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Hospital and Trauma Center

# Cases in Spinal Trauma

Anthony M DiGiorgio, DO, MHA  
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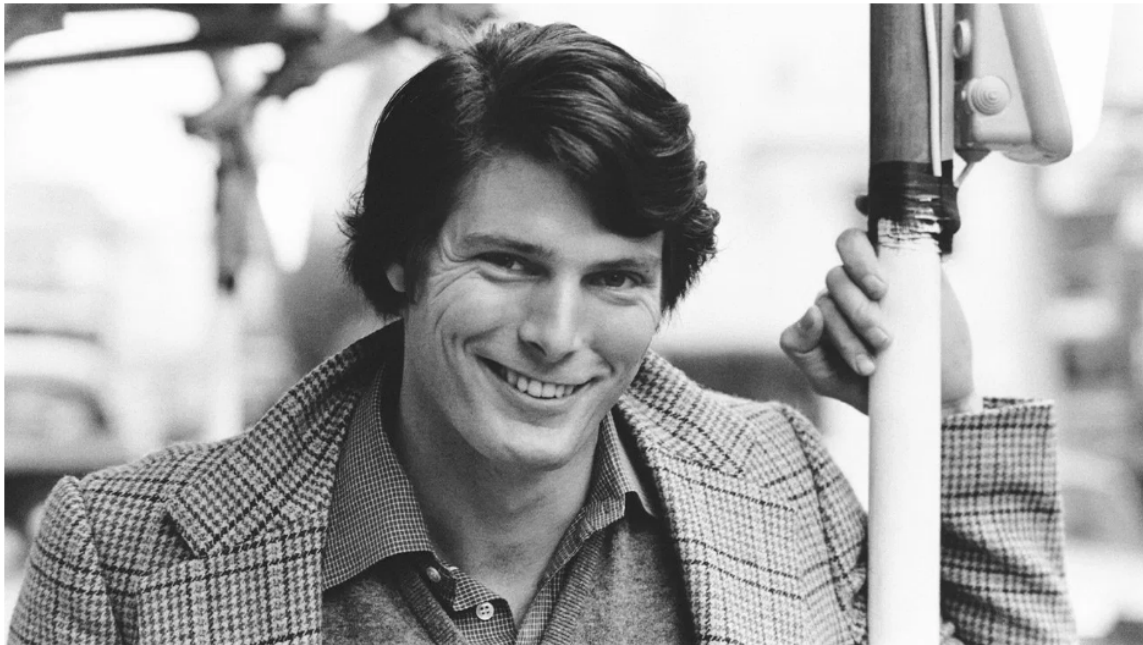
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HEALTH NEWS

✓ Fact Checked

## 15 Years After His Death, Christopher Reeve Is Still Changing Lives



- 219,000 people living in the US with SCI
- Globally, up to 500,000 suffer SCI each year



# Our Patient

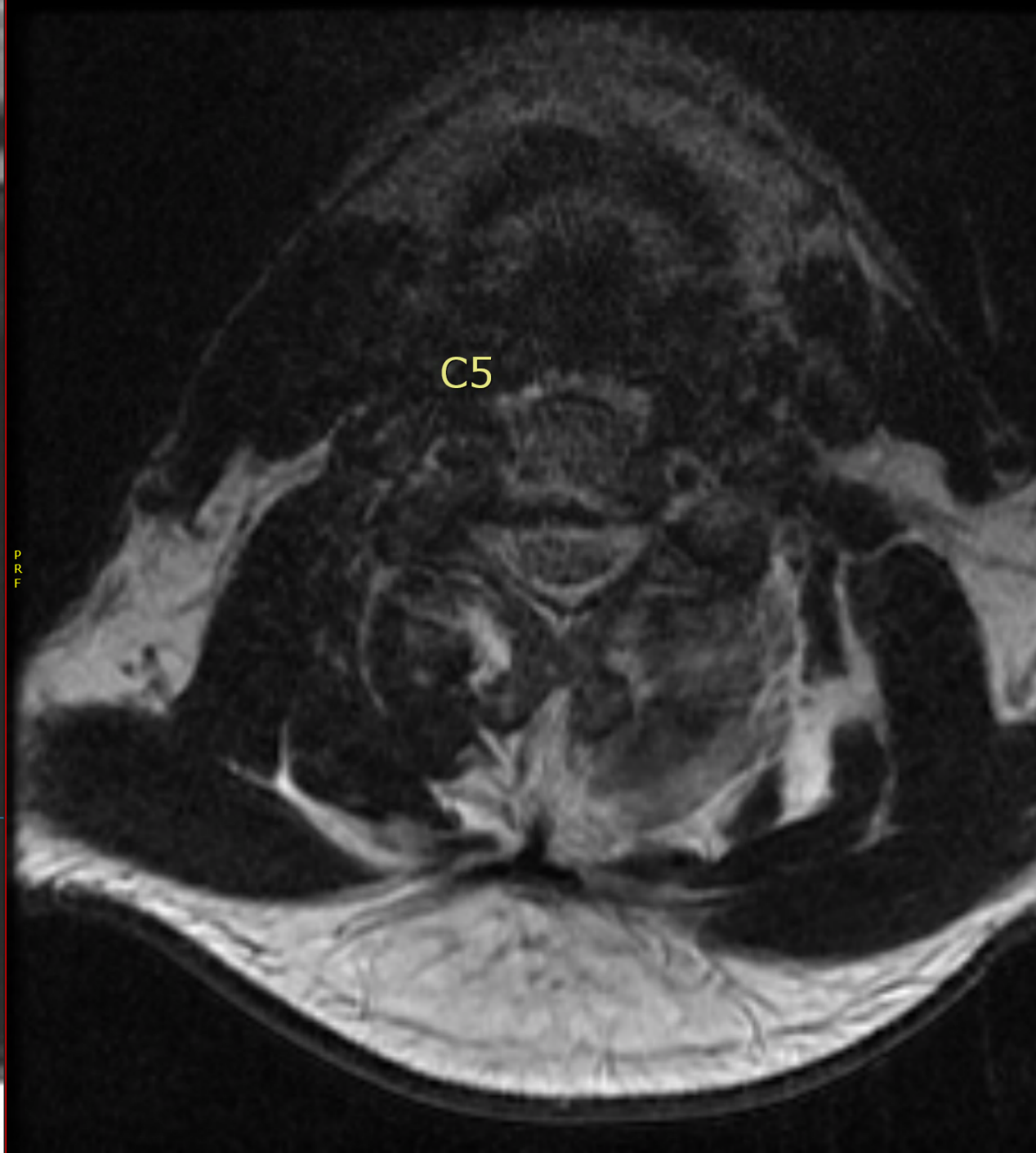
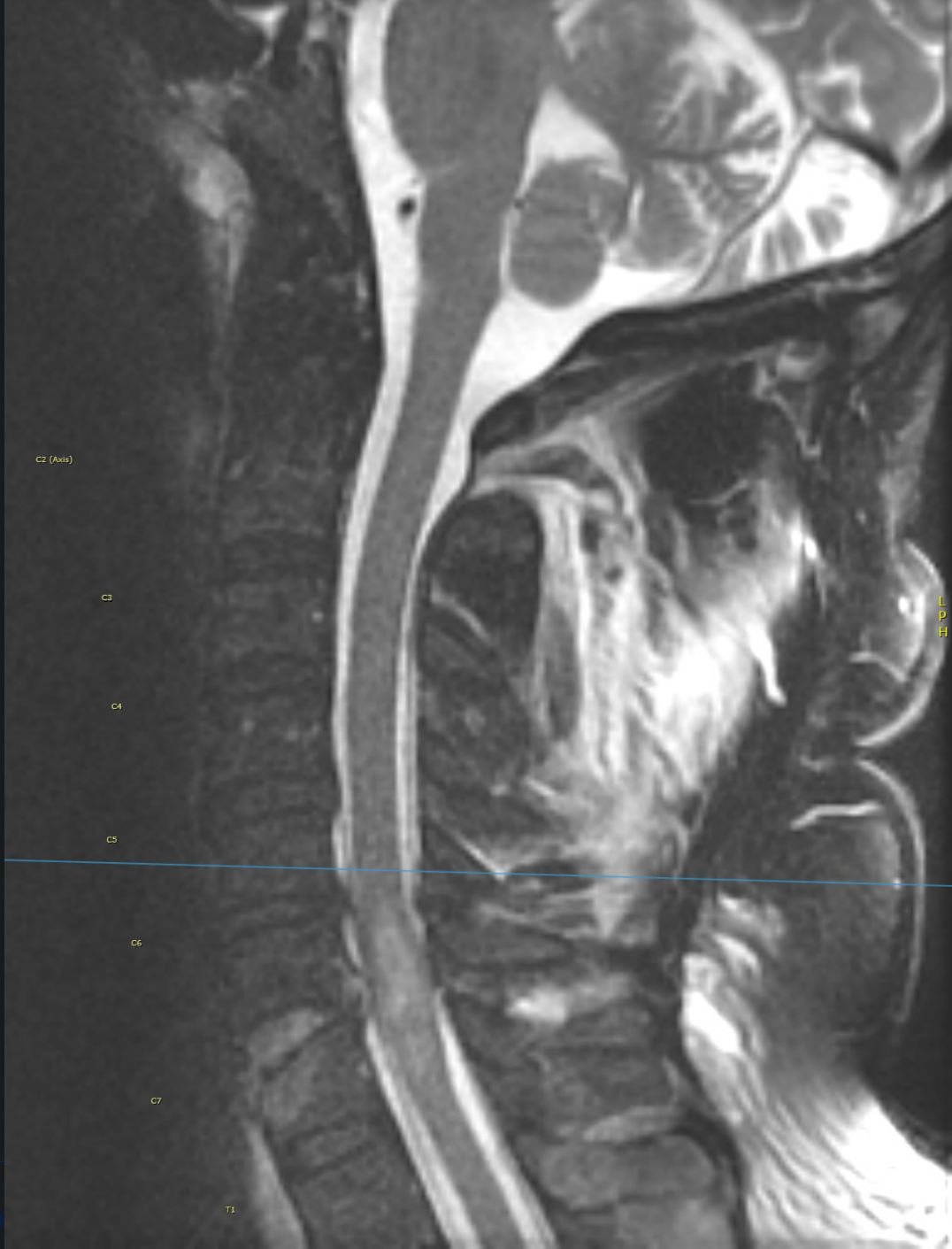
- 56 year old M with a history of sick sinus syndrome
- Syncopal episode, fell backwards
- Presents with neck pain & inability to move legs

# Physical Exam

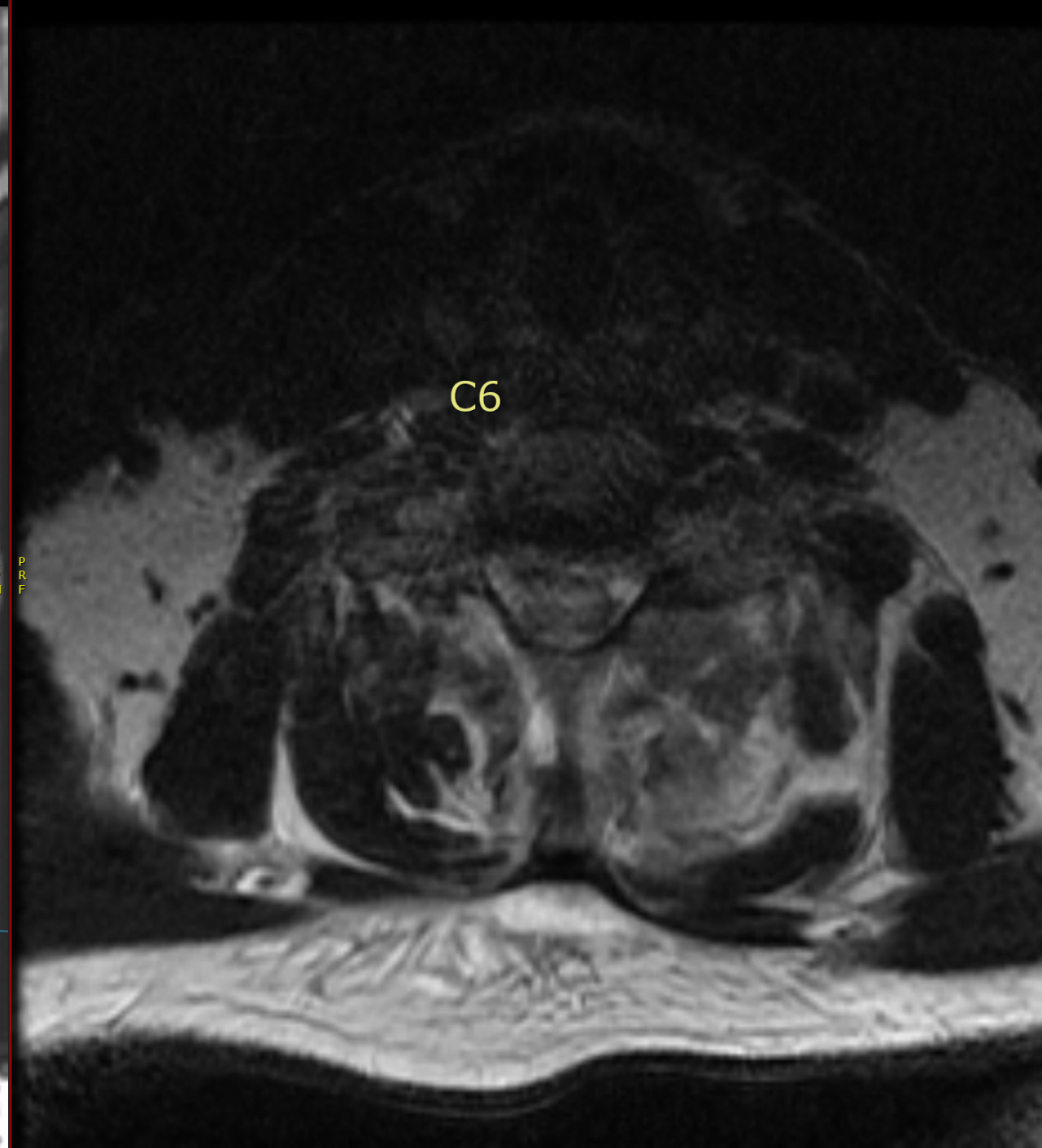
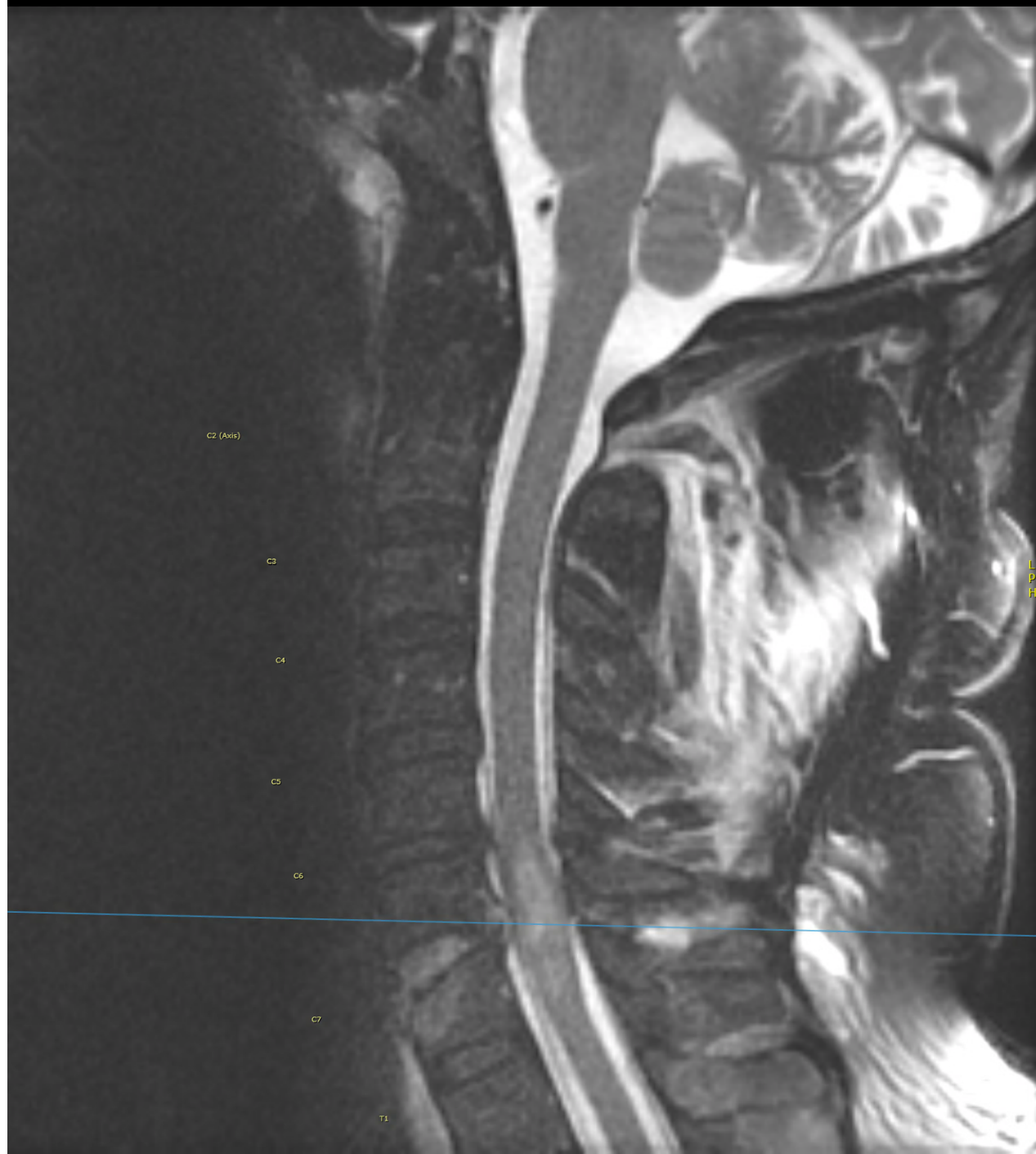
- HR 97, BP 98/51, RR 22, temp 37.5, SpO2 99% on 2LNC
- 5/5 strength in bicep, tricep & deltoid
- 2/5 grip
- 0/5 in legs
- No rectal tone
- No lower extremity reflexes



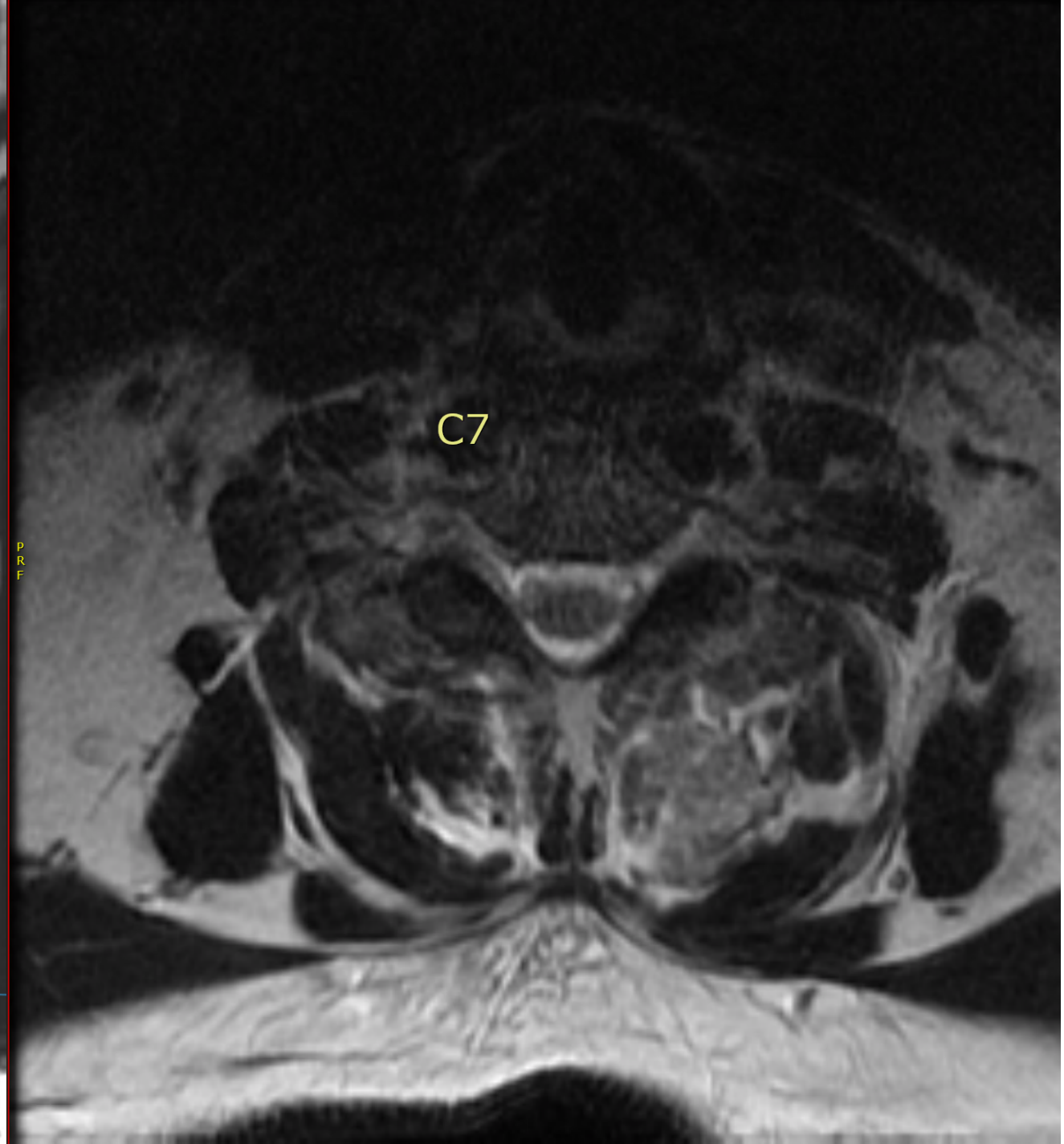














# Basics of Spine Trauma Care

A-B-C's

Neurocardiogenic Shock

Respiratory Failure



Surgery

Decompression

Stabilization



Prevention of Secondary Injury

Spinal Cord Perfusion

Intensive Care Unit

# Does the Patient Need Surgery?

Subaxial Classification System (SLIC) or Thoracolumbar (TLICS)

## ■ Morphology

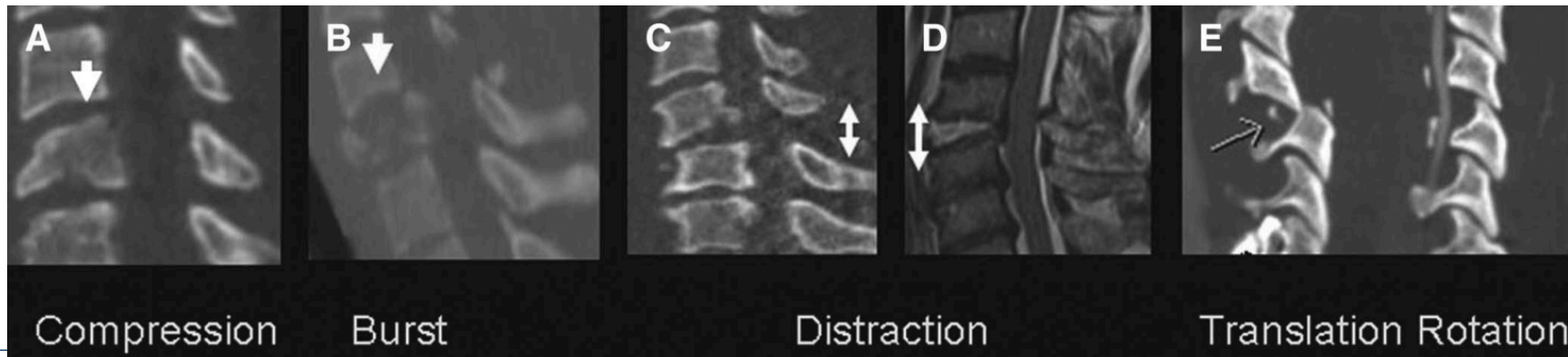
- Intact: 0
- Compression: 1
- Burst: 2
- Distraction: 3
- Rotation: 4

## DLC

Intact: 0  
Indeterminate: 1  
Disrupted: 2

## Neuro Status

Intact: 0  
Root: 1  
Complete cord: 2  
Incomplete cord: 3  
Cord compression: +1

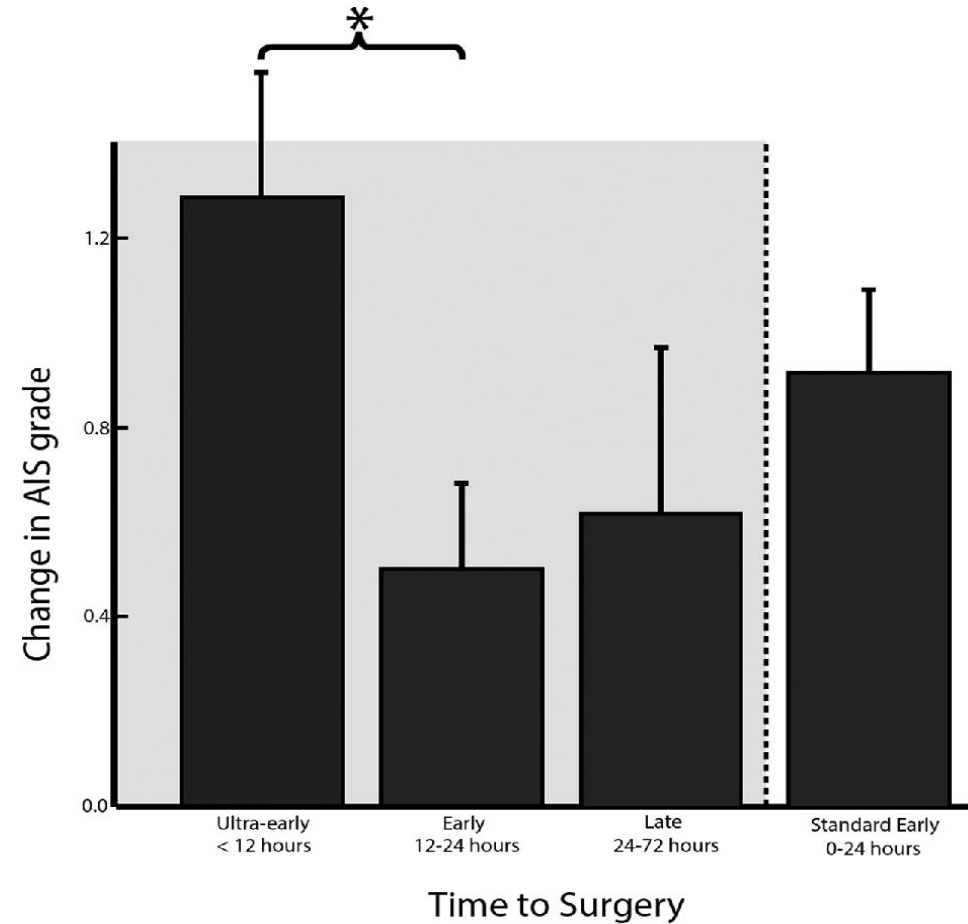


# Timing of Surgery



## Ultra-Early (<12 Hours) Surgery Correlates With Higher Rate of American Spinal Injury Association Impairment Scale Conversion After Cervical Spinal Cord Injury

John F Burke, MD, PhD, John K Yue, MD, Laura B Ngwenya, MD, PhD, Ethan A Winkler, MD, PhD, Jason F Talbott, MD, PhD, Jonathan Z Pan, MD, PhD, Adam R Ferguson, PhD, Michael S Beattie, PhD, Jacqueline C Bresnahan, PhD, Jenny Haefeli, PhD, William D Whetstone, MD, Catherine G Suen, BA, Michael C Huang, MD, Geoffrey T Manley, MD, PhD, Phiroz E Tarapore, MD, Sanjay S Dhall, MD ✉



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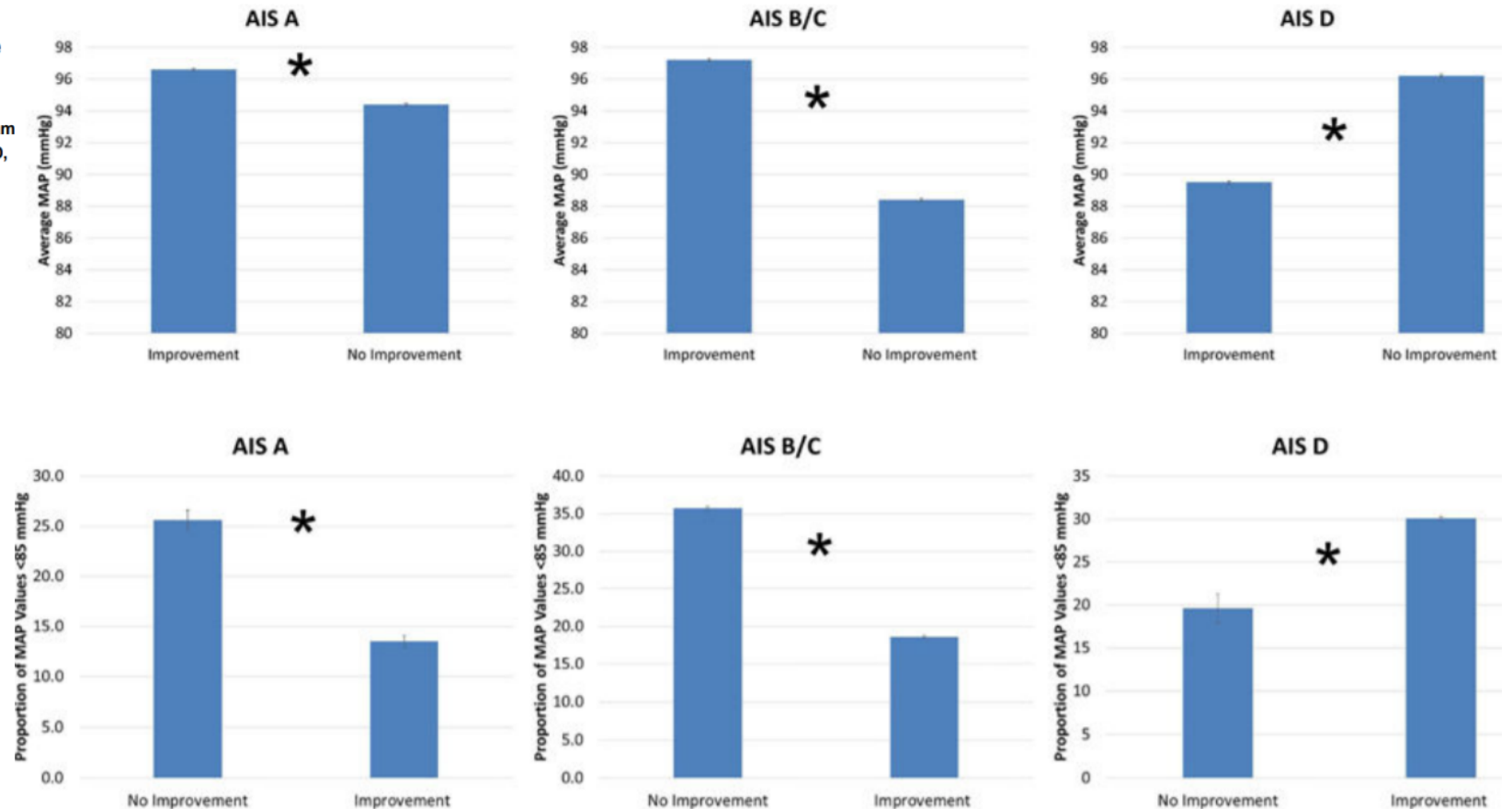
# Prevention of Secondary Injury

## Spinal Cord Perfusion

*World Neurosurg.* 2016 December ; 96: 72–79. doi:10.1016/j.wneu.2016.08.053.

### Higher Mean Arterial Pressure Values Correlate With Neurological Improvement in Patients With Initially Complete Spinal Cord Injuries

Joshua Stephen Catapano, MD<sup>1</sup>, Gregory William John Hawryluk, MD, PhD<sup>2,4,5</sup>, William Whetstone, MD<sup>3</sup>, Rajiv Saigal, MD, PhD<sup>4,5</sup>, Adam Ferguson, PhD<sup>4,5</sup>, Jason Talbott, MD, PhD<sup>6</sup>, Jacqueline Bresnahan, PhD<sup>4,5</sup>, Sanjay Dhall, MD<sup>4,5</sup>, Jonathan Pan, MD, PhD<sup>7</sup>, Michael Beattie, PhD<sup>4,5</sup>, and Geoffrey Manley, MD, PhD<sup>4,5</sup>



# Spinal Shock vs Neurocardiogenic Shock

## Clarification

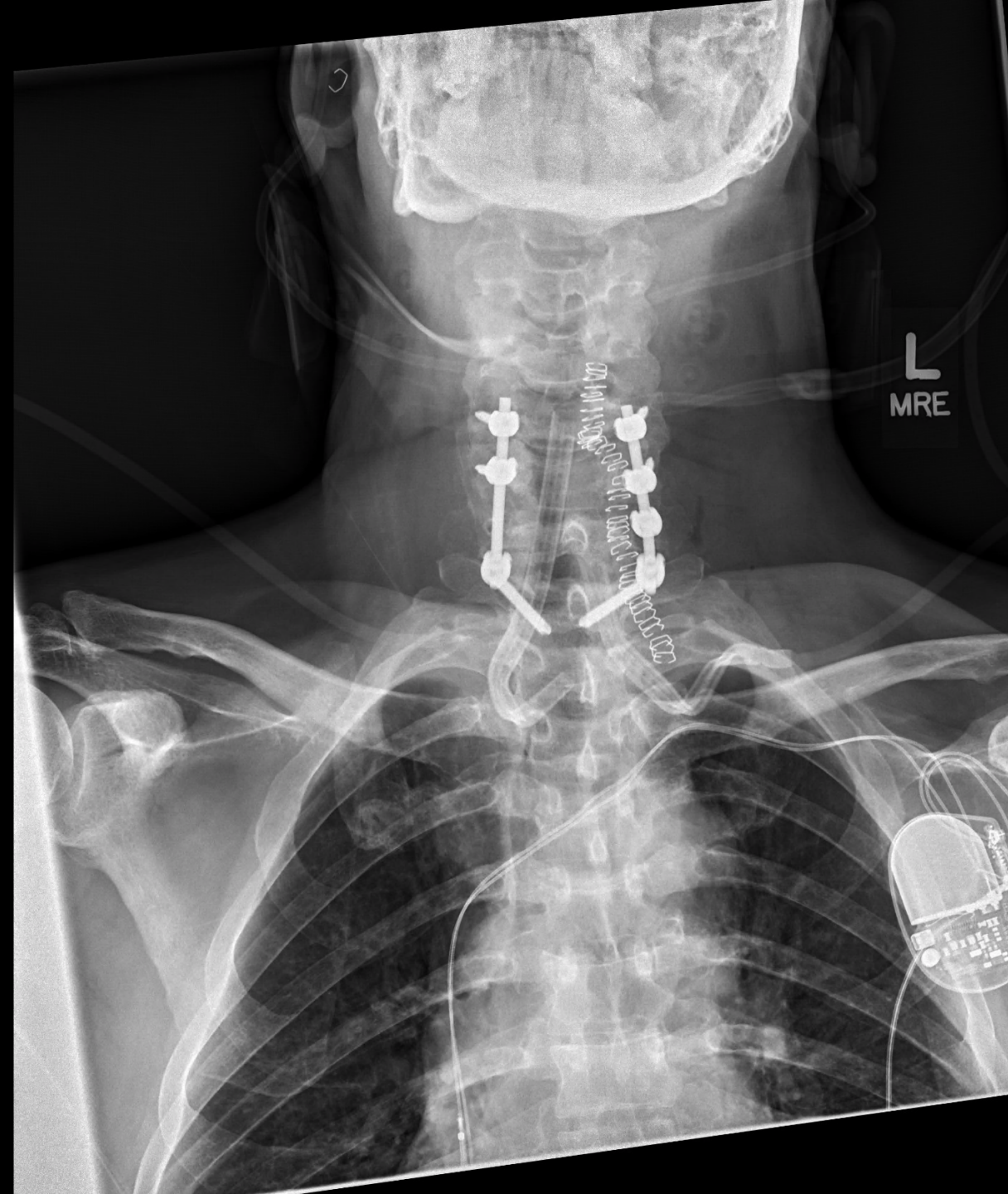
- Spinal shock is mainly a loss of reflexes (flaccid paralysis)
  - **Spinal cord** is in “shock”
- Neurocardiogenic shock is mainly hypotension and bradycardia due to loss of sympathetic tone
  - **Cardiovascular shock** due to loss of tone

# Intensive Care & Beyond

- Respiratory therapy
- Pain Control
- GI/GU
- Psychosocial
- Education
- Rehabilitation



Sep 13, 2019  
4:18 PM



# Our Patient

- Uneventful Postop Course
- Discharged to SCI rehab
  - Slight improvement in grip strength
  - Some sensation BLE
  - Otherwise unchanged

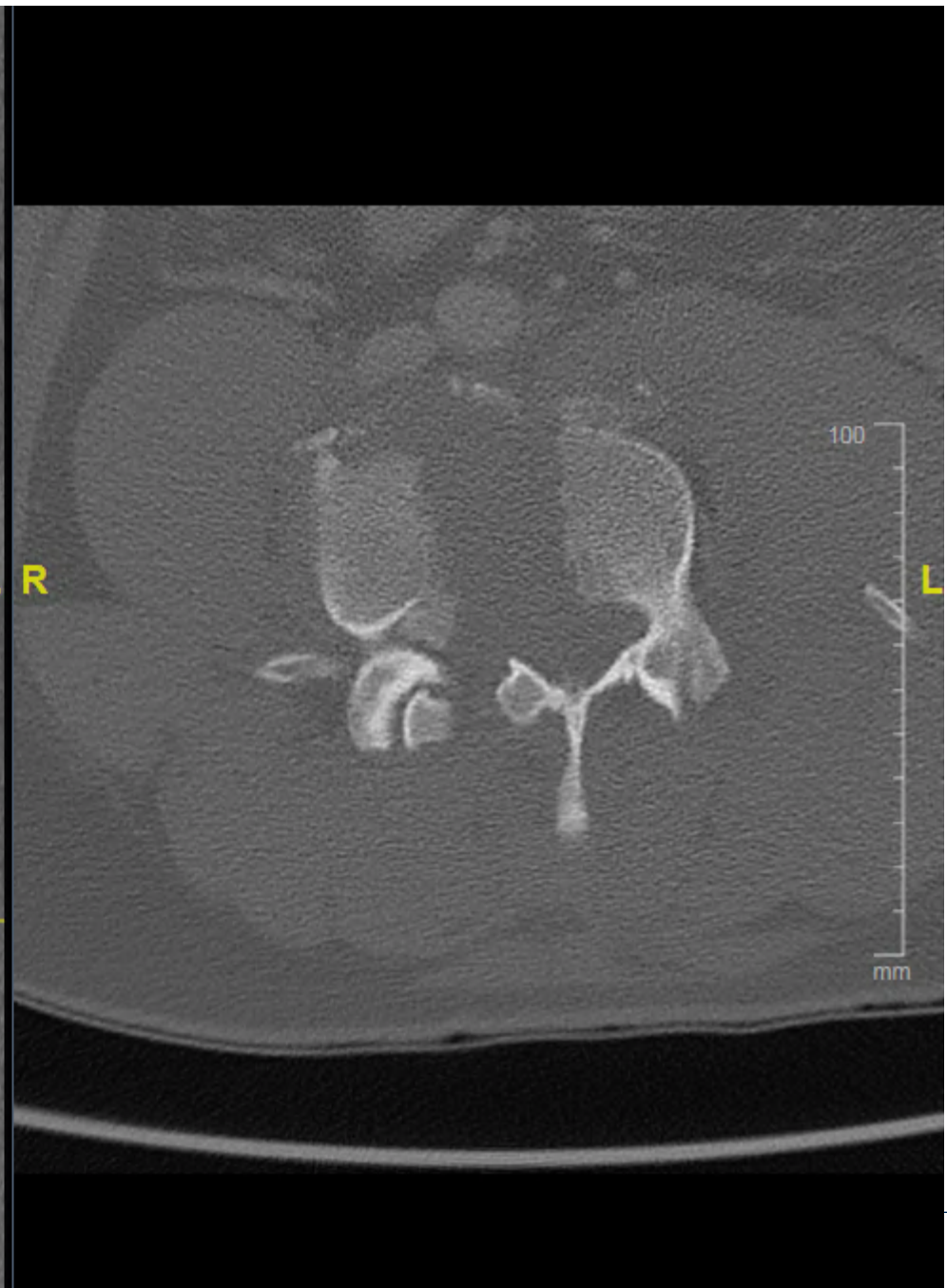
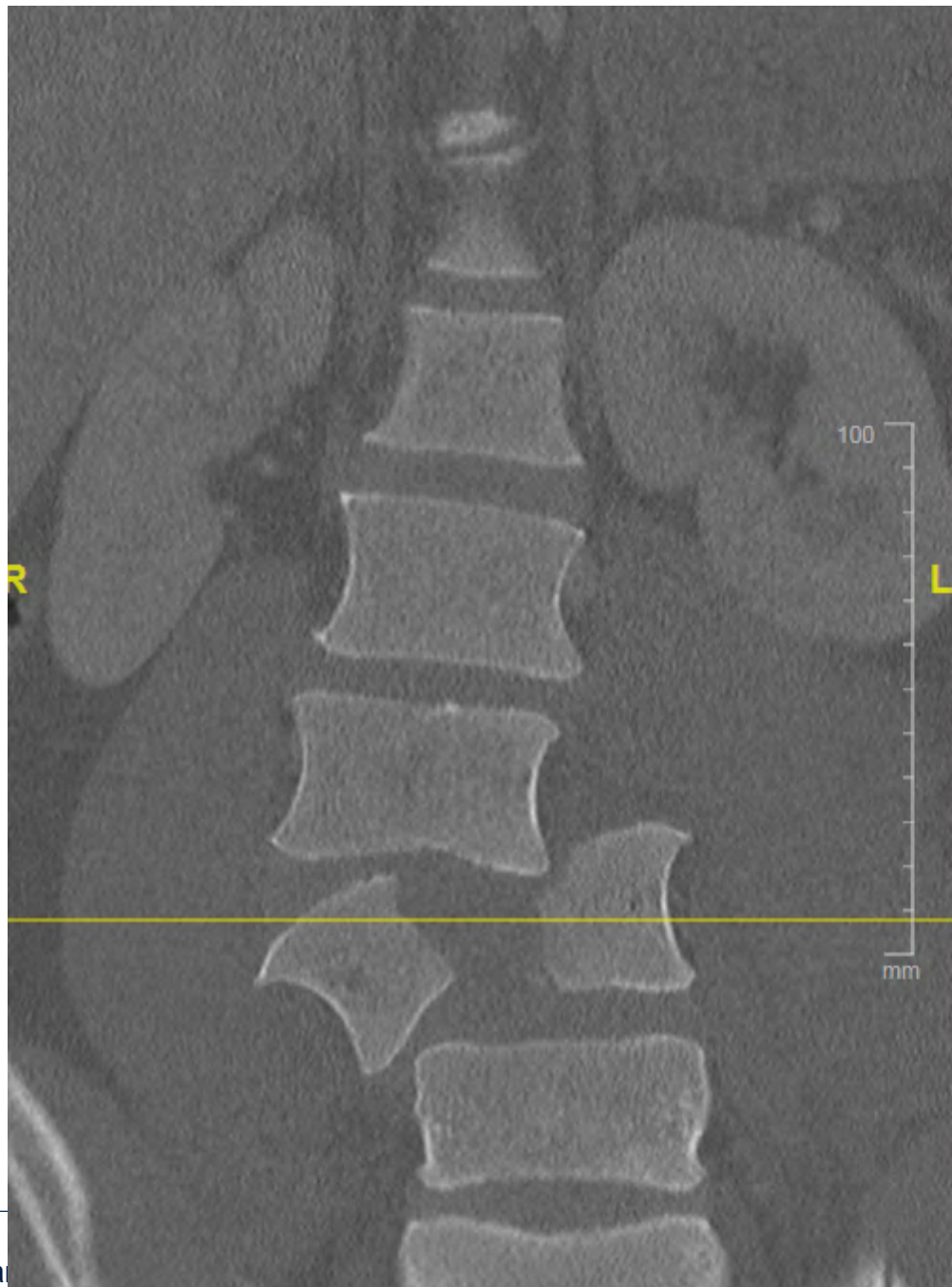
# Another case

- 42 yo M presents after a steel beam fell on his back at work
- Severe back pain, paresthesias in feet
- No significant PMH/PSH

# Physical Exam

- 124/75, HR 100, RR 18
- GCS15, 5/5 except for left HF 4/5
- Decreased proprioception
- Full rectal tone
- WBC/Hgb/Hct/Plt 19/14/40/167
- INR 1.0
- + pelvic fx



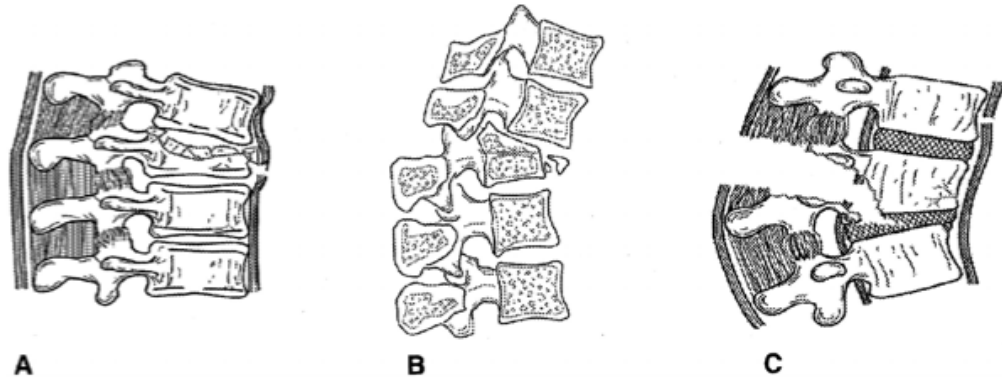




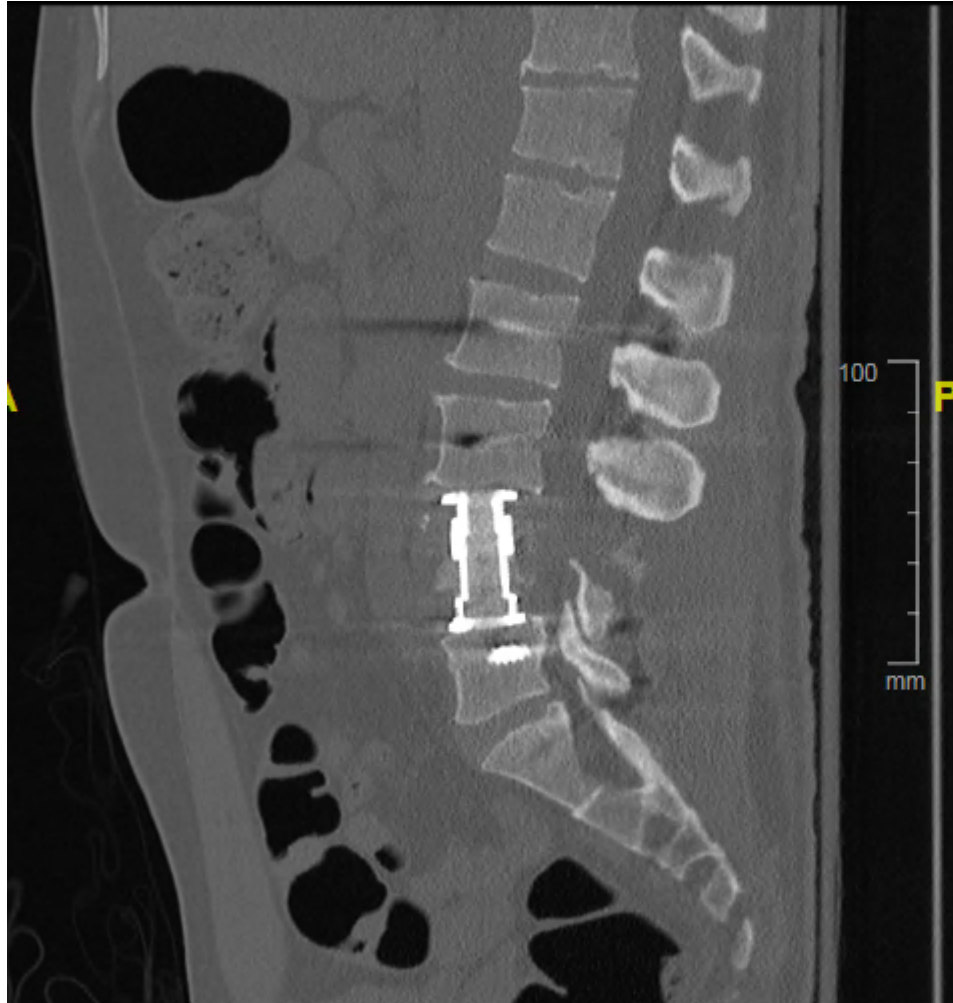
# TLICS

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- Injury morphology
  - Compression: 1
  - Burst: 2
  - Translation/Rotation 3
  - Distraction 4
- PLC integrity
  - Intact 0
  - Indeterminate 2
  - Disrupted 3
- Neurological status
  - Intact 0
  - Nerve root injury 2
  - Complete 2
  - Incomplete 3



# Our Patient



- Anterior & Posterior approach
- Did well, no residual deficits
- Solid arthrodesis at 1 year postop

**WP** Washington Post

## At least 10 injured in shooting near French Quarter, New Orleans police say

The New Orleans Police Department reports that they were shot on the popular Canal Street just after 3 a.m. today.

38 mins ago



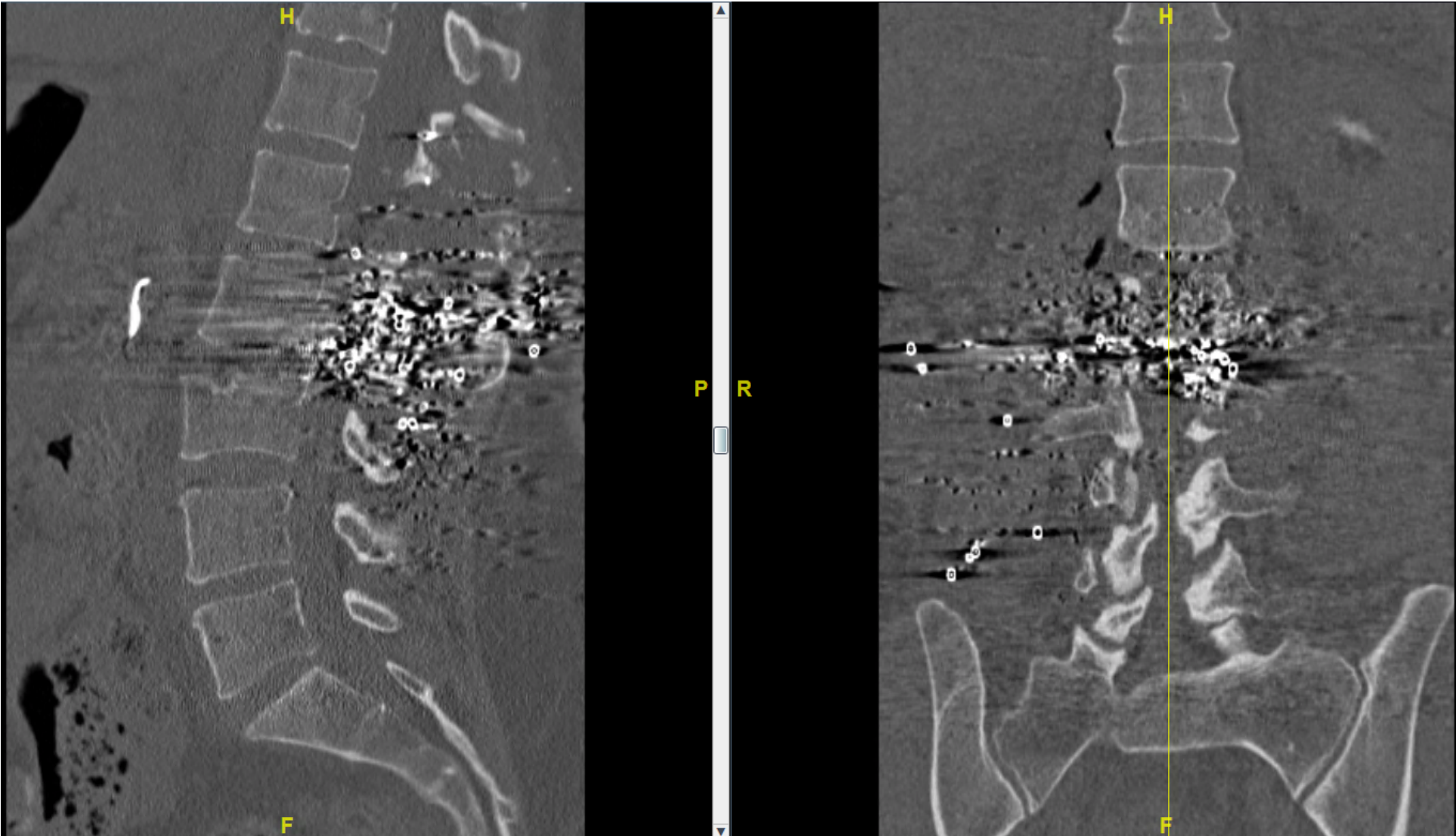
# Case Presentation

- 40 yo F with no PMH presented as a trauma activation, s/p GSW to the back
- Single wound noted to lower back
- Hypotensive, +FAST
- To OR for ex-lap
- Perinephric hematoma found
- Imaging completed postoperatively



IN OR 3  
**SUPINE**  
**Portable**



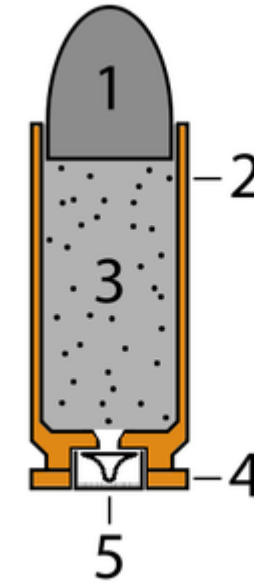


# Gunshot Wounds to the Spine

- 10-20% of all traumatic spinal injuries
- Third most common etiology in civilians
- 80-90% male
- Thoracic spine most commonly injured
  
- Civilian firearm velocities < 2000 ft/s – Low Energy
- Military rifle velocities >2000 ft/s – High Energy
  
- Injury to spinal cord comes from direct damage, shock wave and/or vascular injury/spasm

# Bullets

- Projectile, casing, propellant, rim & primer
- Bullet typically lead
- High velocity bullets have jackets of copper, nickel, alloys or steel
- Bullets are occasionally steel
  - Typically birdshot to reduce lead toxicity



The Spine Journal 13 (2013) 815–822

Basic Science

MRI issues for ballistic objects: information obtained at 1.5-, 3- and 7-Tesla

Russell D. Dedini, MD<sup>a</sup>, Alexandra M. Karacozoff, BS<sup>b</sup>, Frank G. Shellock, PhD<sup>c</sup>,  
Duan Xu, MD, PhD<sup>d</sup>, R. Trigg McClellan, MD<sup>a</sup>, Murat Pekmezci, MD<sup>a,\*</sup>

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Received 11 June 2012; revised 6 November 2012; accepted 25 February 2013

## Gunshot wounds to the spine in post-Katrina New Orleans

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<sup>b</sup>"Bagdasar-Arseni" Emergency Hospital, Bucharest, Romania

<sup>c</sup>Louisiana State University, New Orleans, LA, USA

- 147 patients over 4 years
- 92% male, average age 27 (14-66)
- 84% African American
- 83% had positive toxicology
- 20 patients underwent surgery
  - 11 decompressions, 9 stabilizations
  - One patient improved ASIA C→D
  - Three complications (2 infections, 1 durotomy)



# A case series of penetrating spinal trauma: comparisons to blunt trauma, surgical indications, and outcomes

Kevin D. Morrow, MD,<sup>1</sup> Adam G. Podet, MD,<sup>1</sup> Casey P. Spinelli, BS,<sup>2</sup>  
Lindsay M. Lasseigne, MD,<sup>1</sup> Clifford L. Crutcher II, MD,<sup>1</sup> Jason D. Wilson, MD,<sup>1</sup>  
Gabriel C. Tender, MD,<sup>1</sup> and Anthony M. DiGiorgio, DO, MHA<sup>1</sup>

<sup>1</sup>Department of Neurosurgery and <sup>2</sup>School of Medicine, Louisiana State University Health Sciences Center, New Orleans, Louisiana

Variable	Penetrating	Blunt	p Value
No. of patients	154	976	
Mean age, yrs	29.2	44.1	<0.001
Mean ISS	20.2	15.6	<0.001
Mean hospital LOS, days	20.1	10.3	<0.001
% male	87.7%	69.2%	<0.001
Race			<0.001
African American	80.5%	33.3%	*
Caucasian	14.3%	55.5%	*
Asian	1.3%	1.2%	
Other	3.9%	9.7%	
EtOH over limit	10.4%	22.5%	<0.001
Payer			<0.001
Liability	0	6.8%	*
VA	0	2.2%	
Commercial	13.0%	22.2%	*
Uninsured	17.5%	10.3%	*
Prison	3.9%	0.1%	*
Medicaid	60.4%	32.6%	*
Medicare	3.2%	18.1%	*
Research	0.6%	0%	
Workers' comp	1.3%	5.6%	*
Discharge location			<0.001
Other acute care	9.1%	3.3%	*
Left AMA	1.9%	1.7%	
Deceased	3.9%	6.7%	
Home	51.3%	65.1%	*
Hospice	0%	0.3%	
Jail	5.2%	0.9%	*
LTAC	0	3.0%	*
Rehab	27.3%	13.6%	*
SNF	1.3%	3.4%	

Variable	Value
No. of patients	154
Mean age, yrs (range)	29.2 (15–65)
Male sex	135 (87.7)
Race	
African American	124 (80.5)
Caucasian	22 (14.3)
Asian	2 (1.3)
Other	6 (3.9)
Mean ISS (range)	20.2 (4–75)
SCI	63 (40.9)
Injury level	
Cervical	48 (21.2)
Thoracic	43 (27.8)
Lumbar/sacral	44 (29.2)
MAP goals used	18 (11.7)
Vasopressors used	23 (14.9)
Vascular injury	37 (24.0)
Underwent op	9 (5.8)
Injury intent	
Assault	143 (92.9)
Self-inflicted	2 (1.3)
Accidental	9 (5.8)
Mean hospital LOS, days (range)	20.1 (1–278)

Values are presented as the number of patients (%) unless otherwise indicated.



# Treatment

- Steroids are not recommended
- Antibiotics only if there is visceral perforation
- Tetanus prophylaxis
- Vasopressor support is not recommended
- Neurologic recovery is rare

## **Failure of Mean Arterial Pressure Goals to Improve Outcomes Following Penetrating Spinal Cord Injury**

William J. Readdy, BS, Rajiv Saigal, MD, PhD, William D. Whetstone, MD, Anthony N. Mefford, BS, Adam R. Ferguson, PhD, Jason F. Talbott, MD, PhD, Tomoo Inoue, MD, PhD, Jacqueline C. Bresnahan, PhD, Michael S. Beattie, PhD, Jonathan Pan, MD, PhD, Geoffrey T. Manley, MD, PhD, Sanjay S. Dhall, MD

Neurosurgery (2016) 79 (5): 708-714.

DOI: <https://doi.org/10.1227/NEU.0000000000001249>

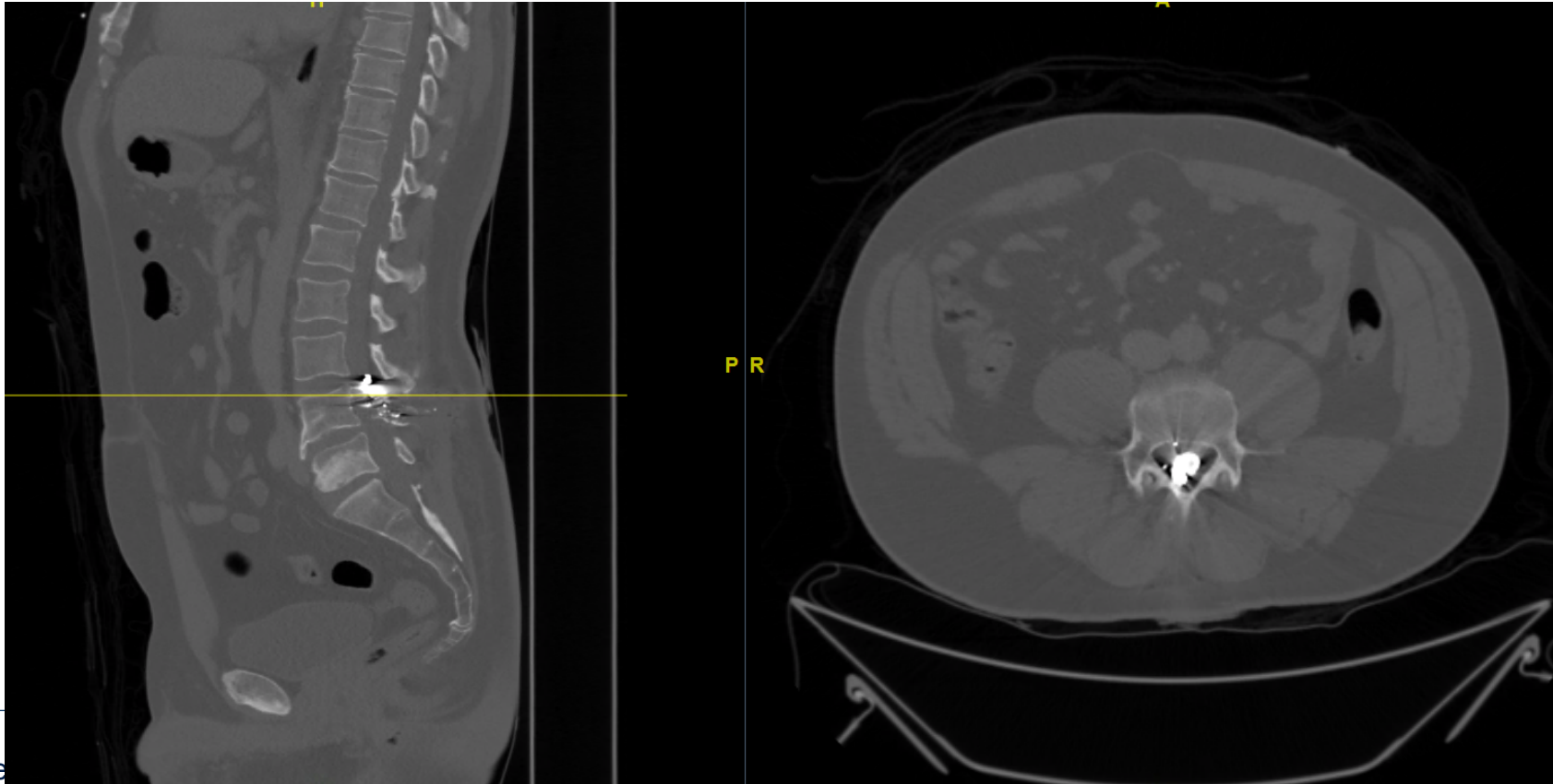
Published: 03 May 2016    **Article history** ▼

# Surgical Indications

- Progressive loss of function with evidence of ongoing compression  
(Benzel et al, Neurosurgery 1987; Cybulski et al, Neurosurgery 1989; Klimo et al, Neurosurgery Focus 2010; Morrow et al, Neurosurgery Focus 2019)
- Spinal Instability (de Barros et al, Spinal Cord 2014; Duz et al, Spine 2008)
- CSF leaks
- Surgery does not:
  - Improve outcome with complete injuries
  - Reduce risk of infection

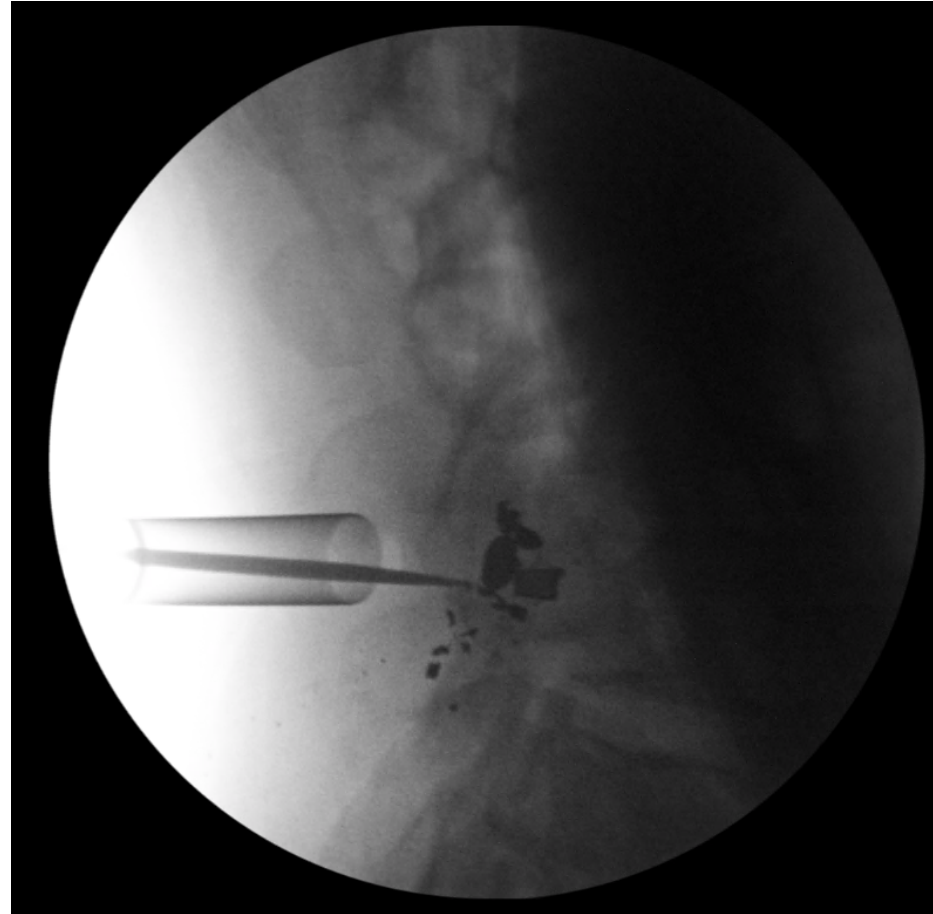
## Another case

- 55 yo M, initially intact, had sudden onset of saddle anesthesia & urinary retention on hospital day #1





# Minimally invasive bullectomy



# Spinal Trauma

- Surgically challenging cases
- Intensive care & rehabilitation are crucial



UCSF

