

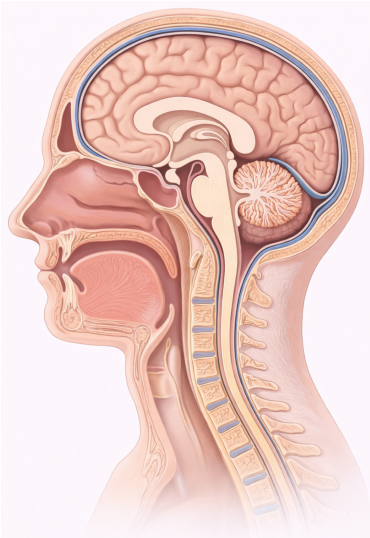
Posterior Cervical Laminoplasty for Cervical Myelopathy

A Motion-Preserving Solution for Multilevel Spinal Cord Compression

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What Is Cervical Myelopathy?



Normal cervical spine with adequate space for the spinal cord within the spinal canal.

The cervical spine is designed to protect the spinal cord while allowing the head and neck to move freely. The spinal canal — the bony tunnel formed by the vertebrae — normally provides ample space for the cord to function without compression.

Cervical myelopathy is a condition in which the spinal cord itself becomes compressed within the cervical (neck) region of the spine. Unlike a simple pinched nerve (radiculopathy), myelopathy involves direct pressure on the cord, which can cause a wide range of neurological symptoms affecting the arms, legs, balance, and bladder/bowel function.

The most common cause is cervical spondylosis — the age-related degeneration of discs and joints that progressively narrows the spinal canal. Other causes include congenitally narrow canals, ossification of the posterior longitudinal ligament (OPLL), disc herniations, and ligament hypertrophy (thickening of the ligamentum flavum).

Recognizing Cervical Myelopathy

Cervical myelopathy tends to develop gradually and is frequently mistaken for normal aging. Because the spinal cord carries signals to and from the entire body, compression at the cervical level can produce a surprisingly diverse constellation of symptoms:

Upper Extremity Symptoms	Lower Extremity & Other Symptoms
Weakness or clumsiness of the hands	Weakness or heaviness of the legs
Difficulty with fine motor tasks (buttoning, writing)	Gait instability — wide-based or shuffling walk
Numbness or tingling in the fingers	Difficulty with balance and frequent falls
Dropping objects unexpectedly	Lhermitte's sign — electric sensation down spine with neck flexion
Arm or shoulder pain radiating from the neck	Bladder urgency or incontinence (advanced cases)

■ **Important:** Myelopathy rarely improves on its own. Because the spinal cord has limited capacity for self-repair, untreated or late-treated compression typically results in permanent neurological deficits. Early diagnosis and timely surgical intervention offer the best chance of recovery and long-term stability.

The Disease: Multilevel Cervical Canal Stenosis

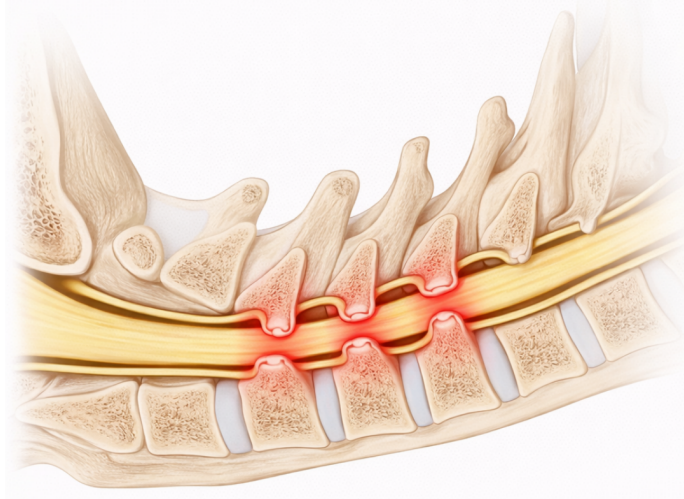


Illustration of multilevel cervical stenosis with progressive narrowing of the spinal canal and compression of the spinal cord across multiple vertebral levels.

In multilevel cervical stenosis, the spinal canal is narrowed at two or more consecutive vertebral levels — commonly C3 through C7. The cord is simultaneously compressed from the front (by degenerative disc material and bone spurs) and from the back (by hypertrophied ligamentum flavum or a buckled, thickened ligament). This circumferential squeeze leaves the cord with no room to function, triggering the progressive neurological decline characteristic of myelopathy.

The key insight guiding surgical strategy is this: at three or more involved levels, the most efficient and durable way to decompress the cord is to **expand the spinal canal from behind** rather than remove pathology level-by-level from the front. This is precisely what laminoplasty achieves.

Why Laminoplasty? The Motion-Preserving Advantage

In the treatment of multilevel cervical myelopathy, patients are often told they need an anterior cervical fusion spanning multiple levels. While fusion is appropriate in some circumstances, posterior cervical laminoplasty offers a compelling alternative that achieves equivalent — and in many cases superior — cord decompression **without permanently fusing the cervical spine.**

◆ Key Advantages of Laminoplasty Over Multilevel Cervical Fusion

- ✓ Motion Preservation — The cervical spine retains its natural range of motion. No vertebrae are fused together, so daily activities and neck mobility are maintained long-term.
- ✓ No Adjacent Segment Disease — Fusion transfers abnormal stress to the levels above and below the construct, accelerating degeneration at those segments. Laminoplasty eliminates this risk entirely, protecting the remaining healthy disc levels.
- ✓ No Donor Site Morbidity — Multilevel fusions often require bone graft harvest from the pelvis, causing significant donor site pain and complications. Laminoplasty avoids bone grafting altogether.
- ✓ No Pseudoarthrosis Risk — Fusion depends on bone healing across multiple levels. Failed fusion (pseudoarthrosis) is a well-known complication requiring revision surgery. Laminoplasty has no fusion to fail.
- ✓ Single-Stage Multilevel Decompression — Three, four, or even five levels can be fully decompressed in one operation. An equivalent anterior fusion would require a technically demanding, high-risk multilevel corpectomy or a long multi-level ACDF.
- ✓ Lower Risk of Swallowing and Voice Complications — Anterior cervical surgery carries risks of dysphagia (difficulty swallowing) and dysphonia (voice hoarseness) due to retraction of the esophagus and recurrent laryngeal nerve. The posterior approach avoids these structures.
- ✓ Preservation of the Posterior Tension Band — The cervical muscles and ligaments at the back of the neck form a critical stabilizing structure. Laminoplasty preserves these tissues far better than multilevel posterior laminectomy alone, reducing the risk of post-operative kyphosis.
- ✓ Durability — Long-term studies demonstrate sustained neurological improvement and canal expansion for 10–20 years after laminoplasty, with low rates of late deterioration.

Laminoplasty vs. Multilevel Cervical Fusion: A Direct Comparison

Feature	Laminoplasty	Multilevel ACDF / Corpectomy
Motion preservation	✓ Full motion retained	✗ Permanently fused
Adjacent segment disease risk	✓ Eliminated	✗ Significant long-term risk
Pseudoarthrosis / hardware failure	✓ Not applicable	✗ Real complication risk
Bone graft / donor site	✓ None required	✗ Often required
Swallowing / voice risk	✓ Avoided (posterior approach)	✗ Dysphagia/dysphonia possible
Levels treated in one operation	✓ 3–5 levels routinely	■ Increases risk with levels
Spinal cord decompression	✓ 40–60% canal enlargement	✓ Effective if complete
Long-term outcomes (10–20 yr)	✓ Sustained improvement	■ Dependent on fusion success

Who Is a Candidate for Laminoplasty?

Posterior cervical laminoplasty is best suited for patients whose anatomy and disease pattern align with the posterior approach. Careful pre-operative evaluation with MRI, CT, and dynamic X-rays determines the optimal surgical strategy.

Ideal Candidates	Alternative Approach May Be Preferred
Multilevel stenosis (C3–C7, 3 or more levels)	Single or two-level disease well-suited to ACDF
Cord compression predominantly from behind (ligamentum flavum hypertrophy)	Significant cervical kyphosis ($>13^\circ$) — laminoplasty less effective
Ossification of the posterior longitudinal ligament (OPLL)	Isolated anterior pathology (large disc herniation at one level)
Congenitally narrow spinal canal with multilevel spondylosis	Severe instability requiring fusion for stability
Preserved or lordotic cervical alignment	Prior posterior cervical surgery at the same levels

Neurological Recovery: What to Expect

Most patients notice neurological improvement within days to weeks of surgery. The speed and extent of recovery depend on the severity and duration of cord compression prior to surgery — underscoring the importance of not delaying treatment once myelopathy is diagnosed.

Recovery Milestones

- Immediate post-op: Many patients notice hand grip strength and dexterity beginning to improve within 24–72 hours.
- 2–6 weeks: Gait stability and balance typically show progressive improvement as cord swelling subsides.
- 3–6 months: Fine motor function (writing, buttoning) continues to recover; most neurological gains occur in this window.
- 6–18 months: Maximum neurological recovery is generally achieved. Chronic cord signal change (myelomalacia) on MRI may limit full restoration.
- Long-term: Studies consistently demonstrate stable or continued improvement at 10 and 20 years post-laminoplasty.

Nuance on Recovery: Laminoplasty halts further neurological deterioration with a very high degree of reliability. Recovery of already-lost function depends on the reversibility of cord injury — which is why early intervention matters. Patients with recent-onset or mild-to-moderate myelopathy tend to achieve the most complete recoveries.

Surgical Recovery Timeline

Timeframe	Milestones & Activity
Hospital (2–3 days)	Pain management, physical and occupational therapy consultation, ambulation initiated day 1. Soft cervical collar for comfort — not structural immobilization.
Weeks 1–2	Home recovery. Wound care, light walking. No lifting, bending, or strenuous activity. Driving restrictions in place. Follow-up with Dr. Caridi for wound check.
Weeks 3–6	Gradual return to desk work and light daily activities. Physical therapy for cervical strengthening and range-of-motion initiated. Neurological improvement typically accelerating.
2–3 Months	Most patients return to sedentary and light occupational duties. Driving typically resumed. Active PT program. Hand dexterity exercises emphasized.
3–6 Months	Return to most physical activities and occupational demands. Continued neurological recovery. MRI may be obtained to confirm adequate cord decompression.
6–12 Months	Full return to all activities in most patients. Neurological plateau typically reached. Annual follow-up to monitor adjacent levels and ensure durable improvement.

Potential Risks and Considerations

Posterior cervical laminoplasty is an established, well-tolerated procedure with an excellent safety profile. As with any cervical spine surgery, patients should understand the following potential risks:

- C5 nerve root palsy — temporary arm weakness or deltoid dysfunction occurring in ~5% of patients due to nerve traction as the cord drifts back; typically resolves fully within weeks to months
- Axial neck pain — some patients experience posterior neck stiffness or discomfort related to muscle dissection; addressed with physical therapy and usually resolves by 6 months
- Loss of motion — while laminoplasty preserves substantially more motion than fusion, some reduction in neck range-of-motion is expected, particularly in flexion
- Infection — rare with modern prophylactic antibiotics and meticulous surgical technique
- Hardware-related issues — titanium miniplates holding the laminar door open rarely require removal; closure of the door ("door closing") is uncommon with modern fixation
- Cerebrospinal fluid leak — rare; managed with primary repair if encountered
- General surgical risks — anesthesia, blood clots, and bleeding; minimized by pre-operative optimization

When to Seek Immediate Evaluation

Seek immediate evaluation if you experience any of the following: Sudden worsening of arm or leg weakness · Loss of bladder or bowel control · New or rapidly progressing difficulty walking · Severe neck pain after trauma · Electric shock sensation throughout the body with neck movement (acute Lhermitte's sign). These symptoms may signal acute cord compression requiring urgent intervention.

Schedule a Consultation with Dr. Caridi

- If you have been diagnosed with cervical myelopathy or multilevel stenosis, or if you are experiencing hand clumsiness, balance problems, or gait instability, an evaluation is the critical first step.
- Dr. Caridi will review your MRI and CT, assess your neurological function, and provide a comprehensive recommendation — including whether laminoplasty, fusion, or another approach is best suited to your specific anatomy and disease pattern.
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