



Does Surgical Intervention Help with Neurological Recovery in a Lumbar Spinal Gun Shot Wound?

A Case Report and Literature Review

Denslow Trumbull, BS

Medical Student – 2nd Year
University of Florida College of Medicine

Disclosure

I have no relevant financial relationships related to the content of this presentation to disclose.

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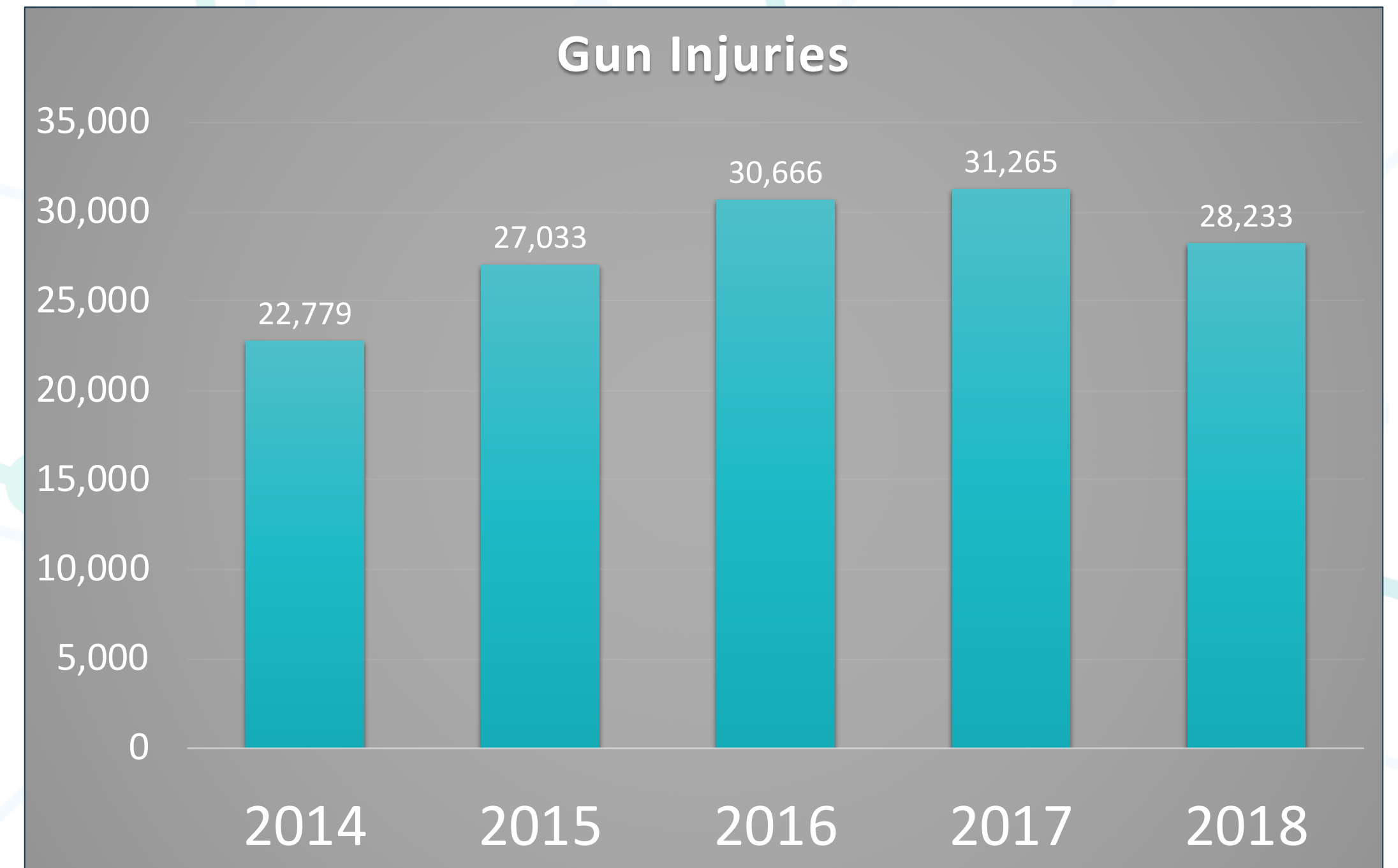
Does Surgical Intervention Help with Neurological Recovery in a Lumbar Spinal Gun Shot Wound? A Case Report and Literature Review.

Kyle Scott, BS; Denslow Trumbull, BS; William Clifton, MD; Gazanfar Rahmathulla, MD

Background

Rising numbers of gun violence

- CDC: firearm homicides have increased
- GSW is 3rd leading cause of spinal injuries (15.2%)
- GSW accounts for 95% of all penetrating spinal cord injuries



NSCISC national spinal cord injury statistical center - 2018 annual report . Accessed: March 23, 2019: <https://www.nscisc.uab.edu/>.

Kegler SR, Dahlberg LL, Mercy JA. Firearm Homicides and Suicides in Major Metropolitan Areas — United States, 2012–2013 and 2015–2016. MMWR Morb Mortal Wkly Rep 2018;67:1233–1237. DOI: <http://dx.doi.org/10.15585/mmwr.mm6744a3>

<https://www.gunviolencearchive.org/past-tolls>

Background

Minimal literature on GSW treatment

- Literature is lacking concerning spinal GSW
- Biased towards conservative treatment
 - opt out of surgery
- No clear guidelines for treatment

Clin Orthop Relat Res (2013) 471:3945–3955
DOI 10.1007/s11999-013-2901-2

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SYMPOSIUM: CIVILIAN GUNSHOT INJURIES

Civilian Gunshot Injuries of the Spinal Cord: A Systematic Review of the Current Literature

Gursukhman S. Sidhu MBBS, Arvinder Ghag MD,
Vanessa Prokuski BA, Alexander R. Vaccaro PhD,
Kristen E. Radcliff MD

Published online: 12 March 2013
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Patient Case

27 year old male

- Suffered GSW to lumbar spine (right lower back) and evaluated by trauma
- Unable to move lower extremities on admission with marginal improvement
- Emergency exploratory laparotomy (outside hospital)
- Deficits worse on the Right Lower Extremity

Patient Case

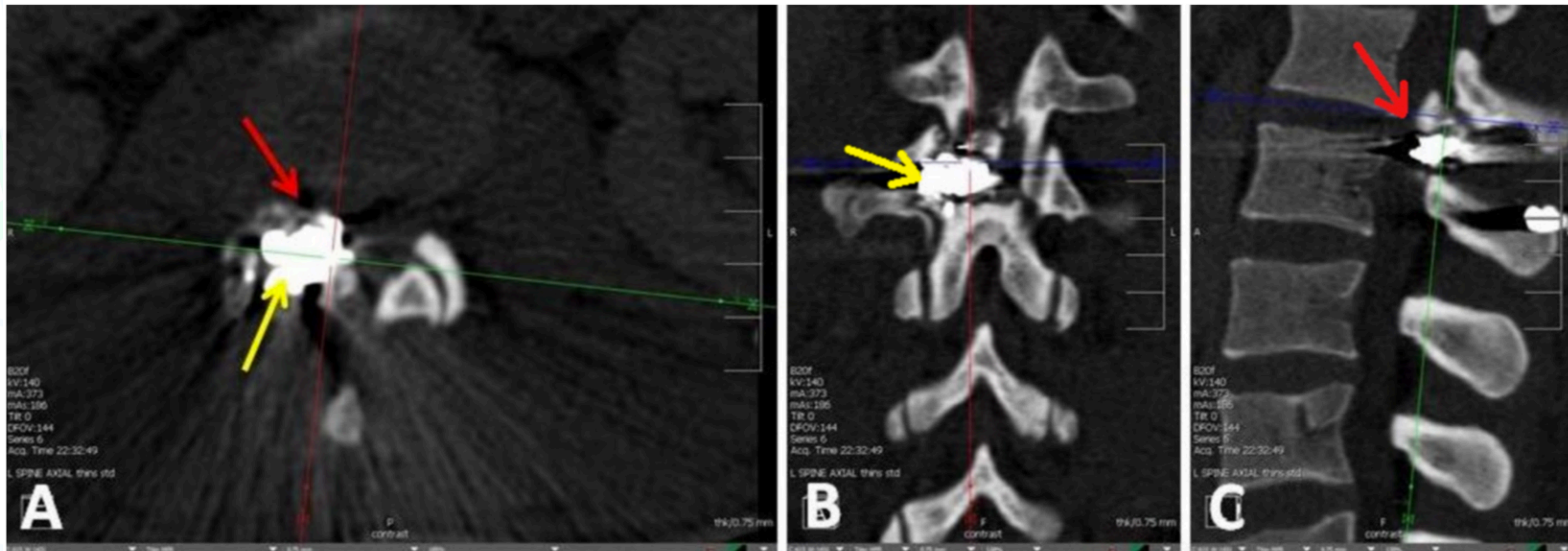
27 year old male

- Patient was discharged after disagreement with staff
- Transferred to us after diagnosis of MRSA bacteremia
 - Has not received MRSA medication for past 2 days
- Patient stabilized in ICU and evaluated
- Evaluation was done 1 week after GSW incident

Bullet location

- Right side between L1/L2
- Fractured right L2 pedicle with mass effect
- Compression of distal roots and conus

→ Bullet fragment
→ Neuroforaminal and recess compromise



Neurological Evaluation

General Evaluation

- Glasgow Coma Score (GCS) of 15
- Urinary/bowel incontinence
- No rectal tone
- Paresthesia
- Bilateral leg weakness

TABLE 38-2

Glasgow Coma Scale

BEHAVIOR	RESPONSE	SCORE
Eye opening response	Spontaneously	4
	To speech	3
	To pain	2
	No response	1
Best verbal response	Oriented to time, place, and person	5
	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	1
Best motor response	Obeys commands	6
	Moves to localized pain	5
	Flexion withdrawal from pain	4
	Abnormal flexion (decorticate)	3
	Abnormal extension (decerebrate)	2
	No response	1
Total score:	Best response	15
	Comatose client	8 or less
	Totally unresponsive	3

Neurological Evaluation - supine

Bilateral Upper Extremity

- 5/5 strength

Right Lower Extremity

- **1/5 strength**
- **2/5 extensor hallucis longus/toe flexion**
- **Decreased sensation and hyperesthesia at L1 level**

- Entrance wound elevated circumferentially and draining purulent fluid

Left Lower Extremity

- 5/5 strength dorsiflexion
- 3/5 hip flexion/hip extension
- 4/5 plantar flexion
- 1-inch elevation
- Intact sensation and hyperesthesia

- Perianal sensation and genital sensation intact
 - Patient refused rectal exam

Summary

- Complete R leg paralysis
- Bilateral leg weakness
- Asymmetrical sensory loss with saddle anesthesia
- ASIA C at L1

American Spinal Cord Injury Scale (ASIA)

ASIA Class	Improvement	Worsening	Ambulation
Asia A Complete	16%	N/A	5%
Asia B Incomplete	60%	10%	33%
Asia C Incomplete	67%	4%	50%
Asia D Incomplete	No data	3%	95%
Asia E Normal	N/A	No data	100%

Roberts TT, Leonard GR, Cepela DJ. Classifications In Brief: American Spinal Injury Association (ASIA) Impairment Scale. Clin Orthop Relat Res. 2017;475(5):1499-1504. doi:10.1007/s11999-016-5133-4

Scivoletto G, Tamburella F, Laurenza L, Torre M, Molinari M. Who is going to walk? A review of the factors influencing walking recovery after spinal cord injury. Front Hum Neurosci. 2014;8. doi:10.3389/fnhum.2014.00141

Neurological Take-away



- Incomplete neurological deficit
- Symptoms due to mass effect
- No further neurological improvement evident

Surgical Procedure

1. Decompress neural elements

- Bullet fragments and fractured bones were removed
- Decompression was performed
- Neural elements were freed of all debris and fragments

2. Realign structures

- Realignment was not needed in this procedure

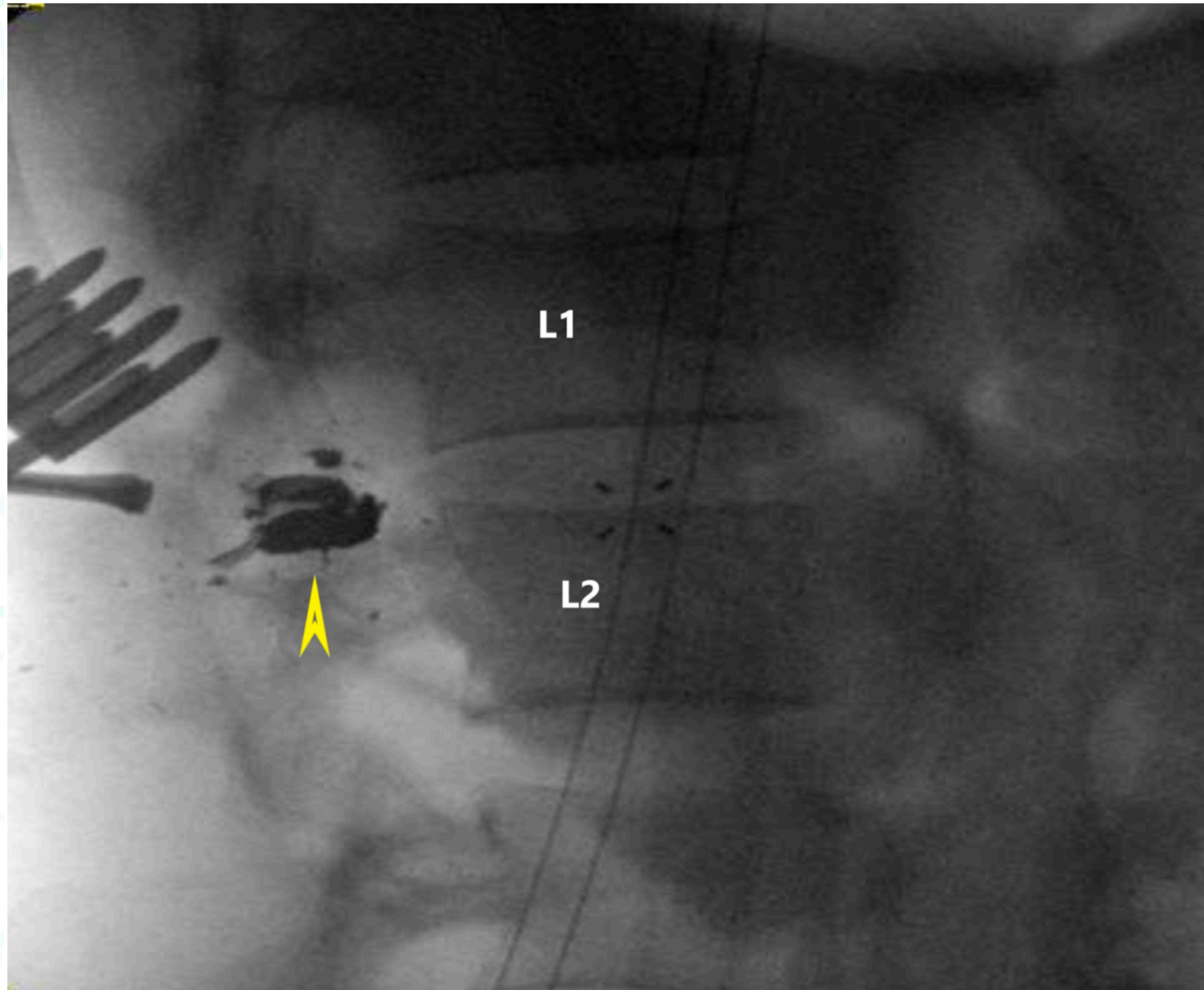
3. Stabilization

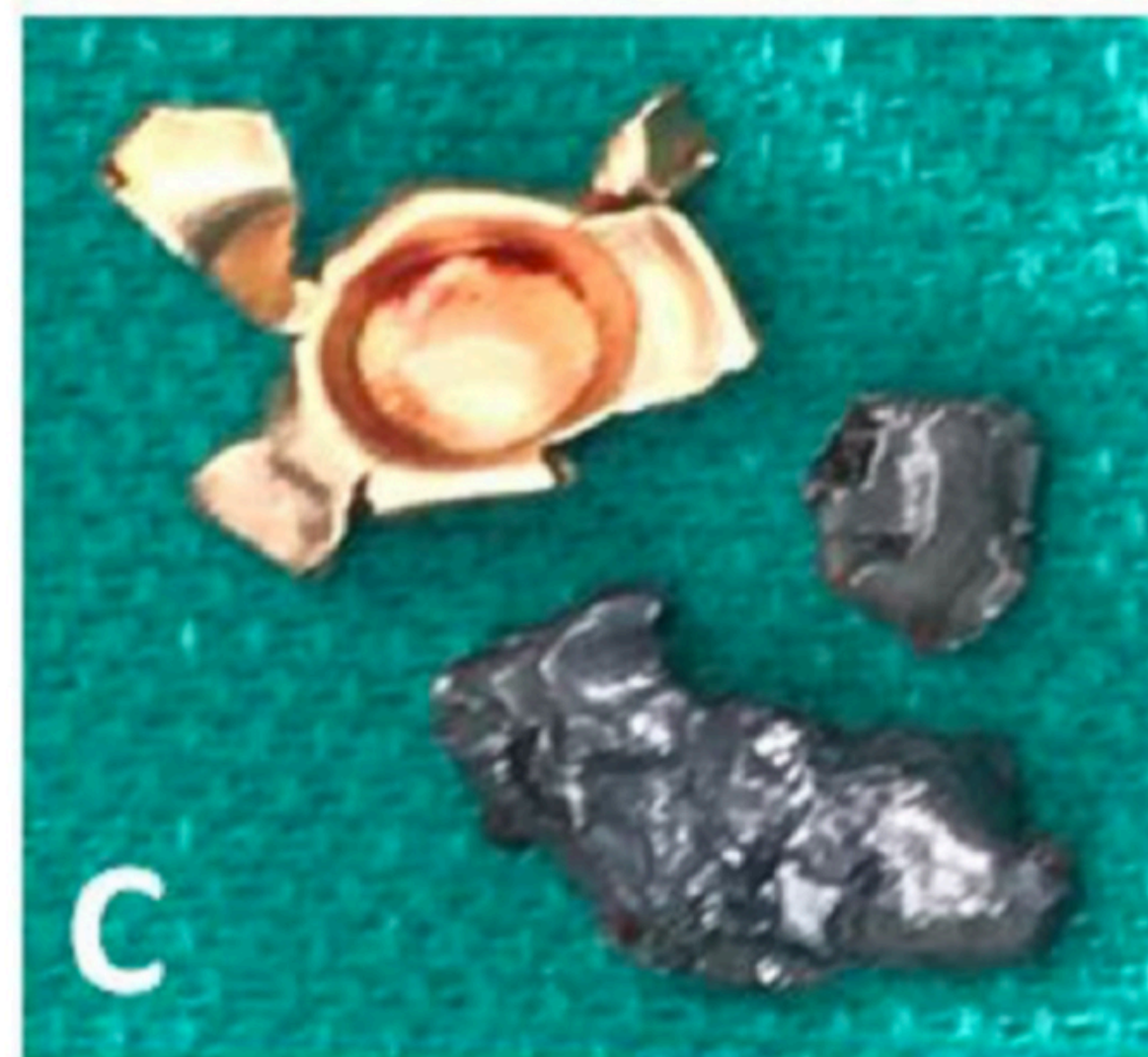
- Stabilization was not needed
- Decompression laminectomy does not usually cause destabilization

Bilateral Laminectomy

- Posterior midline approach
- Excision of T12, L1 and L2 spinous processes
- T12, L1 and L2 laminectomy

Intraoperative Photography





Intraoperative Photography

Post Operation

Immediate Post-op

- Neurological improvement in motor function
- Ability to support weight and ambulate at discharge
- Improvement in bowel and bladder function

2 weeks

- Complete recovery of L leg
- Near complete recovery of strength in R leg

6 weeks

- Near complete resolution of symptoms → ASIA D
- Minimal residual weakness in lower extremities
- Ability to void urine and bowel control
- Autonomic sexual dysfunction during recovery

Why did we choose surgery?

ASIA C

- Symptoms did not worsen or better between incident and evaluation
- Incomplete neurological deficit

Mass Effect & Accessibility

- Primary vs secondary injury
- Patient's limiting factor was pain
- Mass effect caused pain
- Location of bullet: L1/L2 & Easily accessible

Not trans-gastrointestinal

- Additional procedures were not needed

Significance of this case

- Additional case study can be added to existing literature
- Surgical Success: proved beneficial despite literature bias towards conservative approach
- Treatment for spinal GSW should be determined on case-by-case basis
- Individualized Medicine: Patient's signs and symptoms led to determination of surgery

The background features a complex, abstract network of lines and dots. The lines are primarily light blue and green, forming a web-like structure. The dots are small circles in shades of blue and green, scattered throughout the network. The overall effect is a sense of connectivity and complexity.

THANK YOU