Case Report

Successful non-operative management of traumatic extrahepatic portal venous injury without intraperitoneal hemorrhage: a case report

Kunio Hamanaka,[1] Yuusuke Hirokawa,[2] Tsuyoshi Itoh,[2] Mitsuhiro Fujino,[1] Kenichi Kano,[1] Satoru Beppu,[1] Nozomu Sasahashi,[1] and Kei Nishiyama[1]

[1]Department of Emergency and Critical Care Medicine, and [2]Department of Radiology, National Hospital Organization, Kyoto Medical Center, Kyoto, Japan

Case: A 52-year-old woman was admitted to our hospital with hypotension after falling from the fifth floor of an apartment building. Contrast-enhanced computed tomography showed liver injury with extravasation of contrast material from the hepatic artery, and extrahepatic portal venous injury with extravasation and pseudoaneurysm. Intra-abdominal hemorrhage was not observed, and bleeding was confined to the retroperitoneal space. Hepatic arteriography showed extravasation, while portal venography showed pseudoaneurysm but no extravasation. After transarterial embolization, the patient's vital signs improved. Non-operative management was selected for the portal venous injury.

Outcome: Computed tomography on the 58th hospital day revealed disappearance of the portal venous pseudoaneurysm. The patient was discharged on the 90th hospital day without any complications.

Conclusion: This case shows that non-operative management can be selected for portal venous injury when there is no retroperitoneal injury and bleeding is confined to the retroperitoneal space.

Key words: Arteriography, non-operative management, portal venography, portal venous injury, transarterial embolization

INTRODUCTION

TRAUMATIC PORTAL VENOUS injury is uncommon, but can be lethal. Previous reports have emphasized the difficulty of preoperative diagnosis of portal venous injury.[1] Treatment of portal venous injury typically includes venorrhaphy or ligation during surgery. However, management of the portal vein during surgery can be difficult due to its posterior location, significant blood flow, and friability of its wall. Intraoperative exsanguination is the primary cause of death.[2] Here, we describe a case of successful non-operative management of traumatic extrahepatic portal venous injury, which was diagnosed by using contrast-enhanced computed tomography (CT) and portal venography.

Corresponding: Kunio Hamanaka, MD, Department of Emergency and Critical Care Medicine, National Hospital Organization, Kyoto Medical Center, 1-1 Mukaibataketyo, Fushimi-ku, Kyoto 612-8555, Japan. E-mail: centerbeach1981@yahoo.co.jp.
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CASE

A 52-YEAR-OLD WOMAN fell from the fifth floor of an apartment building and was referred to the emergency department of our hospital. She reported abdominal and right hip pain. On arrival, she was conscious (Glasgow Coma Scale score, E4V5M6) but pale, her blood pressure was 60/48 mmHg, pulse rate was 80 b.p.m., respiratory rate was 26 breaths/min, and body temperature was 36.5°C. Focused assessment with sonography for trauma as a primary survey revealed non-specific findings, and she had no external bleeding. Pelvic radiographs showed fracture of the right pubic bone and sacrum. Arterial blood gas analysis revealed a pH level of 7.299, bicarbonate level of 14.4 mmol/L, and lactate level of 6.4 mmol/L. Her hemoglobin (Hb) level was 10.3 g/dL. Blood examination revealed no coagulopathy. At this time, she was diagnosed with hemorrhagic shock; thus, we started massive infusion and ordered transfusion.

After resuscitation with 1500 mL crystalloid solution over 15 min, her blood pressure improved to 100/45 mmHg, and her pulse rate was 75 b.p.m. Whole-body enhanced CT showed liver injury of the posterior segment

of the right lobe with extravasation of contrast material to the intrahepatic and retroperitoneal space secondary to hepatic arterial injury (American Association for the Surgery of Trauma liver injury scale score, IV) (Fig. 1), portal venous injury with extravasation to the retroperitoneal space, and portal venous pseudoaneurysm at the junction of the mesenteric and splenic veins (Figs 2 and 3), but no intra-abdominal hemorrhage. Computed tomography also showed pulmonary contusion, right adrenal gland hemorrhage, partial left renal infarction, and pelvic fracture without extravasation (Injury Severity Score, 34). The patient was diagnosed with hemorrhagic shock primarily due to liver and portal venous injuries.

At our institution, we have a strategy in which we carry out transarterial embolization for arterial bleeding and portal venography for definitive diagnosis of portal venous injury. If portal venography confirms active bleeding due to portal venous injury, or instability of vital signs continues, we perform surgery.

An hour after arrival, 2500 mL crystalloid solution was infused, and the patient's blood pressure and pulse rate improved to 110/70 mmHg and 70 b.p.m., respectively. Arterial blood gas analysis revealed a pH level of 7.295, bicarbonate level of 15.5 mmol/L, and lactate level of 5.7 mmol/L. However, her Hb level decreased to 6.8 mg/dL, and red blood cell and fresh-frozen plasma transfusion was carried out. Hepatic arteriography revealed extravasation of contrast material from the posterior superior branch (A7), while portal venography by selective superior mesenteric artery injection revealed pseudoaneurysm but no extravasation (Fig. 3).

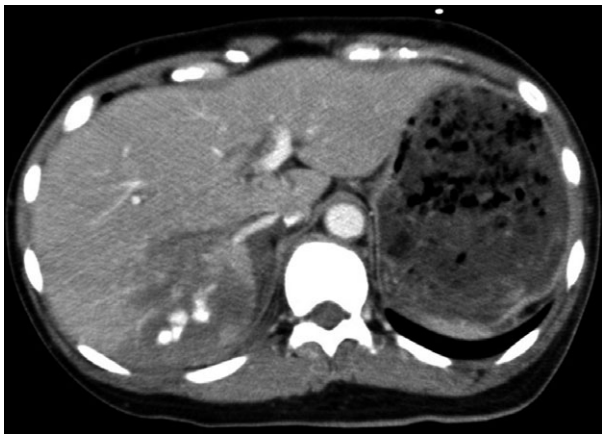

Fig. 1. Contrast-enhanced computed tomography scans of a 52-year-old woman with hypotension who fell from the fifth floor of an apartment building. The images, taken on arrival at the hospital, show liver injury with extravasation of contrast material to the intrahepatic and retroperitoneal space secondary to hepatic arterial injury.

Transarterial embolization was selected for the hepatic arterial injury to control the ongoing bleeding. Catheterization of A7 with a microcatheter and embolization with a gelatin sponge was undertaken. After transarterial embolization, the patient's blood pressure improved to 143/80 mmHg, and her pulse rate was 78 b.p.m. Because portal venography showed no extravasation of contrast material, and her vital signs were improving, non-operative management was selected for the portal venous injury. Furthermore, because angiography of bilateral internal iliac arteries revealed no extravasation, embolization of the internal iliac arteries was not performed. The procedure duration was approximately 45 min.

After infusion with 4 units of packed red blood cells, the patient's Hb level improved to 10.7 mg/dL. Follow-up arterial blood gas analysis revealed a pH level of 7.350, bicarbonate level of 23.5 mmol/L, and lactate level of 4.3 mmol/L. No further blood transfusion was necessary.

Contrast-enhanced CT on the 4th hospital day revealed that the portal venous pseudoaneurysm had shrunk, and there was no extravasation of contrast material (Fig. 3). At this time, the patient started oral intake of regular food, and no complications occurred. Contrast-enhanced CT on the 58th hospital day revealed disappearance of the portal venous pseudoaneurysm (Fig. 3). The patient was discharged on the 90th hospital day without any complications.

DISCUSSION

TRAUMATIC PORTAL VENOUS injury is rare but lethal. In a previous report, 15 (0.08%) of 18,900 trauma patients were identified as having portal venous injury.[2] Portal venous injury is difficult to diagnose preoperatively, and is usually identified intraoperatively.[1,3]

The majority of extrahepatic portal venous injuries are injuries to the body of the vein within the hepatoduodenal ligament, followed by injuries to the junction of the mesenteric and splenic veins.[4] In this case, portal venous injury occurred at this junction. Anatomically, this type of injury is caused by shear force of the mobile mesentery, resulting in avulsion of the junction of the mesenteric and splenic veins.

Venous injury, including of the portal vein, even during the portal venous phase, is often less evident on contrast-enhanced CT compared with arterial injury during the arterial phase due to hemodilution of the contrast material and its elimination by the kidneys. Nevertheless, venous injury can be identified, or at least suspected, based on multidetector CT findings. Venous injury can be identified on CT by

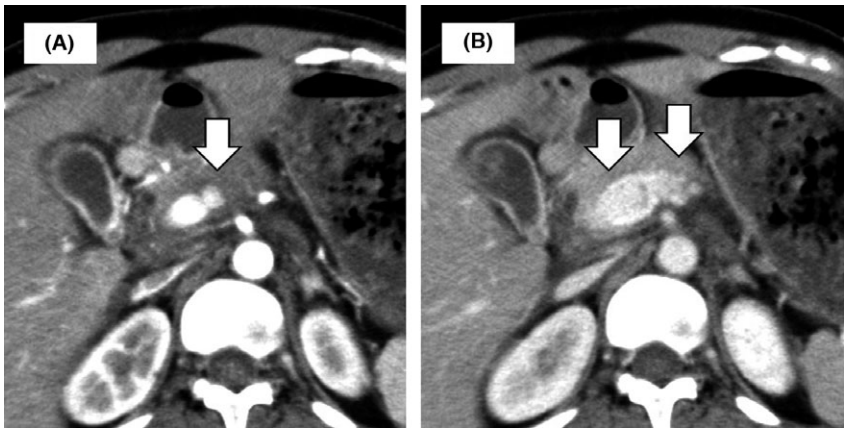

Fig. 2. Contrast-enhanced computed tomography (CT) scans of a 52-year-old woman with hypotension who fell from the fifth floor of an apartment building, taken on hospital arrival. A, Axial CT scan (early phase), showing perivascular hematoma and portal venous pseudoaneurysm to the left of the portal vein (arrow). There is no injury of the proper hepatic artery or common bile duct. B, Axial CT scan (delayed phase), showing extravasation of contrast material from the portal vein spreading to the posterior pancreas and hepatoduodenal ligament along the periportal space (arrow).

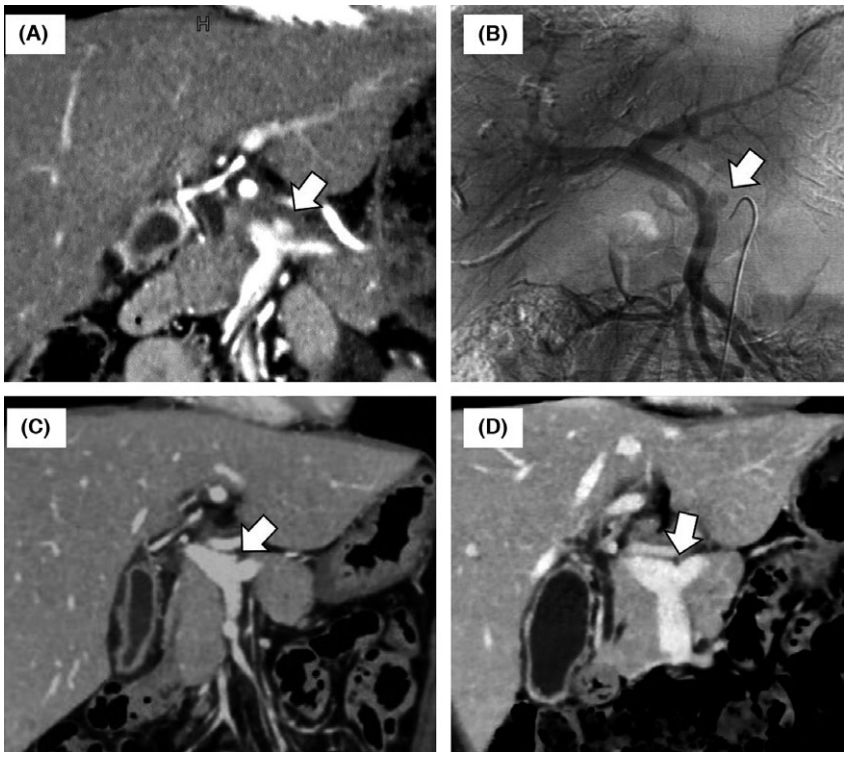

Fig. 3. A, Coronal computed tomography (CT) scan of a 52-year-old woman with hypotension who fell from the fifth floor of an apartment building. The image, taken on arrival at the hospital (early phase), shows perivascular hematoma and portal venous pseudoaneurysm at the junction of the mesenteric and splenic veins (arrow). B, Portal venogram by selective superior mesenteric artery injection, showing pseudoaneurysm at the junction of the mesenteric and splenic veins (arrow) but no extravasation of contrast material. C, Coronal CT scan taken on the 4th hospital day, showing that the portal venous pseudoaneurysm had shrunk (arrow), and there was no extravasation of contrast material. D, Coronal CT scan taken on the 58th hospital day, showing disappearance of the portal venous pseudoaneurysm (arrow).

either direct or indirect signs; direct signs include thrombosis and/or occlusion, avulsion and/or complete tear, rupture, active extravasation, and pseudoaneurysm, while indirect signs include perivascular hematoma, fat stranding, and vessel wall irregularity.[5] In the present case, CT showed direct signs, such as extravasation and pseudoaneurysm, as well as indirect signs, such as perivascular hematoma and fat stranding. Portal venography by selective superior mesenteric artery injection also showed pseudoaneurysm.

Effective treatment guidelines for portal venous injury have not been established due, in part, to the lack of reported cases. Previous reports note that treatment options for portal venous injury include surgery or stent graft placement.[1–4,6,7] Even if bleeding is confined to the retroperitoneal space, the most common treatments for portal venous injury in trauma patients are venorrhaphy and ligation during surgery.[1–4,6] Surgical repair is often technically difficult due to massive bleeding, high incidence of associated injuries, and difficult exposure. Despite the low blood pressure of the portal vein, injury to the vein can be devastating due to its high flow rate, which averages 1 L/min.[2] In some cases, even patients whose vital signs are stable preoperatively can quickly deteriorate during surgery due to exacerbation of uncontrolled bleeding. Furthermore, even if bleeding is controlled during surgery, postoperative complications, such as portal venous thrombosis and sepsis, often occur. Previous publications have reported surgical mortality rates ranging from 40% to 80%.[2–4,6] Stent graft placement is another treatment option for portal venous injury.[7] In the present case, portal venous injury occurred at the junction of the mesenteric and splenic veins. In such cases, stent graft placement is not indicated.

One previous report describing stent grafting for traumatic main portal venous pseudoaneurysm noted that indications of treatment include symptoms that suggest bleeding, such as abdominal pain, CT scan showing persistent bleeding, or hemodynamic instability.[7]

In the present case, contrast-enhanced CT showed extravasation of contrast material from the portal vein, whereas portal venography showed pseudoaneurysm but no extravasation. These findings may indicate that the active bleeding from the portal vein at the time of CT was naturally hemostatic by the time of portal venography. No intra-abdominal hemorrhage on CT indicates that there was no retroperitoneal injury, and that bleeding was confined to the retroperitoneal space. We believe that the active bleeding from the portal vein became hemostatic due to hematoma confined to the retroperitoneal space because the portal vein has such low blood pressure (10 mmHg).

We decided to observe this patient and keep surgical treatment as a salvage procedure for the following reasons: (i) bleeding was confined to the retroperitoneal space, (ii) portal venography showed no extravasation, (iii) vital signs improved and remained stable after transarterial embolization, (iv) surgery for portal venous injury carries a high risk of mortality. However, non-operative management of portal venous injury is challenging even if bleeding is confined to the retroperitoneal space. In such cases, surgical treatment should be kept as a salvage procedure. Further studies are needed to investigate the indications of non-operative management.

We described a rare case of successful non-operative management of traumatic extrahepatic portal venous injury without intra-abdominal hemorrhage. In this case, portal venous injury was diagnosed and evaluated by using contrast-enhanced CT and portal venography by selective superior mesenteric artery injection. We believe that non-operative management was successful in this case because bleeding was confined to the retroperitoneal space.

This case shows that non-operative management can be an option for portal venous injury when there is no intraperitoneal injury and bleeding is confined to the retroperitoneal space.

CONFLICT OF INTEREST

NONE DECLARED.

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