Solitary thoracic intramedullary spinal neurofibroma microsurgically extirpated via recapping T-saw laminoplasty: A case report

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Abstract
We report the case of a 40-year-old female presenting with back pain that was complicated by a solitary intramedullary spinal cord mass at the T10–11 levels, confirmed by magnetic resonance imaging and computed tomography myelography. Microsurgical en bloc extirpation of the tumor approached through a recapping T-saw laminoplasty of T10 was done, and histopathology findings revealed a diagnosis of neurofibroma. Solitary spinal neurofibroma is one of the rarest tumors involving the spinal cord and is very adherent for the lack of a well-defined capsule, requiring careful dissection under microscope magnification for successful en bloc resection. Recapping T-saw laminoplasty affords both maximal exposure and anatomic reconstruction postextirpation, avoiding most postoperative spinal complications.

Keywords
microsurgical extirpation, recapping T-saw laminoplasty, solitary intramedullary neurofibroma, spinal cord tumor

Introduction
Solitary spinal neurofibroma is one of the rarest tumors involving the spinal cord, occurring much less often than schwannoma, meningioma, or glioma.¹ It is now recognized as an entity distinct from the more common spinal schwannoma, having the perineurial cell as its predominant cell type.² Although malignancy is quite common in multiple neurofibromas,³ it is extremely rare for a solitary neurofibroma.⁴

Only 24 cases of solitary intramedullary spinal neurofibroma have been reported, and none published during the last 20 years.²,⁵,⁶ We report our case of a solitary thoracic intramedullary spinal neurofibroma that we surgically approached and excised using recapping T-saw laminoplasty.⁷

Case report
A 40-year-old female presented at our clinic complaining of back pain. She was fully conscious and ambulatory with no systemic signs or neurologic deficits. Plain thoracicolumbar radiographs showed no signs of bony pathology. On magnetic resonance imaging, an intradural mass spanning the T10–11 levels (Figure 1(a) and (b)) was however seen. Computed tomography myelogram confirmed the presence of the cord mass (Figure 2(a) to (c)) and further detailed the latter to be intramedullary and adherent to the cord.

The patient was operated on in the prone position, and the mass was approached through a posterior midline incision made after radiological confirmation of the desired levels. Subperiosteal dissection of the muscles

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was done until complete laminar exposure, and recapping T-saw laminoplasty of T10 was subsequently performed (Figure 3).

Both dura mater and arachnoid mater were opened longitudinally and anchored with sutures laterally. Under microscope magnification, we visualized the mass to be adherent to the cord substance (Figure 4). We had difficulty in identifying a surgical cleavage plane to start from, but with careful dissection and watchful hemostasis, we were able to slowly resect the tumor en bloc, preserving as much normal neural tissue as possible. The dura was then closed tight with sutures, and the vertebral arch recapped with the bilateral transverse processes secured by heavy sutures (Figure 5). The patient was able to move both legs voluntarily right after the operation.

The homogenous nonencapsulated tumor measured $1.5 \times 1 \times 1 \text{cm}^3$ (Figure 6), and final histopathologic results revealed neurofibroma (Figure 7). Surgical wounds closed unremarkably, and the patient was walking normally by the fourth day after surgery.

**Discussion**

Unlike schwannoma, spinal neurofibroma lacks a well-defined capsule, and we observed the same pathoanatomic feature during the microsurgical extirpation. We had difficulty identifying a surgical cleavage plane to dissect from. This knowledge of spinal neurofibroma is very important, as it warrants careful dissection during extirpation to avoid damage to the neural tissues and radicular artery.

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Figure 1. Sagittal (a) and transverse (b) T2-weighted magnetic resonance images showing an intramedullary spinal cord mass at the T10-11 levels.

Figure 2. Sagittal (a), frontal (b), and transverse (c) CT myelographic images showing the tumor to be adherent to the spinal cord (white arrows). CT: computed tomography.
Identification of the interface between normal neural and tumoral tissue is an essential step for total en bloc resection of the tumor using adequate microdissectors. From the wide exposure afforded by the recapping T-saw laminoplasty technique, we were able to carry out a successful dissection and slowly extirpated the tumor en bloc under microscope magnification. Tumor adherence was found to be one important predictive risk factor for neurologic decline after spinal cord tumor resection, but we believe the latter can largely be avoided by doing careful exposure and slow but proper extirpation of any spinal cord tumor under microscope magnification. Our patient had no immediate or late neurologic deficits after surgery and is now as what she was functional preoperatively.

Wide laminectomies in spinal cord tumor surgery are now a thing of the past since our institution published the first report on recapping T-saw laminoplasty. The technique allows anatomic reconstruction of the vertebral arch after tumor resection without added instrumentation. As
documented in both series by Kawahara et al.\textsuperscript{7} and Salpietro et al.,\textsuperscript{10} we incurred no postoperative kyphosis or instability utilizing such optimal reconstruction.

**Conclusion**

We conclude that solitary intramedullary neurofibroma is an extremely rare tumor that is very adherent to the spinal cord, requiring careful dissection under microscope magnification for successful en bloc extirpation. Recapping T-saw laminoplasty affords both maximal exposure and anatomic reconstruction postresection, thereby avoiding most postoperative spinal complications.

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