



Case Report

Delayed spinal epidural hematoma following T1 chance fracture: An illustrative case and review of the literature

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ABSTRACT

Background: A Chance fracture is a traumatic fracture of the thoracic or lumbar spine that occurs secondary to a flexion-distraction injury. Although patients with chance fractures rarely present with neurologic deficits, a subset may become symptomatic from spinal epidural hematomas (SEH) warranting emergent decompressive surgery.

Case Description: An 87-year-old female on anticoagulation presented with a T1 Chance fracture after a fall. She was originally neurologically intact, but became paraplegic over the next 10 h. When the cervical/thoracic magnetic resonance revealed a SEH markedly compressing the cord between the C7-T1 levels, she underwent an emergent decompression; she also had a C5-T4 instrumented fusion. Postoperatively, she regained lower limb function, but expired on postoperative day 5 due to respiratory complications likely attributed to the prolonged surgery for the spinal instrumentation.

Conclusion: Delayed SEH rarely occur following spinal Chance fractures. Here, an 87-year-old female on anticoagulation developed the 10-h delayed onset of a SEH with paraplegia attributed to a T1 Chance fracture at the C7-T1 level. Although she regained neurological function following the emergent decompression, she expired 5 days later likely due to the extended operative time/blood loss from the C5-T4 fusion that could have been avoided.

Keywords: Anticoagulation, Chance fracture, Epidural hematoma, Spine fracture, Thoracic spine

INTRODUCTION

A Chance fracture is a traumatic horizontal fracture of the spine that occurs secondary to a flexion/distraction injury.^[3] These fractures typically extend through the vertebral bodies, pedicles, and spinous processes, with occurring at the thoracolumbar junction.^[1] Patients with Chance fractures may develop spinal epidural hematomas (SEH) between 0.5% and 1.7% of the time.^[1,2] When these patients acutely develop paraparesis/paraplegia, magnetic resonance (MR) studies should be emergently performed. Operative intervention should follow where indicated (i.e., decompression with/without fusion). Here, we report an 87-year-old female on therapeutic anticoagulation who, following a C7-T1 Chance fracture attributed to a fall, developed the 10-hour delayed onset of a SEH resulting in paraplegia that warranted emergent decompression/fusion.

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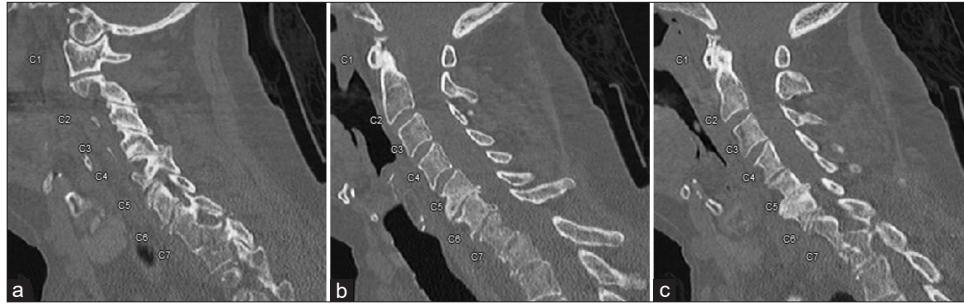


Figure 1: Sagittal cervical spine computed tomography scans demonstrating a T1 Chance fracture (panel (a), left of midline; panel (b), midline, panel (c), and right of midline).

ILLUSTRATIVE CASE

Following a fall at home, an 87-year-old female on Warfarin for coronary artery disease and atrial fibrillation, presented with neck pain but was neurologically intact. Lab studies showed international normalized ratio (INR) of 4.6 and a hemoglobin of 6.6 g/dL; she received one unit of packed red blood cells, 10 mg of vitamin K, and 6 mg of intravenous dexamethasone. The cervical computed tomography showed an acute flexion-distraction injury (Chance fracture) of T1 with kyphosis [Figure 1]. Upon arrival nearly 10 h following her fall, she was paraplegic, had a patchy T1 sensory level, absent rectal tone, and diminished perineal sensation. Anticoagulation was immediately reversed, and the cervical/thoracic MR scans were repeated. They now demonstrated a dorsal SEH at the C7-T1 level (i.e., level of the Chance fracture) that markedly compressed the cord [Figure 2]. She emergently underwent a decompressive laminectomy for evacuation of the spontaneous spinal epidural hematoma (SSEH), followed by a C5-T4 posterolateral fusion utilizing Neuronavigation to place C5-C7 lateral mass screws and T2-T4 pedicle screws. Postoperatively, she was immobilized in a hard cervical collar, and her lower extremity plegia improved to a paresis (i.e., 3/5 proximally; 2/5 distally). However, on postoperative day 4, she aspirated developed respiratory failure, and required endotracheal intubation. She expired on postoperative day 5 following extubation at the family's request.

DISCUSSION

Observations

Chance fractures are traumatic fractures of the thoracic or lumbar spine that occur through flexion-distraction forces that are rarely associated with the delayed onset of SEH. A review of delayed (i.e., 8 h after injury) SEH following traumatic back injuries [Table 1] revealed patients average 55 years of age, and develop myelopathy, on average, within 10 days (range: 0.3–42 days).^[4-10] The thoracic spine is most frequently involved (i.e., 12 of 14 cases or 86%), with cervical-thoracic junction involvement seen in 4 of 14 (29%). These

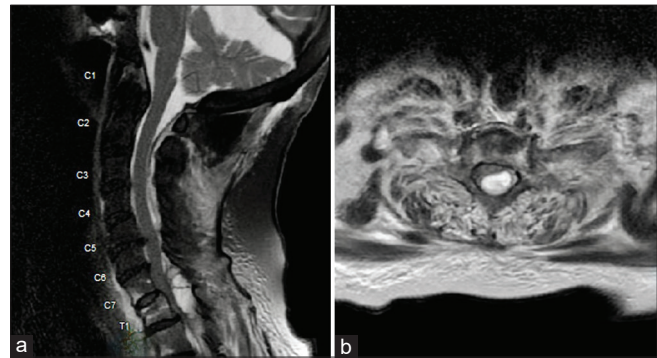


Figure 2: T2 sagittal cervical spine MRI (panel a) and T2 axial cervical spine MRI at the T1 vertebral level (panel b) demonstrating a large dorsal epidural hematoma resulting in mass effect, severe spinal canal narrowing, and subsequent cord compression.

are usually low energy (71%) versus high-energy traumatic events (29%). Further, anticoagulation is a significant risk factor for patients to develop delayed traumatic SSEH (i.e., 7 of 14 cases or 50%).

Etiology of SEH with chance fractures

SSEH with Chance spinal fractures most likely occur secondary to trauma to the thin-walled epidural venous plexus, and are less likely to be attributed to epidural plexus arteriovenous malformation, hemangiomas, and spinal tumors.^[7,10] Here, the patient's Chance fracture likely resulted in shearing or tearing of the epidural veins, while the underlying anticoagulation therapy likely further contributed to the hemorrhage.

Factors to reconsider in this case

Patients with SEH due to chance fractures may warrant decompressive laminectomies alone without fusions. Certainly, in this case, the dorsally located C7-T1 epidural hematoma could have been effectively removed/decompressed within a matter of 1–2 h. The patient should likely not have initially undergone the additional instrumented C5-T4 posterolateral fusion. In short, avoiding the emergent longer-

Table 1: Reported cases of delayed spinal epidural hematoma following traumatic back injury in the literature.

Author (s), Year published	Patient Sex, Age	Original injury/Mechanism	Level of hematoma (C/T/L)	High/Low energy trauma	Time until compressive symptoms	Co-morbidities	First reported symptoms	Operative/nonoperative? Resolution/improvement of symptoms?
Cuenca et al., 2004 ^[3]	M, 22 yrs	Blow to upper back/neck (no fx)	T4	Low energy	10 days	--	Neck/back pain	Nonoperative, yes
Tashjian et al., 2005 ^[10]	M, 37 yrs	T6 compression fx	T6	Low energy	<24 h	Multiple myeloma	Lower extremity paraplegia, sensory loss	Operative, yes
Hsieh et al., 2007 ^[5]	F, 77 yrs	Fall, T10 fragility fx	T11-T12	Low energy	2 weeks	None	Back pain	Operative, yes
Dimou et al., 2010 ^[4]	F, 57 yrs	MVA (no fx)	C3-T2	High energy	1 week	--	Pain/hemiparesis*	Operative, yes
Liebeskind et al., 1975 ^[8]	M, 23 yrs	Fall from height (no fx)	C7-T1	High energy	2.5 weeks	--	Interscapular pain	Operative, yes
Lehman et al., 2011 ^[7]	M, 12 yrs	Head trauma (no fx)	C7-T4	Low energy	3 weeks	None	Back pain	Operative, no
Kang et al., 2012 ^[6]	F, 79 yrs	Fall, T11 fragility fx	T10-L2	Low energy	6 weeks	Osteoporosis	Back pain, motor weakness/paresthesia of lower limbs*	Operative, yes
Tamburrelli et al., 2018 ^[9]	(7 patients) M (4) F (3) 32-82 yrs (mean: 66 yrs)	-Spinal fracture (6) Type A (3)‡ Type B (1)‡ Type C (2)‡ - Head trauma with neck hyperextension (1)	C: 1 T: 5 L: 1	High energy (2) Low energy (5) (3 fragility fx)	<24 h (3) >24 h (4)	DISH (1) AS (1) NHL (2)† Prior cardiac surgery (3)	--	Operative, yes (3) Operative, no (4)
Chu et al., 2022 (current report)	F, 87 years	Fall, T1 fragility fx	Skull base to lower thoracic region	Low energy	9 h	CAD, CKD, atrial fibrillation	Numbness of lower extremities	Operative, yes

†One patient on chemotherapy, ‡Magerl's Classification, *Unclear which symptom came first, AS: Ankylosing spondylitis, C: Cervical, CAD: Coronary artery disease, CKD: Chronic kidney disease, DISH: Diffuse idiopathic skeletal hyperostosis, Fx: Fracture, L: Lumbar, MVA: Motor vehicle accident, NHL: Non-Hodgkin's lymphoma, T: Thoracic, Yr, year

duration posterolateral C5-T4 fusion would have markedly reduced the operative time, and likely avoided the patient's subsequent respiratory decompensation, and death.

CONCLUSION

Delayed SEH following Chance spinal fractures are rare. Here, we presented an 87-year-old female who 10 h following a C7-T1 Chance Fracture developed a SEH warranting emergent laminectomy, but likely not the instrumented fusion that contributed to her demise.

Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

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Conflicts of interest

There are no conflicts of interest

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