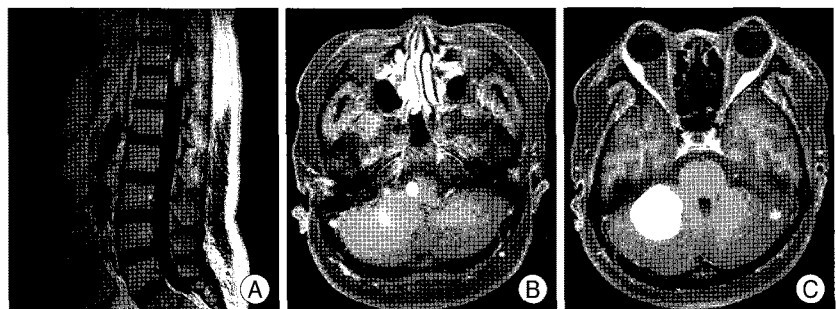


Fig. 8. During the patient underwent the radiotherapy at the cervical spine and the axilla, she complained progressive paralysis. Gadolinium enhanced T1-weighted MR images show newly appeared metastatic lesions at (A) thoracic spine, (B) right medulla and (C) right cerebellum.

tive in controlling the tumor and improving survival rate. For example, the 10-year local control rate in 127 patients with non-metastatic localized myxoid liposarcoma treated with radiotherapy and conservation surgery was 97%¹⁾. Our patient had multicentric metastatic lesions at first diagnosis, and postoperative MRI analysis showed that all tumors had been completely resected. We therefore elected to treat her with systemic chemotherapy rather than radiotherapy. However, after one year, tumors recurred at multiple sites, including the intradural portion of the cervical spine. In addition, she experienced neutropenic fever, a complication due to chemotherapy, necessitating treatment with antibiotics and recombinant granulocyte-stimulating factor and delaying a second operation for 2 months. Despite radiotherapy following the second operation, disseminated metastases developed and the patient died after such recurrence. Radiotherapy is very important. Even if radiotherapy following conservation surgery shows good local control, it is limited in treating patients with multicentric metastatic myxoid liposarcoma. So, early adjuvant radiotherapy is important to prevent disease progression. After recurrence, the clinical course is very aggressive. Treatment for recurrence should be performed immediately. If surgical resection is delayed due to other medical condition, radiotherapy can be the another option.

CONCLUSION

We have described a patient with multicentric myxoid liposarcoma with intradural involvement. These tumors usually have an indolent course, so patients seldom present with specific symptoms until the mass grows to a size large enough to compress the surrounding structures. Radiological examination for sites of frequent metastases should therefore

be performed. Although intradural involvement is rare, it is possible, thus must be considered during differential diagnosis. Therapeutically, surgical resection and radiotherapy are usually sufficient for local control. In cases with multicentric involvement, however, prognosis may be poor, despite the surgery, radiation therapy and chemotherapy.

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