

An Unstable Pelvic Fracture with Lumbar 5/6 Complete Dislocation Fracture that Resulted in Lifesaving Recovery

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Abstract Unstable pelvic fracture is related to high-energy trauma and serious trauma that threatens the patient's life and functional prognosis. Complete traumatic fracture-dislocation of the lumbar spine is a rare spinal injury often leading to death. We herein report a very rare case of unstable pelvic fracture with complete lumbar dislocation fracture that achieved a survival outcome.

Keywords: pelvic fracture, lumbar dislocation, management

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1. Introduction

Unstable pelvic fracture is related to high-energy and serious trauma that threatens a patient's life and functional prognosis. [1,2] Mortality rate of patients with hemodynamic instability due to severe pelvic fracture is as high as 40%. [3] While, complete traumatic fracture-dislocation of the lumbar spine is a rare spinal injury often leading to death. [4,5] Fracture dislocations of the thoracic and lumbar spine comprise less than 3% of all spinal injuries. [4] We herein report an extremely rare case of combination unstable pelvic fracture and complete lumbar dislocation fracture with spinal cord injury that achieved a survival outcome.

2. Case Report

A 54-year-old man suffered injury due to a fallen forklift around 6:30 PM. He became trapped by the machine around his abdomen, and his colleague rescued him after 5 minutes and called an ambulance. He had no specific particular personal or family history. When emergency medical technicians (EMTs) checked him, his blood pressure was stable, and he was complaining of lumbago and paralysis. However, he entered a shock state during transportation 15 minutes after the accident. The EMTs secured a venous route and started to

administer extracellular fluid. This deterioration was communicated to the emergency room (ER) physicians. A protocol of massive transfusion was declared by the ER physicians, and additional staff were prepared.

On arrival at one hour after the accident, his vital signs were as follows: Glasgow Coma Scale, E3V5M6; blood pressure, 87/53 mmHg; heart rate, 114 beats per minute; respiratory rate, 18 breaths/minute; and percutaneous saturation, 98% under 15 L/minute of oxygen. He was no external bleeding, but a hematoma had formed from the left side of the abdomen down to his thigh. A physical examination revealed both lower limb paralysis and sensory disturbance below L5 on the right side and S1 on the left side. His anal and bulbocavernosus reflexes had almost disappeared. Initially, he underwent immediate massive transfusion without cross-matching and then was moved to the computed tomography (CT) room. Enhanced CT revealed multiple rib fractures, L5/6 complete dislocation fracture, pelvic ring unstable fracture, and extravasation around the pubic fracture (Figure 1, Figure 2).

He underwent tracheal intubation and repeated blood transfusion due to unstable circulation in preparation of radiology intervention. And then, emergency trans-arterial embolization (TAE) by radiologists and obtained stable circulation. The orthopedists then performed external fixation of the pelvic ring and direct traction of the right thigh to stabilize the pelvis and release the occlusion of the lumbar spine and right pelvic ring.

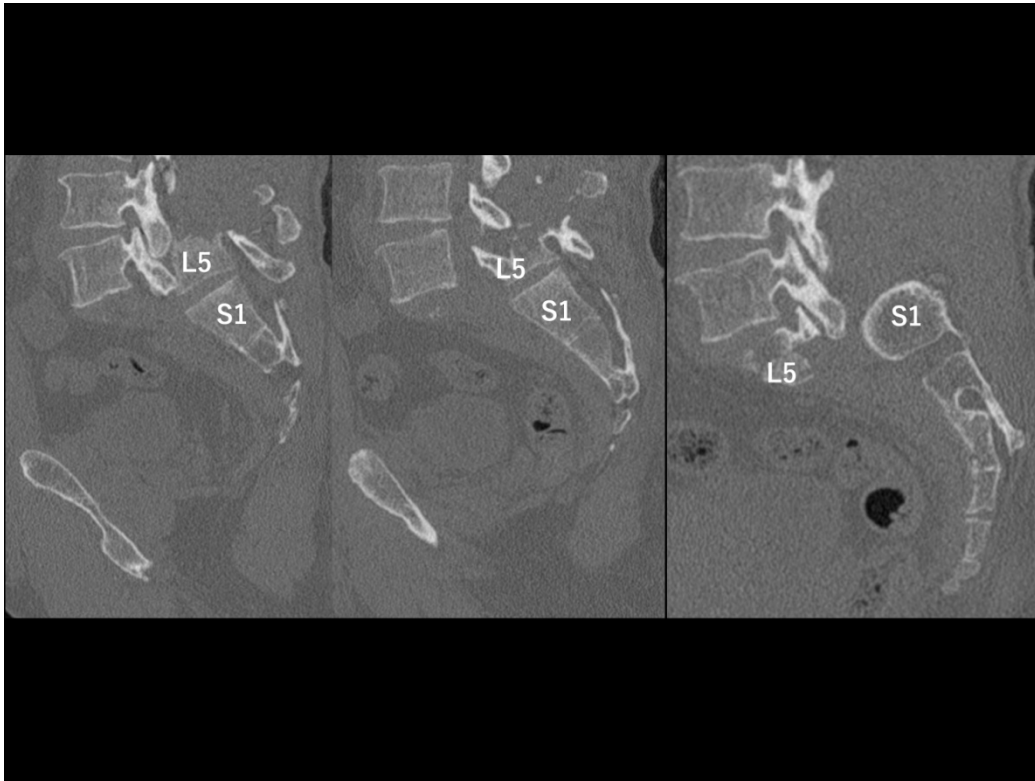


Figure 1. Sagittal view of computed tomography (CT) on arrival (bony density image). CT revealed complete L5/6(S1) anterior dislocation fracture

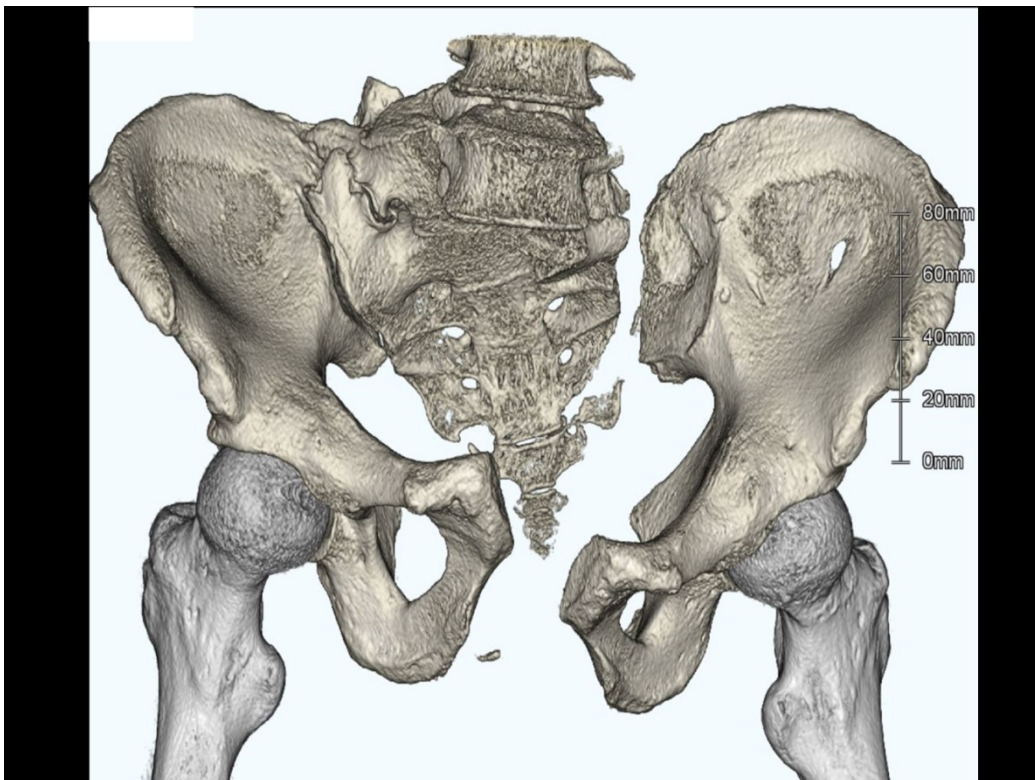


Figure 2. Three-dimensional computed tomography (CT) on arrival. CT revealed complete L5/6 dislocation fracture and vertical shear pelvic ring unstable fracture.

The patient required the initial transfusion of red blood cell and fresh-frozen plasma at 10 units each and entered the intensive-care unit approximately 5 h after the accident. However, despite receiving a sufficient amount of fluid and blood transfusion, he became complicated with acute renal failure and hyperkalemia induced by rhabdomyolysis. He required continuous hemodiafiltration on day 3. His

renal function and electrolyte imbalance improved quickly, and renal replacement therapy was canceled on the next day. The orthopedists performed internal plate fixing for pubic symphysis dissection and trans-iliac and trans-sacral screw fixations for left sacroiliac dislocation on day 5. A spine team then performed posterior lumbar retraction and fixation with L5/6 inter-body fusion on the following day (Figure 3).



Figure 3. Pelvic X-ray on day 6. The patient underwent two-staged operations. The orthopedists performed plate and nail fixing for the pubic fracture on day 5. After a base had been formed, a spinal team performed posterior lumbar fixation for lumbosacral dislocation on day 6

The postoperative course was uneventful, and he was extubated on day 7. The patient became able to walk about 20 meters with a circle walker after rehabilitation. He was therefore transferred to another hospital for rehabilitation. After six months, he was able to walk again with a cane but still had neurological bladder and sensory left leg disturbance as sequelae.

3. Discussion

This is an extremely rare combination of unstable vertical shear pelvic fracture with complete lumbar dislocation fracture that resulted in a survival outcome. Previous reports have suggested that lumbosacral junction injury should be considered in patients with unstable pelvic fracture; however, this case seemed to have an intact lumbosacral junction. [6,7] We were unable to find any reports describing cases of vertical shear pelvic fracture combined with complete lumbar dislocation fracture, both of which are classified as C (most severe) by the Orthopaedic Trauma Association classification, that resulted in a survival outcome. [8,9,10,11]

There were several points that allowed a survival outcome to be achieved in the present patient. The first was the prehospital management by EMTs, including selection of an appropriate hospital by trauma bypass, early recognition of hemorrhagic shock, and sharing this information with the in-hospital staff. [12] This allowed for the necessary medical resources to be available promptly when the patient arrived. The second was the coordination and cooperation of the trauma team, including ER physicians, radiologists and orthopedists to

control unstable circulation due to severe trauma. Early TAE and external fixation were important for bleeding control. [13] The third was the provision of consistent treatments from the ER to the intensive-care unit by the acute medical care team. A robust body of data supports improvement in patient-level outcomes when care is provided by an interprofessional team. [14] The fourth was the early performance of two-stage internal fixation for extraordinary combination of fractures and dislocations by orthopedists when the patient was stabilized by intensive care, followed by appropriate rehabilitation. The present patient was complicated by severe orthopedic injuries that were managed by first forming a base (stabilizing the pelvis) followed by building a pillar (stabilizing the lumbar region). This management approach resembles the two-stage operations performed for patients with unstable open sacral fracture with unstable lower lumbar vertical fracture. [15]

Such multidisciplinary management may have resulted in the survival outcome of the present case. The unique injury pattern described in this case is presented in order to offer better insight into management of this complex injury.

4. Conclusion

We experienced an extremely rare combination of the combination of unstable pelvic fracture and lumbar 5/6 complete dislocation fracture. Coordination and cooperation among EMTs, ER physicians, radiologists, intensivists, orthopedists, and paramedical staff is essential to obtain a favorable outcome.

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References

- [1] Burkhardt M, Nienaber U, Pizanis A, Maegele M, Culemann U, Bouillon B, Flohé S, Pohlemann T, Paffrath T; TraumaRegister DGU; German Pelvic Injury Register of the Deutsche Gesellschaft für Unfallchirurgie. Acute management and outcome of multiple trauma patients with pelvic disruptions. *Crit Care* 2012; 16: 3-11.
- [2] Mejia D, Parra MW, Ordoñez CA, Padilla N, Caicedo Y, Pereira Warr S, Jurado-Muñoz PA, Torres M, Martínez A, Serna JJ, Rodríguez-Holguín F, Salcedo A, García A, Millán M, Pino LF, González Hadad A, Herrera MA, Moore EE. Hemodynamically unstable pelvic fracture: A damage control surgical algorithm that fits your reality. *Colomb Med (Cali)*. 2020 Dec 30; 51(4): e4214510.
- [3] Li P, Liu F, Li Q, Zhou D, Dong J, Wang D. Role of pelvic packing in the first attention given to hemodynamically unstable pelvic fracture patients: a meta-analysis. *J Orthop Traumatol*. 2022 Jul 7; 23(1): 29.
- [4] Mohammadi HR, Zandi S. Complete traumatic fracture-dislocation L3-L4 of the lumbar spine. *Pak J Med Sci*. 2013 Sep; 29(5): 1283-4.
- [5] Crawford CH 3rd, Puno RM, Campbell MJ, Carreon LY. Surgical management of severely displaced pediatric seat-belt fracture-dislocations of the lumbar spine associated with occlusion of the abdominal aorta and avulsion of the cauda equina: a report of two cases. *Spine (Phila Pa 1976)*. 2008 May 1; 33(10): E325-8.
- [6] Isler B. Lumbosacral lesions associated with pelvic ring injuries. *J Orthop Trauma*. 1990; 4(1): 1-6.
- [7] Leone A, Cerase A, Priolo F, Marano P. Lumbosacral junction injury associated with unstable pelvic fracture: classification and diagnosis. *Radiology*. 1997 Oct; 205(1):253-9.
- [8] Marsh JL, Slongo TF, Agel J, Broderick JS, Creevey W, DeCoster TA, et al. Fracture and dislocation classification compendium - 2007: Orthopaedic Trauma Association classification, database and outcomes committee. *J Orthop Trauma* 2007; 21: S1-133.
- [9] Ohmori T, Matsumoto T, Kitamura T, Tamura R, Tada K, Inoue T, Hayashi T, Numoto K, Tokioka T. Scoring system to predict hemorrhage in pelvic ring fracture. *Orthop Traumatol Surg Res*. 2016 Dec; 102(8): 1023-1028.
- [10] Divi SN, Schroeder GD, Oner FC, Kandziora F, Schnake KJ, Dvorak MF, Benneker LM, Chapman JR, Vaccaro AR. AOSpine-Spine Trauma Classification System: The Value of Modifiers: A Narrative Review With Commentary on Evolving Descriptive Principles. *Global Spine J*. 2019 May; 9(1 Suppl): 77S-88S.
- [11] Du JP, Fan Y, Liu JJ, Zhang JN, Meng YB, Mu CC, Hao DJ. Decompression for Traumatic Thoracic/Thoracolumbar Incomplete Spinal Cord Injury: Application of AO Spine Injury Classification System to Identify the Timing of Operation. *World Neurosurg*. 2018 Aug; 116: e867-e873.
- [12] Garwe T, Cowan LD, Neas BR, Sacra JC, Albrecht RM. Directness of transport of major trauma patients to a level I trauma center: a propensity-adjusted survival analysis of the impact on short-term mortality. *J Trauma*. 2011 May; 70(5): 1118-27.
- [13] Tiel Groenestege-Kreb D, van Maarseveen O, Leenen L. Trauma team. *Br J Anaesth*. 2014 Aug; 113(2): 258-65.
- [14] Donovan AL, Aldrich JM, Gross AK, Barchas DM, Thornton KC, Schell-Chaple HM, Gropper MA, Lipshutz AKM; University of California, San Francisco Critical Care Innovations Group. Interprofessional Care and Teamwork in the ICU. *Crit Care Med*. 2018 Jun; 46(6): 980-990.
- [15] Al Eissa S, Taha W, Alhelal F, Abaalkhail MS, Al Turki A, Benmeakel M, Konbaz F. Traumatic sacralization of L5 vertebra with severe extension type spinopelvic dissociation: A case report. *Trauma Case Rep*. 2020 Jul 29; 29: 100338.

