

The Successful Treatment of a Patient with Multiple Injuries, Including Unstable Thoracic Cage and Pelvic Fracture

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Abstract: A 56-year-old man on a motorcycle ran into a car that had swerved into the oncoming traffic lane in order to pass another car on a mountain path in the Izu peninsula. He was evacuated by a physician-staffed helicopter. On arrival, as he had severe hemorrhagic hypotension, he received urgent transfusions, tracheal intubation and cannulation into the femoral artery for trans-arterial embolization. Whole-body computed tomography (CT) revealed multiple injuries, including unstable thoracic cage and pelvic fracture. Extravasation of contrast medium was observed just at the retroperitoneal space at the pelvis. Urgent trans-arterial embolization for unstable pelvic fracture was executed, followed by external fixation for the fractures. After obtaining stable circulation and respiration by intensive care, he underwent stabilization of thoracic spine and internal fixation for his unstable pelvic fracture separately. Finally, he was transferred to his local medical facility for rehabilitation. This is the first case of the successful recovery a patient who had multiple lethal injuries, including a combination of unstable thoracic cage and pelvic fracture. A multidisciplinary approach, including resuscitation based on the polytrauma guideline and a hospital-tailored treatment protocol, and team dynamics conducted by trained emergency physicians were key to obtaining a survival discharge.

Keywords: unstable thoracic cage fracture; unstable pelvic fracture; outcome

INTRODUCTION

Unstable thoracic cage fracture and unstable pelvic fracture are both life-threatening injuries [1-4]. As we could find no reports on patients who obtained a survival outcome with both types of injuries, we herein report our successful case.

CASE PRESENTATION

A 56-year-old man on a motorcycle ran into a car that had swerved into the oncoming traffic lane. He was evacuated by a physician-staffed helicopter in a state of shock but with a clear airway, receiving only a venous line with limited infusion. On arrival, his Glasgow Coma Scale score was 10. His systolic blood pressure was 60 mmHg, heart rate 132 beats per minute and respiratory rate 36 breaths per minute. He had paraplegia preserving touch sensation (Frankel B).

Chest roentgen revealed multiple rib fractures with a widening mediastinum, and pelvic roentgen revealed unstable pelvic fracture (Figure 1, 2). As he had severe hemorrhagic hypotension, he received urgent different blood type O transfusions, tracheal intubation and cannulation into the femoral artery for intra-aortic balloon occlusion and/or trans-arterial

embolization. Whole-body computed tomography (CT) revealed atlas, axis, upper thoracic spinal, sternal, multiple ribs with lung contusion, lumbar, pelvic, open left distal radio-ulnar, left fibula and right proximal tibial fractures (Figure 3). Extravasation of contrast medium was observed just at the retroperitoneal space at the pelvis.

Urgent trans-arterial embolization for unstable pelvic fracture was executed, followed by external fixation for the left open radio-ulnar fractures and pelvic fractures. He underwent transfusion with 26 units of red blood cell, 20 units of fresh-frozen plasma and 10 units of platelets in the first 24 h. After obtaining stable circulation on the third hospital day, he underwent stabilization of thoracic spine by posterior fixation in the supine position (Figure 4). As he was under external fixation for unstable pelvic fracture, his knees were bent and held with a decompressive pillow to achieve the operative position.

He developed acute respiratory distress syndrome due to massive transfusion and pneumonia and required mechanical ventilation. After his respiratory function improved, he underwent internal

fixation for his unstable pelvic fracture and left radio-ulnar fractures on the tenth hospital day (Figure 4). The next day, he was extubated. His sensation had been preserved in his lower extremities, but he had paresis corresponding to 3 of 5 on the manual muscle test (Frankel C). Internal fixation for the tibial fracture was

performed on the 25th days after treating a catheter infection.

After these procedures, he was transferred to his local medical facility for rehabilitation.



Fig-1: Chest roentgen on arrival. The x-p reveals a widening mediastinum.



Fig-2: Reconstruction by computed tomography for the pelvis. The pelvis has an unstable fracture.

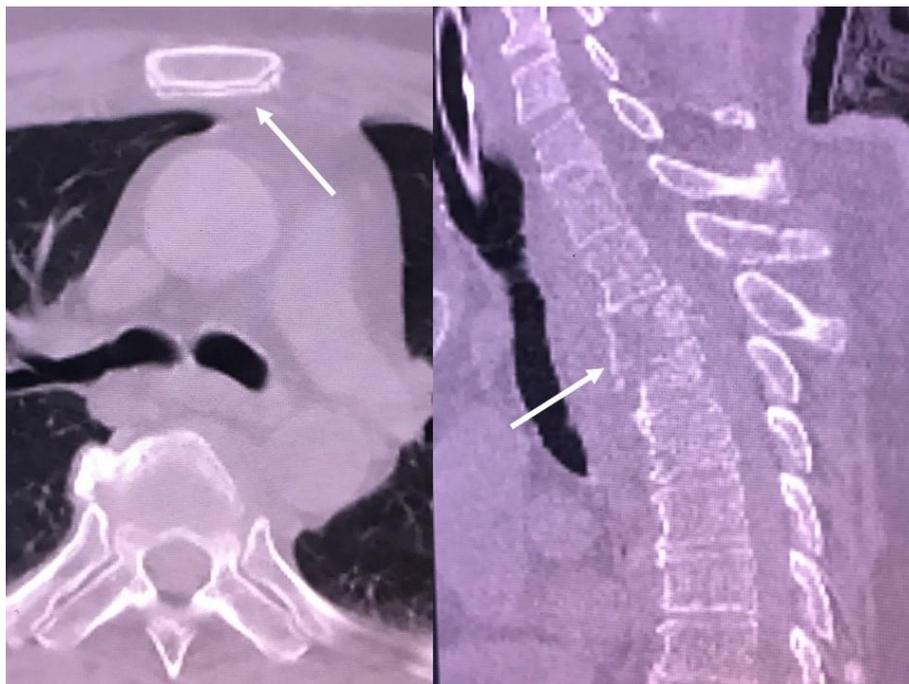


Fig-3: Whole body computed tomography (CT) for the thorax. CT demonstrates upper thoracic spinal displaced fracture with sternal fracture, suggesting an unstable thoracic cage.

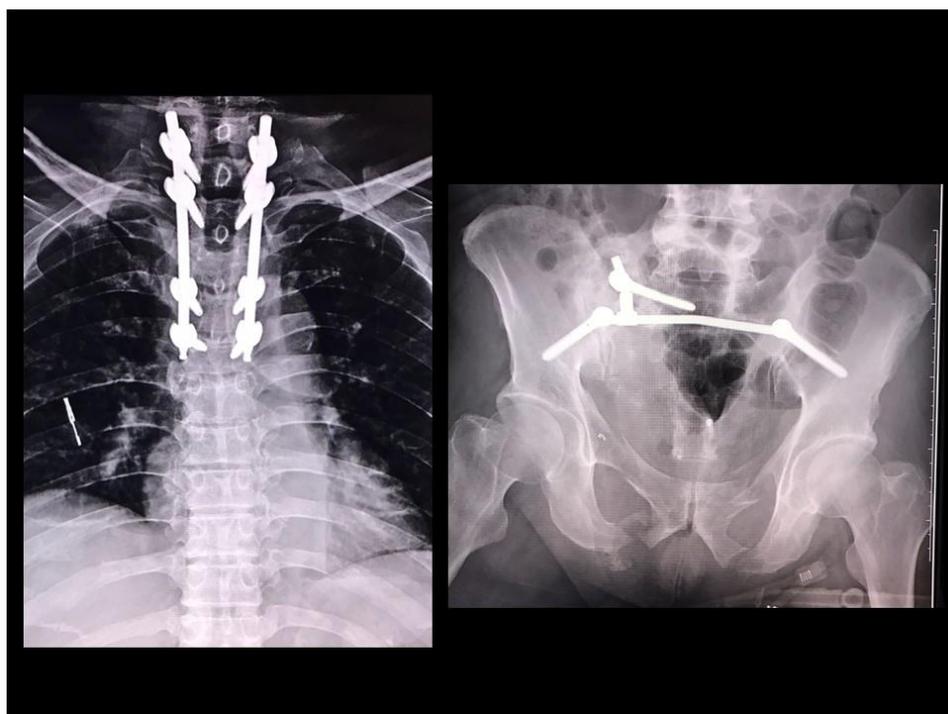


Fig-4: Postoperative roentgen. Roentgen reveal internal fixation of the thoracic cage and pelvis (left: thorax, right: pelvis).

DISCUSSION

To our knowledge, this is the first case of the successful recovery a patient who had multiple lethal injuries, including a combination of unstable thoracic cage and pelvic fracture.

The first key to this patient's successful treatment was initial resuscitation based on a recent strategy for severe trauma. Using the physician-staffed

helicopter, the patient was quickly and directly transported to our hospital, which is equal to a level 1 trauma center in the United States; this transport was quicker than could have been achieved with a ground ambulance, which would have arrived at our hospital more than 30 minutes later. By this approach, trauma bypass was established. We routinely insert cannulations into the femoral artery during standby for intra-aortic balloon occlusion, trans-arterial

embolization and/or monitoring in traumatized shock patients in the emergency room. Whole-body CT to evaluate the injury sites revealed multiple injuries, but active bleeding was only at pelvic fracture. Accordingly, we selected trans-arterial embolization to stabilize the circulation in order to prevent hemorrhagic death. Transfusion was performed based on the vital signs, not the level of hemoglobin on the first hospital day [5].

The second key to this patient's successful treatment was that emergency physicians directed the resuscitation team via bi-directional communication. Our emergency physicians treat traumatized patients from the emergency room to the intensive-care unit in order to stabilize the vital signs under a consistent strategy, while maintaining close communication with the relevant department through two conferences per day. This approach facilitated the appropriate timing of several orthopedic operations in this case.

The third key to this patient's successful treatment was the aggressive internal fixation of the unstable thoracic cage and pelvic fracture using the unique operative position by trained orthopedicians. Stabilizing these unstable thoracic and pelvic fractures in the early phase resulted in the patient being able to leave the bed early and minimized the occurrence of complications during the intensive care [6].

CONCLUSION

We herein report a successfully treated patient who had multiple lethal injuries, including a combination of unstable thoracic cage and pelvic fracture. A multidisciplinary approach, including resuscitation based on the polytrauma guideline and a hospital-tailored treatment protocol, and team dynamics conducted by trained emergency physicians were key to obtaining a survival discharge.

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REFERENCES

1. Morgenstern M, von Rueden C, Callsen H, Friederichs J, Hungerer S, Bühren V, Woltmann A, Hierholzer C. The unstable thoracic cage injury: The concomitant sternal fracture indicates a severe thoracic spine fracture. *Injury*. 2016 Nov;47(11):2465-2472.
2. Chaudhary SB, Roselli E, Steinmetz M, Mroz TE. Thoracic aortic dissection and mycotic pseudoaneurysm in the setting of an unstable upper

- thoracic type b2 fracture. *Global Spine J*. 2012 Sep;2(3):175-82.
3. Rudloff MI, Triantafillou KM. Management of Pelvic Ring Injuries in Unstable Patients. *Orthop Clin North Am*. 2016 Jul;47(3):551-63.
4. Morozumi J, Homma H, Ohta S, Noda M, Oda J, Mishima S, Yukioka T. Impact of mobile angiography in the emergency department for controlling pelvic fracture hemorrhage with hemodynamic instability. *J Trauma*. 2009 Aug;67(2):245-51.
5. Hussmann B, Lendemans S. Pre-hospital and early in-hospital management of severe injuries: changes and trends. *Injury*. 2014 Oct;45 Suppl 3:S39-42.
6. Galeiras Vázquez R, Ferreiro Velasco ME, Mourelo Fariña M, Montoto Marqués A, Salvador de la Barrera S. Update on traumatic acute spinal cord injury. Part 1. *Med Intensiva*. 2017;41:237-247.