

Case Report

Primary spinal intradural extraskelatal Ewing sarcoma mimicking a giant nerve sheath tumor: case report and review of the literature

Mingfei Zhao¹, Buyi Zhang², Feng Liang¹, Jianmin Zhang¹

¹Department of Neurosurgery, Second Affiliated Hospital, School of Medicine, Zhejiang University, Hangzhou, Zhejiang 310009, China; ²Department of Pathology, Second Affiliated Hospital, School of Medicine, Zhejiang University, Hangzhou, Zhejiang 310009, China

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Abstract: Primary intradural extraskelatal Ewing sarcoma is a very rare form of malignant neoplasm. Only few cases have been reported on the literature. Here, we report a case of a 14-year-old boy who had a chief complaint of pain and tingling in the right lower limb. The patient initially seemed to have a giant nerve sheath tumor but was eventually diagnosed with intradural extraskelatal Ewing sarcoma arising from the nerve roots of the cauda equine. The literature with regard to primary spinal intradural extraskelatal Ewing sarcoma is reviewed.

Keywords: Intradural, extraskelatal ewing sarcoma, spine, nerve sheath tumor

Introduction

Extraskelatal Ewing sarcoma (EES) is a rare, round-cell malignant neoplasm that affects children and adolescents. It occurs predominantly in the paravertebral regions and epidural spaces, and the involvement of the intradural space is decidedly rare. Here we report a case of intradural extraskelatal Ewing sarcoma arising from the nerve roots of the cauda equina mimicking a nerve sheath tumor.

Case report

A 14-years-old boy came to our hospital with a chief complaint of pain and tingling in the right lower limb, which had lasted more than 1 year. Before visiting us, he was diagnosed with growing pains in another hospital and received no treatment. However, his pain did not disappear but aggravated. So he was taken to our hospital and underwent CT of the lumbar. The CT myelography showed a large, epidural and paravertebral mass displacing at the L4-L5 level. Neither permeative destruction nor sclerotic bony changes were seen in the vertebral bones (not shown). A subsequent Magnetic resonance imaging (MRI) of the spine revealed

a giant dumbbell-shaped mass filling the spinal canal starting at L2 and extending down to S1 level. The tumor demonstrated inhomogeneous slight hypointense on T1-weighted images (**Figure 1A**) and slight hyperintense on T2-weighted images (**Figure 1B**), and showed obviously enhancement on contrast-enhanced T1-weighted images (**Figure 1C**). His physical examination revealed hypoaesthesia on the posterior of his right lower limb, but without any other signs or symptoms such as decreasing of muscle strength, constipation or urinary disturbance. Routine laboratory investigations, including complete blood count, total leukocyte count, hemoglobin, tumor markers, and other parameters, were normal.

Considering the common diagnosis of nerve sheath tumor, the patient was transferred to the neurological surgery department and underwent posterior partial laminectomy of L2 to L5. During surgery, a dark red mass with distinct boundary and extensive vascular supply was found. Several nerve roots of Cauda equina were enclosed by the tumor. A piecemeal gross total resection of the intraspinal tumor and partial resection of paravertebral tumor were performed.

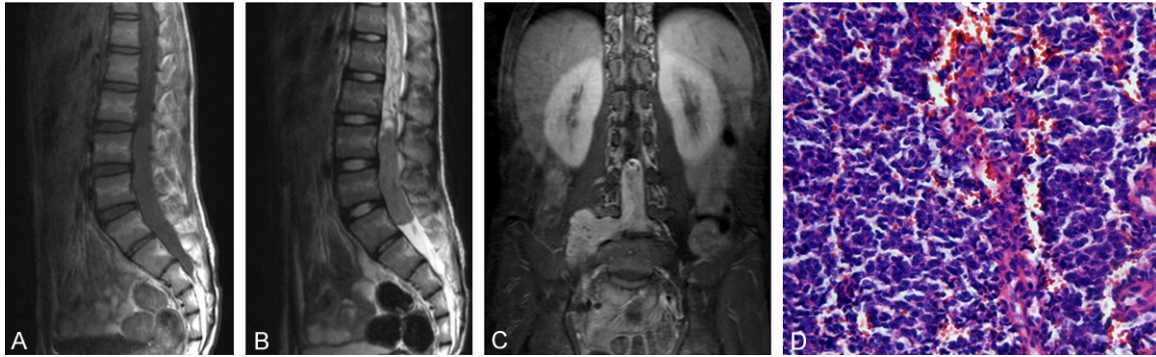


Figure 1. A: T1-weighted sagittal MRI shows an inhomogeneous slight hypointense mass filling the spinal canal extending from L2 to S1. B: T2-weighted MRI demonstrates the tumor is slight hyperintense. C: Contrast-enhanced T1-weighted MRI shows obviously enhancement of the tumor mass extending through the spinal canal and enlarging the neural foramina. D: The tumor shows small, round, malignant cells with hyperchromatic nuclei, scant cytoplasm, and brisk mitotic figures (hematoxylin and eosin, 200×).

Histologically, the tumor consisted of small, round, malignant cells with hyperchromatic nuclei, scant cytoplasm, and brisk mitotic figures (**Figure 1D**). Immunohistochemically, the tumor cells showed intense membrane reactivity for CD99, and nonimmunoreactive for CD34, D31, CD3, CD20, CD43, CD79a, S100, NSE, GFAP, Desmin, Myoglobin, and TdT. Thus the diagnosis of Ewing's sarcoma was established.

The symptoms of the patient were improved after surgery. After discharge from hospital, the patient received adjuvant therapy including combined chemotherapy (cyclophosphamide, doxorubicin and ifosfamide) and radiation therapy (a total dose of 5000 cGy in 25 fractions) at a local hospital. At 12-months telephone follow-up, the patient's back pain disappeared and he is clinically stable.

Literature search

We performed a PubMed search for all cases of intradural extramedullary extraskelatal Ewing sarcoma of the spinal cord up to October 2014. Cases were analyzed for basic demographic features including age, sex, location, clinical manifestation, adjuvant therapy, and clinical outcome (**Table 1**).

Discussion

Lower extremities pain is common in adolescent, and in most cases it is nonspecific and self-limiting [13]. However, thorough physical and imaging examination should be undertaken to rule out serious diseases, such as infec-

tions or tumors. Our case emphasizes that plain radiograph or CT myelography of the spine should be taken routinely when the pain is still exiting or even deteriorates. If so, the diagnosis of this patient and operation for Ewing's sarcoma would not be delayed for such a long time. Delays in diagnosis and treatment may lead to early metastasis, which remains the most important prognostic factor affecting outcome [14].

Ewing's sarcoma and primitive peripheral neuroectodermal tumor (PNET) are round-cell sarcomas that belong to the ES family. They varied degrees of neuroectodermal differentiation and represented two ends of the spectrum of the same entity [15]. Most of the Ewing's sarcoma occur in the long bones, pelvis, or ribs [16], but rarely may have an extraskelatal origin that named extraskelatal Ewing sarcoma. EES has similar histology to skeletal Ewing sarcoma, which commonly affects the epidural spaces and paravertebral regions. The involvement of the intradural space is rare, and only 15 cases of primary intradural extramedullary EES have been previously reported [1-12]. It is noteworthy that 3 of the 15 reported cases of intradural extramedullary EES were adolescent [1, 2, 4], while the others were adult [3, 5-12].

Definitive diagnosis of extraskelatal Ewing sarcoma relies on pathological assessment, and molecular or cytogenetic analysis of the translocation $t(11;22)(q24;q12)$ has been recognized as the diagnostic gold standard [17]. Other tumors such as neuroblastoma, lym-

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Table 1. Summary of previously reported cases of spinal intradural Extraskkeletal Ewing Sarcoma

Author	Location	Age/Sex	Chief complaint	Duration of symptoms (mo)	Adjuvant therapy	Clinical outcome
Uesaka et al, [1] 2003	C7-T1	11/Female	Back pain	1	NR	NR
Woestenborghs et al, [2] 2005	C4-T2	11/Male	Progressive quadriparesis.	NR	CT (VCR, IFO, AMD, VP16, alternating with VCR, AMD, VP16)	NR
Haresh et al, [3] 2008	T11-S2	26/Male	Low back pain, weakness in both lower limbs	2	RT (5000 cGy) CT (VCR, AMD, CTX, alternating with IFO, CDDP, VP16)	Clinically stable at 6 months
Klimo P et al, [4] 2009	L4	10/Male	Right leg pain	Several	RT (5040 cGy) CT (VCR, CTX, AMD alternating with IFO, VP16)	Disease free at 7 months
Kim et al, [5] 2009	C3-C5	32/Female	Pain and numbness of upper extremities	1.5	RT (3000 cGy) CT (IFO, VP16)	Disease free at 12 months
Vincentelli et al, [6] 2010	T11-L4	40/Female	Acute urinary retention	3 d.	RT (4000 cGy) CT (AMD, Holoxan)	Disease free at 6 months
Karikari et al, [7] 2010	L1	56/Female	Bilateral buttock cramping and posterior leg pain	5	RT (local radiation therapy) CT (VCR, AMD, CTX alternating with IFO, VP16)	Disease free at 7 months
Mateen et al, [8] 2011	L2-3	60/Male	Low back pain radiated to both ankles	2	RT (5040 cGy) CT (IFO, VP16 alternating with IFO, AMD)	Dead at 48 months
	T10-L1	50/Male	Hip and low back pain radiated to lower extremities	4	RT (5040 cGy) CT (VCR, AMD, CTX alternating with IFO, VP16)	Disease free at 26 months
Bazzocchi et al, [9] 2013	T6-T7	44/Female	Acute paraplegic syndrome	1 d.	RT (5400 cGy) CT (VCR, CTX, ADR, IFO, VP16)	Disease-free after therapy
Khalatbari et al, [10] 2013	L5-S1	28/Female	Low back and right radicular pain	3	RT (5000 cGy) CT (VCR, AMD, CTX alternating with IFO, VP16)	Disease free at 6 years
Pancucci et al, [11] 2013	L4-S2	55/Male	Acute urinary retention, bilateral leg pain and weakness	1 d.	RT (5600 cGy) CT (ANTs, IFO, VP16)	Disease free at 13 months
	L2-L3	25/Female	Lumbar and leg pain, motor deficits	NR	None	Recurrence at 14 months
Mardekian et al, [12] 2014	T12-L1	26/Male	Low back pain	NR	NR	NR
	T12-L1	70/Female	Back pain	NR	NR	NR
Current case	L2-S1	14/Male	Pain and tingling in right lower limb	12	RT (5000 cGy) CT (IFO, AMD, CTX)	Clinically stable at 12 months

VCR, Vincristine; AMD, Doxorubicin; CTX, Cyclophosphamide; ADR, Adriamycin; IFO, Ifosfamide; CDDP, Cisplatin; VP16, Etoposide; ANTs, Anthracyclines; CT, Chemotherapy; RT, Radiotherapy; NR, not reported.

phoma, and ependymoma should be included in the differential diagnosis. Immunohistochemically, neuroblastoma would be positive for CD56, and a monoclonal lymphoid population would support the diagnosis of lymphoma. The ependymal true rosettes or pseudorosettes and a papillary arrangement of cuboidal or columnar tumor cells are morphological characteristic of ependymoma [18].

The treatment consists of wide surgical resection within safe limits, followed by chemoradiation and local irradiation. This may lead to improvement of the prognosis [3]. Ewing sarcoma is an aggressive type of tumors with a high incidence of recurrence and metastasis [14], so follow up should be undertaken routinely in order to find the recurrence or metastasis as soon as possible. And it is necessary to restart chemotherapy and radiotherapy in the patients with recurrence, for it may help to control the disease effectively [3].

Our case was initially assumed to be a nerve sheath tumor but was finally diagnosed with an extraskeletal Ewing sarcoma. Some previous reported cases were also manifested as other spinal tumors such as meningioma [8], schwannoma [11], and ependymoma [12]. These cases should alert the clinicians to keep in mind that extraskeletal Ewing sarcoma is in the differential diagnosis of intradural mass lesions, and prompt operation should be performed to establish the diagnosis.

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Disclosure of conflict of interest

None.

Address correspondence to: Dr. Jianmin Zhang, Department of Neurosurgery, Second Affiliated Hospital, School of Medicine, Zhejiang University, 88 Jiefang Rd. Hangzhou 310009, Zhejiang, China. Tel: +86-571-87784785; Fax: +86-571-87784755; E-mail: zjm135@vip.sina.com

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