Case report

Thoracic intradural extramedullary lesions causing progressive myelopathy as an initial manifestation of granulomatosis with polyangiitis: a case report and review of literature

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Context: To our knowledge, only a few reports regarding the spinal involvement of granulomatosis with polyangiitis (GPA)—also termed as Wegener's granulomatosis—have been published. However, all these cases reportedly exhibited epidural tumor-like lesions or dural thickening.

Findings: We report the case of a 57-year-old woman with progressive myelopathy caused by multiple spinal lesions with GPA, which appeared to be protruding inwards, within the dura mater, on magnetic resonance imaging (MRI); these lesions were difficult to distinguish from intradural tumors. Moreover, these lesions exhibited low intensity on both T1- and T2-weighted MRI, and showed prominent enhancement on gadolinium-contrast imaging. Resection biopsy was effective for both diagnosis and the recovery of the neurological deficit.

Conclusion: Based on these findings, we suggest that GPA lesions can exhibit variable patterns in the spine. Nevertheless, clinicians should consider the possibility of GPA in such cases, particularly when multiple, inwardly protruding tumor-like lesions are detected within the dura mater on MRI.

Introduction

Granulomatosis with polyangiitis (GPA)—also known as Wegener's granulomatosis—was first described by Friedrich Wegener in 1936.¹ GPA is characterized by necrotizing granulomatous inflammation as well as small-vessel vasculitis of the upper and lower respiratory tracts, kidneys, and other organs.² The central nervous system (CNS) can also be affected by GPA; however, to our knowledge, only a few reports of spinal cord involvement in GPA have been published, and all these cases have exhibited epidural lesions or dural thickening caused by GPA.^{3–9} In the present report, we describe the case of a patient who presented with progressive

myelopathy due to intradural extramedullary lesions in the thoracic spine as an initial manifestation of GPA.

Case report

Presentation and examination

A 57-year-old woman with a 2-month history of left intercostal neuralgia presented with progressive gait disturbance, which was first noted 3 weeks prior to her visit to our clinic. When she first visited our clinic, she was unable to walk independently, due to spastic paraparesis; moreover, she exhibited bladder dysfunction. Sagittal magnetic resonance imaging (MRI) showed multiple lesions in the thoracic spine, which exhibited low intensity on both T1- and T2-weighted imaging and prominent enhancement on gadolinium-enhanced imaging (Fig. 1 A-C). Furthermore, T2-weighted axial

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Figure 1. (A), (B) and (C) represent sagittal T1-weighted, T2-weighted, and gadolinium-enhanced magnetic resonance (MR) images of the spinal cord obtained during the primary visit, respectively. Multiple inwardly protruding lesions are indicated by white arrowheads, and appeared to have low intensity on T1- and T2-weighted images and strong enhancement on contrast media administration. The white arrows indicate the enhanced lesions at the anterior aspect of the vertebra. (D) T2-weighted axial MR image at the Th3 level, where the spinal cord is most severely compressed. (E) T2-weighted axial MR image at the Th9/10 level. The black arrows in (D) and (E) indicate the retained epidural fat; at both levels, the lesions appear to be protruding inwardly from the dura mater.

MRI clearly showed that the epidural fat was retained, thus indicating that these lesions were located intradurally (Fig. 1 D-E). In addition, the enhanced lesions were observed at the anterior aspect of the thoracic vertebrae (Fig. 1 C).

Operation

To achieve a pathological diagnosis as well as spinal cord decompression, surgery was performed at the Th2–4 lesion, where the spinal cord was most severely

compressed. After laminectomy was performed from Th2 to Th4, a longitudinal incision was made in the dura mater. The mass was located outside the arachnoid mater and the border between the mass and the inner layer of the dura mater was unclear; hence, the inner layer of the dura mater was resected, while the outer layer was preserved. After the surgery, the neurological deficit gradually recovered, and at 2 weeks after surgery, she was able to walk independently.

Figure 2. Histology of the resected mass at the Th2-Th4 level. Necrotizing granuloma formation (center) and surrounding lymphoplasmacytic infiltration (right) are observed. A multinucleated giant cell is also observed (arrow). Hematoxylin and eosin stain ($\times 200$).

Pathological findings

Histological examination of the lesion indicated dense lymphoplasmacytic infiltration and necrotizing granuloma formation (Fig. 2). Moreover, scattered multinucleated giant cells were observed. However, no evidence of necrotizing vasculitis was found.

Postoperative course

After the surgery, she was diagnosed with GPA with certain other conditions, including saddle nose, elevated serum anti-myeloperoxidase ANCA (MPO-ANCA) level, and refractory otitis media. Moreover, she was found to have diabetes insipidus, and MRI of the head indicated an enlarged pituitary gland, including infundibular thickening, which implied pituitary involvement of GPA.

At 1 month after surgery, treatment with prednisolone (PSL; 50 mg/day) and intravenous cyclophosphamide administration was initiated. MRI, performed 4 weeks after the initiation of medication, clearly indicated that the lesions remaining after surgery had diminished, thus suggesting that these lesions were consistent with those of GPA (Fig. 3). Nevertheless, diabetes insipidus was still observed after treatment, even though pituitary gland enlargement appeared to be reduced on MRI.

Discussion

Although the involvement of the CNS in cases of GPA is rare, cranial neuropathies are commonly reported in such cases. Moreover, even though cases of GPA with spinal involvement are very few, most of these cases exhibit epidural mass or dural thickening.^{3–10} In the present case, the GPA masses appeared to be protruding inwardly, within the dura mater, and showed retained epidural fat tissue; hence, it was difficult to distinguish

Figure 3. (A) Sagittal T1-weighted magnetic resonance (MR) image of the spinal cord at 7 days after surgery. (B) Sagittal T1-weighted MR image of the spinal cord at 4 weeks after the initiation of medication. The white arrowhead indicates the portion where the spinal cord at the Th2-Th4 level is well decompressed, following the resection of the lesion. The white arrow indicates the regression of the remaining lesion at Th9/10 level with medication.

these lesions from intradural tumors such as multiple meningiomas or metastatic tumors. To our knowledge, this is the first case of spinal GPA to undergo a longitudinal dural incision to achieve sufficient decompression and obtain adequate specimens; in the other cases of spinal GPA, specimens were collected from the surrounding dura mater tissue.

Furthermore, in previous studies, spinal GPA lesions have been reported to exhibit various MRI patterns. In most cases, the lesions exhibit low intensity on both T1- and T2-weighted MRI and prominent enhancement on gadolinium-enhanced MRI. However, Albayram *et al.* reported a case of spinal GPA lesions without any such enhancement on contrast agent administration.^{3–9} In the present case, similar to that observed in most cases, the spinal GPA lesions exhibited low intensity on both T1- and T2-weighted MRI and prominent enhancement on gadolinium-contrast MRI, which supports the diagnosis of GPA.

The dural lesions observed in cases of GPA are believed to be a result of hypertrophic pachymeningitis.⁴ In the present case, inflammation mainly affected the inner layer of the dura mater, which caused the inward protrusion of the GPA lesions. In previous studies, only a few cases of GPA with prevertebral lesions have

been reported.^{11–14} Hence, the enhanced lesions in the anterior aspect of the thoracic vertebrae in the present case were believed to be consistent with GPA.

In the present case, GPA was diagnosed based on the 1990 ACR criteria for the classification of Wegener's granulomatosis. Spinal tumors, including multiple meningiomas or metastatic tumors; infectious diseases, such as tuberculosis, fungal infection, or syphilis; and inflammatory diseases, such as GPA, IgG4-related disease, sarcoidosis, or Langerhans cell histiocytosis are the other conditions that were included in the differential diagnosis. Among these conditions, tumors were excluded based on the pathological findings of the resected specimen, infectious diseases were excluded based on the findings of cerebrospinal fluid culture, and other inflammatory diseases were excluded based on the histological findings. However, the clinical findings, including typical saddle nose and refractory otitis media, and the granulomatous inflammation on histological examination were consistent with a diagnosis of GPA, even though the presence of anti-MPO ANCA antibodies was somewhat atypical. GPA is a type of ANCA-associated small-vessel vasculitis, and is usually associated with proteinase 3 anti-neutrophil cytoplasmic antibody (PR3-ANCA) in 90% of patients.² However, anti-MPO ANCA may also be observed in cases of GPA.¹⁵ In the literature, the detailed findings of 7 cases with spine lesions caused by GPA have been reported; of these cases, 5 were positive for anti-MPO ANCA and 2 were positive for PR3-ANCA.^{3–8} Hence, GPA with spinal involvement can manifest differently based on the ANCA serology, although the underlying mechanisms require further evaluation.

Thus far, no consensus has been reached regarding the treatment of spinal paralysis caused by lesions of GPA. Prednisolone, azathioprine, and cyclophosphamide are currently the common treatment options for GPA; in the present case, these drugs were effective for ensuring the regression of the remaining spinal lesions.^{16–17} However, when the rapid impairment of paralysis was observed in the present case, drug administration alone was not considered to be appropriate, as spinal paralysis occasionally becomes irreversible in severe cases. Therefore, once spinal involvement is detected in cases of GPA, we have to consider surgical decompression as a treatment option.

In conclusion, we present a case with spinal involvement of GPA, wherein the lesions were protruding inwardly, within the dura mater, and were difficult to distinguish from intradural tumors. Thus, clinicians should be aware that GPA lesions can manifest as different patterns in the spine.

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