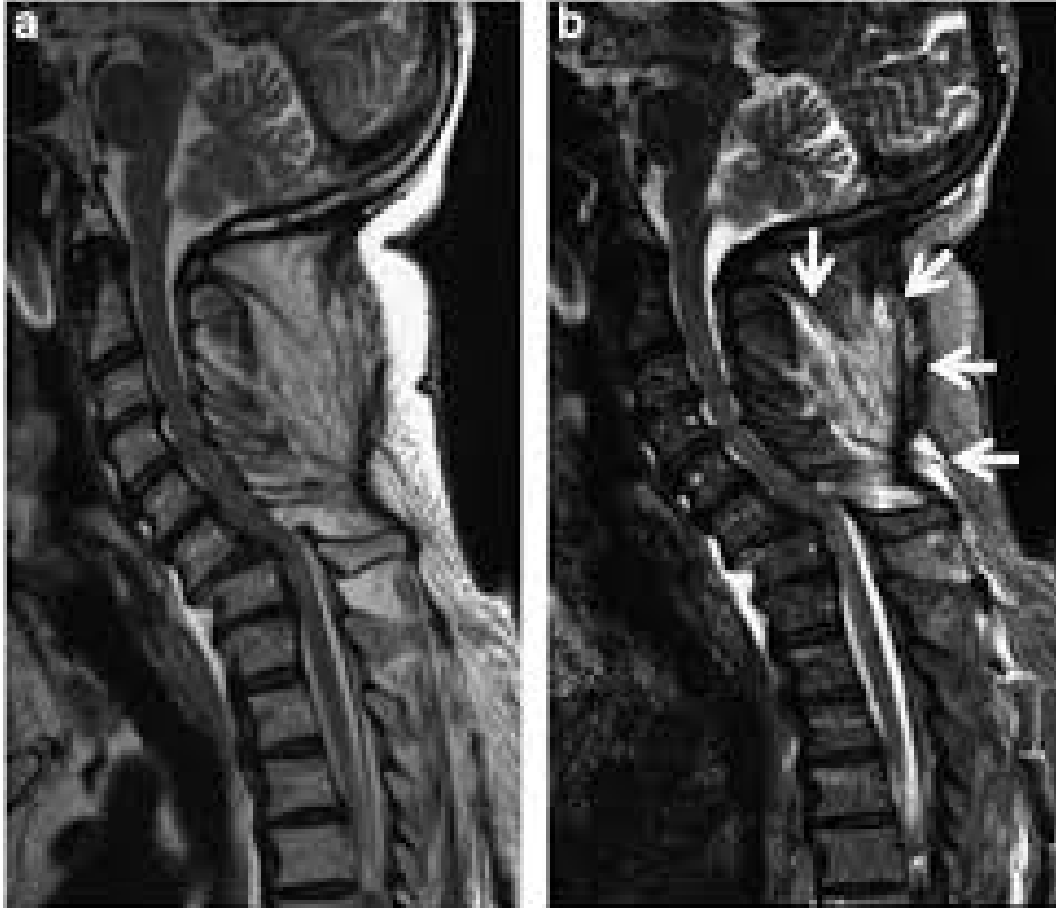


An MRI scan of a cervical spine, showing the vertebrae and intervertebral discs in grayscale. The image is used as a background for the text.

# Cervical Trauma: *When* and How?

Is there a controversy?

# What would you do if no barrier to surgery?



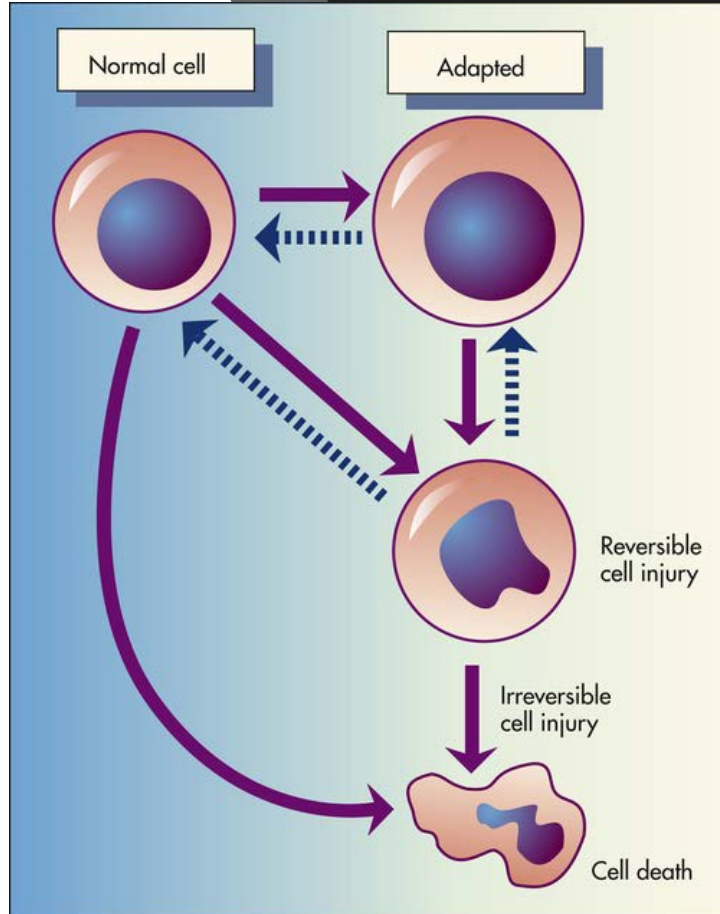
1. ASIA A – complete SCI
  1. No surgery
  2. Delayed surgery several days later
  3. Urgent surgery within 24 hours
2. ASIA B, C, D – incomplete SCI
  1. No surgery
  2. Delayed surgery several days later
  3. Urgent surgery within 24 hours
3. ASIA E – neurologically intact
  1. No surgery
  2. Delayed surgery several days later
  3. Urgent surgery within 24 hours



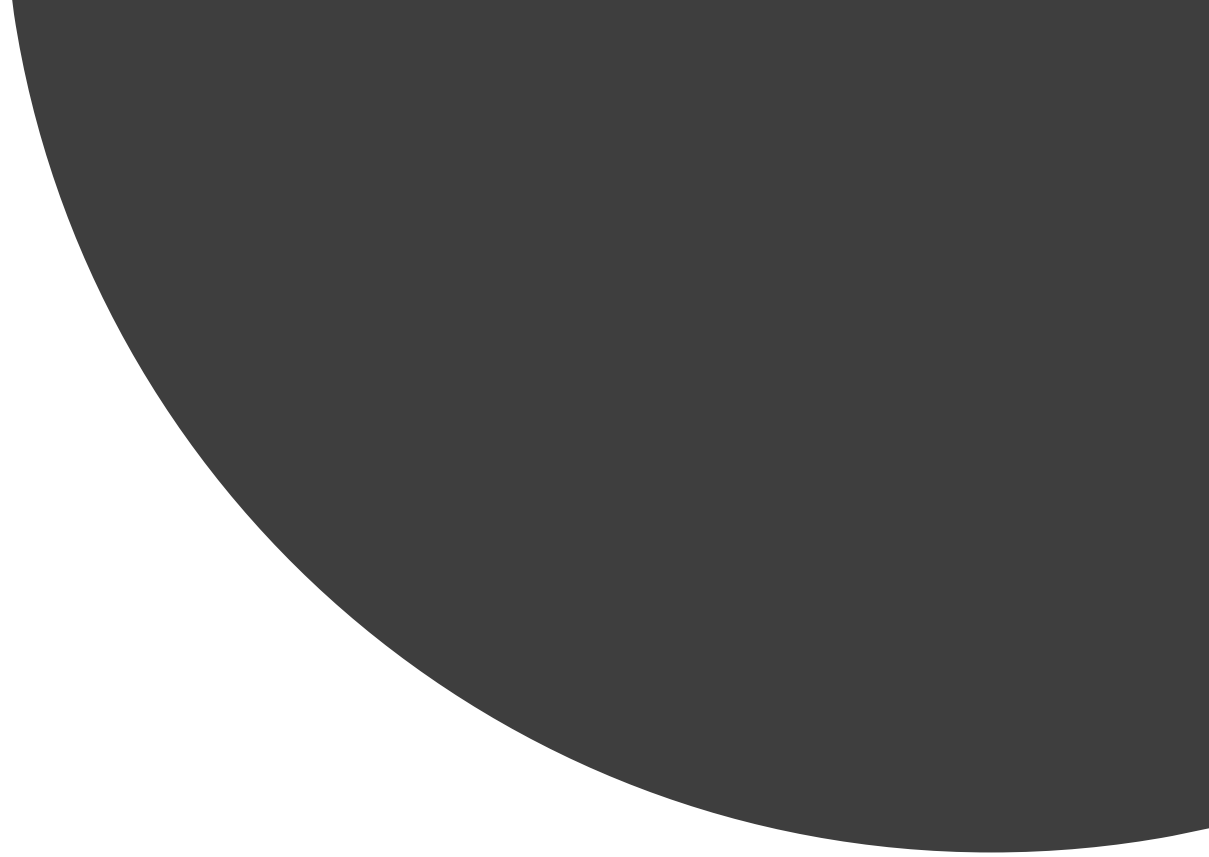
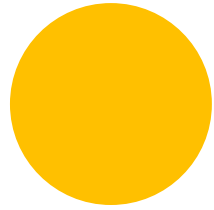
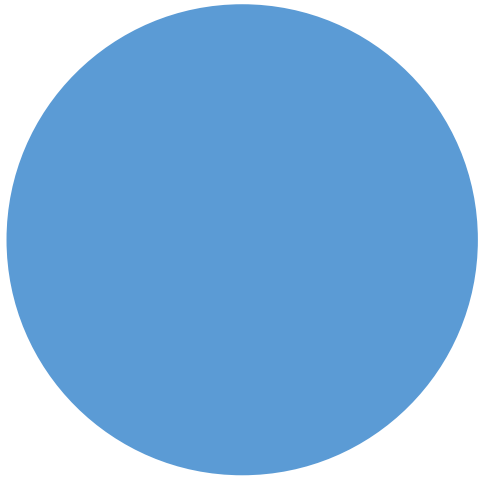
## Primary “Mechanical” Injury

- Initial rapid spinal cord compression and contusion
- Irreversible
- Initiates a cascade of down-stream events
- Nothing we can do about this
- But what about secondary Injury

# Secondary “Cellular” Injury



- Hemorrhage, Vasospasm, Ischemia, Edema, Excitotoxicity – neurotransmitters, Inflammation, Apoptosis
- Lots of animal studies supporting early decompression and evidence that neural tissue destruction is worsened by a persistent compression on the spinal cord. (Vaccaro et al., 1997; Fehlings and Arvin 2009; Fehlings et al., 2012).
- Therefore earlier the decompression surgery the better . . .



But what is early?



No benefit  
from early  
versus late  
surgery -  
before 72  
hours versus  
after 72 hours

- Waters R, Adkins R, Yakura J, Sie I (1996) Effect of surgery on motor recovery following traumatic spinal cord injury. *Spinal Cord* 34: 188–192.
- **Vaccaro A, Daugherty R, Sheehan T, Dante S, Cotler J, et al. (1997) Neurologic outcome of early versus late surgery for cervical spinal cord injury. *Spine* 22: 609–612.**
- Papadopoulos S, Selden N, Quint D, Patel N, Gillespie B, et al. (2002) Immediate spinal cord decompression for cervical spinal cord injury: Feasibility and outcome. *J Trauma* 52: 323–332.
- McKinley W, Meade M, Kirshblum S, Barnard B (2004) Outcomes of early surgical management versus late or no surgical intervention after acute spinal cord injury. *Arch Phys Med Rehabil* 85: 1818–1825.

# But what about < 24 hours?

- LaRosa G, Conti A, Cardali S, Cacciola F, Tomasello F (2004) Does early decompression improve neurological outcome of spinal cord injured patients? Appraisal of the literature using a meta-analytical approach. Spinal Cord 42: 503–512.
- Suggested decompression < 24 hours improved outcomes versus delayed or conservative
- So, what does the most up to date literature suggest?

A 3D graphic featuring the number '24' in large, bold, red digits. Below the number, the word 'HOURS' is written in large, bold, grey, sans-serif capital letters. The entire graphic is set against a white background with a subtle reflection effect beneath the text.

# Only 6/449 publications met strict inclusion criteria for all SCI (Global Spine Journal 2017)

Dvorak MF, Noonan VK, Fallah N, et al. The influence of time from injury to surgery on motor recovery and length of hospital stay in acute traumatic spinal cord injury: an observational Canadian cohort study. *J Neurotrauma*. 2015;32:645-654. doi:10.1089/neu.2014.3632.

***Fehlings MG, Vaccaro A, Wilson JR, et al. Early versus delayed decompression for traumatic cervical spinal cord injury: results of the Surgical Timing in Acute Spinal Cord Injury Study (STASCIS). PLoS One. 2012;7:e32037. doi:10.31371/journal.pone. 0032037.***

Wilson JR, Singh A, Craven C, et al. Early versus late surgery for traumatic spinal cord injury: the results of a prospective Canadian cohort study. *Spinal Cord*. 2012;50:840-843. doi:10.1038/sc.2012.59.

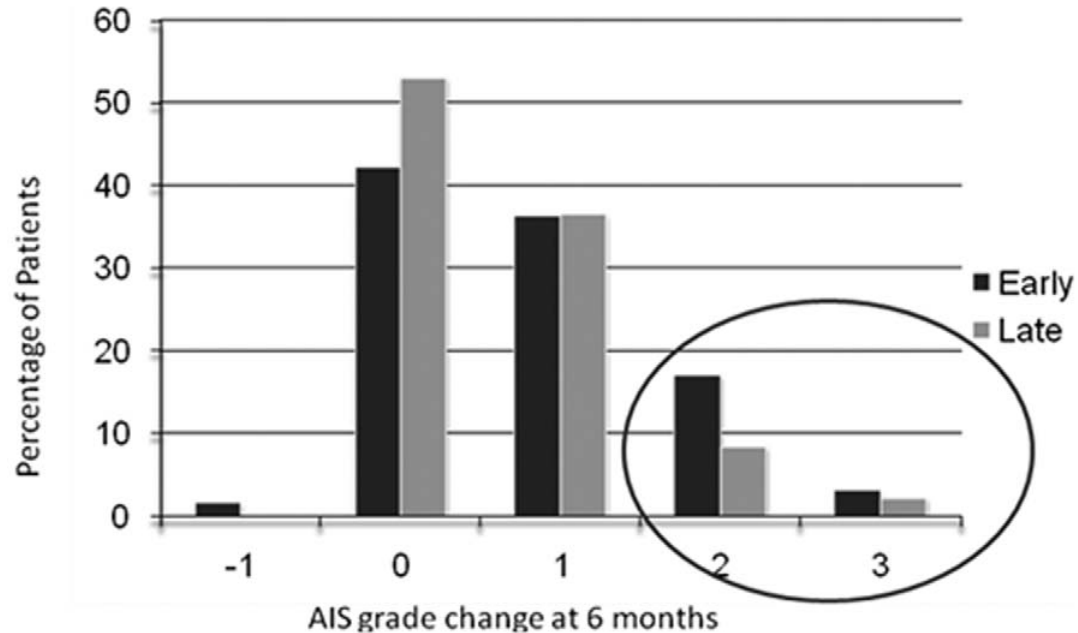
Bourassa-Moreau E, Mac-Thiong JM, Ehrmann Feldman D, Thompson C, Parent S. Complications in acute phase hospitalization of traumatic spinal cord injury: does surgical timing matter? *J Trauma Acute Care Surg*. 2013;74:849-854. doi:10.1097/TA.1090b1013e31827e31381.

Rahimi-Movaghar V, Niakan A, Haghnegahdar A, Shahlaee A, Saadat S, Barzideh E. Early versus late surgical decompression for traumatic thoracic/thoracolumbar (T1-L1) spinal cord injured patients. Primary results of a randomized controlled trial at one year follow-up. *Neurosciences (Riyadh)*. 2014;19: 183-191.

Lenehan B, Fisher CG, Vaccaro A, Fehlings M, Aarabi B, Dvorak MF. The urgency of surgical decompression in acute central cord injuries with spondylosis and without instability. *Spine (Phila Pa 1976)*. 2010;35(21 suppl): S180-S186. doi:10.1097/BRS.1090b1013e3181f1032a1044.



# STASCIS



- Largest prospective multi-center study comparing early vs. late surgical decompression in the setting of acute traumatic spinal cord injury
- 313 patients with acute cervical SCI treated early < 24 hours versus late ~ 48 hours
- 20% of early patients improved = or >2 grades on ASIA scale as opposed to 9% of delayed patients at 6 months
- 1 grade of improvement occurred in same rate in both early and late surgery groups
- Almost 80% of early surgery patients did not have positive change of grade or did not have positive change different than late surgery patients

# What is evidence based medicine on early decompression for cervical SCI?

There is no proven real benefit to early surgery.

Like methylprednisolone, maybe there really is no difference?

Maybe we are making no difference with secondary injury with surgical decompression?

Or maybe we have not identified the right patient . . . Patient selection!

Are we practicing unproven not evidence based medicine?

## DECRA and RescueICP

- Decompressive craniectomy in patients with TBI and persistently raised intracranial pressure, after stage 1 and 2 management, was associated with lower mortality than medical management. However, more survivors in the surgical group than in the medical group were dependent on others. **With data now available from [DECRA](#) and RESCUEICP, there is likely to be concern that life saving surgery may not predictably result in sufficiently good functional survival.** Further investigations, exploring patient selection, longer term recovery and quality of life may be indicated

# Some things we know for sure

1

Early surgery is safe

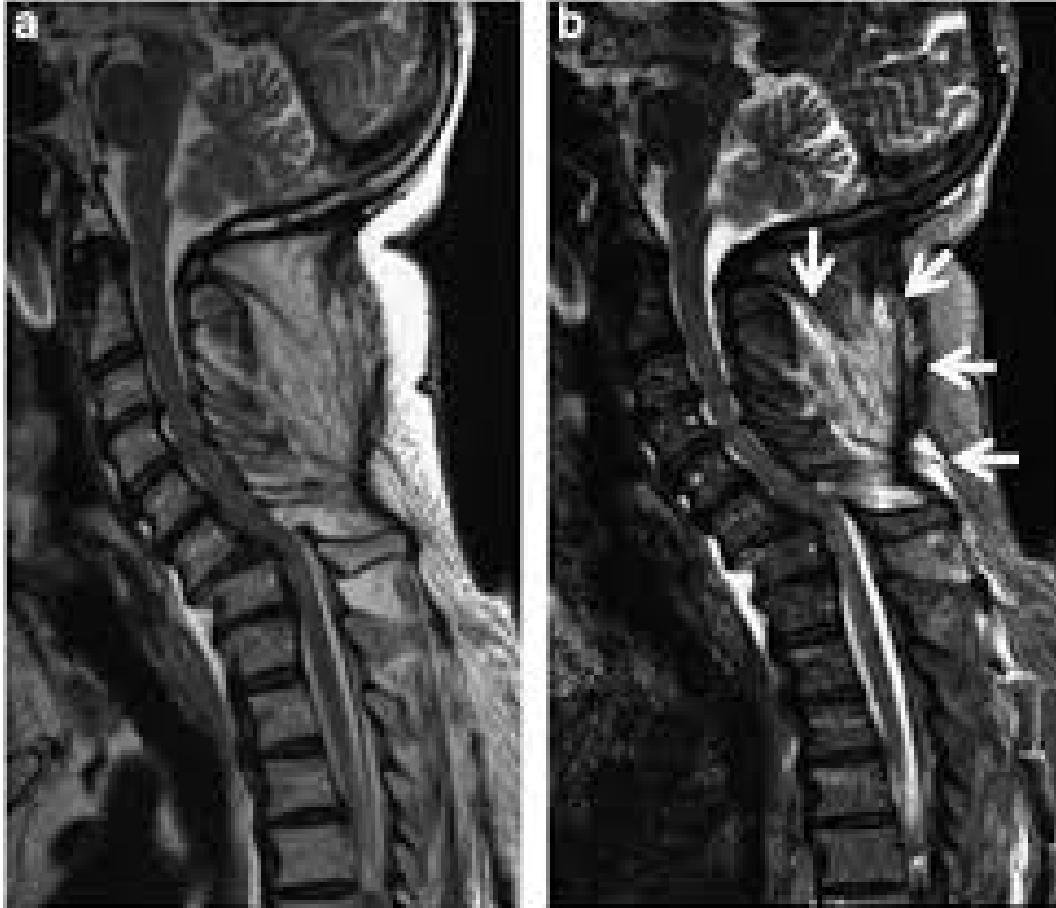
2

Many reports  
suggests benefits of  
early surgery

3

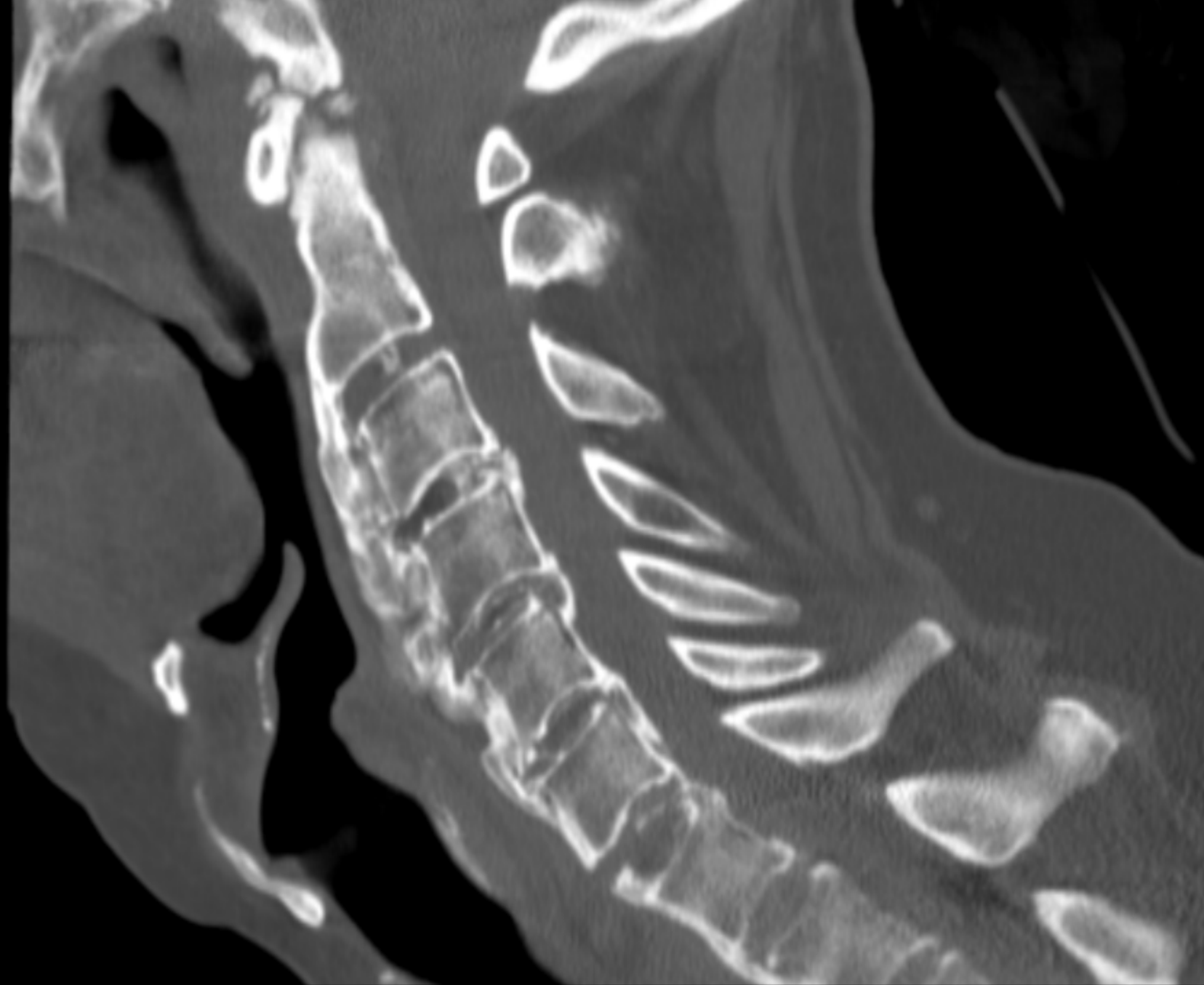
No reports of  
benefits of delayed  
surgery

# What would you do if no barrier to surgery?



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A



A

