

## Resection of a Dumbbell-Shaped Thoracic Neurinoma by Hemilaminectomy: A Case Report

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**Neurinomas originating from intercostal nerve roots can grow both inside and outside of the spinal canal, forming dumbbell-shaped tumors. Such a neurinoma was discovered at the Th3 and Th4 levels in a 73-year-old woman during evaluation for breast cancer surgery. Magnetic resonance images (MRI) showed spinal cord compression by the tumor despite lack of neurologic symptoms. The tumor was resected successfully via hemilaminectomy with costotransversectomy. Postoperative course was uneventful, and no stabilization was needed after operation. Back pain was the only postoperative complication. Analgesics were administered for 1 month, and the pain resolved over 3 months. No recurrent neurinoma was found in follow-up images at 8 months. We consider hemilaminectomy safe and effective for complete resection of a dumbbell-shaped thoracic neurinoma. (Ann Thorac Cardiovasc Surg 2007; 13: 36–9)**

**Key words:** dumbbell-shaped tumor, neurinoma, hemilaminectomy

### Introduction

Neurinomas arising from roots of intercostal nerves sometimes grow inside and outside of the spinal canal, forming a dumbbell-shaped mass.<sup>1–3</sup> These tumors can compress roots and the spinal cord to cause neurologic symptoms such as neuralgia<sup>4,5</sup> and myelopathy.<sup>6</sup> Spinal neurinomas were also reported to cause intradural hemorrhage requiring emergency surgery.<sup>7–9</sup> Even in asymptomatic patients, complete removal of these tumors is necessary to prevent onset of neurologic deficits. However, the risk of postoperative complications arising from injury of the spinal cord or dura mater during surgery are also of concern. A safe operative approach to these tumors is essential.

We report on the successful removal of a dumbbell-shaped thoracic neurinoma via a hemilaminectomy with a costotransversectomy.

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### Case Report

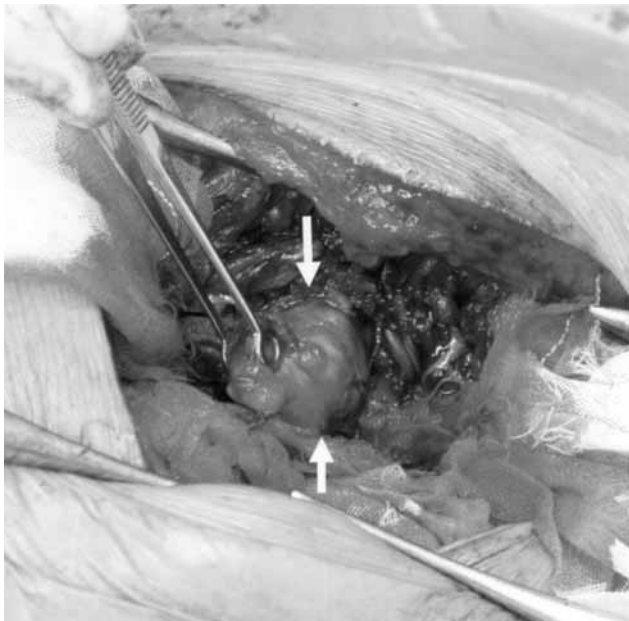
A preoperative radiological assessment in a 73-year-old woman prior to breast cancer surgery revealed a tumor in the left thoracic cavity. The tumor was posterior and formed masses within both the thoracic cavity and the spinal canal. A further tumor was occupying the intervertebral foramen between Th3 and Th4 (Fig. 1). Although a magnetic resonance image (MRI) demonstrated a spinal cord compression by the tumor, no neurologic symptoms were present. Percutaneous needle aspiration was performed for cytologic examination, which identified the tumor as neurinoma rather than metastatic breast cancer (Fig. 2). After left mastectomy followed by 3 cycles of adriamycin-based chemotherapy, the neurinoma was resected to prevent myelopathy.

The tumor was removed by hemilaminectomy with costotransversectomy. With the patient in a prone position the precise location of the tumor was confirmed by the Ce7 vertebra with metal pins under fluoroscopy. A longitudinal left paravertebral skin incision 15 cm in length at the Th2 to Th4 level was made. The left paraspinous muscles were dissected subperiosteally from the spinous to the transverse processes. Th3 hemilaminectomy was performed to open the spinal canal to visualize the tumor



**Fig. 1.** Gadolinium-enhancement magnetic resonance image of the tumor.

The tumor occupied a portion of the posterior left thoracic cavity, also entering the spinal canal from the intervertebral foramen between Th3 and Th4 to compress the spinal cord.



**Fig. 3.** Findings during operation.  
Arrows indicate the tumor.

(Fig. 3). An adhesion between the tumor and dura mater was dissected carefully under direct vision. Following a portion of the tumor being freed from the dura, portions



**Fig. 2.** Cytologic specimen obtained by percutaneous needle aspiration. (Papanicolaou stain:  $\times 400$ )

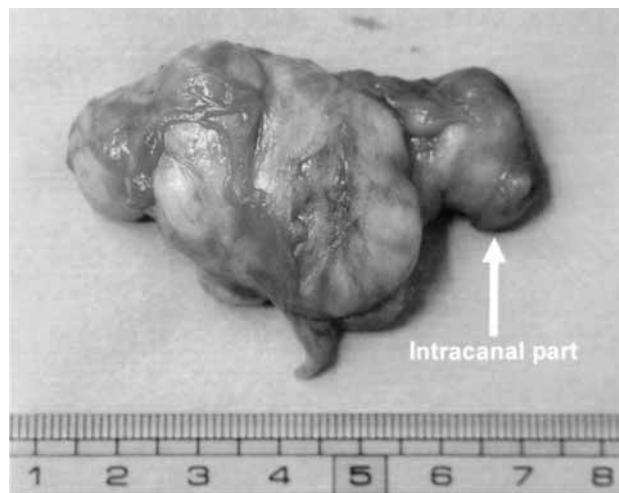
Aggregated spindle cells showing nuclear palisading suggested a neurinoma. No nuclear atypia and mitoses were seen.

of the 4th transverse process and the rib were resected to remove the intrathoracic component through the intervertebral foramen. Finally all remaining portions of the tumor were resected (Fig. 4). Hemilaminectomy and dissection between the tumor and dura mater were performed by orthopedists, and other procedures were done by chest surgeons. Intraoperative blood loss was 450 ml, and time of operation was 2.5 hrs. Pathologic examination confirmed that the tumor was a neurinoma with no malignant features (Fig. 5).

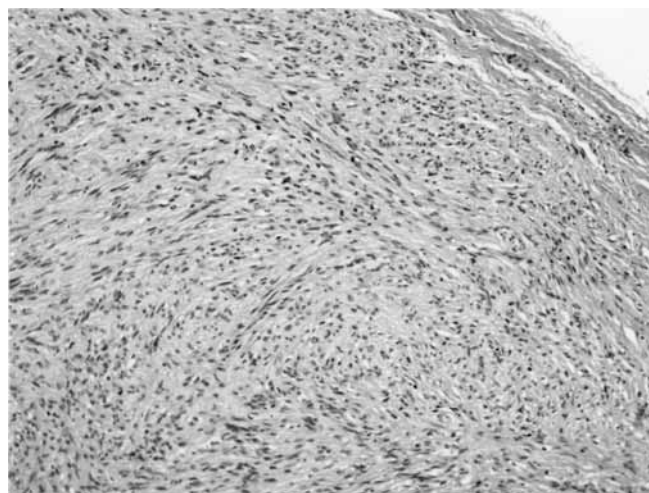
Stabilization was not required after the operation. The patient was discharged from our hospital 3 weeks postoperatively. Analgesics, diclofenac sodium and loxoprofen sodium, were administered for 1 month for back pain, the only postoperative complication, which resolved within 3 months. No local recurrence was evident from follow-up imaging at 8 months.

### Discussion

Dumbbell-shaped thoracic neurinomas represent a distinct type of tumor. They develop within the vicinity of an intervertebral foramen and then grow in 2 directions to involve both the spinal canal and the posterior thoracic cavity. Most of such tumors originate from the intercostal nerves, and can be resected by either a thoracic (anterior)<sup>10</sup> or a spinal (posterior)<sup>11</sup> approach. With either, special attention is required during resection of the portion within the spinal canal; as injury to the spinal cord may cause myelopathy, while dural injury could result in ongoing leakage of cerebrospinal fluid into the pleural



**Fig. 4.** Macroscopic appearance of the resected dumbbell-shaped tumor, measuring 6.0×4.5×3.0 cm.



**Fig. 5.** Microscopic findings of the resected tumor. (HE stain: ×200) The pathologic diagnosis was neurinoma (Antoni A type), with no malignant findings.

cavity. At present, most neurinomas wholly confined to the chest wall can be resected easily via the thoracic cavity using video-assisted thoracoscopic surgery (VATS).<sup>12)</sup> However, if a portion of the tumor extends into the spinal canal, the situation becomes quite different. Although the thoracic approach has sometimes been employed for these dumbbell-shaped tumors, resection of the intraspinal component is difficult without laminectomy.<sup>13,14)</sup> Diaz et al.<sup>15)</sup> reported a case of subarachnoid-pleural fistula occurring after resection of a dumbbell-shaped neurinoma via a posterolateral thoracotomy. We therefore consider the anterior approach more hazardous when an intraspinal component is present.

Local recurrence after operation is also a concern, especially when the tumor proves to be a malignant neurinoma.<sup>16,17)</sup> Schick et al.<sup>18)</sup> reported outcomes after resection of 197 benign spinal neoplasms (meningioma, 41%; neurinoma, 33%; and neurofibroma, 6.1%). Among all tumors, 79.7% were thought to be resected completely. Recurrence was noted in 10.2% on an average of 4.3 years postoperatively. Thus, complete resection and careful long-term follow-up is essential even for benign tumors.

Hemilaminectomy was chosen as our approach because it permitted safe dissection of the intraspinal portion of the tumor from the cord. Takamura et al.<sup>5)</sup> resected a dumbbell-shaped neurinoma at Th8 via a posterolateral approach using hemilaminectomy and partial costotransversectomy. Their report emphasized that this approach allowed excellent visualization of the anterior paraspinous component of the tumor. When we opened the spinal ca-

nal, we encountered adhesion between the tumor and dura mater, which was managed by careful dissection to free the tumor from the dura. Kanemoto et al.<sup>19)</sup> reported a method of hemilaminectomy for a dumbbell-type neurinoma without costotransversectomy. We added costotransversectomy, because the tumor was relatively large. No major complications were noted during or after the operation except for postoperative back pain, probably related to dissection of paraspinous muscles. Pain no longer was present after 3 months.

In conclusion, we found hemilaminectomy to be a safe and useful approach for complete resection of a dumbbell-shaped thoracic neurinoma.

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