

## Case Report

# Effective hemostasis by preperitoneal pelvic packing for common iliac vein injury without pelvic fracture in severe blunt trauma: a case report

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**Background:** A common iliac vein injury in the absence of pelvic fractures due to blunt trauma is rare, with no treatment strategy established.

**Case Presentation:** A 48-year-old man, who was injured in a dumbwaiter accident, presented to the hospital with hemorrhagic shock. Computed tomography (CT) revealed active bleeding from the intercostal and hepatic arteries as well as the left common iliac vein. No pelvic fracture was noted. Preperitoneal pelvic packing was performed for the left common iliac vein injury as a damage control surgery. After the operation, endovascular embolization was performed to address the arterial bleeding. The patient became hemodynamically stable, and follow-up CT showed no signs of bleeding. The packing gauze was removed 3 days after the admission. The patient was discharged without complications.

**Conclusion:** Preperitoneal pelvic packing provided temporary hemostasis in a hemodynamically unstable patient with common iliac vein injury but with no pelvic fractures.

**Key words:** Damage control surgery, iliac vein injury, preperitoneal pelvic packing, severe blunt trauma, treatment strategy

## INTRODUCTION

THE PERSISTENTLY HIGH mortality rate associated with traumatic cases worldwide needs to be addressed.

Hemorrhage is the main cause of trauma-related deaths. Thus, achieving hemostasis is important.<sup>1</sup> A common iliac vein injury without pelvic fracture due to blunt trauma is a rare finding. However, its mortality rate is high.<sup>2</sup> Furthermore, the treatment strategy has not been standardized. This study presents a report of a patient who suffered a blunt injury that resulted in a left common iliac vein injury without pelvic fractures. Hemostasis was successfully achieved via preperitoneal pelvic packing.

## CASE

A 48-year-old man sustained an injury in a dumbwaiter accident. During a periodic inspection, the dumbwaiter

fell on him from overhead. Emergency medical services and a prehospital team were dispatched. At the time of contact, the patient complained of chest pain. His vital signs were a Glasgow Coma Scale (GCS) score of E3V4M6, SpO<sub>2</sub> of 93% with a 10-L oxygen mask, blood pressure of 60/— mmHg, and heart rate of 164 beats/min. Physical examination revealed no findings associated with a tension pneumothorax. The focused assessment with sonography for trauma (FAST) was unremarkable, and external bleeding was not detected. After administration of 500 mL Ringer's solution, the systolic blood pressure improved to 90 mmHg. Thus, the patient was immediately transported to our hospital without hemostatic intervention at the scene of the injury.

On arrival, his vital signs were GCS of E3V4M6, SpO<sub>2</sub> of 93% with a 10-L oxygen mask, blood pressure of 93/65 mmHg, and heart rate of 158 beats/min. The patient was deemed to be in a state of respiratory and circulatory collapse. Thus, a massive transfusion protocol was initiated, and intubation was immediately performed. A thoracic drainage tube was inserted because the chest X-ray showed a pneumothorax. The patient remained in hemorrhagic shock. Neither chest and pelvic X-rays nor FAST identified the source of bleeding. Therefore, a full contrast-enhanced computed tomography (CT) was performed, while massive

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transfusion was continuing. CT showed multiple right rib fractures with intracoastal arterial bleeding, bilateral pneumothorax, liver injury (American Association for the Surgery of Trauma grade 3) with arterial extravasation, left retroperitoneal hematoma, left common iliac vein injury with massive extravasation (Fig. 1), and a right femoral fracture. The dumbwaiter was assumed to have fallen on the right side of the patient's back while he was crouching, and likely caused an excessive bending of the upper body. The patient had an injury severity score of 34. The blood examination revealed a hemoglobin level of 9.7 g/dL, platelet count of  $19 \times 10^4/\mu\text{L}$ , pH of 7.061, lactate of 12.8 mmol/L, international normalized ratio of prothrombin time of 1.21, fibrinogen of 141 mg/dL, and axillary body temperature of 36.2°C.

While inserting an intra-aortic balloon occlusion catheter to prepare for deterioration of vital signs, left-sided preperitoneal pelvic packing was immediately performed to address the left common iliac vein injury within 14 min. The gauze was placed more cephalad and lateral to downregulate the blood flow of the injured common iliac vein. Then, 16 min after preperitoneal pelvic packing was finished, endovascular embolization of the intracoastal artery and posterior segmental branch of the hepatic artery was performed. Following the procedure, the patient became hemodynamically stable. The venous angiography of the left iliac vein and follow-up CT showed no apparent bleeding from the arteries and veins (Fig. 2) In addition, skeletal traction for the femur fracture was performed after the embolization.

The packing gauze was removed 3 days after admission, and rebleeding was not detected. On the seventh day after admission, the patient's right femoral fracture and lumbar vertebral fracture were treated via open reduction and internal fixation. He was extubated on the next day. The patient was discharged without major complications 39 days after admission.



**Fig. 2.** CT showed the left-sided preperitoneal pelvic packing gauze (arrows). There was no extravasation or obstruction from the left common iliac vein. We pressed the left iliac vein using gauze and pile-up gauze from the preperitoneal space to near the midline rectus to apply adequate pressure.

## DISCUSSION

**I**N THE PRESENT case, preperitoneal pelvic packing was successfully performed to control the bleeding from the common iliac vein without pelvic fractures. Immediate endovascular embolization for arterial bleeding was important; however, we thought immediate hemostasis for iliac vein injury was also important because the CT showed massive bleeding from the iliac vein. Therefore, we selected preperitoneal pelvic packing as the initial treatment because it could provide temporary hemostasis most quickly during preparation of endovascular embolization. There have been no reports on the application of preperitoneal pelvic packing to achieve temporary hemostasis of an injured common iliac vein.

Open surgical venous repair or ligation has been selected to achieve hemostasis in iliac vein injuries.<sup>3</sup> However, iliac



**Fig. 1.** (A) Computed tomography showed the left retroperitoneal hematoma and the left common iliac vein injury with venous extravasation (arrow). (B) The iliac artery was intact.

venous lesions, exposed to a large retroperitoneal hematoma, are difficult to treat and require a prolonged treatment duration.<sup>4</sup> The patient in the present case was hemodynamically unstable, and multiple arterial bleeding events occurred. Therefore, immediate endovascular embolization was required. As the CT showed massive bleeding from the iliac vein, immediate bleeding control of the iliac vein was also necessary. We selected preperitoneal pelvic packing as the initial treatment because it could provide temporary hemostasis for the venous hemorrhage most quickly.

Preperitoneal pelvic packing is typically performed to address life-threatening hemorrhage due to unstable pelvic fractures and is associated with a low mortality rate.<sup>5</sup> A previous study showed the favorable outcomes of preperitoneal pelvic packing in intrapelvic venous hemorrhage involving the internal iliac vein. It could be performed immediately within 30 min.<sup>6</sup> The patient in the present case did not sustain any pelvic fractures; however, the bleeding of the common iliac vein was successfully controlled by compressing the distal internal and external iliac veins. Therefore, this method could be an effective damage control approach in such cases.

A recent report documented the safety of conservative management in hemodynamically stable patients with iliac vein injury.<sup>7</sup> However, for unstable patients with massive hemorrhage, such as our patient, conservative management is limited. Mosquera *et al.*<sup>8</sup> reported a hemodynamically unstable patient who underwent endovascular repair using a covered stent for an iliac vein injury. This approach is ideal for facilities with sufficient experience in providing endovascular treatment for injured veins. However, preperitoneal packing is a viable option that achieves temporary hemorrhage control for facilities with less experience of endovascular repair.

## CONCLUSION

**WE ENCOUNTERED** A case of a common iliac vein injury without pelvic fracture and successfully managed hemorrhage with preperitoneal pelvic packing. Preperitoneal pelvic packing was a viable treatment option that

achieved temporary hemostasis in hemodynamically unstable patients with a common iliac vein injury.

## DISCLOSURE

**A**PPROVAL OF THE research protocol with approval No. and committee Name: N/A.

Informed Consent: Informed consent for the publication of clinical details and images was obtained from the patient.

Registry and the Registration No. of the study/Trial: N/A.  
Animal Studies: N/A.

Conflict of Interest: The authors declare no conflicts of interest.

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