



Principles of Spine Surgery and Perioperative Spine Care

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Cuyuna Regional Medical Center / MNDKSPAN 2026

01

What we will discuss

01

Why this operation?

Connect decompression, stabilization and alignment with the patient's symptoms.

02

What matters in PACU?

Distinguish expected findings from changes that need urgent review.

03

Where does VELYS fit?

Discuss robotic assistance and our experience at CRMC.

02

The goals of spine surgery

Decompress

Create space for a nerve root or the spinal cord.

Stabilize

Limit painful or abnormal motion when fusion is indicated.

Realign

Restore alignment when deformity contributes to symptoms or imbalance.

03

Symptoms help identify the surgical target

Radiculopathy

Radiating pain, sensory change or focal weakness in a nerve root distribution.

Myelopathy

Cord dysfunction with hand clumsiness, gait difficulty or long-tract signs.

Claudication

Leg symptoms with standing or walking, often relieved by sitting or flexion.

**The preoperative exam
is the comparison point.**

04

Preoperative spine exam: nursing baseline

Before sedation when feasible • Compare right and left • Document existing deficits



Motor

Arms: grip, elbow bend / straighten

Legs: hip flexion, knee extension, ankle up / down

Sensation + symptoms

Light touch in arms / legs; pain location, radiation and any numbness, tingling or recent change.

Usual function

Hand dexterity, walking tolerance, gait aid and falls. Observe gait only if safe.

Compare hand grips

Record specific R / L findings.

Notify surgeon / anesthesia promptly about NEW or worsening findings:

Weakness • Saddle numbness • Urinary retention / incontinence • Bowel dysfunction

Open RN, Nursing Skills 2e (2023); AANN (2014 review); NICE NG127. Photo: M. Pomietto / CVTC, CC BY 4.0.

05

Anterior cervical fusion and arthroplasty



ACDF

Decompression with fusion

Treating cervical nerve root or spinal cord compression



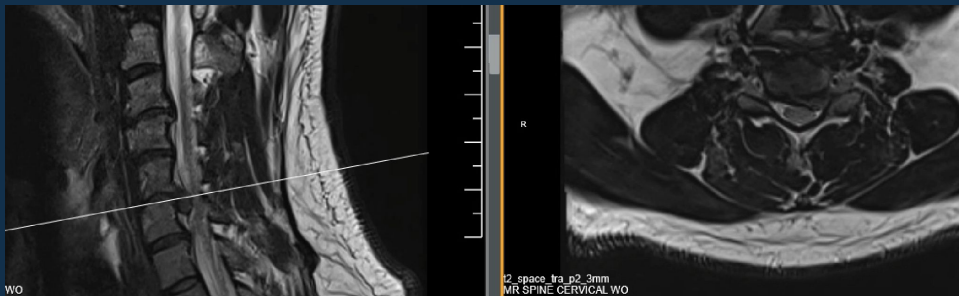
Disc arthroplasty

Motion preservation in selected patients

06

Cervical radiculopathy

51-YEAR-OLD MAN WITH C6 WEAKNESS AND NUMBNESS

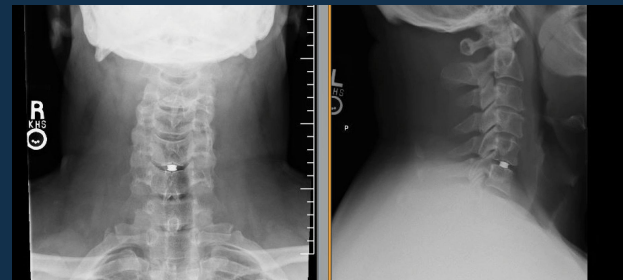


Which motor and sensory findings belong in the baseline handoff?

07

Cervical radiculopathy: follow-up

SAME 51-YEAR-OLD MAN



6
weeks

Full symptom resolution

08

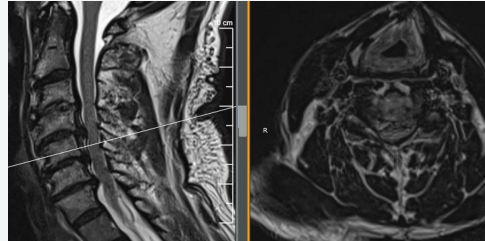
Cervical myelopathy

What patients describe

Clumsy hands, imbalance, leg stiffness or weakness.

What we look for

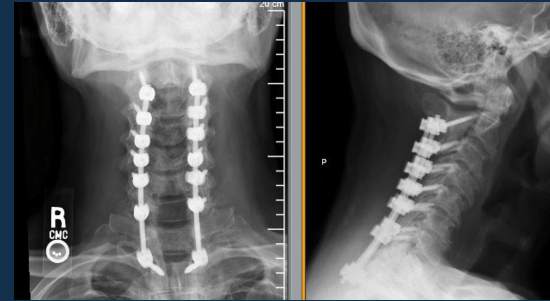
Hyperreflexia, difficulty with tandem gait and other long-tract signs.



Decompression aims to limit progression. Recovery may take time.

09

Posterior cervical care



Neurologic comparison

Assess both arms and legs against baseline, including shoulder and elbow strength.

Collar and positioning

Support alignment and follow the patient's prescribed collar and activity orders.

10

Anterior cervical surgery: airway risk



Neck swelling
Voice change
Dysphagia
Stridor or distress

Emergency escalation

Call emergency help, anesthesia and the spine surgeon immediately.

Colón et al. 2024

11

PACU DISCUSSION

“My neck feels tight.”

After ACDF, the patient's voice changes and breathing becomes more difficult.

What is your first priority?
Who needs to be at the bedside?

Teaching scenario. Colón et al. 2024

12

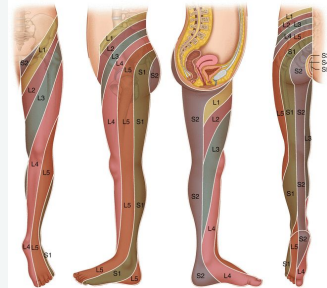
Lumbar radiculopathy

Symptoms

Leg pain with sensory change or focal weakness.

Surgical options

Microdiscectomy, laminoforaminotomy or fusion, depending on the pathology.

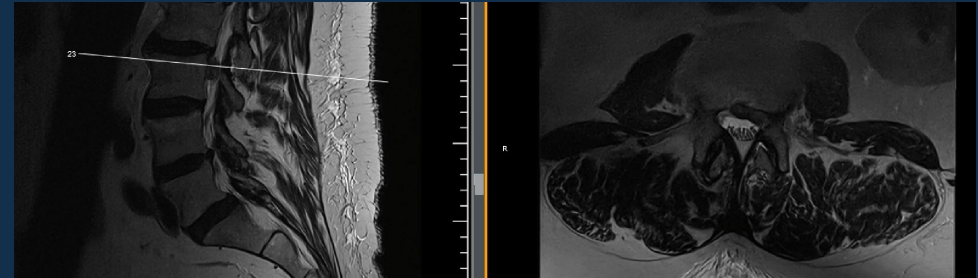


Pain may improve before numbness or weakness.

13

Disc herniation: six-week review

71-YEAR-OLD MAN



Leg pain resolved at six weeks. What else belongs in the recovery assessment?

14

Lumbar stenosis and neurogenic claudication

Standing or walking

Aching, burning, heaviness or weakness in the legs

Sitting or leaning forward

Symptoms often ease with flexion



15

Neurogenic claudication

68-YEAR-OLD MAN

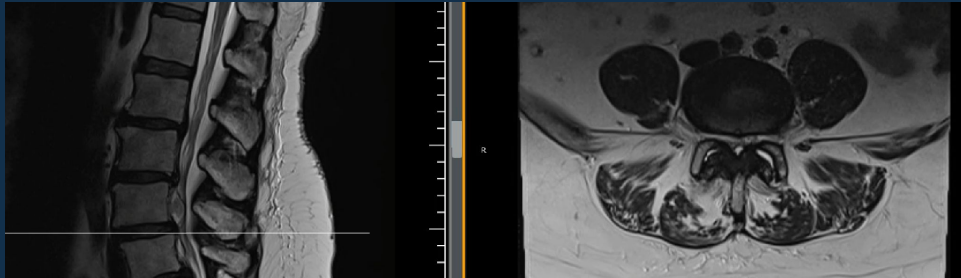


How would walking tolerance and posture shape your preoperative assessment?

16

Neurogenic claudication

61-YEAR-OLD WOMAN

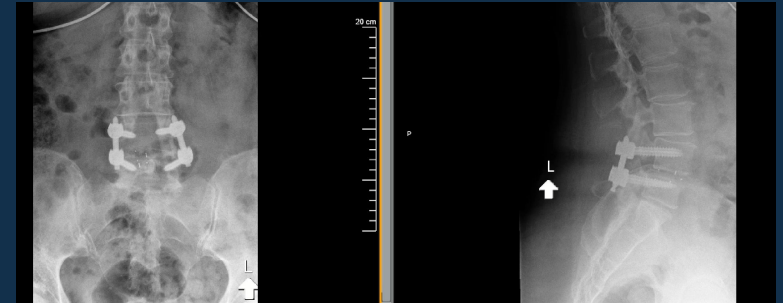


Which symptoms and baseline deficits would you want documented before surgery?

17

Six-week postoperative review

NEUROGENIC CLAUDICATION



What changed on imaging? What would you ask about function and symptoms?

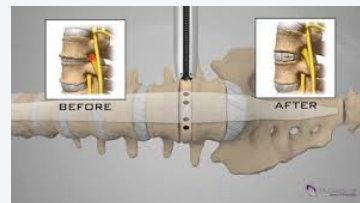
18

Direct and indirect decompression



Direct

Remove tissue that compresses a nerve root or the spinal cord.



Indirect

Restore space through disc height and alignment.

19

Indirect decompression: before and after

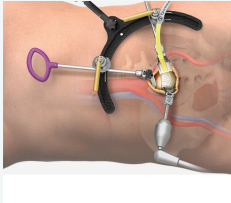
NEUROGENIC CLAUDICATION



Which changes illustrate the goal of restoring space?

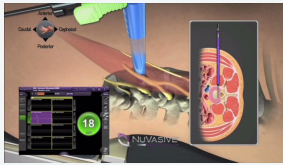
20

Lumbar fusion approaches



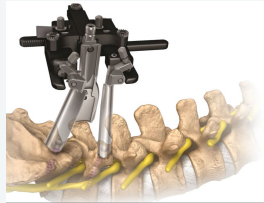
ALIF

Anterior access
Abdominal and vascular concerns in the handoff



LLIF / XLIF / DLIF

Lateral access
Hip flexion and knee extension exam



TLIF

Posterior access
Lower-limb motor and sensory comparison

21

Lateral fusion: the postoperative exam



Quadriceps activation

New, severe or progressive weakness needs prompt review.

Hip flexion

Pain or weakness may occur after a transpsoas approach. Document and compare.

Knee extension

New quadriceps weakness or knee buckling raises concern for femoral nerve dysfunction.

22

After DLIF: distinguish the postoperative findings

Direct lateral interbody fusion (transpsoas): compare with baseline

Finding	LFCN numbness	Psoas irritation	Femoral nerve palsy
Symptoms	Anterolateral thigh numbness / burning	Groin / thigh pain with hip flexion	Anterior thigh ± medial leg sensory loss
Hip flexion	Preserved	Painful or weak	May also be weak
Knee extension	Preserved	Intact if isolated	Weak; may buckle
Patellar reflex*	Preserved	Intact if isolated	May be reduced or absent

LFCN = lateral femoral cutaneous nerve. *Reflexes: assess within training / local policy.
Typical patterns can overlap; the exam guides assessment, not a definitive diagnosis.

New quadriceps weakness warrants urgent surgical review.

Punberger et al. 2012; Santilli et al. 2024; AAOS; NLM MeSH. Full references in notes.

23

DLIF complications: nursing priorities

Recheck before standing

Check both sides:
hip flexion, knee extension,
and sensation vs. baseline.

Support transfers.
A weak quadriceps can buckle.

Activate the emergency response for hemodynamic instability or rapid deterioration.

Mundis et al. 2023; Almazrou et al. 2020; Hwang et al. 2022. Full references in notes.

New or progressive motor deficit

Notify surgeon promptly; urgent review for quadriceps weakness or a worsening deficit.

Psoas / retroperitoneal hematoma

Escalating flank or groin pain, falling hemoglobin, hypotension or new weakness.

Abdominal complications

Increasing pain or distension, vomiting, fever or systemic decline: urgent review for ileus or bowel / visceral injury.

24

Spondylolisthesis: minimally invasive lateral fusion

BEFORE AND AFTER SURGERY



Preoperative



Postoperative

25

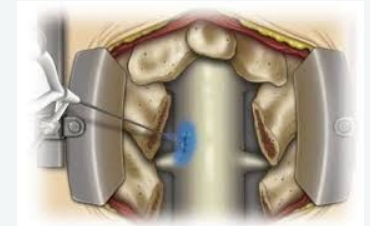
Durotomy: care follows the repair plan

Handoff

Repair details, drains, positioning and mobility orders.

Changes to report

Postural headache, clear wound drainage or a new neurologic finding.



Prolonged bed rest is not an automatic default.

Verma et al. 2022

26

A focused neurologic handoff

Baseline

Symptoms, existing deficits and the preoperative exam

Operation

Levels, approach, decompression or fusion, and intraoperative concerns

Recovery plan

Current exam, drains, positioning, activity and escalation contact

Smeijers et al. 2024

27

New neurologic change needs urgent review

New motor loss
Progressive sensory change
Severe escalating pain
New saddle symptoms

**Urgent
surgical
review**

Repeat and document the exam. Escalate without delay.

Smeijers et al. 2024

28

Recovery beyond the incision

Comfort with safe breathing

Use the ordered multimodal plan.
Reassess sedation, ventilation and pain.

Readiness to move

Address nausea, dizziness and motor deficits before assisted activity.

Debono et al. 2021

29

Discharge teaching that patients can use



Activity and wound care

Use the actual brace, mobility, dressing and bathing instructions.

Medication plan

Give explicit analgesic instructions and an anticoagulant restart plan.

“Tell me when you would call us.”

30

Common questions after surgery

“When do I restart my blood thinner?”

Confirm the exact drug, dose and restart date in the surgical plan.

“What can I do at home?”

Review walking, lifting, bending, twisting, help at home and follow-up.

“What about dental work or another procedure?”

Coordinate timing and any medication needs with the treating teams.

31

A clear route back to the spine team

The operative note and discharge plan should name the next step and the contact.



James Stokman, MD / Paige Kane, PA-C / Meredith DeCent, PA-C

32

VELYST™ Spine in the operating room



J&J MedTech. VELYST Active Robotic Assistance

Robotic assistance

Supports planned instrument guidance.

Navigation

Provides spatial guidance during the procedure.

The surgeon directs the operation.

33

How VELYS supports instrumentation

Plan

The surgeon plans trajectories using patient imaging.

Guide

Navigation and active robotic assistance support instrument positioning.

Verify

The team tracks movement and checks accuracy throughout the workflow.

Manufacturer description. J&J MedTech

34

My VELYS Spine experience at CRMC

100

procedures completed

Reported August 7, 2026

First CRMC case

June 27, 2025

Program launch

Fourth U.S. program

A milestone in local experience and access to spine technology

CRMC. CRMC Reaches 100 Robotic Spine Procedure Milestone. August 7, 2026

35

The procedure still determines PACU care

Robotic assistance does not replace the bedside exam.

**Approach and levels
Airway and breathing
Motor and sensory baseline
Individual recovery orders**

The handoff should describe the operation and the patient.

36

Knowledge check

True or false?

- 1 New neck swelling with respiratory distress after anterior cervical surgery requires immediate emergency escalation.
- 2 After robot-assisted spine surgery, routine postoperative neurologic assessment can be omitted.

37

Clinical references: urgent complications

Colón LF, Barber L, Soffin E, Albert TJ, Katsuura Y. (2024)

Management and treatment algorithm of airway complications after anterior cervical spine surgery: systematic review.
Journal of Spine Surgery. 10(3):562–575.

[doi:10.21037/jss-23-32](https://doi.org/10.21037/jss-23-32)

Smeijers S, et al. (2024)

Consensus statement by the Belgian Society of Neurosurgery and literature review on the diagnosis and management of postoperative spinal epidural hematoma. Brain & Spine. 4:103904.

[doi:10.1016/j.bas.2024.103904](https://doi.org/10.1016/j.bas.2024.103904)

38

Clinical references: perioperative recovery

Verma K, Freelin AH, Atkinson KA, Graham RS, Broaddus WC. (2022)

Early mobilization versus bed rest for incidental durotomy: an institutional cohort study.
Journal of Neurosurgery: Spine. 37(3):460–465.

[doi:10.3171/2022.1.SPINE211208](https://doi.org/10.3171/2022.1.SPINE211208)

Debono B, et al. (2021)

Consensus statement for perioperative care in lumbar spinal fusion: Enhanced Recovery After Surgery (ERAS®) Society recommendations.
The Spine Journal. 21(5):729–752.

[doi:10.1016/j.spinee.2021.01.001](https://doi.org/10.1016/j.spinee.2021.01.001)

39

Technology, practice and case sources

J&J MedTech

VELYS Active Robotic Assistance. Product information and platform launch materials.

injmedtech.com/en-US/products/velys-active-robotic-assistance

Cuyuna Regional Medical Center

CRMC Reaches 100 Robotic Spine Procedure Milestone. August 7, 2026.
Spine surgery service and James Stokman, MD provider pages.

cuyunamed.org/knowledge-hub/robotic-spine-surgery-100-cases/

Original cases and clinical images

Stokman J, Kane P, DeCent M. Spine PACU Education 2025. Presenter-supplied material.

40



Spine expertise, close to home

James Stokman, MD

Fellowship-trained orthopaedic spine surgeon

Cervical and lumbar spine care
Minimally invasive options
VELYS Spine robotic assistance

Consultations and referrals

218-545-1044

Cuyuna Regional Medical Center / Crosby, Minnesota