



Pain in the Neck: Cervical Spine Review & Updates

Chairperson:

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Monday, March 25th, 2024

4:10-5:20pm



Work Related & Patient Related Risk Factors for Poor Outcomes in Cervical Spine Surgery

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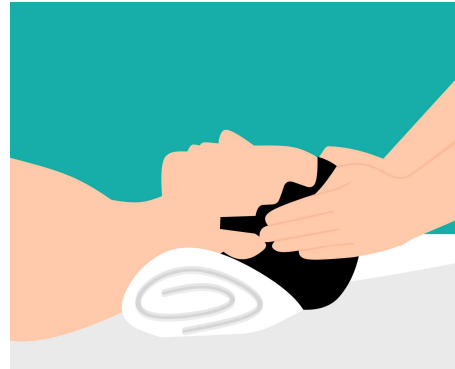
2024

**Work Related Injuries
Workshop**

Disclosure

- I have something to Disclose (Website)
- 

Outcome Prediction?



Factors → Outcomes

- **Modifiable**

VS

- **Non Modifiable**

- Early RTW < 6 months

VS

- Late RTW > or = 6 months

Factors listed have “moderate” or “strong” statistical significance
Factors with “limited” significance are NOT listed

Factors → Outcomes

- Injury:
 - Severity
 - Pain
- Treatment:
 - Timeliness
 - Conservative vs intervention
- (Expedited) Recovery:
 - Rehabilitation
 - Expectations
- Person related (injured worker):
 - Age
 - Baseline Medical morbidities
 - Baseline Functional status
 - Socioeconomic status
 - Education
 - Baseline Job satisfaction
- Workplace Environment
 - Physical Demands
 - Modified duties
- Litigation:
 - Attorney Involvement
 - Work compensation status

Non Modifiable Factors → Poor Outcomes

- Injury:
 - Severity (Early + Late)
 - Pain (Late): higher intensity, catastrophising, poor-coping, fear-avoidance
- Treatment:
 - Timeliness: Delay in referral (Early + Late)
 - Conservative vs intervention: Non-Op
- (Expedited) Recovery:
 - Rehabilitation
 - Expectations:
 - Negative recovery expectations (late)
 - Non established RTW expectations
- Person related (injured worker):
 - Age: Older (Late)
 - Baseline Medical morbidities: Poor Health
 - Baseline Functional status: Low function (Late)
 - Socioeconomic status: Low income (Late)
 - Education: Low education (Late)
 - Baseline Job satisfaction: Low satisfaction
- Workplace Environment
 - Physical Demands: More physical (Late)
 - Modified duties: lack of accommodations
- Litigation:
 - Attorney Involvement
 - Work compensation status (Late)

Modifiable Factors → Poor Outcomes

- Injury:
 - Severity (early, late)
 - Pain (late): higher intensity, catastrophising, poor-coping, fear-avoidance
- Treatment:
 - Timeliness: Delay in referral (Early + Late)
 - Conservative vs intervention: Non-Op
- (Expedited) Recovery: (Early + Late)
 - Rehabilitation
 - Expectations:
 - Negative recovery expectations (late)
 - Non established RTW expectations
- Person related (injured worker):
 - Age: Older (Late)
 - Baseline Medical morbidities: Poor Health
 - Baseline Functional status: Low function (Late)
 - Socioeconomic status: Low income (Late)
 - Education: Low education (Late)
 - Baseline Job satisfaction: Low satisfaction
- Workplace Environment
 - Physical Demands: More physical (Late)
 - Modified duties: lack of accommodations
- Litigation:
 - Attorney Involvement
 - Work compensation status (Late)

FOCUS – Modifiable Factors



- Early Referral to Spine specialists
- Early Pain Management
- Early Surgery (if warranted)
Better than delayed Rx
- Early Rehabilitation

- Workplace – Job Satisfaction
- Offer Modified Duties

- Align Goal RTW!!

MANAGE EXPECTATIONS
Collective Stakeholder GOAL
RTW !!

Literature

1. Steenstra IA et al. Systematic Review of Prognostic Factors for Return to Work in Workers with Sub Acute and Chronic Low Back Pain. *J Occup Rehabil.* 2017;27(3):369-381. doi:10.1007/s10926-016-9666-x
2. Yannik TL, et al. Prognostic factors specific to work-related musculoskeletal disorders: An overview of recent systematic reviews. *Musculoskeletal Science and Practice.* Aug 2023
3. Hong PD, et al. Systematic Review of Biopsychosocial Prognostic Factors for Return to Work After Acute Orthopedic Trauma: A 2020 Update. *Frontiers in Rehabilitation.*
4. C. Cancelliere *et al.* Factors affecting return to work after injury or illness: best evidence synthesis of systematic reviews. *Chiropr. Man. Ther.* (2016)



Thank You!



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Anterior versus Posterior Approaches to Cervical Spine Pathologies

Adetokunbo A. Oyelese, MD, PhD

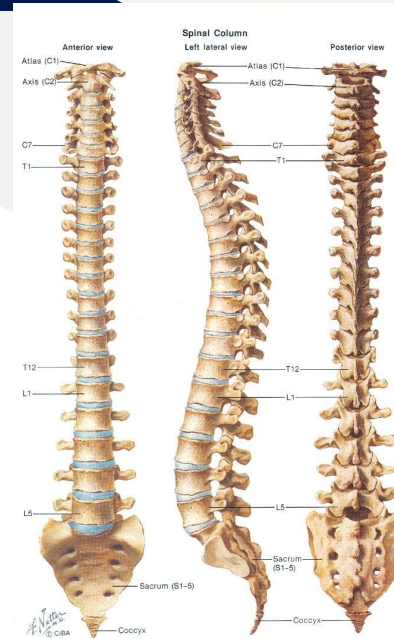
Professor and Vice-Chair
Department of Neurosurgery

Director Spine Division and
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Brown University Medical School

Function of Spine

- Protect the spinal cord.
- Serve as a structural support for the body



Goals of Spine Surgery

- Decompression
- Realignment
- Stabilization



Cervical Spine Surgical Approaches

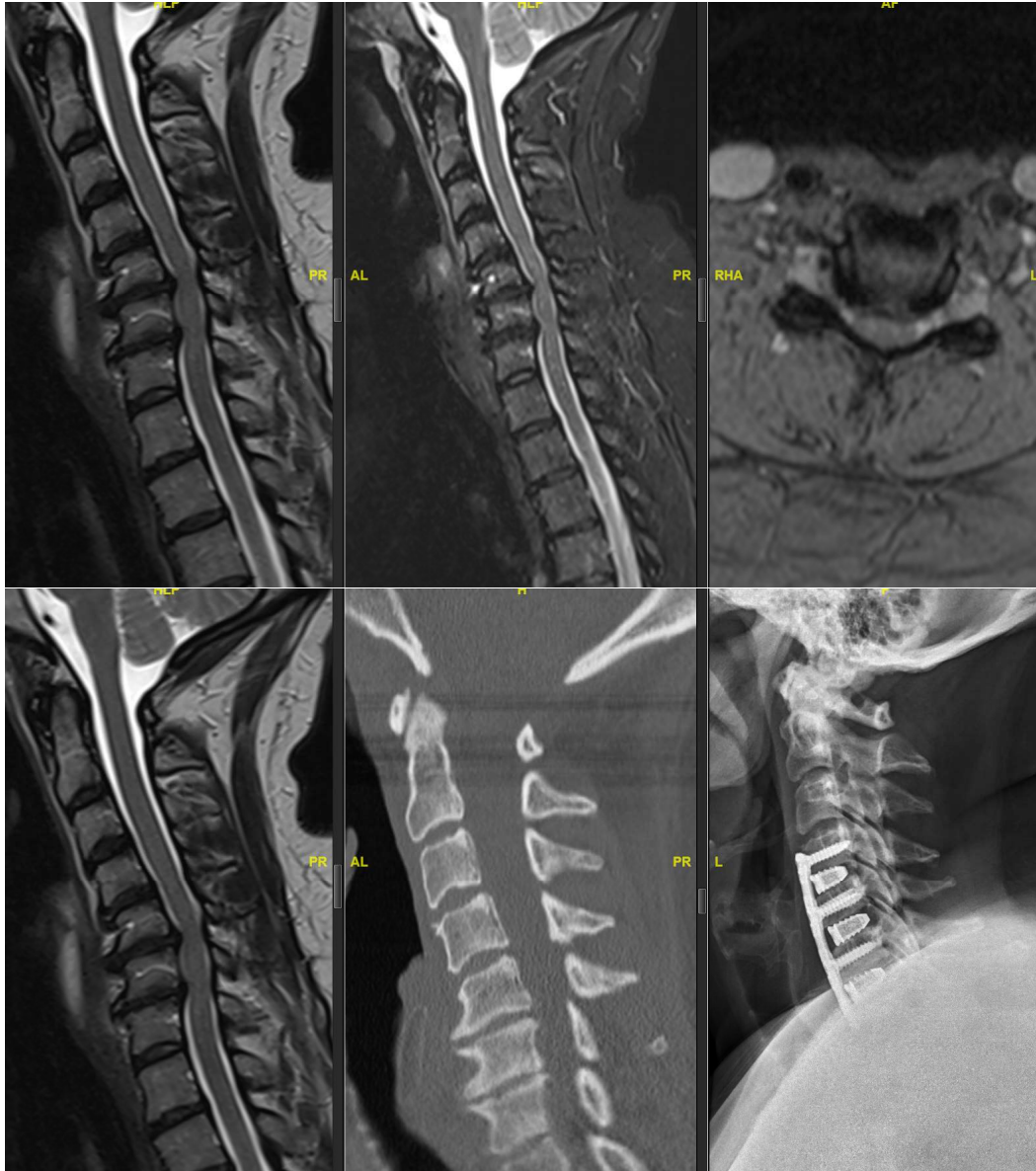
COULD BE DIRECT OR INDIRECT

Anterior Approaches

- Discectomy and Fusion
- Disc Arthroplasty
- Corpectomy

Posterior Approaches

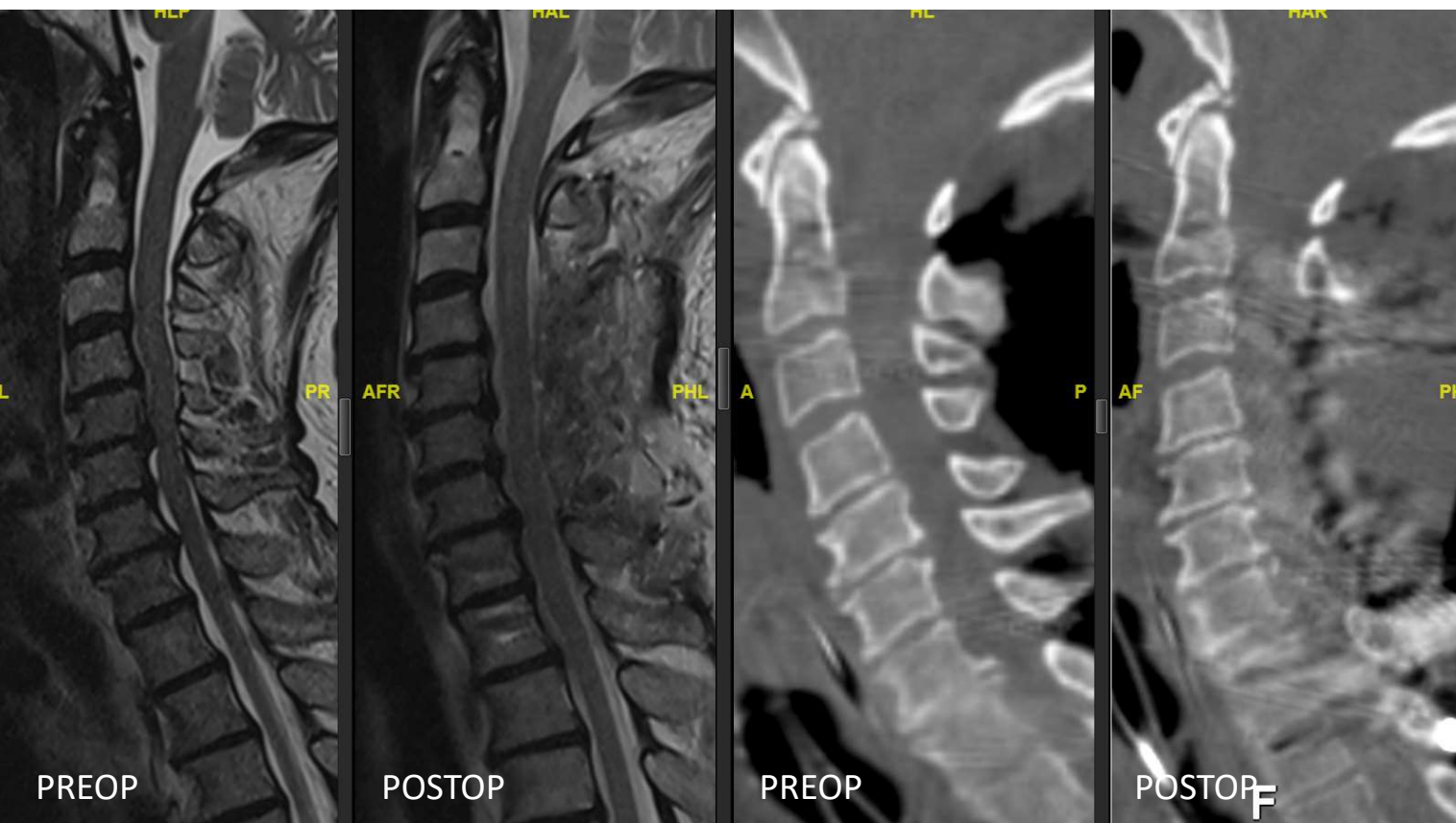
- Laminectomy
- Laminectomy and Fusion
- Laminoplasty
- Posterior Foraminotomy/Discectomy



- Multilevel cervical disc disease with stenosis, kyphosis
- Treated with multilevel anterior discectomies and fusion



- Multilevel cervical disc disease with stenosis, kyphosis
- Treated with multilevel anterior corpectomy, discectomy and fusion



- Multilevel cervical disc disease with stenosis, kyphosis
- Treated with multilevel posterior laminectomy and fusion

Anterior cervical discectomy and fusion versus posterior decompression in patients with degenerative cervical myelopathy: a systematic review and meta-analysis

Presented at the 2023 AANS/CNS Joint Section on Disorders of the Spine and Peripheral Nerves

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Jordina Rincon-Torroella, MD,¹ Wuyang Yang, MD,¹ Risheng Xu, MD, PhD,¹ Ali Bydon, MD,¹
Timothy Witham, MD,¹ Allan Belzberg, MD,¹ Nicholas Theodore, MD,¹ and Daniel Lubelski, MD¹

¹Department of Neurosurgery, Johns Hopkins University School of Medicine, Baltimore, Maryland; and ²Department of Neurosurgery, Golestan Hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

OBJECTIVE The optimal surgical approach for patients with multilevel degenerative cervical myelopathy (DCM) remains unknown. This systematic review and meta-analysis sought to compare anterior cervical discectomy and fusion (ACDF) versus posterior decompression (PD) in patients with DCM spanning ≥ 2 levels without ossification of the posterior longitudinal ligament.

METHODS MEDLINE and PubMed were searched from inception to February 22, 2022. The primary outcomes were Neck Disability Index (NDI), SF-36 Physical Component Summary (PCS), modified Japanese Orthopaedic Association (mJOA) scale, visual analog scale (VAS), and EQ-5D scores. Secondary outcomes were operative duration, hospital length of stay (LOS), postoperative morbidity (including hematoma, surgical site infection [SSI], CSF leakage, dysphagia, dysphonia, C5 palsy, and fusion failure), mortality, readmission, reoperation, and Cobb angle.

RESULTS Nineteen studies comprising 8340 patients were included, of whom 4118 (49.4%) and 4222 (50.6%) underwent ACDF and PD, respectively. The mean number of involved spinal levels was comparable between the groups (3.1 vs 3.5, $p = 0.15$). The mean differences (MDs) of the primary outcomes were the mean of each index in the ACDF group minus that of the PD group. At the 1-year follow-up, the MDs of the NDI (-1.67 [95% CI -3.51 to 0.18], $p = 0.08$), SF-36 PCS (2.48 [95% CI -0.59 to 5.55], $p = 0.11$), and VAS (-0.32 [95% CI -0.97 to 0.34], $p = 0.35$) scores were similar between the groups. While the MDs of the mJOA (0.71 [95% CI 0.27 to 1.16], $p = 0.002$) and EQ-5D (0.04 [95% CI 0.01 to 0.08], $p = 0.02$) scores were greater in the ACDF group, the differences were not clinically significant given the minimal clinically important differences (MCIDs) of 2 and 0.05 points, respectively. In the ACDF group, the MDs for operative bleeding (-102.77 ml [95% CI -169.23 to -36.30 ml], $p = 0.002$) and LOS (-1.42 days [95% CI -2.01 to -0.82 days], $p < 0.00001$) were lower, the dysphagia OR (11.10 [95% CI 5.43 – 22.67], $p < 0.00001$) was higher, and the ORs for SSI (0.43 [95% CI 0.24 – 0.78], $p = 0.006$) and C5 palsy (0.32 [95% CI 0.15 – 0.70], $p = 0.004$) were lower. The other outcomes were similar between the groups. Overall evidence according to the GRADE (Grading of Recommendations, Assessment, Development and Evaluations) approach was moderate.

CONCLUSIONS ACDF and PD are similar regarding functional outcomes. ACDF is beneficial in terms of less bleeding, shorter LOS, and lower odds of SSI and C5 palsy, while the procedure carries higher odds of dysphagia. The authors recommend individualized treatment decision-making.

Differences in Patient-Reported Outcomes Between Anterior and Posterior Approaches for Treatment of Cervical Spondylotic Myelopathy: A Quality Outcomes Database Analysis

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■ **OBJECTIVE:** Surgery for cervical spondylotic myelopathy (CSM) may use anterior or posterior approaches. Our objective was to compare baseline differences and validated postoperative patient-reported outcome measures between anterior and posterior approaches.

■ **METHODS:** The NeuroPoint Quality Outcomes Database was queried retrospectively to identify patients with symptomatic CSM treated at 14 high-volume sites. Demographic, comorbidity, socioeconomic, and outcome measures were compared between treatment groups at baseline and 3 and 12 months postoperatively.

■ **RESULTS:** Of the 1151 patients with CSM in the cervical registry, 791 (68.7%) underwent anterior surgery and 360 (31.3%) underwent posterior surgery. Significant baseline differences were observed in age, comorbidities, myelopathy severity, unemployment, and length of hospital stay. After adjusting for these differences, anterior surgery patients had significantly lower Neck Disability Index score (NDI) and a higher proportion reaching a minimal clinically important difference (MCID) in NDI ($P = 0.005$ at 3 months; $P = 0.003$ at 12 months). Although modified Japanese Orthopaedic Association scores were lower in anterior surgery patients at 3

and 12 months ($P < 0.001$ and $P = 0.022$, respectively), no differences were seen in MCID or change from baseline. Greater EuroQol-5D improvement at 3 months after anterior versus posterior surgery ($P = 0.024$) was not sustained at 12 months and was insignificant on multivariate analysis.

■ **CONCLUSIONS:** In the largest analysis to date of CSM surgery data, significant baseline differences existed for patients undergoing anterior versus posterior surgery for CSM. After adjusting for these differences, patients undergoing anterior surgery were more likely to achieve clinically significant improvement in NDI at short- and long-term follow-up.

INTRODUCTION

Cervical spondylotic myelopathy (CSM) is the most common cause of adult spinal cord disease.¹ CSM is the result of chronic osteoarthritic degenerative changes of the bony and ligamentous anatomy of the cervical spine as well as the cervical disc spaces.² If left untreated, CSM can lead to



Original Article

Cost analysis comparison between anterior and posterior cervical spine approaches

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ABSTRACT

Background: The costs of cervical spine surgery have steadily increased. We performed a 5-year propensity scoring-matched analysis of 276 patients undergoing anterior versus posterior cervical surgery at one institution.

Methods: We performed propensity score matching on financial data from 276 patients undergoing 1–3 level anterior versus posterior cervical fusions for degenerative disease (2015–2019).

Results: We found no significant difference between anterior versus posterior approaches for hospital costs (\$42,529.63 vs. \$45,110.52), net revenue (\$40,877.25 vs. \$34,036.01), or contribution margins (\$14,230.19 vs. \$6,312.54). Multivariate regression analysis showed variables significantly associated with the lower contribution margins included age ($\beta = -392.3$) and length of stay (LOS; $\beta = -1151$). Removing age/LOS from the analysis, contribution margins were significantly higher for the anterior versus posterior approach (\$17,824.16 vs. \$6,312.54, $P = 0.01$).

Conclusion: Anterior cervical surgery produced higher contribution margins compared to posterior approaches, most likely because posterior surgery was typically performed in older patients requiring longer LOS.

Keywords: Anterior, Cervical spine surgery, Contribution margins, Finances, Posterior, Propensity scoring matched analysis, Revenue

What factors influence surgical decision-making in anterior versus posterior surgery for cervical myelopathy? A QOD analysis

Presented at the 2023 AANS/CNS Joint Section on Disorders of the Spine and Peripheral Nerves

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Kai-Ming Fu, MD, PhD,⁹ Michael S. Virk, MD, PhD,⁹ John J. Knightly, MD,¹⁰ Scott Meyer, MD,¹⁰
Paul Park, MD,¹¹ Cheerag Upadhyaya, MD, MBA, MSc,¹² Mark E. Shaffrey, MD,¹³
Avery L. Buchholz, MD, MPH,¹³ Luis M. Tumialán, MD,¹⁴ Jay Turner, MD, PhD,¹⁴ Nitin Agarwal, MD,¹⁵
Dean Chou, MD,³ Nauman S. Chaudhry, MD,¹ Regis W. Haid Jr., MD,¹⁶
Praveen V. Mummaneni, MD, MBA,¹⁷ Mohamad Bydon, MD,² and Oren N. Gottfried, MD¹

CONCLUSIONS The selection of approach for patients with CSM depends on patient demographics and symptomology. Posterior surgery was performed in patients who were older and had worse systemic disease, increased myelopathy, and greater levels of stenosis. Anterior surgery was more often performed in patients who were employed and had intervertebral disc herniation.

Summary

- Anterior and Posterior Approaches to the Cervical Spine are equivalent in producing good outcomes depending on the specific pathology and specific patient factors
- When favorable, a direct approach to the pathology is preferred
- When factors are unfavorable, an indirect approach should be undertaken
- Anterior approaches may be associated with less pain, lower infection and overall complication rates and lower overall costs likely due to shorter hospital length of stay



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THANK YOU!



2024

Work Related Injuries
Workshop

Who Is The Optimal Patient for Cervical Injections & When To Stop

Roberto Feliz, MD

Anesthesiologist /

Interventional Pain Management

Who is the Optimal Patient for Cervical Injection & When to Stop

- The aim is to reduce the acute or persistent post injury reactive ultra-localized inflammation to prevent or delay progression from Acute Pain into Chronic Pain (\$\$\$).
- Keep the injury or inflammation (**reversible**) and from progression into at an **irreversible** (MMI) final stage.

Who is the Optimal Patient for Cervical Injection & When to Stop

• Reversible

- Cellular Swelling
 - Local release of Mediators of inflammation.
 - These mediators lead to cellular membrane ionic shift and fluid shifts, cellular swelling.
 - Aim to decrease or stop cellular swelling, ASAP, to prevent cellular death and chronic pain, **Irreversibility**.

• Irreversible

- Persistent Cellular Swelling, leads to localized cellular DEATH, Chronic pain.
 - CNS Bombardment keeps occurring
 - NMDA Receptor Activation leading to Wind Up, central Sensitization/neuroadaptation/neuro plasticity.
 - Neuro-inflammation (microglia/Astroglia neuronal Glia cells Activation. Opioid induced Toll

Who is the Optimal Patient for Cervical Injection & When to Stop

- Who is the Optimal Patient?
- **Always a debate:** But any patient with pain who has inflammation, irritation or compression of spinal nerves, facet joints leading to pain or discomfort.
- These patients often have: Disk herniation, degenerative disc disease, Cervical arthritis (cervical spondylosis), cervical spinal stenosis.

Who is the Optimal Patient for Cervical Injection & When to Stop

- How successful are cervical spine injections:
- **Who knows?** The literature is all over the place: 50% to 80%
- What we do know is that: Cervical spine injections can provide significant short term pain relief (weeks to months) and may reduce the need for surgery.
- Cervical spine injections do help improve quality of life, facilitate PT, exercises with reduce pain.

Who is the Optimal Patient for Cervical Injection & When to Stop

- When to STOP:
- The typical recommendation: 3 to 4 per year depending on patient condition. Repeated injections over time may have diminishing returns for some patients.
- Again, effective positive short-term relief is often achieved. Long-term relief is less clear.
- **Stop:** Based upon response to treatment and Patient/Clinician discretion.



Lightning Round: Case Discussions

Tony Tannoury, MD