Huge solitary osteochondroma at T11 level causing myelopathy: case report

Koichiro Okuyama¹, Mitsuho Chiba¹, Kyoji Okada², Kozo Sato² and Naoto Hoshi³

¹Department of Orthopaedic Surgery, Akita Rosai Hospital; ²Department of Orthopaedic Surgery, Akita University School of Medicine and ³Second Department of Pathology, Akita University School of Medicine, Japan

A solitary osteochondroma of the vertebral column is rare, and also it will rarely cause neurological deficits. Myelopathy from a tumour usually presents insidiously with neurological deficits. We report a case of a huge solitary osteochondroma at T11 level with an acute onset of myelopathy induced by a minor trauma.

MRI findings of a spinal osteochondroma has rarely been described. In our patient, the MRI demonstrated an outer osteochondral layer and an ossified centre of the mass. A literature review has also been undertaken.

Keywords: huge solitary osteochondroma; thoracic spine; myelopathy; acute onset; magnetic resonance image (MRI)

Case report

A 60-year-old man was admitted to the Akita Rosai Hospital in December 1992, with a chief complaint of slowly increasing weakness and numbness of both lower extremities, more right than left, for 5 years. He reported that the illness began immediately after falling onto his buttock from a horizontal bar.

On examination, there was no tenderness over his back, and the general physical examinations were normal, without any obvious exostoses in the trunk or extremities. The dorsiflexors and evertors of the right foot were very weak (2/5) in the right foot, and the score was 4 in the left foot. There was sensory loss below the T12 dermatome on the right side and below the L4 dermatome on the left side. The right patellar tendon reflex was depressed, Babinski reflexes were present, as was ankle clonus. There was a neuropathic bladder, being hyperactive. The residual urine volume was 70 ml.

Plain roentgenograms demonstrated an abnormal ossified mass, protruding into the spinal canal, medial to the left T11/T12 facet joint. A myelogram showed the spinal cord to be severely compressed by an extradural ossified mass from the dorsal aspect (Figure 1). Computer assisted tomograms (CT) with and without contrast medium revealed an elliptically ossified mass, arising from the left inferior articular process of T11, was projecting into the spinal canal beyond the mid-line, and the spinal cord was severely flattened by the lesion (Figure 2).

A T1-weighted sagittal view of MRI (TR: 440 ms and TE: 25 ms, spin-echo) demonstrated an elliptical mass of high signal intensity covered with a low-signal

curvilinear line (Figure 3a). The mass showed mixed signal intensity with a low-signal curvilinear line on a T2-weighted image (TR: 3000 ms and TE: 100 ms, fast spin-echo) (Figure 3b).

In January 1993, a wide laminectomy from T10 to T12 was performed with excision of a 1.5 × 2 × 3 cm cartilaginous mass, which was projecting into the spinal canal beyond the mid-line, with a bony connection with the left inferior articular process of T11. The spinal cord was severely compressed from the left to the right. Although the cartilaginous surface was smooth, it was severely adherent to the duramater, therefore complete gross resection of the mass required partial excision of the dura. The duramater defect was closed with fascia and fibrin sealant. Postoperatively, there was moderate decrease of the sensory change in the legs, but with no recovery of muscle lower strength. The neuropathic bladder improved, and the residual urine volume has decreased to 20 ml.

Microscopic examination of the tumour showed that part of it consisted of irregular bony trabeculae and fatty bone marrow. The surface of the lesion was covered with a thin layer of cartilage. The high power view demonstrated that cartilaginous cells in the surface area of the lesion were irregularly distributed. The pathological diagnosis was osteochondroma (Figure 4a,b).

Discussion

Osteochondromas in the spine have been rarely reported. Albrecht¹ reported the incidence to be 3.0% of all osteochondromas. In Dahlin's data,² the incidence was 3.3%. Furthermore, spinal cord compression causing neurological deficits is very unusual.

The author reviewed 22 cases of osteochondroma of the thoracic spine with myelopathy (Table 1 for

Figure 1 Myelogram showing the spinal cord severely compressed by an extradural ossifying mass from the dorsal aspect

Figure 2 Computerized tomogram demonstrating an elliptically ossified lesion at the left inferior articular process of T11, and the spinal cord severely flattened by the lesion

solitary,^{3–13} and Table 2 for hereditary^{14–22}). Solitary osteochondromas have been reported in 12 cases (male eight, female four) with an average age of 30 years (ranging from 12 to 61 years), and with an average symptom duration of 12 months (ranging from 1 to 60 months). Hereditary multiple exostoses have also been reported in ten cases (male seven, female three) with an average age of 26 years (ranging from 9 to 58 years), and with an average symptom duration of 51 months (ranging from 1.5 to 384 months). The T4 vertebra is the most commonly affected level for a solitary osteochondroma (42%). The T11 vertebra is rarely uninvolved; the patients of Lanzieri¹⁰ and Cannon¹⁴ were reported although the tumour involved the adjacent vertebrae. The size of the osteochondroma that we are reporting was very large, and flattened the spinal cord. No similar case was found in the literature. The original site of the

a

a

Figure 3 A T1-weighted sagittal view of MRI (TR: 440 ms and TE: 25 ms) demonstrating an elliptical mass with high signal intensity surrounded a low-signal curvilinear line (a). A T2-weighted image (TR: 3000 ms and TE: 100 ms) showing a mass of mixed intensity also surrounded by a low-signal curvilinear line (b)

lesion has been described in nineteen cases. The costovertebral junction including the rib head being the most common origin, 42% of the solitary osteochondroma, and 40% of hereditary multiple

exostoses, respectively. The intervertebral joint, facet and pedicle were also noted to be affected.

Our patient developed an immediate neurological deficit after a fall on his buttock. Myelopathy from an

Figure 4 Photomicrograph (a) revealing the lesion consisted of an irregular bony trabeculae with a fatty bone marrow, and a thin layer of the cartilage covering the surface of the lesion. High power view demonstrating cartilaginous cells in the surface of the lesion irregularly distributed, and mild nuclear atypia. **a:** original magnitude $\times 7.5$ **b:** original magnitude $\times 50$ H&E

Table 1 Summary of 12 cases of thoracic myelopathy resulting from a solitary osteochondroma

<i>Authors (ref no.)</i>	<i>Year</i>	<i>Age</i>	<i>Patients Sex</i>	<i>Affected level(s)</i>	<i>Origin</i>	<i>Duration of neurological Symptoms</i>	<i>Surgical Result</i>
Bradford FK (3)	1954	29	Male	T8	Vertebral body	3 months	Not improved
		61	Male	T9	Vertebral body	1 year	Not improved
Twersky J (4)	1975	12	Male	T4-7	Rib posterior portion	1 month	Excellent
Natarajan M (5)	1976	21	Male	T4-5	Costovertebral angle	2 months	Good
Loftus CM (6)	1980	28	Male	T4	Pars interarticularis	5 years	Good
Spallone A (7)	1981	22	Female	T1-2	Intervertebral joint/Pedicle	2 years	?
Karian (8)	1984	24	Male	T4	Pedicle/Vertebral body	3 months	Improved
Kak VK (9)	1985	40	Female	T6-8	Pedicle	7 months	
Lanzieri CF (10)	1985	18	Female	T11-12	Costovertebral junction		
Linkowski (11)	1985	33	Male	T3	Superior facet/Lamina	10 weeks	Good
Marchand (12)	1986	49	Female	T8	Vertebral body	1 month	Good
Yablon JS (13)	1990	26	Male	T4	Costovertebral junction		
<i>our patient</i>	<i>1996</i>	<i>60</i>	<i>male</i>	<i>T11</i>	<i>Inferior articular process</i>	<i>5 years</i>	<i>Not improved</i>

Table 2 Summary of ten cases of thoracic myelopathy due to hereditary multiple exostoses

<i>Authors (ref no.)</i>	<i>Year</i>	<i>Age</i>	<i>Patients Sex</i>	<i>Affected level(s)</i>	<i>Origin</i>	<i>Duration of neurological Symptoms</i>	<i>Surgical Result</i>
Cannon JF (14)	1954	23	Female	T10-12	?	1 year	Good
Larson NE (15)	1957	33	Male	T3	Costovertebral junction	18 months	Good
Goldenberg DB (16)	1968	23	Male	T5-6	Costovertebral junction	6 weeks	Fair
Crowell RM (17)	1972	13	Male	T2	?	3 months	Good
		18	Male	T8	Pedicle?	4 months	Improved
Becker MH (18)	1978	17	Male	Upper T	Costovertebral junction	3 months	Good
Ho Su (19)	1979	58	Female	T1-2	Inferoposterior aspect?	32 years	Not improved
Palmer FJ (20)	1980	31	Female	T2-3	Pedicle	2 years	Improved
Buur T (21)	1983	33	Male	T4	?	6 months	Improved
Morikawa F (22)	1990	9	Male	C7-T1	Pedicle/Vertebral body	?	Improved

osteochondroma usually appears gradually. Myelopathy associated with trauma or a strenuous activity have very rarely been reported.^{12,23–25} The only example in the thoracic spine was reported by Marchand *et al.*¹² in 1986. The rarity of an acute onset of thoracic myelopathy from an osteochondroma may be partly attributed to the limited mobility of the thoracic spine compared to the cervical and lumbar regions.²⁶

The MRI appearance of spinal osteochondromas has not often been described.^{22,27–29} In our patient there was a peripheral low rim signal on the T1 and T2-weighted images, which was compatible with an endochondral ossifying layer, and a high signal on the T1-weighted, a mixed signal on the T2-weighted image in a central area pathologically corresponding to the irregular bony trabeculae with the fatty bone marrow. The perichondrium described by Lee *et al.*³⁰ was not seen. Complete resection of the cartilaginous cap is essential to prevent tumour recurrence, thus, an accurate assessment of the endochondral ossifying or cartilaginous layer of the osteochondroma adjacent to the dura is a preoperative keypoint. In our patient, the MRI showed the benefit of detecting the layer which could not be demonstrated by CT imaging or by the myelogram.

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