



Case Report

A purely midline ventral schwannoma mimicking a meningioma in the thoracic spine resected via costotransversectomy



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ABSTRACT

Spinal schwannomas are intradural nerve sheath tumors typically located in a dorsolateral or ventrolateral position. Clinical presentations vary from radicular root pain to cord compression myelopathy. Prognosis is usually benign if the tumor can be removed safely. A 62-year-old man had myelopathy and incontinence due to a midline ventral intradural-extramedullary tumor of the thoracic spinal cord. Magnetic resonance imaging demonstrated that the tumor was movable and connected with one root. The tumor was removed with a unilateral costotransversectomy with a posterior approach. Histological diagnosis revealed a schwannoma. Magnetic resonance imaging is a prerequisite to differentiate a ventral and midline intradural spinal schwannoma from other tumors preoperatively. A posterior approach is an efficient and effective method of treating a purely ventral thoracic schwannoma with significant cord compression.

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1. Introduction

Given the typical origin from Schwann cells of the nerve sheath, a spinal schwannoma is one of the most common intradural-extramedullary tumors. A spinal schwannoma almost always locates eccentrically in the dorsolateral, lateral, or ventrolateral position [1]. These tumors can be removed safely through a posterior or posterolateral approach [2]. To our knowledge, a purely ventrally located intradural schwannoma in the thoracic spinal cord is rare [3]. Here, we present a case of a ventral, movable schwannoma of the thoracic spinal cord with myelopathy.

2. Case report

A 62-year-old man presented with progressive numbness and weakness over the bilateral lower limbs for 17 months. He complained of shooting pain with radiation to the bilateral lower limbs

and also suffered from stool incontinence. Neurological examination revealed bilateral hypesthesia below the T10 dermatome but preserved proprioception. Muscle power in the lower limbs from the bilateral hip flexors to the ankle plantar flexors was graded 3, and the deep tendon reflexes of the knee and ankle were increased. The Babinski sign was positive. Although the voluntary contraction of the anal sphincter was weak, the anal reflex was intact and the anal tone was preserved. Thoracic spine magnetic resonance imaging (MRI) first revealed an isointensity mass located between the T9 and T10 levels over the ventral side of the thoracic cord on T1-weighted images (WI; Fig. 1A). In order to differentiate this tumor from other pathological entities, another T1WI scan with contrast enhancement was done 9 days later, and showed a well-encapsulated, homogeneous enhancing mass with a root origin movable over T8 (Fig. 1B). Axial T2WI MRI delineated the margin between the large ventral tumor and the significantly compressed dorsal spinal cord (Fig. 1C).

The patient underwent a right side costotransversectomy at T9 and partial laminectomy at T8. A well-encapsulated tumor was noted after opening the dura (Fig. 1D). The tumor was movable and connected to one nerve root. The tumor was totally removed. After closure of the dura, we inserted transpedicle screws over the right T8, T9, and T10 vertebrae, and applied a rod for fixation.

Conflicts of interest: none.

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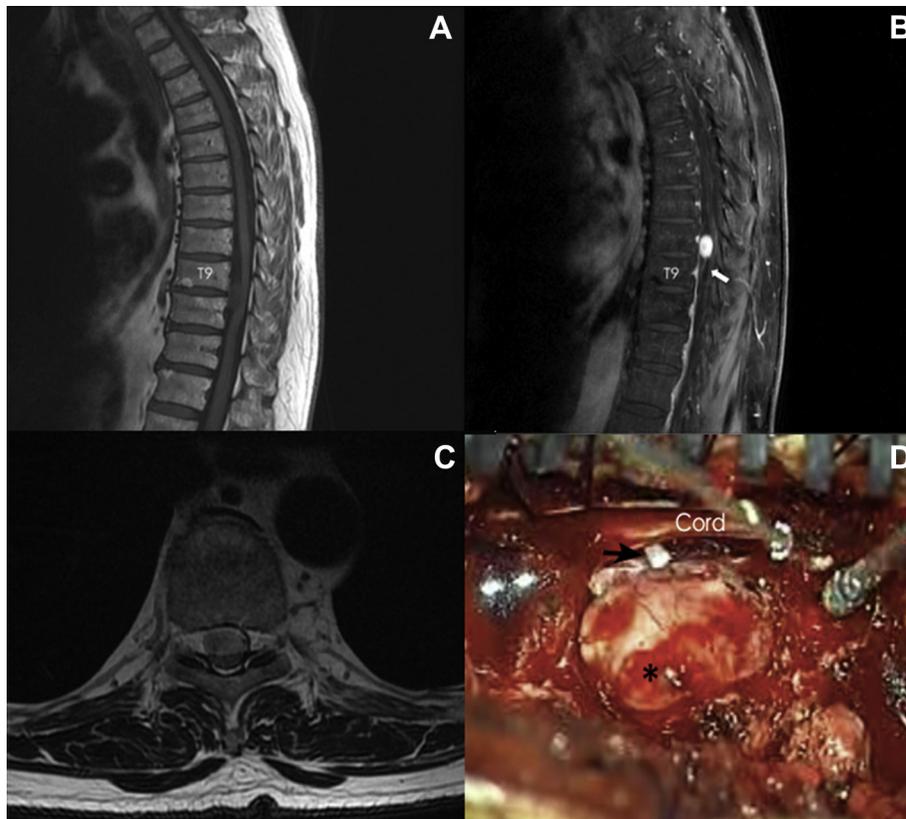


Fig. 1. (A) A schwannoma is seen as an isointense mass between the T9–T10 levels over the ventral side of the thoracic cord on T1WI. (B) Another T1 scan with contrast enhancement 9 days later shows a well-encapsulated, homogeneous enhanced mass with a root origin (white arrow) movable over T8. (C) The spinal cord is compressed considerably by the ventral midline schwannoma in axial T2WI. (D) Gross picture of the thoracic spinal schwannoma with root connection (asterisk: tumor; black arrow: root). T1WI = T1-weighted image; T2WI = T2-weighted image.

Somatosensory-evoked potentials were monitored intraoperatively and remained stable. A pathological examination of the tumor revealed a typical schwannoma, which included Antoni A and Antoni B areas and Verocay bodies (Fig. 2). The patient recovered well without complications. His incontinence improved significantly. Two weeks after the operation, muscle power in the lower limbs recovered to grade 4 and he could walk independently.

3. Discussion

Spinal nerve sheath tumors including schwannoma and neurofibroma constitute about one-fourth of intradural spinal tumors and are also the most common intradural extramedullary ones [4]. The majority of spinal schwannomas originate from dorsal

sensory roots. Our report with purely midline and ventral located schwannoma might indicate an alternative origin of tumors of Schwann cell derivation [5]. Preoperatively, a schwannoma must be differentiated from a meningioma, another common spinal tumor, which has a more varied location but is often situated anterior to the spinal cord [6]. The initial impression in this case was meningioma. However, most schwannomas are isointense to the spinal cord on T1-weighted images and hyperintense to the cord on T2-weighted images [7]. The most important finding was that the second preoperative MRI showed that the tumor moved to a different thoracic level with a root connection, which highlights that MRI can provide significant information for surgical planning.

The location of the spinal tumor may be the most important factor in deciding on the surgical approach. A transthoracic

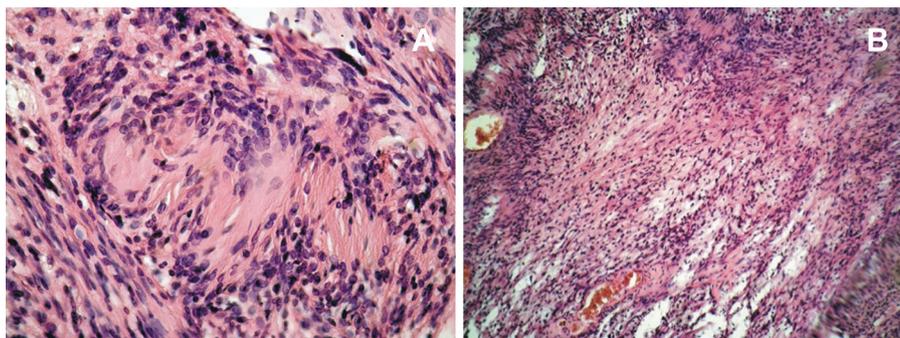


Fig. 2. Histological samples show typical features of a schwannoma including Verocay bodies in (A) Antoni A ($\times 400$) and (B) Antoni B areas ($\times 100$).

thoracotomy allows direct visualization of the ventral dura, but extensive mobilization or manipulation of the lungs may lead to significant pulmonary or vascular complications [8]. A lateral extracavitary approach is usually reserved for spinal tumors when extensive paraspinous exposure is required [9]. A costo-transversectomy provides access to most ventral intradural spinal lesions, whereas meticulous cord manipulation and varying degrees of bone resection are necessary to prevent endangering neurological function [3]. However, our case experience revealed that the costotransversectomy without destabilization was enough for the ventral intradural-extramedullary movable schwannoma and provided considerable visualization of the tumor. The artery of Adamkiewicz is the largest anterior segmental medullary artery and supplies the spinal cord from T8 to the conus. It arises from the left posterior intercostal artery in 80% of patients, and enters the spinal canal between T9 and T12 in 75% of patients. Therefore, most surgeons advocate a right side approach to avoid inadvertent injury of this artery [10]. The initial presentations of spinal intradural tumors vary in accordance with the level of the tumor. The most common symptom is segmental pain because of direct or indirect irritation of the nerve root or root compression by the tumor [11–13]. Motor weakness in the lower extremities or incontinence may not be obvious until later stages. However, when tumors locate merely over the ventral side of the spinal cord and compress the spinal cord directly, such as our case, the spinal tracts can be damaged and myelopathy develops as the first clinical presentation [14]. Although a T2 root section could potentially result in Horner syndrome, and lower thoracic motor root division (T8–L1) can cause a painful pseudohernia of the abdominal wall, there is seldom any significant clinical deficit when thoracic nerve roots below T1 are sacrificed [15]. Because the extent of removal is the most significant factor in recurrence, we resected the tumor and the associated root completely [16,17].

In conclusion, although most spinal schwannomas present over the easily accessed dorsolateral position, they should also be considered in a purely midline and ventral thoracic tumor with myelopathy as an initial symptom. Even if the imaging characteristics of a schwannoma usually overlap with meningioma, imaging features such as movability and connected roots are helpful in surgical planning. Unilateral costotransversectomy provides an

effective approach for an intradural-extramedullary schwannoma that is ventral and midline to the thoracic spinal cord.

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