

Laminectomy for Spinal Cord Injury (SCI)

- Phyllanthin from *Phyllanthus amarus* exerts neuroprotective effects against spinal cord injury in experimental rats
- 3D-printed guide template for cervical stabilization surgery: A case report
- AO Spine Clinical Practice Recommendations for the Surgical Management of Acute Traumatic Spinal Cord Injury: Contemporary Concepts
- Diffuse idiopathic skeletal hyperostosis presenting as spinal cord compression combined with intervertebral space narrowing: A case report
- Total recovery spinal cord injury in cervical 5-6 dislocation: Case reports
- Choosing the right treatment for degenerative cervical myelopathy
- Therapeutic Effects of Low-Level Laser Therapy on Rat Spinal Cord Injury: Analysis of Inflammatory Markers and Testicular Function
- A comprehensive visual report of urodynamic study in rats with spinal cord injury

A **laminectomy** in the setting of **spinal cord injury** is performed to **decompress** the spinal cord, manage **intracanal pressure**, and improve potential for **neurological recovery**.

1. Purpose of Laminectomy in SCI

- Relieve **mechanical compression** (bone fragments, hematoma, edema). - Reduce **intrathecal pressure** (ITP). - Allow for **cord expansion** without additional ischemia. - Facilitate **duraplasty** if needed. - Enable **stabilization** when combined with posterior fixation.

2. Indications

- Persistent compression on imaging. - Neurological deterioration. - Elevated ITP or spinal canal compartment syndrome. - Adjunct to fusion for unstable fractures.

3. Technique Overview

- Removal of lamina at affected levels. - Extension to adjacent levels if necessary. - May be combined with:

- **Duraplasty** to expand the dura.
- **Posterior instrumentation** for stabilization.

4. Considerations and Risks

- **Spinal instability** risk; may require fusion. - **Incomplete decompression** if anterior compression persists. - Risk of **dural tear** and **CSF leak**. - Risk of **infection, hematoma, or neurological worsening**.

Summary

In SCI, **laminectomy** is a critical surgical tool for **cord decompression** and **pressure management**, often combined with **duraplasty** and **fusion** to maximize recovery potential.

Systematic reviews

A systematic review explores the [Spinal cord injury pathophysiology](#) and evaluates evidence linking decompressive [laminectomy](#) and [duraplasty](#) to improved [neuroplasticity](#) and [recovery](#).

A comprehensive search was conducted in PubMed, Web of Science, and Cochrane Library for studies on decompressive surgery in SCI. Inclusion criteria were original articles investigating pathophysiology, neuroplasticity mechanisms, or surgical outcomes. Data on pathophysiological changes, molecular markers, and functional outcomes were extracted.

From 1240 initial articles, 43 studies were included, encompassing both animal models and human clinical data. Findings highlighted the role of inflammatory cascades, blood-spinal cord barrier disruption, and neurotrophic factor modulation in recovery. Decompressive duraplasty was associated with improved intrathecal pressure (ITP) management and [neuroplasticity markers](#), such as [BDNF](#) and [GAP-43](#).

This review underscores the therapeutic potential of decompressive laminectomy and [duraplasty](#) in SCI. While evidence suggests benefits in promoting [neuroplasticity](#), further research is needed to elucidate molecular mechanisms and refine interventions ¹⁾.

This systematic review offers a valuable synthesis of current knowledge linking decompressive surgery to neuroplasticity and recovery after SCI. However, methodological limitations, particularly around study heterogeneity and lack of critical appraisal depth, temper the strength of its conclusions. Future studies should focus on better standardization, precise mechanistic investigations, and controlled clinical trials to confirm and refine these preliminary findings.

¹⁾

Archavlis E, Palombi D, Konstantinidis D, Carvi Y, Nievas M, Trobisch P, Stoyanova II. Pathophysiologic Mechanisms of Severe Spinal Cord Injury and Neuroplasticity Following Decompressive Laminectomy and Expansive Duraplasty: A Systematic Review. *Neurol Int*. 2025 Apr 16;17(4):57. doi: 10.3390/neurolint17040057. PMID: 40278428.

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