Non-Dural-Based Spinal Meningioma: The First Case Report of a Fibrous Subtype and a Review of the Literature

Ji Hye Lee, M.D., Hong Joo Moon, M.D., Ph.D., Joo Han Kim, M.D., Ph.D., Youn-Kwan Park, M.D., Ph.D.
Department of Neurosurgery, Korea University Guro Hospital, Korea University College of Medicine, Seoul, Korea

INTRODUCTION

Spinal meningiomas are common, comprising 25–46% of primary intra-spinal tumors. They affect mostly female patients, and the average age of patients is about 50 years. Spinal meningiomas are located in the intra-dural and extradural spaces, and typically adhere to the dura matter. To date, few cases of non-dural-based meningiomas have been reported, as most are reports of clear cell meningiomas. This case report describes the first case of a non-dural based fibrous meningioma in the cervico-thoracic region in a 49-year-old female patient.

CASE REPORT

A 49-year-old female patient was admitted complaining of persistent pain and numbness in both legs for 4 months and a recently developed gait disturbance. These symptoms had intensified recently, and she was unable to walk without assistance. No remarkable disease or trauma history was noted. A neurological examination revealed bilateral numbness of the lower extremities that was particularly right-side dominant with an unclear dermatome. Hip flexion and extension motor grade was grade IV bilaterally. The pathological Babinski and ankle clonus reflexes were positive. Bladder and anal sphincter functions were preserved and motor and sensory functions of the upper extremities were normal. A laboratory examination and plain radiography of the cervical and thoracic spine were unremarkable. Magnetic resonance image (MRI) demonstrated a 1.7×1.4-cm lobulated mass in the C7–T1 dorsal space, probably the intra-dural extramedullary space. T2-weighted MRI showed a low-signal-intensity elliptical lesion, which was enhanced peripherally on a gadolinium enhanced T1-weighted image. The spinal cord was severely compressed and displaced anteriorly by the mass lesion.

A C7-T1 cervical laminectomy and vertical incision in the dura were performed. No dural attached or adherent point was observed around the mass lesion when the intra-dural space was explored. The mass was covered with a white membrane but was not adhered to the dura, and its appearance was consistent with a neurilemmoma. The histopathological diagnosis was fibrous-type meningioma. The recovery of the patient was uneventful. No surgical complications and no recurrence of the tumor had occurred at the 6-month follow-up.

Key Words: Spinal tumor · Fibrous meningioma · Non-dural based.
lowish round mass (Fig. 2). Debunking and careful resection was performed using a microsurgical technique. A complete resection was achieved.

Spindle-shaped cells in a collagen-rich matrix were observed microscopically. The spindle tumor cells showed moderate nuclear polymorphism and formed parallel fascicles. Immunohistochemical staining revealed vimentin-positive, epithelial membrane antigen-negative, and S-100-protein-negative tissues (Fig. 3). These findings were consistent with a fibrous-type meningioma.

The leg numbness and gait disturbance showed gradual improvement postoperatively. The 1 week postoperative MRI revealed no residual tumor and no complications (Fig. 4). The patient was discharged without any complications. At the 1-month follow-up, the gait disturbance had improved, and she was able to walk without assistance.

**DISCUSSION**

Spinal meningiomas typically affect females at a female-to-male ratio of 4-5:1 and usually occur in patients >50 years old.7,15,24 The most frequent site of a spinal meningioma is the thoracic spine, followed in frequency by the cervical and lumbo-sacral spinal levels.7,15,24 Meningothelial and psammomatous meningiomas are the most common histopathological subtypes of spinal meningiomas.15,24 A fibrous meningioma is an uncommon subtype, representing about 1% of all spinal meningiomas15,24 and has benign features.

Spinal meningiomas typically attach to the dura, and non-dural spinal meningiomas are rare.15,24,28 Eighteen cases of non-dural based spinal meningiomas have been reported to date (Table 1).2,4,6,8,9,11,13,14,16-22. Most tumors in these cases occur in the lumbo-sacral region (16 cases), including the thoraco-lumbar junction (two cases).2,4,6,8,9,11,13,14,16-20,21. The other two cases were cervical (C3-5) and thoracic (T9-10) meningiomas.11,21 Our case is the third case that involved cervico-thoracic spine (C7-T1). The average age of these cases was about 25 years, which is less than the average age of patients with general spinal meningiomas, except one case (a 65-year-old female with a thoracic clear cell meningioma).29

Most of histopathologic subtype of non-dural-based spinal meningiomas was clear cell meningioma (15 cases)2,4,6,8,9,11,13,14,16-18,20-22, whereas the remaining three cases were angiomatosus, transition-
CONCLUSION

We report the first case of a fibrous-type spinal meningioma without dural attachment.

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Table 1. The reported cases of non-dural-b based spinal meningiomas

| Authors                  | Sex | Age | Location | Subtype of tumor      |
|-------------------------|-----|-----|----------|-----------------------|
| Ng et al.               | M   | 23  | L5 root  | Angiomatos            |
| Holtzman and Jormark    | M   | 32  | L3-4     | Clear-cell            |
| Maxwell et al.          | F   | 31  | L3       | Clear-cell            |
| Dubois et al.           | F   | 10  | L1-4     | Clear-cell            |
| Jallo et al.            | F   | 8   | L1-3     | Clear-cell            |
| Jallo et al.            | F   | 2   | C3-5     | Clear-cell            |
| Carrà et al.            | M   | 2   | T1-L-4   | Clear-cell            |
| Mizutani et al.         | F   | 20  | L5-S1    | Transitional          |
| Cho et al.              | F   | 17  | S1       | Clear-cell            |
| Chen et al.             | F   | 41  | L4-5     | Clear-cell            |
| Payano et al.           | M   | 24  | L3-4     | Clear-cell            |
| Payano et al.           | F   | 19  | L3       | Clear-cell            |
| Hwang et al.            | F   | 46  | T12-L4   | Meningotheliomatos    |
| Oviedo et al.           | M   | 7   | L3       | Clear-cell            |
| Park et al.             | F   | 65  | T9-10    | Clear-cell            |
| Nakajima et al.         | F   | 21  | L2-4     | Clear-cell            |
| Ko et al.               | F   | 34  | L2-3     | Clear-cell            |
| Kobayashi et al.        | M   | 43  | L1-3     | Clear-cell            |
| Present case            | F   | 49  | C7-T1    | Fibrous               |

spinal based spinal meningiomas, the possibility of total resection and/or radiotherapy should be taken into consideration. However, it is remarkable that subtype of present case was benign as fibrous subtype, and there were other three cases of benign subtypes.

MRI of a spinal meningioma typically shows homogenous enhancement and the “dural tail sign”, which is dural enhancement or thickening near the tumor on enhanced T1-weighted images. However, the meningioma in the present case showed only peripheral enhancement, and there was no “dural tail sign”. Therefore, even if no typical sign of a meningioma on MRI such as the “dural tail sign” is present, the possibility of a meningioma should not be ruled out.

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| Jallo et al.            | F   | 8   | L1-3     | Clear-cell            |
| Jallo et al.            | F   | 2   | C3-5     | Clear-cell            |
| Carrà et al.            | M   | 2   | T1-L-4   | Clear-cell            |
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| Cho et al.              | F   | 17  | S1       | Clear-cell            |
| Chen et al.             | F   | 41  | L4-5     | Clear-cell            |
| Payano et al.           | M   | 24  | L3-4     | Clear-cell            |
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CONCLUSION

We report the first case of a fibrous-type spinal meningioma without dural attachment.