Cervical Myelopathy : Approach of Surgery – Anterior or Posterior?

Prof. Dr. Shahidul Islam
Head of Department, Orthopedics and Spine Surgery
Ad-din Women's Medical College
Moghbazar, Dhaka, Bangladesh

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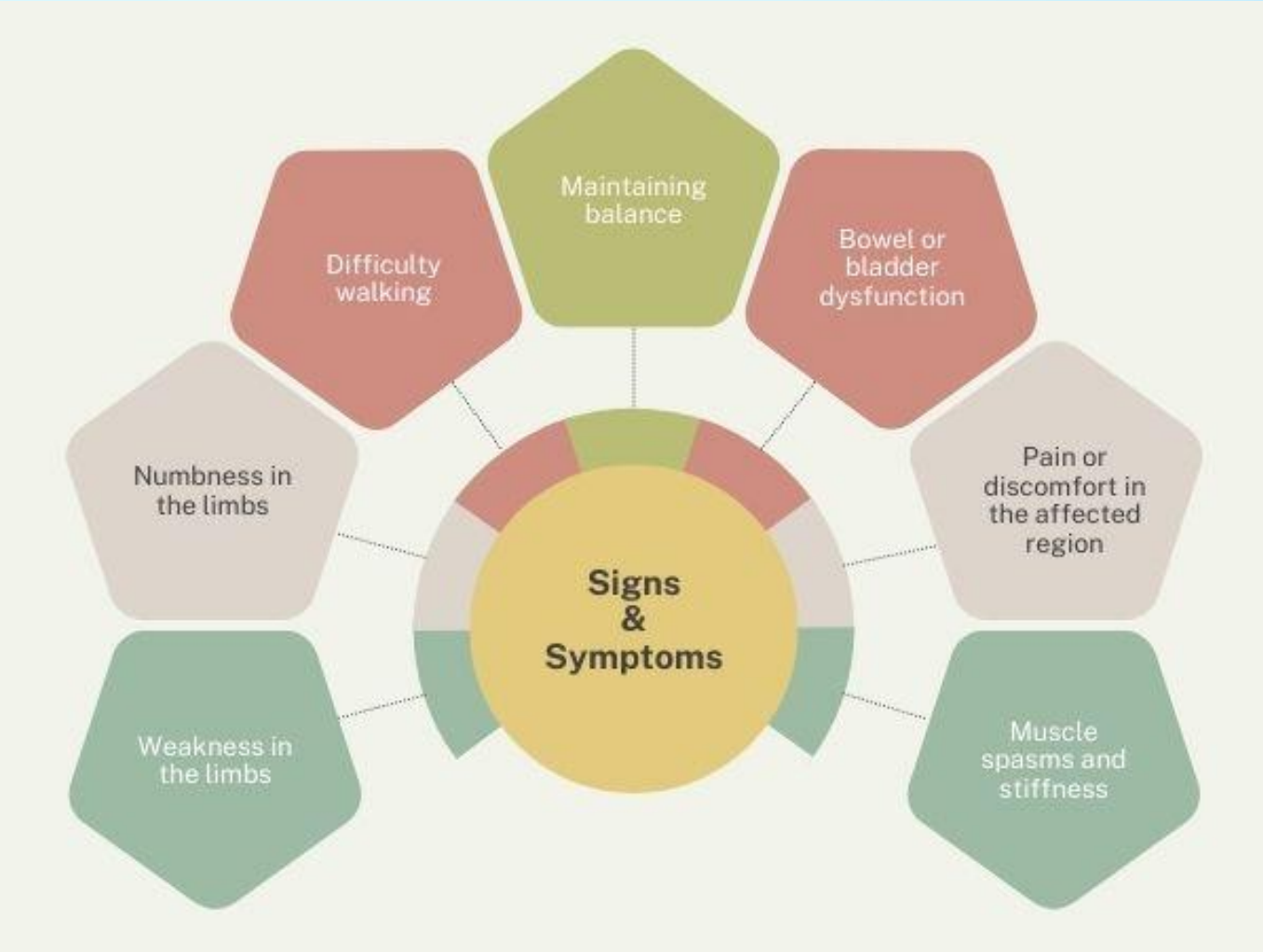
Introduction

- **Definition of Myelopathy:**

Myelopathy describes any neurologic deficit related to the spinal cord.

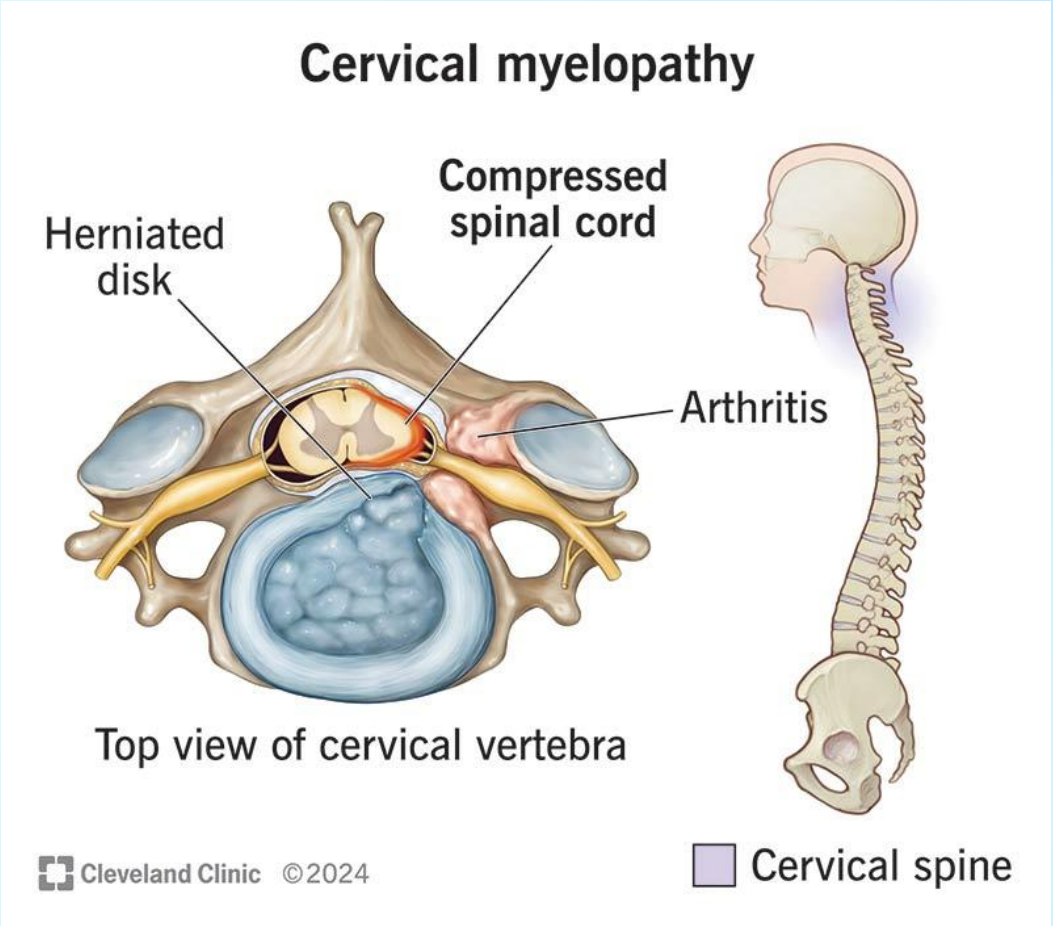
(Seidenwurm, 2008)



- **Definition of Cervical Myelopathy:**

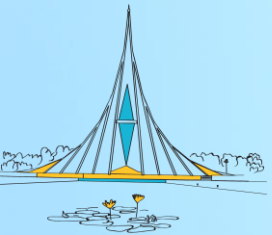
Cervical myelopathy is a progressive neurologic condition resulting from cervical spinal cord compression that commonly presents with spasticity, hyperreflexia, and pathologic reflexes, as well as signs such as digit or hand clumsiness and disturbances in gait.

(Margetis & Donnally III, 2025)



MRI of cervical spine of a 63 year old male showing cervical myelopathy with myelomalacic change due to PID in C4/C5, C5/C6, C6/C7 level

What will be the approach?



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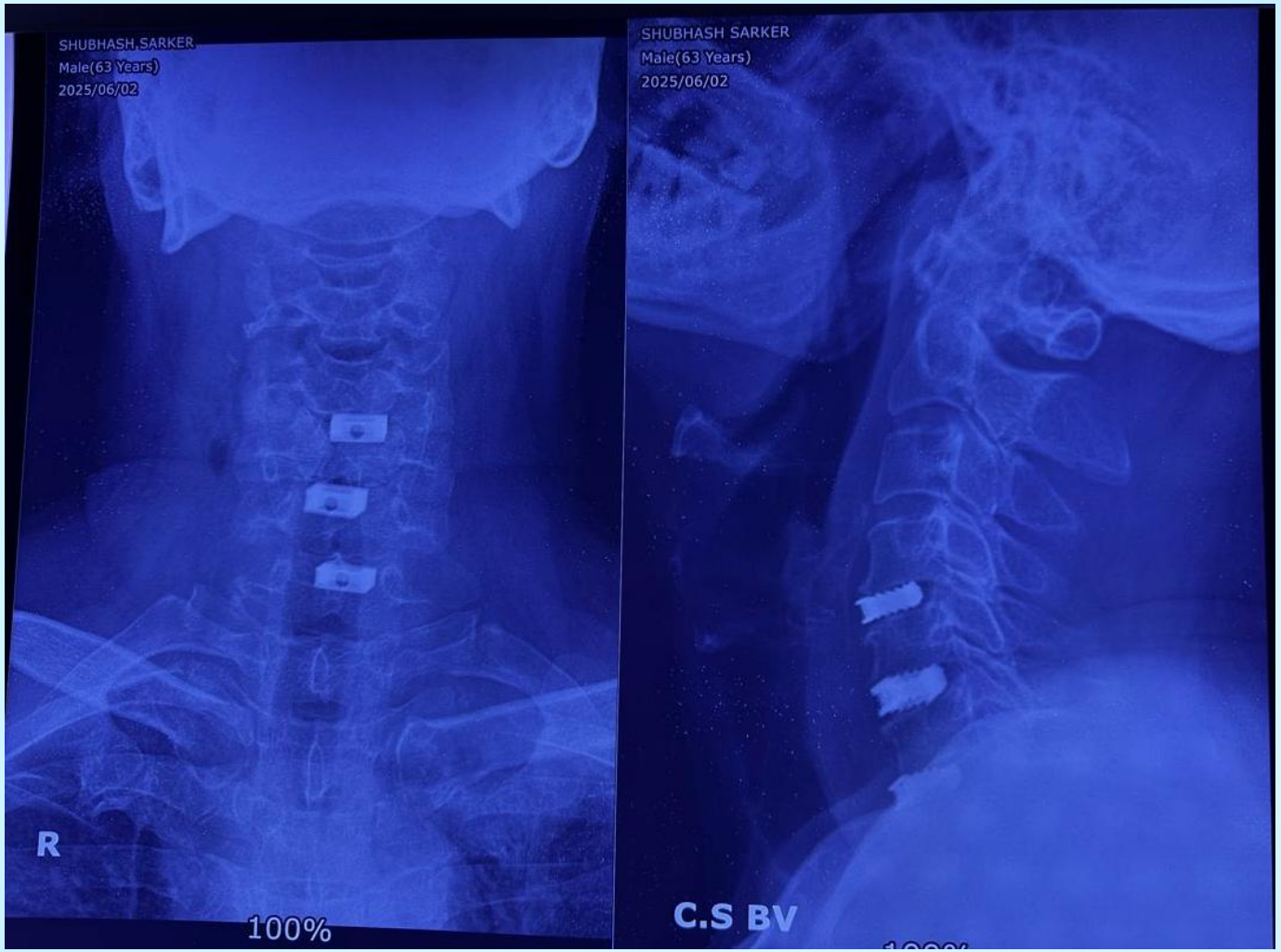
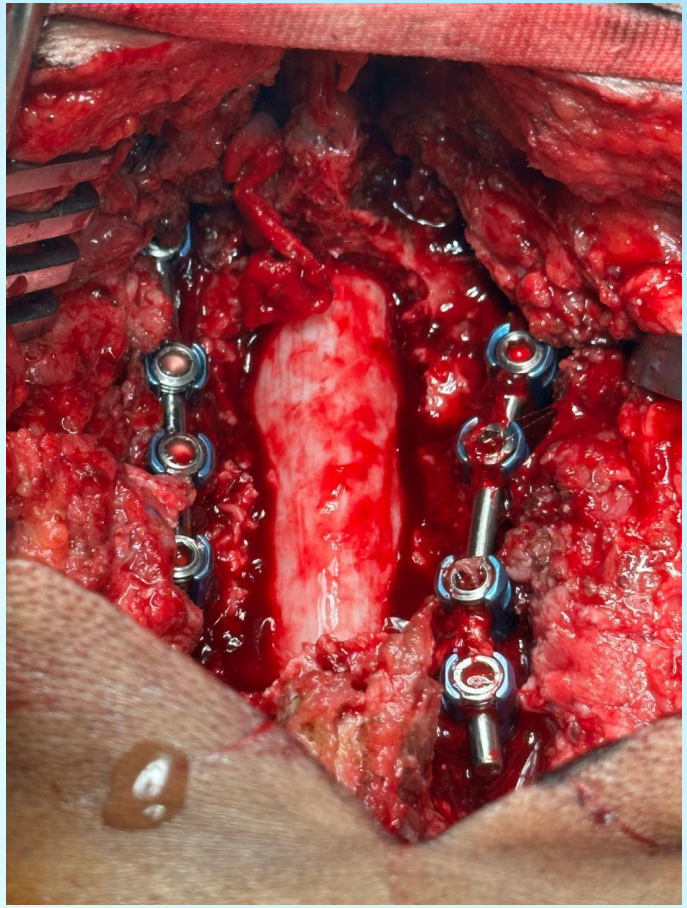
- The patient presented to us with quadriparesis.
- He underwent surgery previously by a professor of neurosurgery but didn’t improve.
- Post-operative MRI showed no decompression.

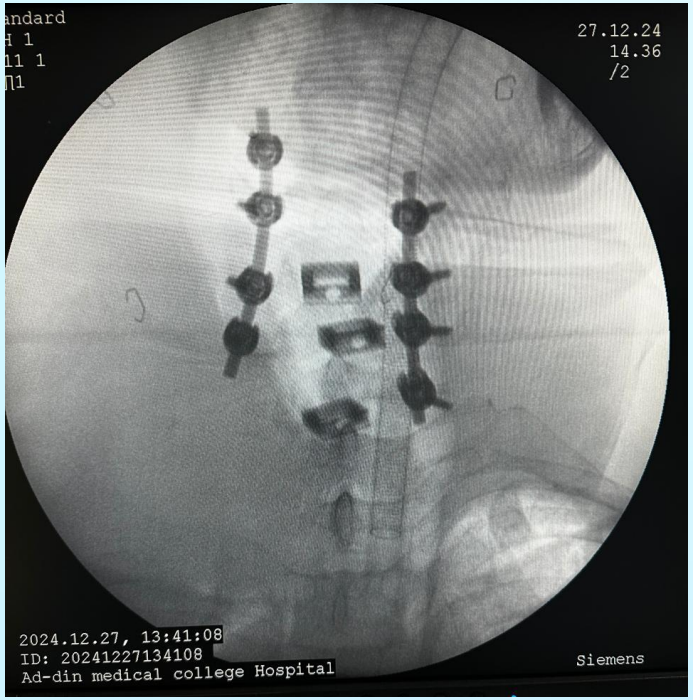
First post-operative MRI

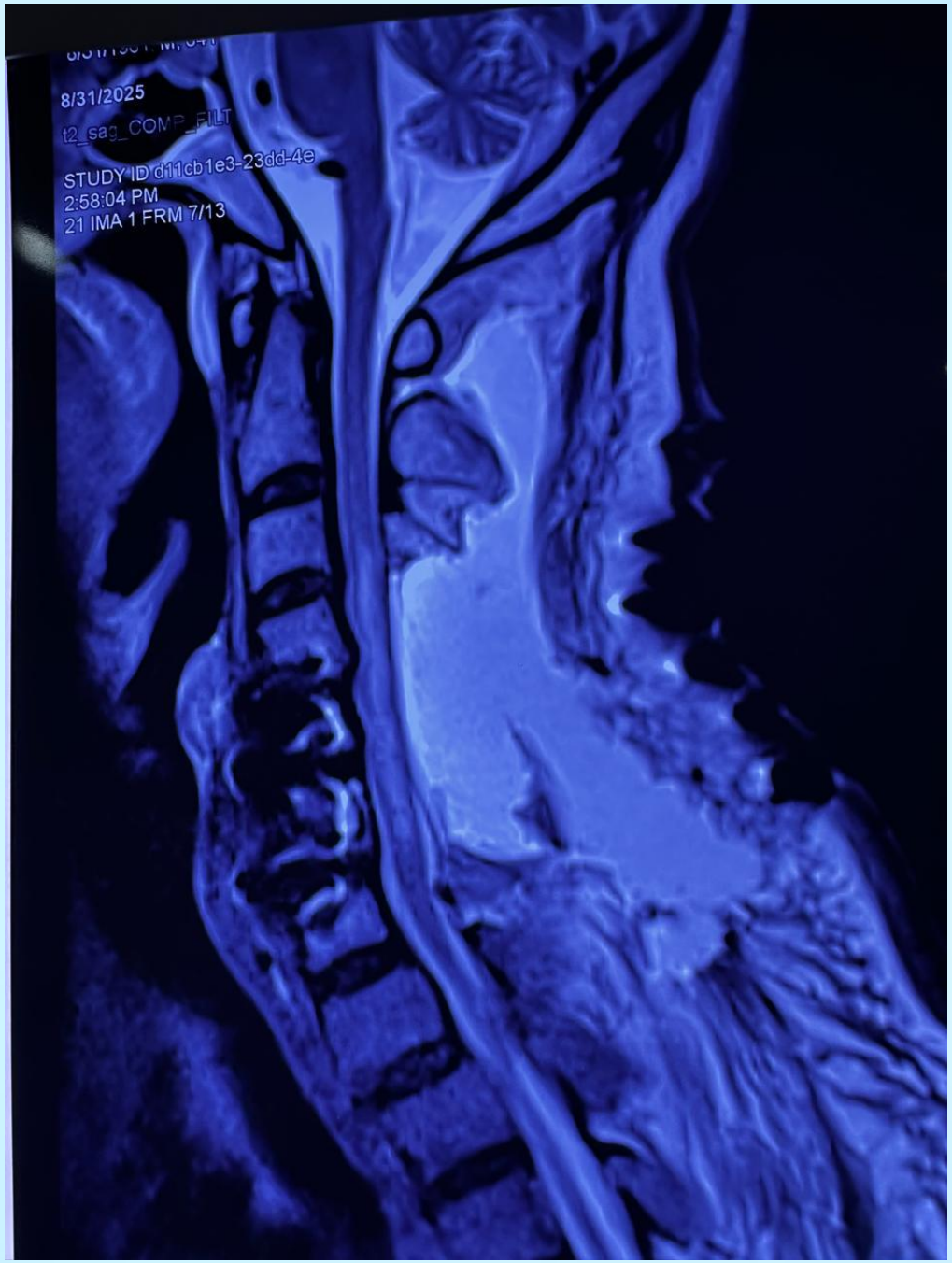


Post-operative X-ray

- Then we performed revised operation on the patient.
- Posterior cervical laminectomy and fusion with lateral mass screw was done at C4/C5, C5/C6, C6/C7 level.
- 2nd post-operative MRI shows evidence of decompression, ie. cord came back in normal caliber.



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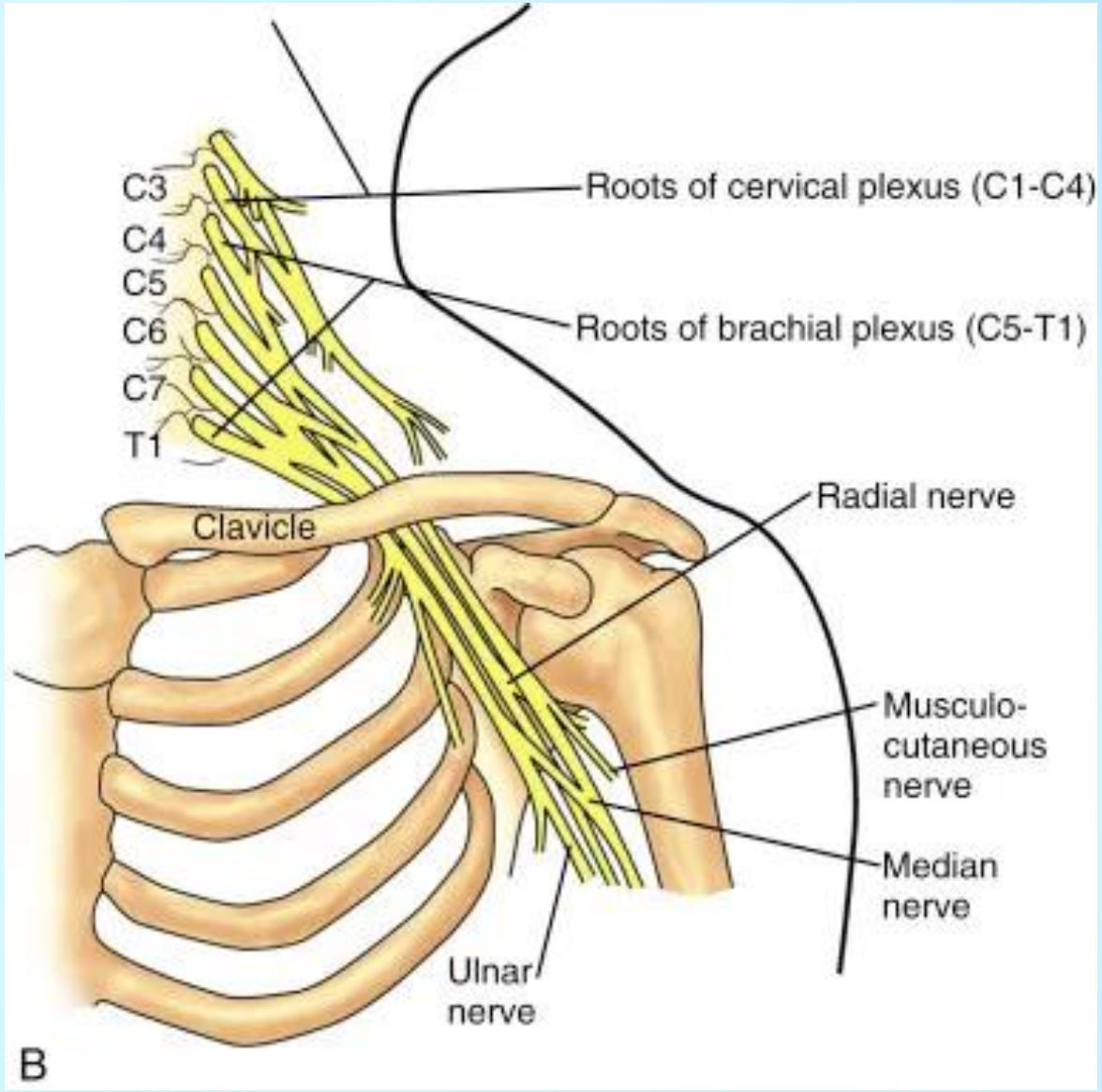
- **Clinical Importance of Cervical Myelopathy:**

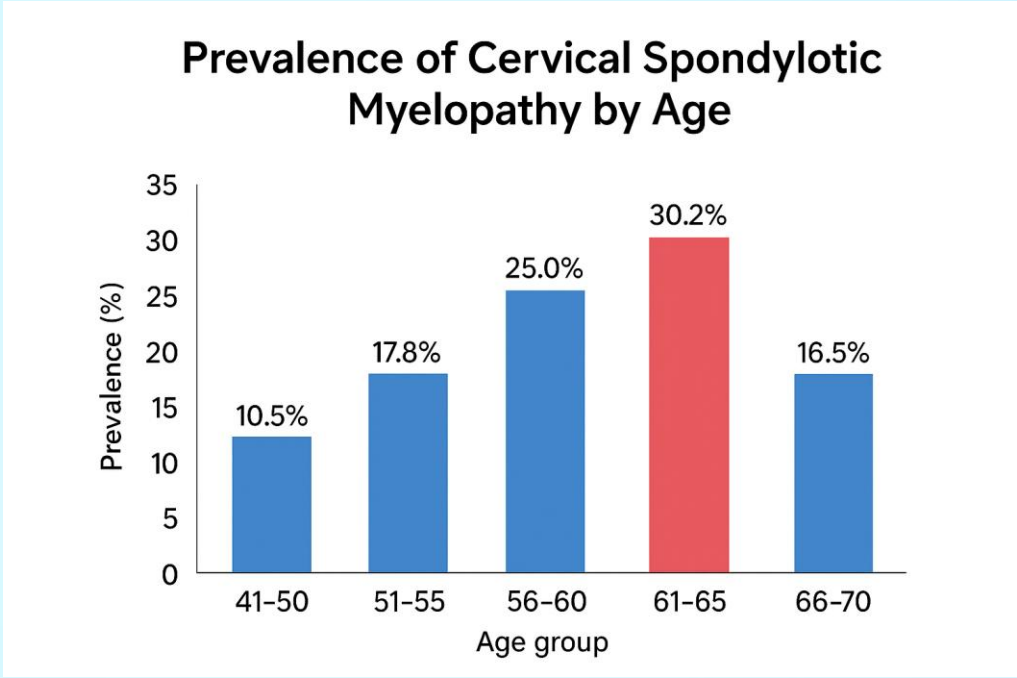
1) Often needs surgical intervention.
2) Can progress to significant paralysis and severe disability if untreated.

(Margetis & Donnally, 2025)

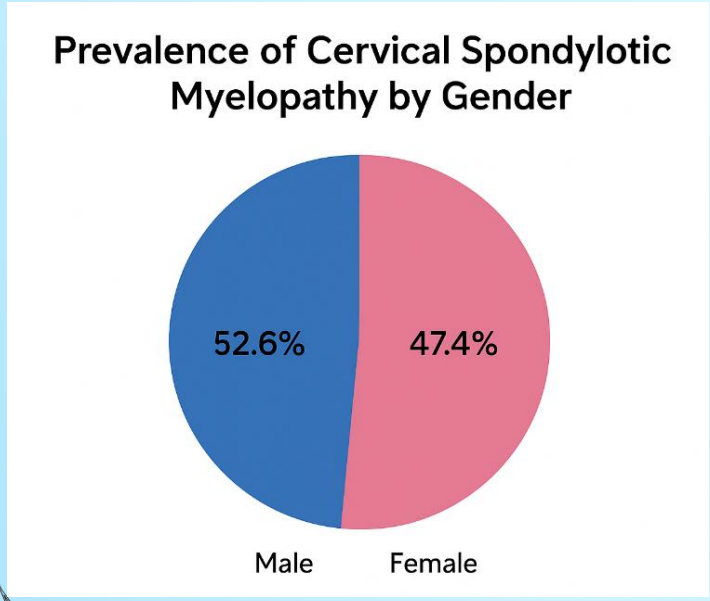


Epidemiology

- There is a significant association between age and cervical spondylotic myelopathy.



Population between 61-65 years old has the greatest prevalence (30.2%).



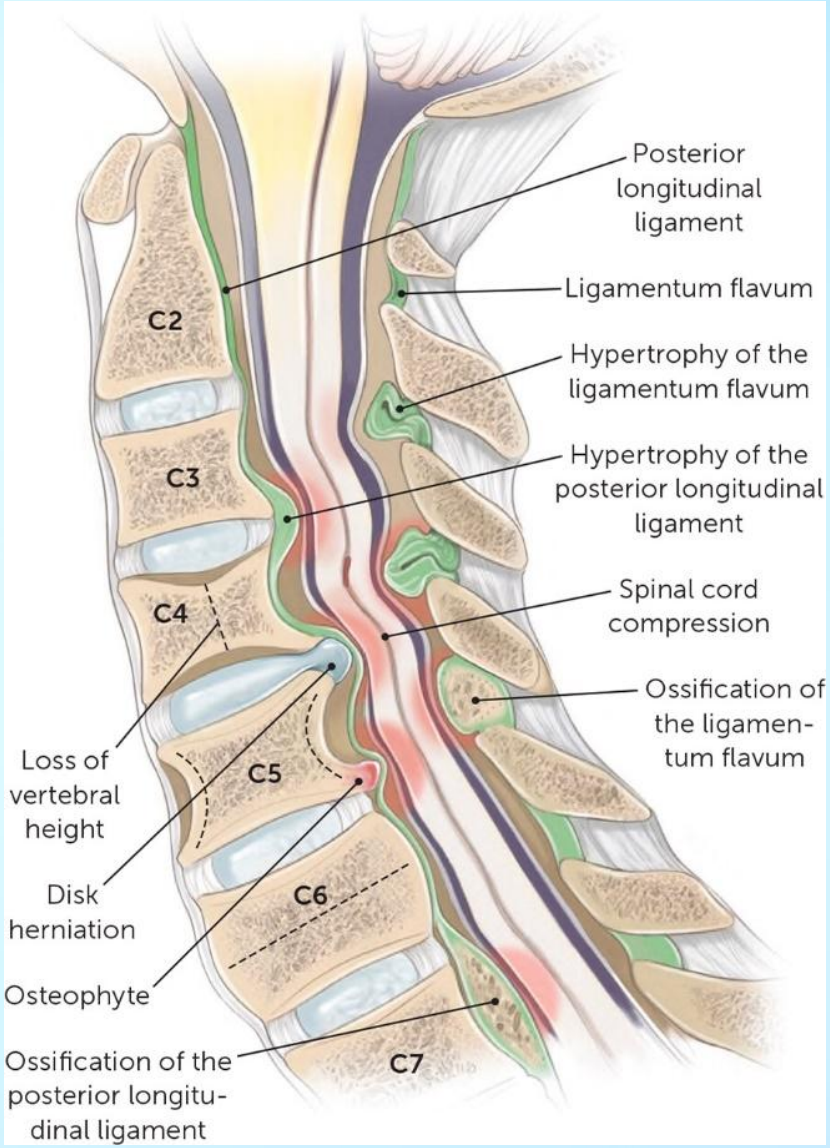
More prevalent in males (52.6%).

(Shahzadi, Kousar, Zain, Islam, & Raza, 2023)

Etiology

- **Most common:** anterior degenerative changes, eg. osteophytes and discosteophytic complexes.
- Trauma, tumor, or infection.
- Direct compression of the spinal cord, or surrounding blood vessels.
- Spondylosis (most common etiology in people ≥55 years).

(Tyger, 2022)

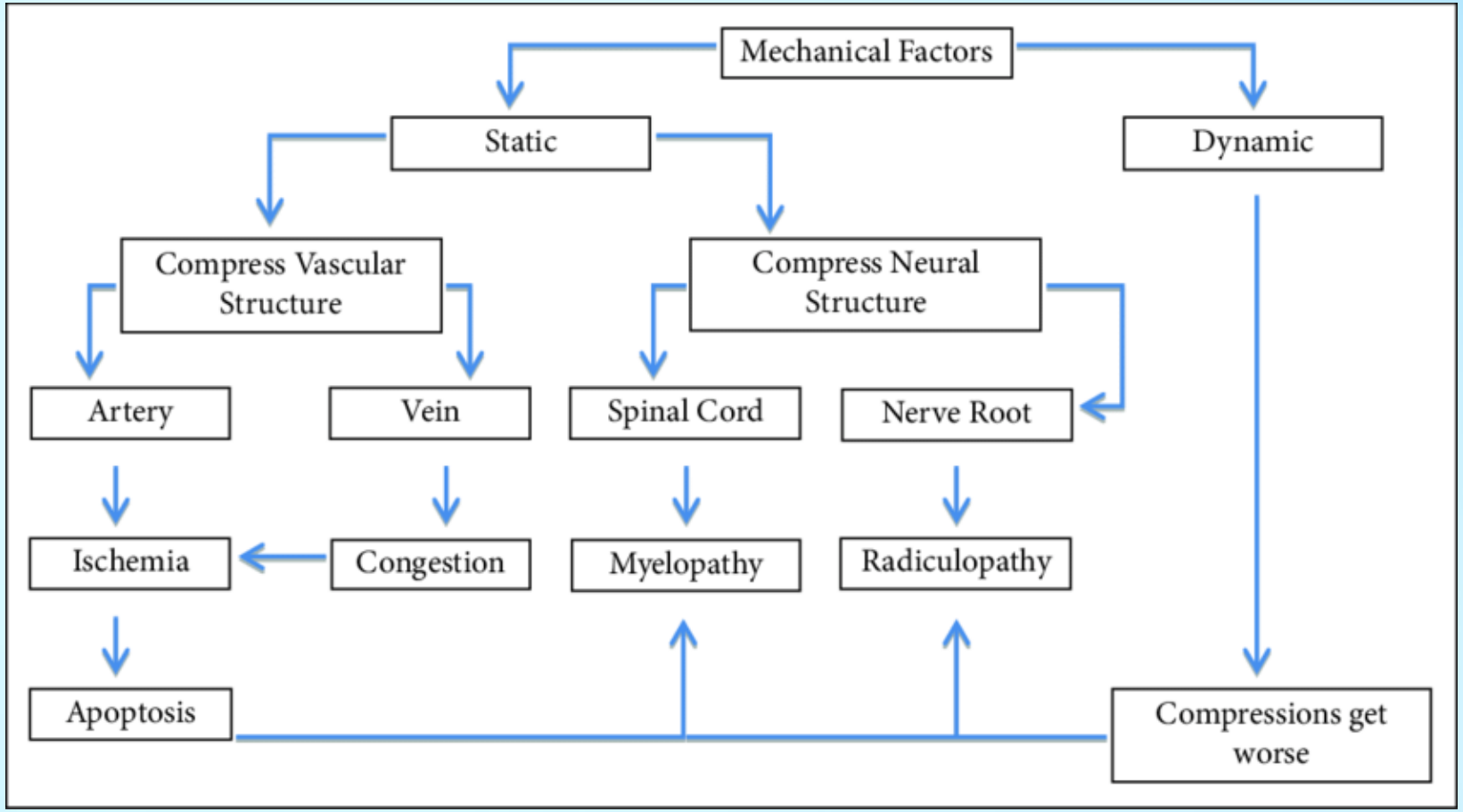


Pathophysiology

- **Pathophysiology is multi factorial:**

1) Static factors: Causes stenosis.
2) Dynamic factors: Results in repetitive injury to the spinal cord.

(Lebl et al., 2011)



(Mardhika et al., 2017)

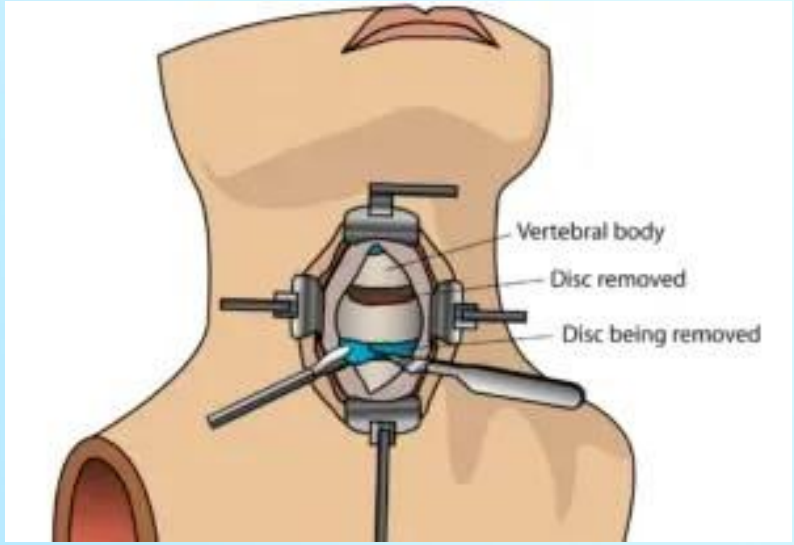
Goals of Surgery

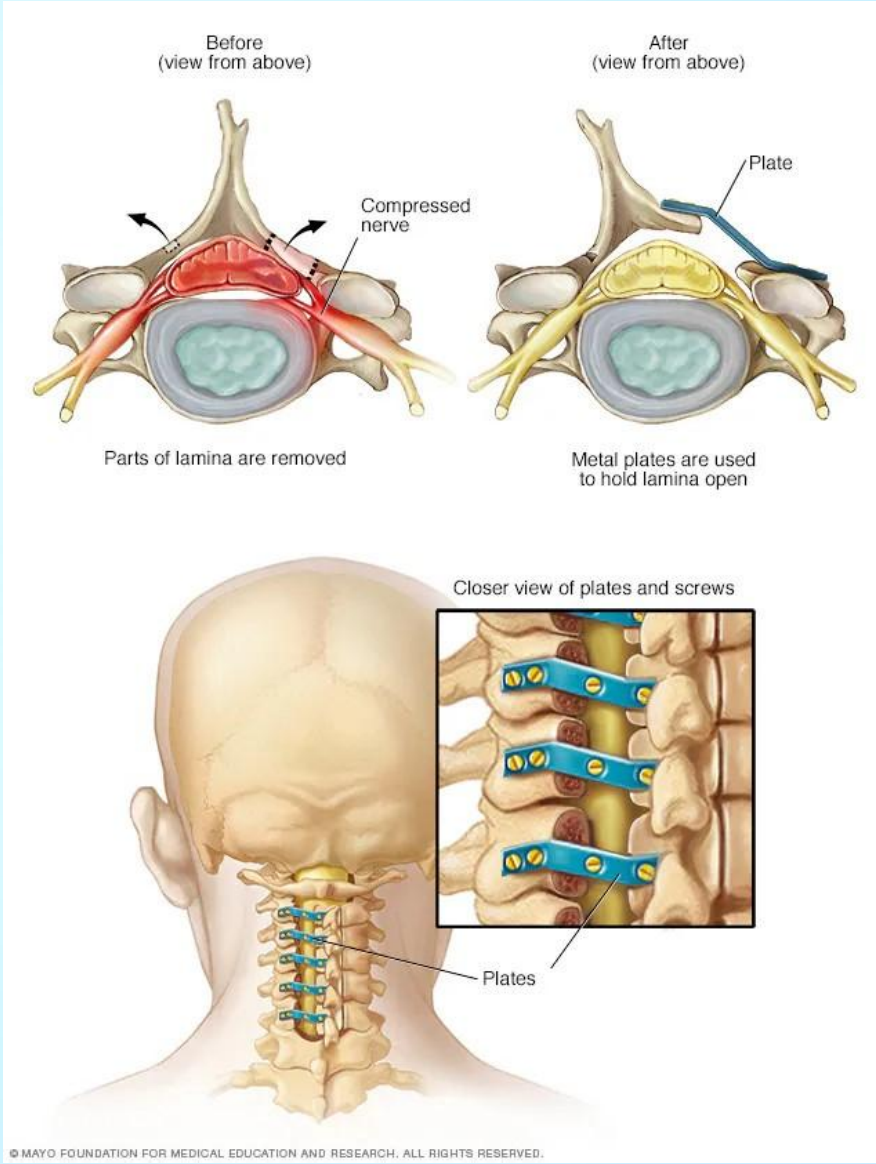
- Adequate decompression.
- Preservation of spinal stability.
- Correction of cervical alignment.
- Restoration of function.
- Prevention of further deterioration of neurological deficit.

Surgical Approaches

1) Anterior
2) Posterior
3) Combined

(Yalamanchili, Vives, & Chaudhary, 2012)





Factors Influencing Surgical Approach Selection

- Location of cord compression.
- Number of levels involved.
- Sagittal alignment.
- Instability.
- Associated axial neck pain.
- Risk factors for pseudoarthrosis.

(Yalamanchili, Vives, & Chaudhary, 2012)

Anterior Approach

- **Indications:**
- Soft disc herniations.
- Concomitant severe axial neck pain.
- Kyphosis.
- 1-2 levels of involvement.

- **Procedures:**
- Single or multilevel anterior cervical discectomy and fusion (ACDF),
- Anterior cervical corpectomy and fusion (ACCF).
- Cervical disc replacement (CDR).

(Yalamanchili, Vives, & Chaudhary, 2012)

- **Advantages:**
- Addresses the ventral pathology by direct decompression.
- Immediate stability of the cervical spine is achieved if grafting is added.

(Muthukumar, 2012)

- **Complications:**
- Higher risk of dysphagia or recurrent laryngeal nerve irritation.
- Adjacent-segment degeneration over time.
- More blood loss.
- Longer operative time.
- Higher incidence of graft-related complications.

(Margetis & Donnally III, 2025)

Posterior Approach

- **Indications:**
- Congenital stenosis.
- Older patients with advanced multilevel spondylosis.
- Certain cases of ossification of the posterior longitudinal ligament (OPLL)

(Yalamanchili, Vives, & Chaudhary, 2012)

- **Procedures:**
- Laminoplasty.
- Laminectomy.
- Posterior decompression and fusion.

(Farrokhi et al., 2025)

- **Advantages:**
- Multilevel procedure is technically easier.
- Shorter operative time.
- Fewer perioperative complication.
- Less risk of unintentional durotomy and CSF leak.
- No risk of recurrent laryngeal nerve palsy.
- No intervertebral strut graft related complications, eg. subsidence or dislodgement.

- **Complications:**
- Risk of postoperative kyphosis.
- Difficulty to correct ventral pathology.
- Increased postoperative pain and morbidity.
- Risk of C5 palsy.

(Komotar, Mocco, & Kaiser, 2006)

Combined Approach

- **Indications:**
- Both ventral and dorsal compression of the thecal sac.
- Patient with multilevel disease who developed kyphosis.
- Severe osteoporosis
- When poor fusion is anticipated, eg. renal disease, heavy smoker.

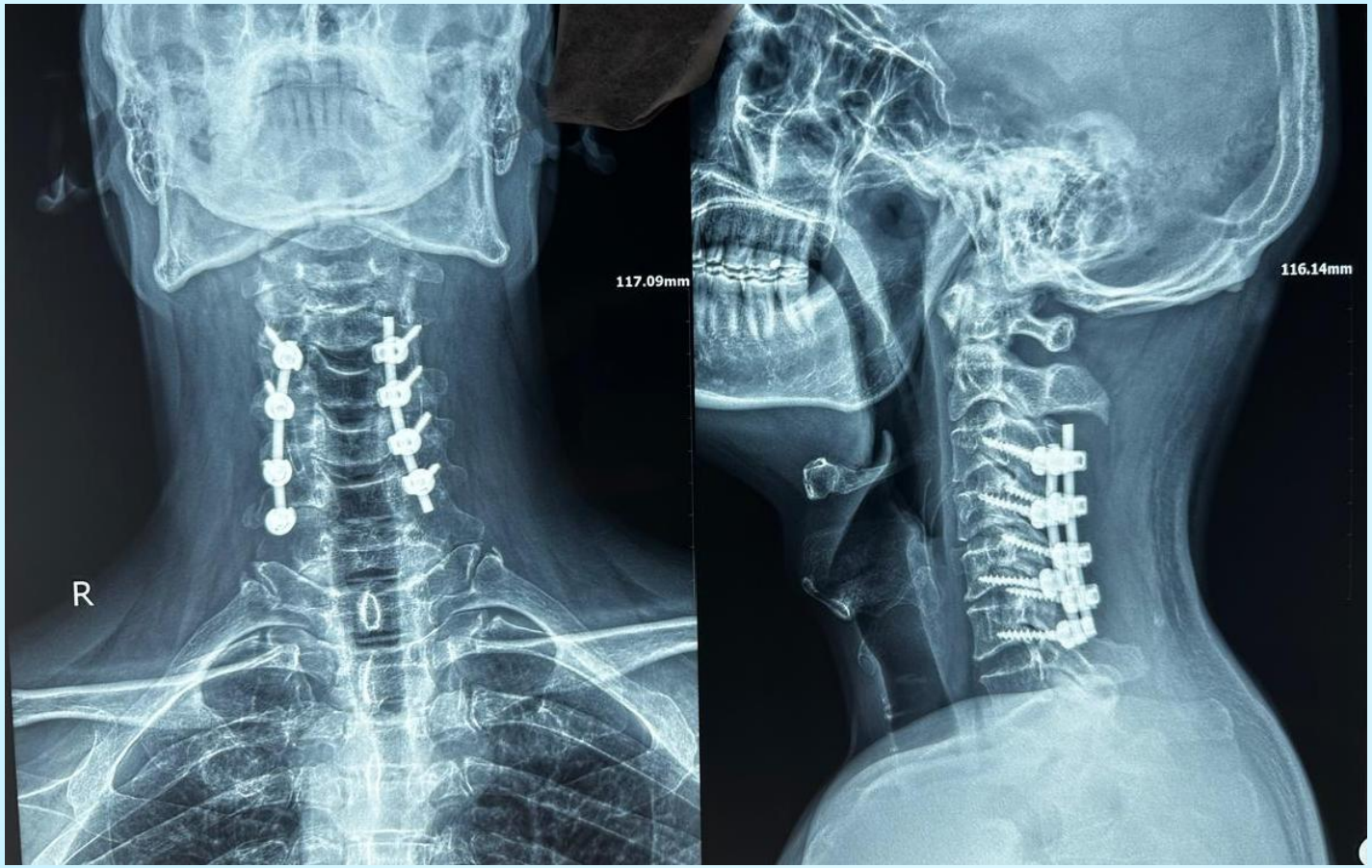
(Muthukumar, 2012)

Comparison: Anterior vs Posterior

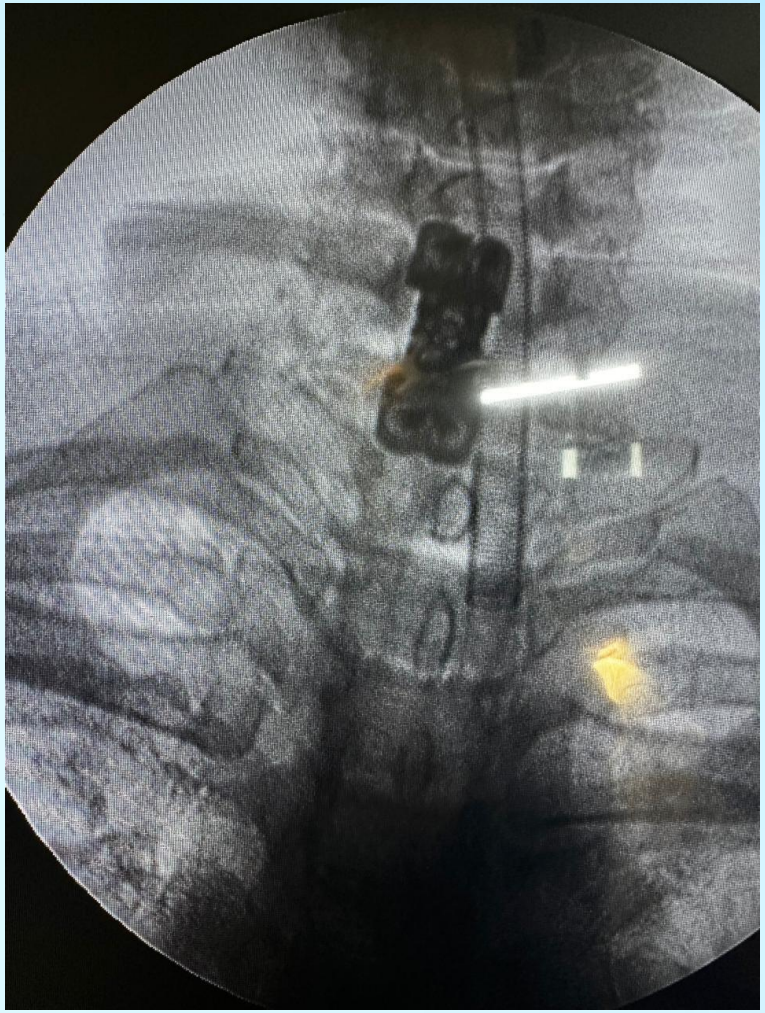
Anterior approach	Posterior approach
Primarily anterior compression	Primarily posterior compression
1–2 levels of disease	≥3 levels of disease
Kyphotic deformity	Normal or lordotic deformity
Absence of congenital canal stenosis	Presence of congenital canal stenosis
Associated radiculopathy	No radiculopathy
Absence of OPLL	Presence of OPLL

(Komotar, Mocco, & Kaiser, 2006)

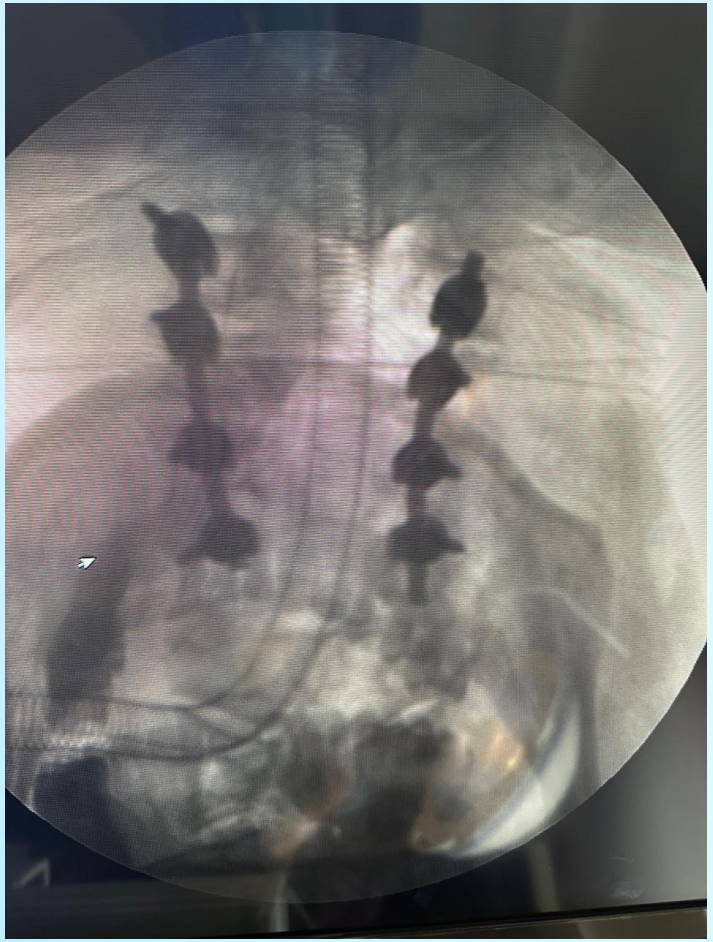
Some Cases

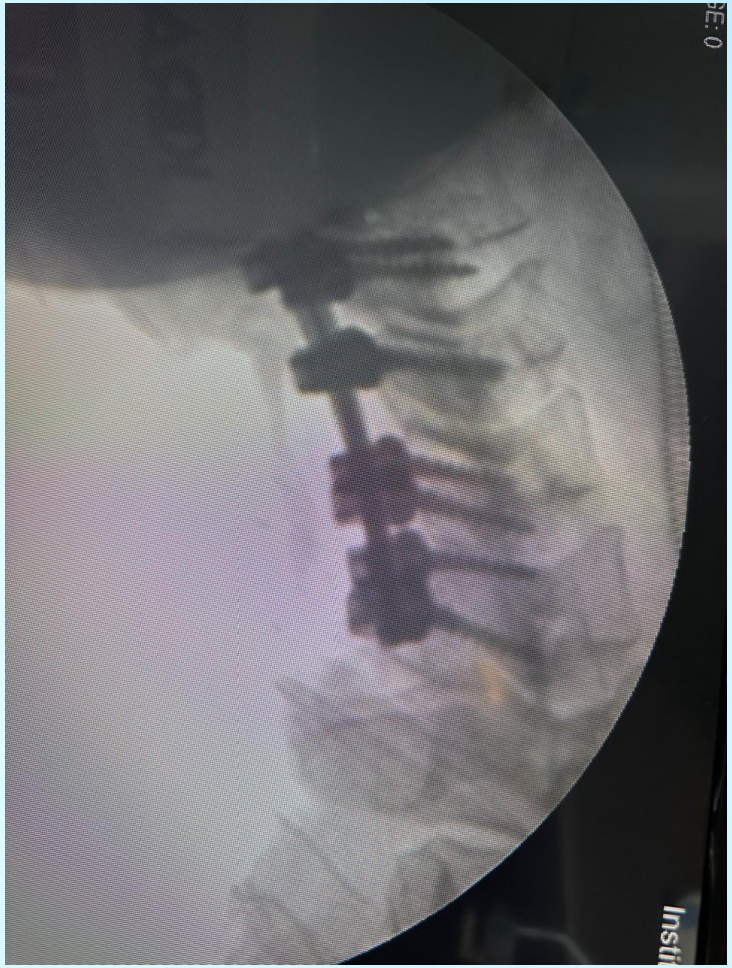


X-ray of cervical spine of a 47 Y/O male with multilevel compression. Surgery was done by posterior approach.

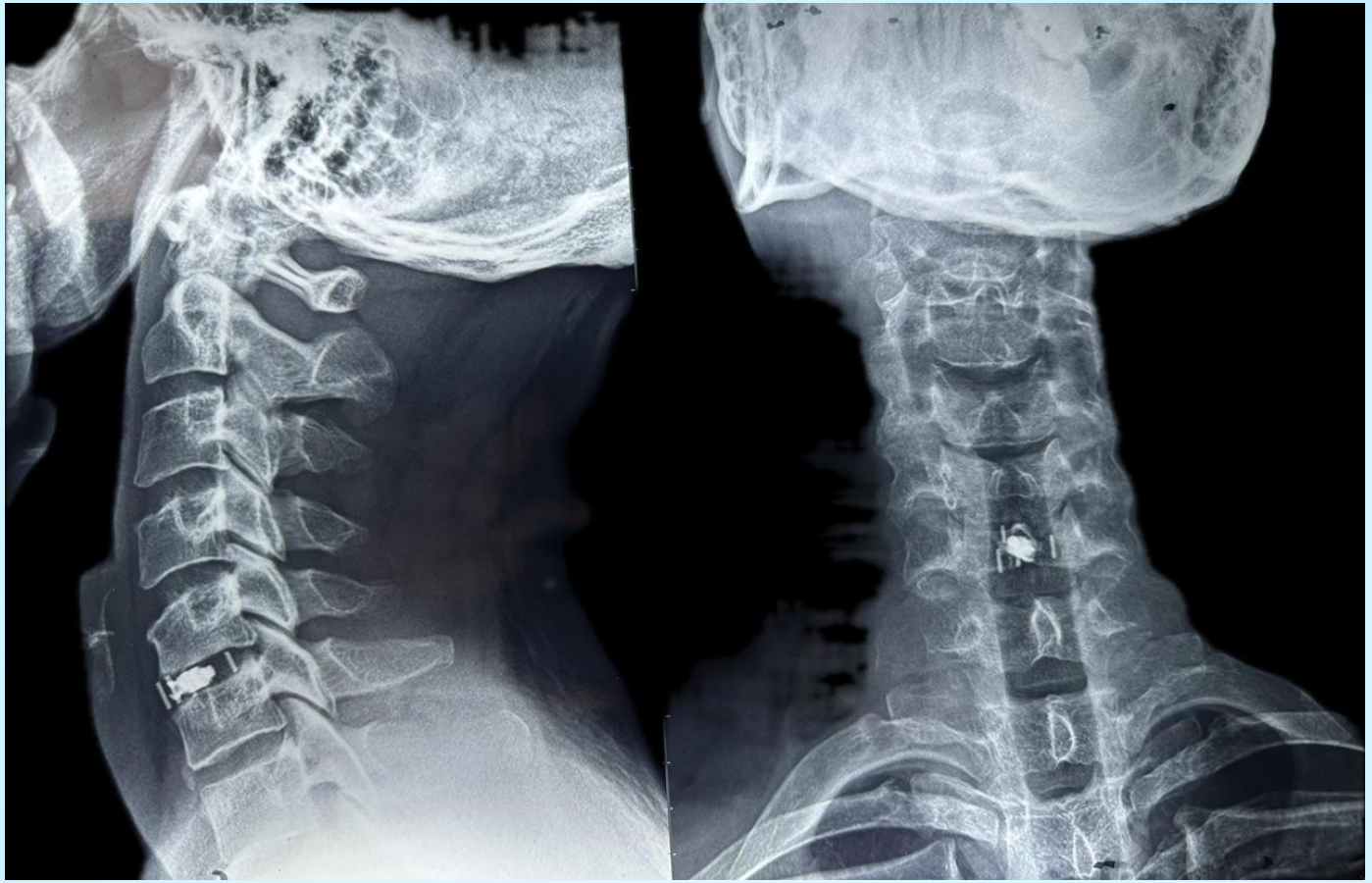


Per-operative C-arm image of a 43 Y/O male patient with single level corpectomy with expandable cage (anterior approach)

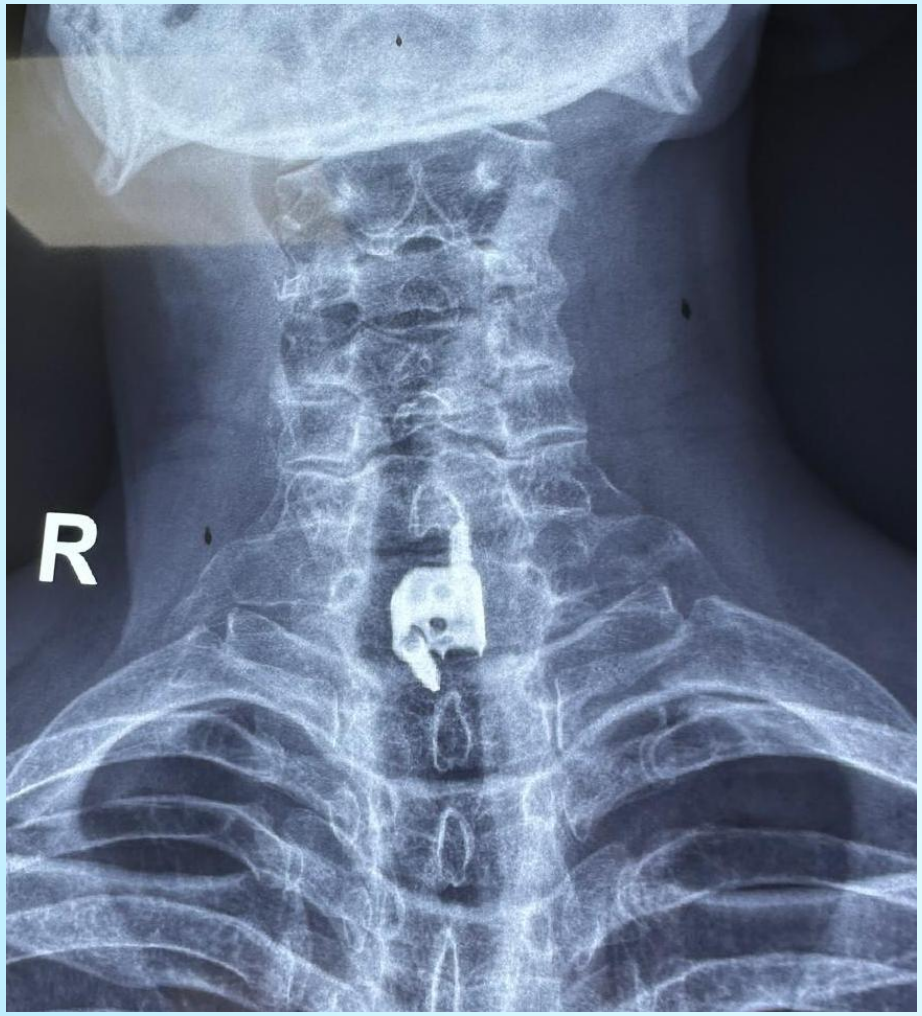




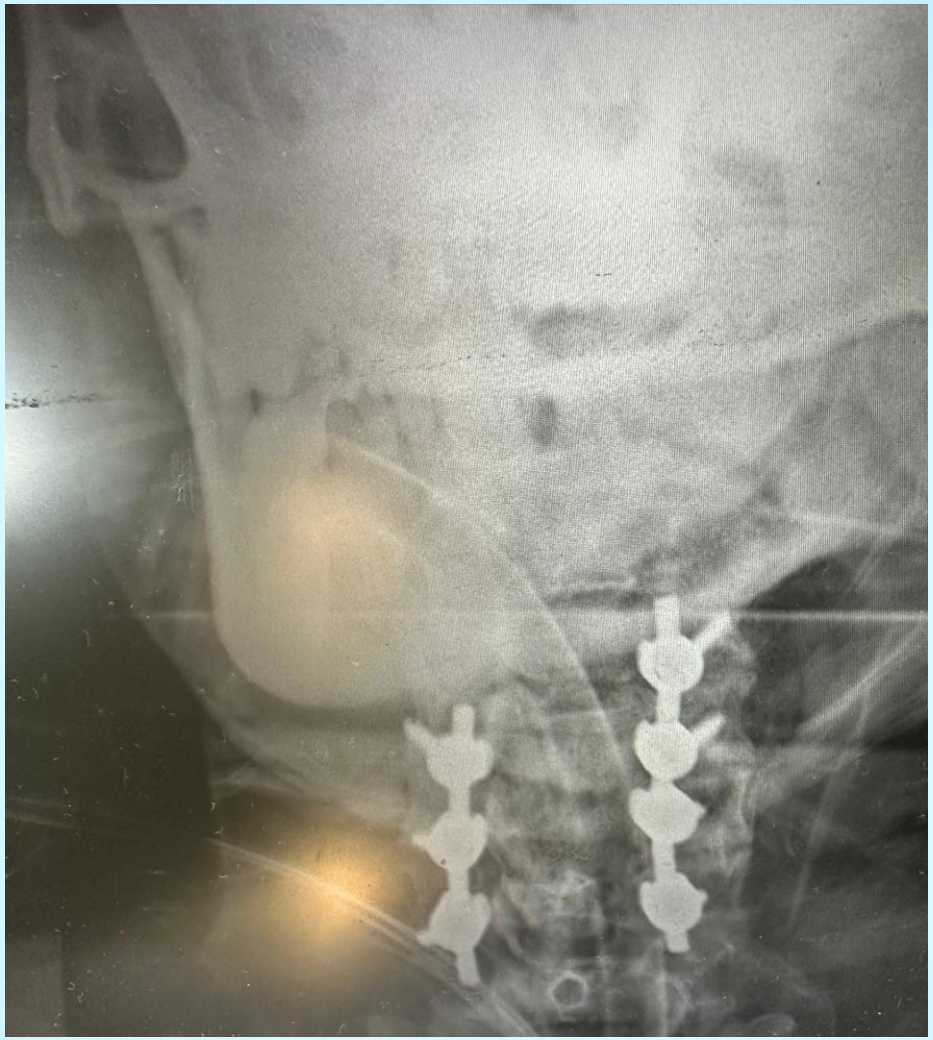
Per-operative C-arm image of a 50 Y/O female with multilevel compression. Surgery was done by posterior approach.



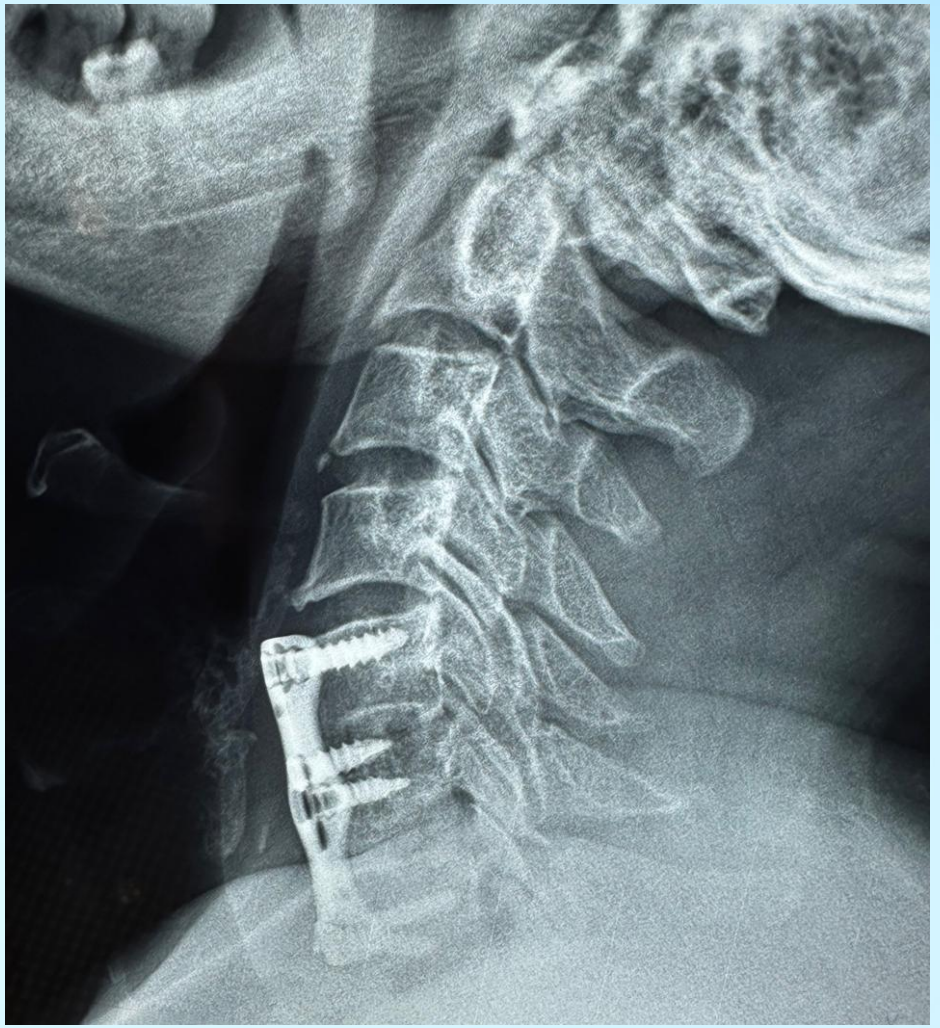
Post-operative X-ray of a 52 Y/O female with single level disc prolapse. ACDF done with stand alone cage.



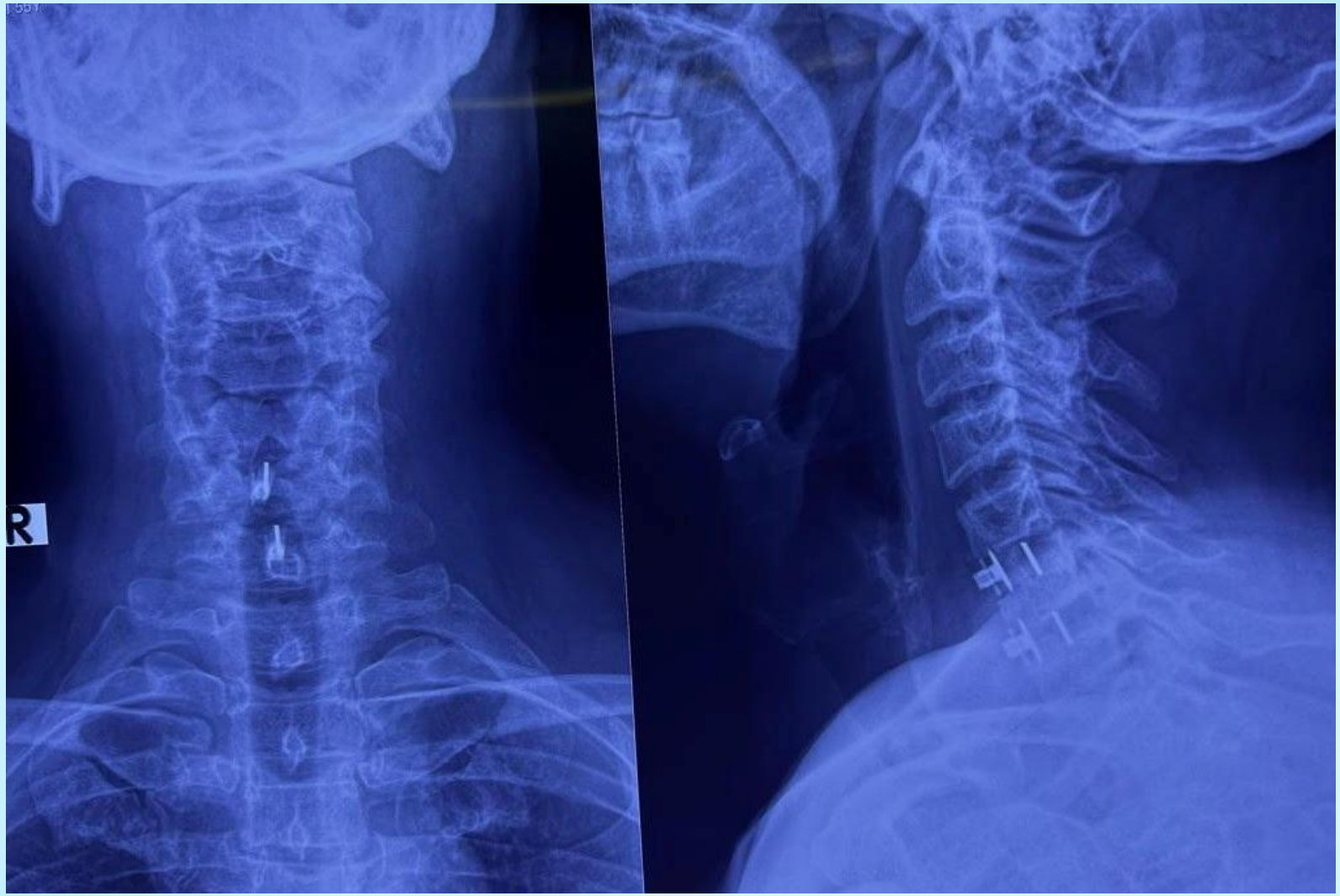
Post-operative X-ray of a 62 Y/O male with single level disc prolapse. ACDF done with stand alone cage.



Post-operative X-ray 60 Y/O female with multilevel compression. Surgery was done by posterior approach.



Post-operative X-ray 45 Y/O male with 2 levels compression. ACDF with plate fixation was done.



Post-operative X-ray of a 55 Y/O male with single level disc prolapse. ACDF was done with stand alone blade cage.

Conclusion

- No surgical approach is universally considered as ‘gold standard’ for cervical myelopathy.
- Anterior, posterior or combined – approach is tailored according to pathology, level of involvement and spinal alignment.
- Anterior approach is suitable for 1-2 levels of involvement, whereas posterior approach is preferred for ≥ 3 levels.


আদ্-দ্বীন মেডিকেল কলেজ হাসপাতাল
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Bangladesh Against Terrorism

Dr. Md. Idris Ali, renowned spine surgeon of Bangladesh

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