Intraosseous Schwannoma of the Thoracic Spine: A Case Report

Ikuo Kudawara[1], Hiroyuki Aono[1]

Abstract

Introduction: Primary schwannoma of the bone is extremely rare. Spinal schwannoma usually rises in the nerve root or the cauda equina and their branches that occasionally scallop on the adjacent bone. On radiology, their features often mimic those of bone tumors such as osteoblastoma, hemangioma, aneurysmal bone cyst, plasmacytoma, or bone metastasis. Therefore, the diagnosis of pure spinal schwannoma of the bone should be evaluated carefully when referring to radiological and histopathological findings.

Case Report: A 64-year-old female presented with back pain and lower leg dysesthesia. The tumor within the left lamina of the 12th thoracic spine showed an expansile and lytic lesion on computed tomography (CT) and intermediate signals on the T1-weighted image and high signals on the T2-weighted image on magnetic resonance imaging. In addition, an old compression fracture in the same vertebra was observed. A CT-guided biopsy specimen suggested schwannoma. The tumor was successfully excised, and afterward, remission of the symptoms was observed. A definitive diagnosis of intraosseous schwannoma was made. There has been no recurrence in the 6 years following surgery.

Conclusion: We have presented the radiological and histopathological findings as well as the clinical outcomes of an unusual case of intraosseous schwannoma of the posterior element of the 12th thoracic spine. Pre-operative CT-guided biopsy was useful in making a diagnosis and planning a surgical strategy.

Keywords: Schwannoma, Thoracic spine, Bone

Introduction

Schwannoma is a common benign soft-tissue tumor that occurs in various sites of the extremities and the trunk. In contrast, primary schwannoma of the bone is extremely rare and accounts for <0.2% of all primary bone tumors [1, 2]. Spinal schwannoma usually rises in the nerve root or the cauda equina and their branches that occasionally scallop on the adjacent bone. On radiology, their features often mimic those of bone tumors such as osteoblastoma, hemangioma, aneurysmal bone cyst, plasmacytoma, or bone metastasis. Therefore, the diagnosis of pure spinal schwannoma of the bone should be evaluated carefully when referring to radiological and histopathological findings. Herein, we report an unusual case of an intraosseous schwannoma in the posterior element of the 12th thoracic spine after a compression fracture of the vertebral body in the same vertebra.

Case Report

A 64-year-old woman presented with the back pain for 1 year. She had also developed slowly worsening bilateral lower leg dysesthesia a month before. On physical examination, she had local kyphosis at the thoracolumber junction with normal neurologic examination results.

She walked with the support of a cane on the road and moved up or down the stairs with the support of the handrail. In her history, she had a compression fracture of the thoracic (T) 12 vertebral body due to a fall from the second floor when she was 27 years old.

A lateral plain X-ray showed an old compression fracture of T12 the vertebral body (Fig. 1a). A computed tomography (CT) myelography demonstrated an expansile and osteolytic lesion within the left lamina of T12 (Fig. 1b). Magnetic resonance imaging (MRI) revealed that the tumor had intermediate signals on the T1-weighted image (Fig. 1c) and central very high signal and peripheral high signal on the T2-weighted image (Fig. 1d). Percutaneous CT-guided needle biopsy of the tumor was performed under local anesthesia with lidocaine (Fig. 2). Histologically, the tumor composed of uniform spindle cells, which was positive for S100, and the Mib-1 (Ki-67) index was less than 5%. The above findings were strongly suggestive of schwannoma.

The patient provided informed consent for biopsy and surgery and according to the local institutional review board guidelines.

Surgery was performed through a posterior approach under general anesthesia. The tumor was completely resected "en-block" while saving the nerve roots and dural sac (Fig. 3a). The tumor was located within the lamina and extended to the epidural space. However, it did not connect to the adjacent dura matter and nerve roots. Histology of the tumor removed revealed highly cellular spindle cells, many dilated vessels, and

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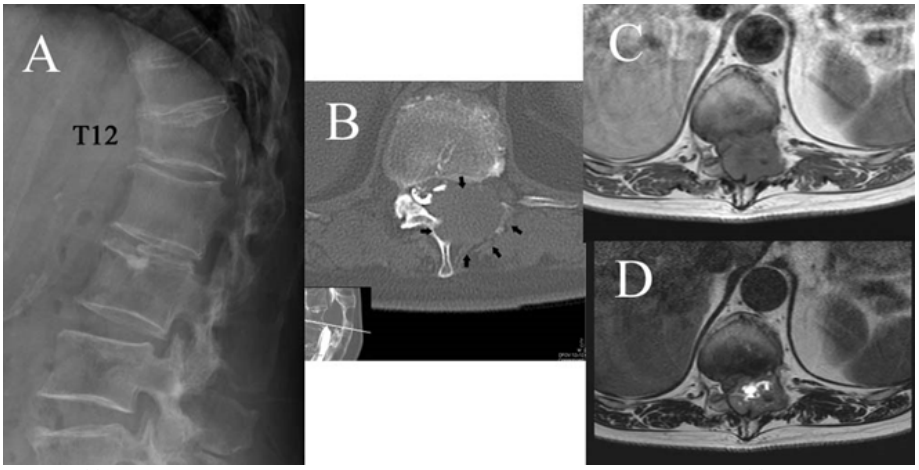

Figure 1: (a) A lateral plain X-ray showing an old compression fracture of the 12th vertebral body. (b) An axial computed tomography-myelography showing that the expansile tumor involves the left lamina and the base of the spinous process of the T12. The thecal sac was remarkably compressed by the tumor. (c) An axial T1-weighted magnetic resonance imaging (MRI) showing a tumor within the left posterior element that is of an intermediate signal. The part of the central portion of the tumor shows a low signal compared to the muscle. (d) In an axial T2-weighted MRI, the tumor shows a heterogeneously high signal compared to the muscle. The low signal area in the T1-weighted image shows marked high intensity.

hyalinization (Fig. 3b-c). In addition, peripheral lamellar bone formation was observed (Fig. 3b). From the above radiological and histologically findings, a definitive diagnosis of intraosseous schwannoma was made. The patient's post-operative course was uneventful. The back pain reduced and the right lower leg dysesthesia of resolved immediately after surgery. Post-operative MRI demonstrated that the tumor had been completely removed. She was able to walk without any assistance 2 weeks after surgery. Two months after surgery, she was able to do almost home management and walk without support. There has been no recurrence on MRI evaluation in the 6 years following surgery. Her presenting symptoms had almost completed resolved except mild dysesthesia of the left foot.

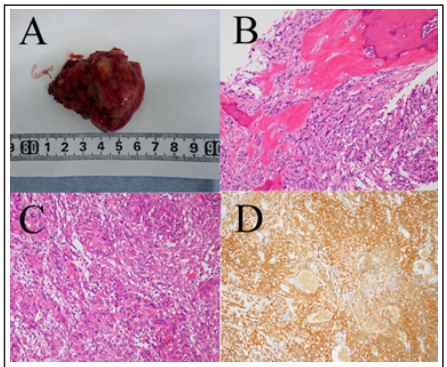

Figure 3: (a) Gross appearance of the tumor removed. The tumor is soft, glossy, and yellowish-red. (b-d) Photomicrograph. (b) Peripheral lamellar bone formation of the tumor. ×200, (c) High cellularity of spindle cells and vessels. ×200 Hematoxylin-eosin, and (d) Immunohistochemically, the tumor cells are strongly positive for S100. ×100.

Discussion

There are three mechanisms and conditions of schwannoma of the bone:

(1) Secondary bone erosion due to extension of a soft-tissue tumor, (2) progression of a tumor within the nerve root forming a dumbbell-shaped configuration, and (3) an intramedullary tumor [2]. (1) and (2) are occasionally observed on CT or MRI; however, (3) is a very rare condition. A radiological and histopathological study of 17 intramedullary schwannoma cases (excluding spinal cases) indicated that the most of the cases showed lytic expansile lesions on radiology and features of the conventional schwannoma on pathology [3]. In the spinal cases, the most common site is the sacrum and mobile spine cases are extremely rare. A recent review indicated that the until now, only 25 cases of intraosseous schwannoma of the mobile spine have been reported [4]. Of eight cases of the thoracic spine, four cases occurred in the posterior element including the pedicle, transverse process, and lamina [5, 6, 7, 8, 9, 10, 11, 12]. Interestingly, six of nine thoracic spine cases, including the present case, were occurred in the T12 [5, 6, 7, 8, 9]. The thoraco-lumber region is the region that the most easily receives a concentrated force due to trauma. However, there is no basis on which to assert that the present case was a post-traumatic tumor.

The present case was considered to be arising from the Schwann cells of the fine nerves in the posterior element, includes the bone

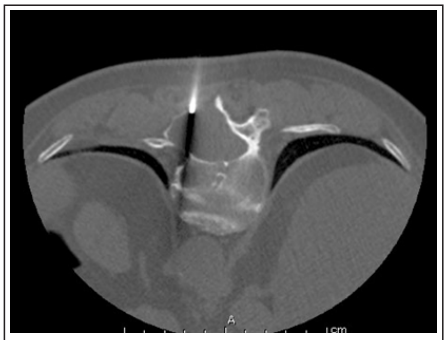

Figure 2: Computed tomography-guided percutaneous needle biopsy.

marrow, periosteum of the lamina, or a ligamentum flavum, because the tumor expanded from the center of the lamina to the epidural space unconnected to the nerve roots.

The differential diagnoses of expansile bone lesions of the posterior element, such as in the present case, are osteoblastoma, giant cell tumor of bone, aneurysmal bone cyst, plasmacytoma, and bone metastasis [9, 10]. A biopsy is essential to confirm the definitive diagnosis as a spinal lesion. The percutaneous CT-guided needle biopsy that we performed before surgery is a safe and less invasive procedure. Moreover, the accuracy rate of pathological diagnosis for the various spinal lesions has been reported to be 93% [13]. Therefore, a pre-operative CT-guided biopsy was helpful in ruling out malignancy in the present case. S100 positive benign spindle cells in the biopsy specimen were strongly suggestive of benign neurogenic tumor. The surgical outcomes of intraosseous schwannoma of the thoracic spine are generally well referred to in the previous studies [8, 10, 11].

Conclusion and Clinical Relevance

We have presented the radiological and histopathological findings as well as the clinical outcomes of an unusual case of intraosseous schwannoma of the posterior element of the 12th thoracic spine. Intraosseous schwannoma should be considered in the differential diagnosis of an expansile and osteolytic lesion within the lamina of spine on CT or MRI. Pre-operative CT-guided biopsy was useful in making a diagnosis and planning a surgical strategy. There has been no recurrence in the 6 years following surgery.

A favorable clinical outcome after surgery is achieved.

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