Spinal cord injury surgery

- Radial Nerve Palsy as an Iatrogenic Complication of Shoulder Replacement Surgery With Significant Bone Loss of the Humerus Resembling Gorham-Stout Disease: Case Report and Review of the Literature
- Sustained release of canine mesenchymal stem/stromal cell-derived extracellular vesicles rescues motor function in rodent spinal cord injury models
- Case-Control Investigation of Association of Clinician-Determined Variables With Progressive Myelomalacia After Acute Thoracolumbar Disc Extrusion in Dogs
- Association between concomitant traumatic brain injury and unfavorable 1-year outcomes in patients with traumatic spinal cord injury
- Corrigendum to "MAPK signaling pathway in spinal cord injury: Mechanisms and therapeutic potential" [Experimental Neurology 383 (2025) 115043]
- Clinical experience implanting a miniature externally powered vagus nerve stimulator
- Development and Evaluation of a 3D Motion Capture Model for Upper Extremity Kinematics During Wheelchair Maneuvering in Individuals with Spinal Cord Injuries: A Pilot Study
- Challenges associated with chronic aortic dissections: single-center experience of iliac branch devices in chronic aortic dissections

---

Spinal Cord Injury (SCI) Surgery

Surgical intervention in SCI focuses on **decompression**, **stabilization**, and **optimization of neurological recovery**.

1. Indications for Surgery

- Spinal instability - Progressive neurological deficits - Compression of the spinal cord or nerve roots - Fracture-dislocations - Penetrating injuries (select cases)

see Laminectomy for Spinal Cord Injury

2. Goals of Surgery

- **Decompression**: Relieve pressure on the spinal cord. - **Stabilization**: Restore and maintain spinal column alignment. - **Facilitation of Early Mobilization**: Reduce complications. - **Potential Enhancement of Recovery**: Limit secondary injury.

3. Types of Surgical Procedures

a) Decompressive Laminectomy

- Removal of the vertebral lamina to decompress the spinal cord. - May include duraplasty to lower intrathecal pressure.

b) Anterior Decompression and Fusion

- Removal of disc material or vertebral body (corpectomy) with fusion. - Especially in cervical injuries.

c) Posterior Decompression and Stabilization

- Laminectomy and posterior instrumentation (rods and screws). - Used for thoracic or lumbar injuries.

d) Circumferential Approaches

- Combined anterior and posterior approaches for severe instability.

e) Minimally Invasive Techniques

- Endoscopic or percutaneous fixation in select cases.

4. Timing of Surgery

- **Early Surgery (<24 hours)**: Better neurological and functional outcomes. - **Delayed Surgery (>24–72 hours)**: Sometimes necessary based on patient factors.

5. Risks and Complications

- Infection - Implant failure - Dural tears - Worsening of neurological function - Hematoma - Nonunion (pseudarthrosis)

Summary

Surgery in spinal cord injury is aimed at **decompressing** the neural elements, **stabilizing** the spine, and **facilitating recovery**. Optimal surgical timing, approach, and patient selection are critical for maximizing outcomes.

After traumatic spinal cord injury (TSCI), laminectomy does not improve intraspinal pressure (ISP), spinal cord perfusion pressure (SCPP) or the vascular pressure reactivity index (sPRx) at the injury site sufficiently because of dural compression.

21 patients with acute, severe TSCI had realignment of the fracture and surgical fixation; 11 had laminectomy (laminectomy group) and 10 had laminectomy and duroplasty (laminectomy + duroplasty group). Primary outcomes were MRI evidence of spinal cord decompression (increase in intradural space, cerebrospinal fluid around the injured cord) and spinal cord physiology (ISP, SCPP, sPRx). The laminectomy and laminectomy + duroplasty groups were well matched. Compared with the laminectomy group, the laminectomy + duroplasty group had greater increase in intradural space at the injury site and more effective decompression of the injured cord. In the laminectomy + duroplasty group, ISP was lower, SCPP higher and sPRx lower, i.e. improved vascular pressure reactivity, compared with the laminectomy group. Duroplasty caused Cerebrospinal fluid fistula that settled with lumbar drainage in one patient and pseudomeningocele that resolved in five patients. We conclude that, after TSCI, laminectomy + duroplasty improves spinal cord radiological and physiological parameters more effectively than laminectomy [1].

1)
Phang I, Werndle MC, Saadoun S, Varsos GV, Czosnyka M, Zoumprouli A, Papadopoulos MC. Expansion Duroplasty Improves Intraspinal Pressure, Spinal Cord Perfusion Pressure and Vascular Pressure Reactivity Index in Patients with Traumatic Spinal Cord Injury. J Neurotrauma. 2015 Feb 23. [Epub ahead of print] PubMed PMID: 25705999.