

Clinical outcomes of recapping T-saw laminoplasty for thoracic spinal cord tumors

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INTRODUCTION: Surgical resection of spinal cord tumors is typically performed using a posterior approach with a wide laminectomy. However, this approach is associated with postoperative complications such as kyphotic deformity and laminectomy membrane formation. Laminoplasty can address these issues, but conventional techniques often provide an inadequate surgical field, making it difficult to completely resect large tumors or those that invade the intervertebral foramen like dumbbell tumors. Although resection of the intervertebral joint provides a wider field of view, spinal stability is lost and instrumented reconstruction is required after tumor resection. To achieve a wide surgical field while preserving anatomical and physiological reconstruction of the vertebral arch, we have developed and performed a technique called "Recapping T-saw laminoplasty. This study investigated the surgical outcomes of recapping T-saw laminoplasty for spinal cord tumors.

METHODS:

We retrospectively analyzed the clinical and radiological data of 40 patients who underwent recapping T-saw laminoplasty for thoracic spinal cord tumors at our hospital between January 2011 and March 2025. Inclusion criteria were a follow-up duration of at least two years, with a mean follow-up of 62.7 months (range, 24–109 months). Surgical outcomes included operative time, blood loss, tumor resection rate (complete resection defined as >95%), intraoperative and postoperative complications, postoperative back or lower back pain, functional status assessment (the modified Japanese Orthopedic Association [JOA] scoring system and Frankel grade), radiological assessment (bone union, kyphosis deformity >10°), and rates of local recurrence and reoperation. Recapping T-saw laminoplasty was performed as follows (Figures 1–4): (1) The inferior half of the spinous process of the vertebra immediately superior to the intended laminectomy area was removed; (2) A T-saw was passed beneath the lamina (A) and cuts were made from the pedicle to the transverse process (B), (3) En bloc resection of the posterior arch was performed, followed by tumor excision; and (4) The posterior arch was anatomically reconstructed.

RESULTS:

The mean age at surgery was 56.1 years (range, 24–81 years), and the cohort included 13 men and 27 women. The number of resected vertebral arches was one for 28 cases (70%), two for 10 cases (25%), and three for 2 cases (5%). The tumor types included schwannomas in 19 patients (48%), meningiomas in 16 (40%), and others in 5 (12%); dumbbell tumors were observed in 9 patients (23%). The mean operative time and blood loss were 226 min and 142 ml, respectively. Complete resection was performed for 38 tumors (95%), and 2 tumors (5%) were partially resected. Postoperative complications were observed in 8 of the 40 patients (20%), including neurological complications in 5 (13%) and continuous cerebrospinal fluid leakage in 5 (13%). Two patients (5%) complained of back or lower back pain one year postoperatively. Functional improvement was observed in 34 patients (85%) based on the modified JOA score. Among 14 patients with a preoperative Frankel grade of C or D, 12 (86%) improved by at least one grade one year after surgery. Bone union was observed in all cases on computed tomography (CT) at the 1-year follow-up. Postoperative kyphotic deformity was observed in 7 cases (18%), with all of these having two or more vertebral arches resected. Tumor recurrence was observed in two cases (5%) with meningiomas, which required reoperation, and no revision surgeries were performed due to kyphotic deformity or postoperative complications.

DISCUSSION AND CONCLUSION:

Recapping T-saw laminoplasty for thoracic spinal cord tumors provides an excellent surgical field for safe and complete tumor resection while preserving anatomical and biomechanical integrity through posterior arch reconstruction.

Figure. 1



Figure. 2

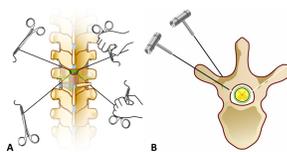


Figure. 3

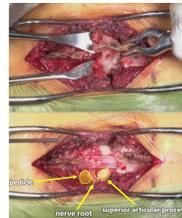


Figure. 4

