Spinal Carcinoid Metastasis with Dural Invasion

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Key words
- Carcinoid tumor
- Intradural extramedullary spinal cord tumors
- Spinal metastasis

Abbreviations and Acronyms
CNS: Central nervous system
MRI: Magnetic resonance imaging

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■ OBJECTIVE: **To present the unusual finding of a lumbar intradural carcinoid metastasis in a 67-year-old man with a primary thymic carcinoid diagnosed 16 years before presentation.**

■ METHODS: **The history and imaging findings of this patient are presented, and the literature is reviewed.**

■ RESULTS: **Only three patients with intradural carcinoid tumors, including the one described here, have been reported. In each case, the tumor was discovered in the lumbar region. All patients were treated with surgery. The clinical behavior of metastatic carcinoid in the central nervous system (CNS) and the treatment rationale are also described.**

■ CONCLUSIONS: **Carcinoid tumor metastases are rarely identified in the CNS even in patients with advanced metastatic disease.**

INTRODUCTION

Carcinoid tumors are rare neuroendocrine neoplasms often discovered in the gastrointestinal tract and bronchopulmonary tree. Metastases arising from malignant carcinoid tumors are infrequently identified in the central nervous system (CNS) and usually only during the late stages of the disease. To date, only two patients with intradural spinal carcinoid metastasis have been described in the literature. We present the case of a 67-year-old man with a metastatic carcinoid tumor that was found in the lumbar spine with dural invasion.

CASE REPORT

History

A 67-year-old Indian man with a medical history significant for carcinoid tumor of the thymus presented to the Cleveland Clinic outpatient clinic complaining of left lower extremity weakness for 3 weeks. In 1991, 16 years before presentation, a mass was discovered on a routine chest x-ray. He was diagnosed with thymic carcinoid tumor and underwent thymectomy without adjuvant therapy. Metastases were found in the right ileum, the left ventricle of the heart, and the para-aortic region 5 years after his initial presentation. He was treated with octreotide (Sandostatin; Novartis, Cambridge, MA). Multiple bony metastases involving the spine were discovered 6 months later on computed tomography scan after he complained of back pain. He was treated with external-beam radiation therapy from T10 to the sacrum (40 Gy over 20 fractions) and from C1 to C7 (37.5 Gy over 20 fractions) and chemotherapy with streptozocin. This treatment regimen alleviated his pain. In 1998, he had radiation therapy to his spine from T4 to T8 (37.5 Gy over 15 fractions) for progressive disease. He was started on interferon alpha. Octreotide was resumed for persistent left ventricular mass. He developed a right-sided Bell palsy in 2000 that resolved without treatment but recurred in 2002. Magnetic resonance imaging (MRI) showed a 10 mm × 7 mm × 14 mm erosive, enhancing right petrous bone mass. A biopsy specimen of the mass was consistent with carcinoid tumor. This lesion remained stable until 2004. He was then treated with radiation therapy to the right petrous bone (5000 cGy over 25 fractions) and with intensity-modulated radiotherapy (200 cGy over 10 fractions). Two years before presentation, he developed epidural metastases at T2-3 and T8-9. He was treated at an outside hospital where the tumors were debulked after multilevel laminectomies leaving him with bothersome bowel and bladder incontinence. Computed tomography scan showed a 2.2 cm × 1.8 cm clival mass that remained stable on follow-up imaging.

The patient presented to our outpatient clinic in 2007 for a second opinion regarding new left lower extremity weakness, and MRI revealed interval spinal disease progression. Radiation therapy for spinal disease was initiated at an outside hospital but not completed. He denied paresthesias but complained of worsening bowel and bladder control. The radiation oncology service at our institution did not expect significant benefit in either tumor control or symptom relief with further irradiation. In addition to metastatic carcinoid of the thymus, his past medical history includes benign prostatic hypertrophy, vitamin B_{12} deficiency, type 2 diabetes mellitus, and hyperlipidemia.

Examination

On examination, the patient was found to have a peripheral palsy of cranial nerve VII

and decreased hearing on the right. His other cranial nerves were intact. He had two well-healed incisions in his upper thoracic and mid-thoracic region. Muscle bulk and tone were normal and symmetric. Spinal or paraspinal tenderness was not elicited. Motor power was diminished (4/5) in the left hip flexors and knee extensors. Light touch and pinprick were reduced in an L4 dermatomal distribution. Long tract signs were not evident.

Neuroimaging

MRI of the thoracic and lumbar spine revealed an epidural and paraspinal mass centered over T3 (**Figure 1A**). Bony involvement at T9 contributed to a pathologic fracture and central stenosis with associated cord signal changes (**Figure 1B**). In the lumbar spine, an L5 epidural mass extended into the left L5-S1 foramen (**Figure 1C**).

Surgical Procedure

In the thoracic spine, laminectomies were performed at T2 and T3. The bulk of the tumor at this level was resected piecemeal from the underlying dura. The patient underwent laminectomies and resection of the epidural tumor at T8 and T9. After laminectomies at L4 and L5, the thecal sac was gently retracted to expose the ventral component of the tumor mass, which had invaded the dura. The operating microscope was brought into the field, and the dural opening was expanded. The intradural component of the tumor had become entwined with multiple nerve roots limiting the resection. The dura was closed with 4-0 Nurolon sutures (Ethicon, Cincinnati, OH). Tumor specimens from each location confirmed the diagnosis of metastatic carcinoid tumor (**Figure 2**). The thymic tumor stained positive for synaptophysin, chromogranin, and cytokeratins AE1 and 3. Electron microscopy showed trabeculae of cells with neurosecretory granules (100–120 nm in diameter) marked by an electron dense core with a limiting membrane separated by an electron lucent space.

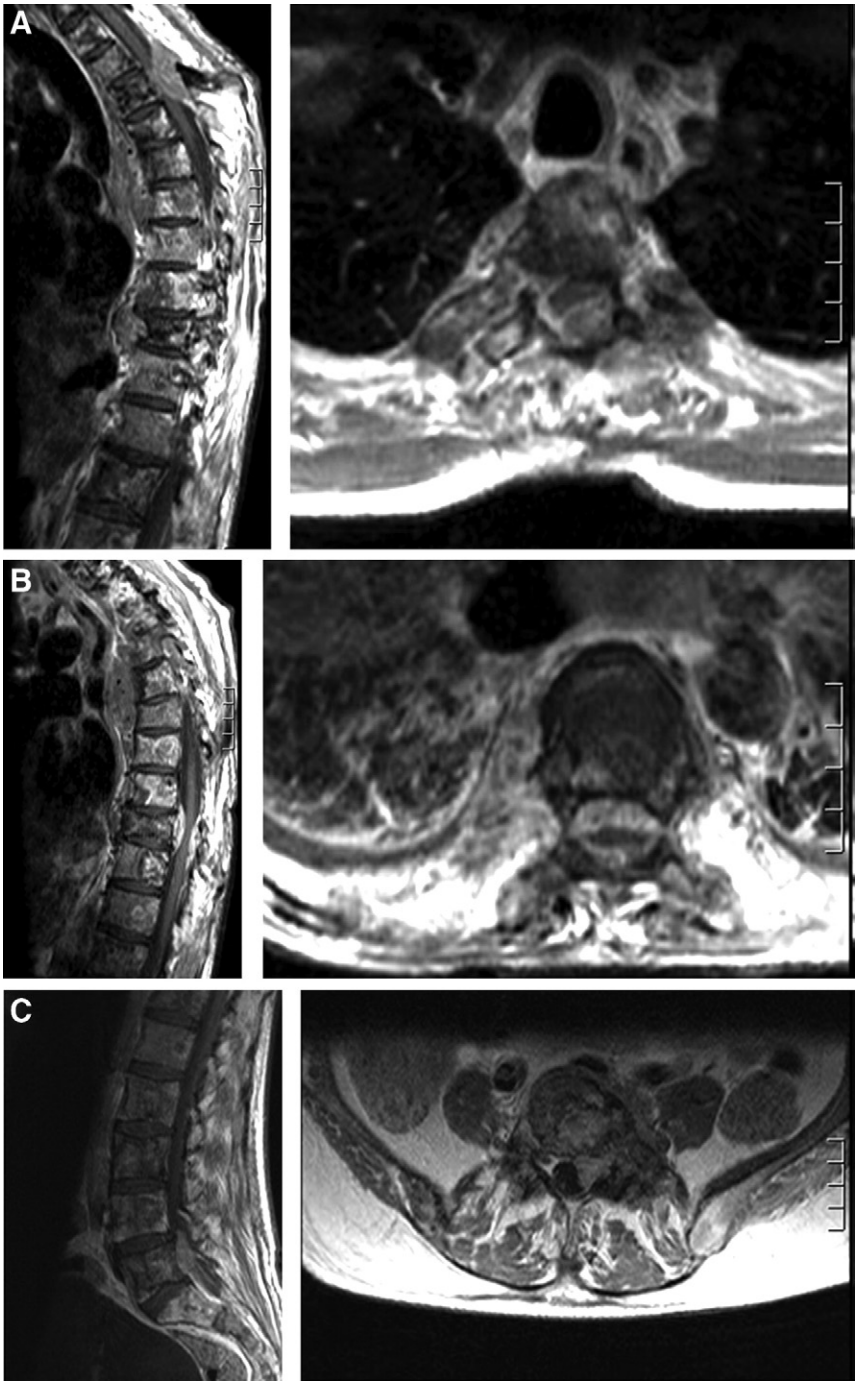

Figure 1. Enhanced T1-weighted magnetic resonance imaging (MRI) of thoracic and lumbar spine. **(A)** Enhancing, dorsal epidural mass centered over T3 vertebral body displaces spinal cord to the right. There is heterogeneous marrow involvement consistent with metastatic disease. **(B)** At T9, spinal cord is encased by metastatic carcinoid tumor dorsal and ventral to spinal cord. There is partial collapse of T9 vertebral body. **(C)** In lumbar spine, metastatic carcinoid tumor is seen dorsal to L5 vertebral body and extending out left L5-S1 foramen.

Postoperative Course

The patient developed tachycardia, dyspnea, and elevation of cardiac enzymes (troponin 0.18) postoperatively. He was evaluated by a cardiologist, and an acute coronary event and pulmonary edema were diagnosed. Beta blockers were recommended. He was discharged to a rehabilitation facility 3 days after the operation with unchanged left lower extremity weakness. He