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Case Report

Traumatic iliac vein rupture managed using a bare-metal stent

Jung Guen Cha [a], Sang Yub Lee [a,*], Jihoon Hong [a], Jong Min Park [a], Kyoung Hoon Lim [b], Donghyeon Kim [c]

[a] Department of Radiology, School of Medicine, Kyungpook National University, 680 Gukchaebosang-ro, Jung-gu, Daegu 41944, Republic of Korea
[b] Department of Surgery, School of Medicine, Kyungpook National University, 680 Gukchaebosang-ro, Jung-gu, Daegu 41944, Republic of Korea
[c] Department of Radiology, Gyeongbuk Regional Rehabilitation Hospital, 120, Mirae-ro, Gyeongsan-si, Gyeongsangbuk-do, Republic of Korea

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ABSTRACT

Iliac vein rupture resulting from blunt trauma is rare but can be fatal and challenging to diagnose despite thorough clinical investigation and image workup. Here, we present a case of traumatic iliac vein rupture managed by emergent endovascular repair using a bare-metal stent. Low pressure traumatic venous rupture is different from arterial rupture, and a bare-metal stent can be a sufficient tool to control bleeding.

Introduction

Traumatic iliac vein rupture is rare but can be fatal, and its mortality rate is high, ranging from 55.6% to 100% [1]. Furthermore, it is challenging to detect venous rupture even with clinical and imaging tests. This is because the rate of bleeding is slower in venous than arterial bleeding, and contrast extravasation is observed only in the delayed phase image in computed tomography (CT). Furthermore, most reported iliac vein rupture cases were resolved using covered stent graft [2–5]. We present a case of traumatic iliac vein rupture managed by emergent endovascular repair using a bare-metal stent.

Case presentation

A 68-year-old man injured from squeezing between two eight-ton trucks was transported to our emergency department. On arrival, his vital signs were 93/35 mmHg blood pressure, 77 beats/min pulse rate, 10.5 g/dl serum hemoglobin, and 32.5% hematocrit. Contrast-enhanced computed tomography (CECT) revealed left pelvic and thigh hematoma with suspicious multifocal petechial contrast leakage combined with left pelvic bone and comminuted femur fracture (Fig. 1A). Furthermore, multifocal arterial bleeding was suspected, and the patient was transferred to the angiography suite for emergency intervention.

A standard aortography was performed, revealing suspicious multifocal petechial hemorrhage from fine branches of the left internal iliac and deep femoral artery. Two culprit vessels were embolized with large gel foam particles (1000–1400 μm), and final completion angiography showed no bleeding. Nevertheless, a day after embolization for arterial bleeding, his hemodynamic condition remained unstable: 85/74 mmHg blood pressure and 109/min pulse rate; the hemoglobin level dropped to 8.4 g/dl. Persistent bleeding was suspected, and CECT was performed again, revealing that left pelvic side hematoma was markedly increased in size without contrast extravasation (Fig. 1B). Then, we suspected venous bleeding; considering the location of the hematoma, a left iliac vein injury was suspected. On impression of the left side venous injury, he was transported to angiography suite right after the CECT. The left

* Corresponding author.
E-mail address: sangyub@knu.ac.kr (S.Y. Lee).

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femoral vein was accessed with the guidance of ultrasonography; venography was performed. Left femoral venography showed active contrast leakage at the distal external iliac vein and proximal stenosis due to compression by the hematoma and possible intimal injury (Fig. 2A). Thus, we planned a bare-metal stent placement to resolve stenosis and increase venous outflow.

A seven-French introducer sheath was inserted via the left femoral vein, and a 0.035-inch guidewire was passed through the lesion. Then, a 14 × 60 mm self-expandable bare stent (SMART; Cordis, Miami, USA) was deployed across the rupture site and proximal stenosis. Completion venography revealed no other contrast extravasation, and venous outflow was improved (Fig. 2B).

The patient was hospitalized for a long time to manage multiple fractures, surgically. Follow-up CECT six months after the procedure revealed patent stent and resolution of previous left pelvic hematoma (Fig. 3). The patient was not anticoagulated during and after hospitalization.

Discussion

Traumatic iliac vein rupture is rare but can be fatal. In the case of a stable condition, conservative treatment precedes, and traumatic iliac vein rupture can be self-limiting owing to retroperitoneal tamponade [4]. However, if the patient shows unstable vital signs, more active treatment is required [6]. In the past, surgery was considered the first option, but there are many controversies [1,7]. It is challenging to surgically open to the vein rupture site, and the tamponade effect of hematoma decreases during laparotomy. There is a risk of rapid bleeding; thus, endovascular management is more advantageous.

So far, only two studies have reported that bare-metal stent resolved traumatic iliac vein injury [1,8]. In iliac vein rupture, hematoma, confined to the retroperitoneal space and around the venous rupture site, has a mass effect and causes venous compression. Moreover, intimal injury of the vein may cause stenosis. As a result, decreased venous return increases venous pressure at the rupture site, causing more venous bleeding. Thus, bleeding increases the size of the hematoma, and in such a manner, a vicious cycle is formed. Compared with arterial bleeding, venous bleeding is in significantly lower pressure. Thus, it is more important to reduce the pressure at the rupture site by making patent venous outflow with stent placement rather than sealing it as an arterial rupture. The treatment success in our case may be related as much to relieving venous hypertension than to other factors.

When the venous rupture size is too large to control bleeding using bare-metal stent alone, covered stent graft can be an option. However, in the absence of an appropriately sized covered stent graft, bleeding can be controlled by filling the pseudoaneurysm with coil or glue, in addition to bare-metal stent placement. Unlike arterial pseudoaneurysm, in the case of venous pseudoaneurysm, as the pressure is extremely low, stent-assisted coiling of the pseudoaneurysm can control active bleeding [6,9].

Ragu et al. reported a proper stent size in pelvic venous stenting and that a common iliac vein stent size should be at least 16 mm, an external iliac vein stent of 14 mm, and a common femoral vein stent of 12 mm [10]. For such a large size, a bare stent is usually more available than a stent graft. Furthermore, the stent graft has a disadvantage in that it requires more oversizing due to migration risk and is more rigid than the bare-metal stent. Although delivery sheath size does not cause a significant problem in venous intervention, the required sheath size for a bare-metal stent is much smaller than a stent graft.

Unlike arterial injury, contrast extravasation may not be visible by CT in venous injury, and late detection can occur, such as in this study. In the case of venous injury, only arterial phase CT can miss the venous bleeding, and the dynamic phase of CT examination is recommended for trauma patients. If there is no arterial bleeding focus and hematoma around the lesion continues to increase, venous injury should be suspected and direct venography is necessary.

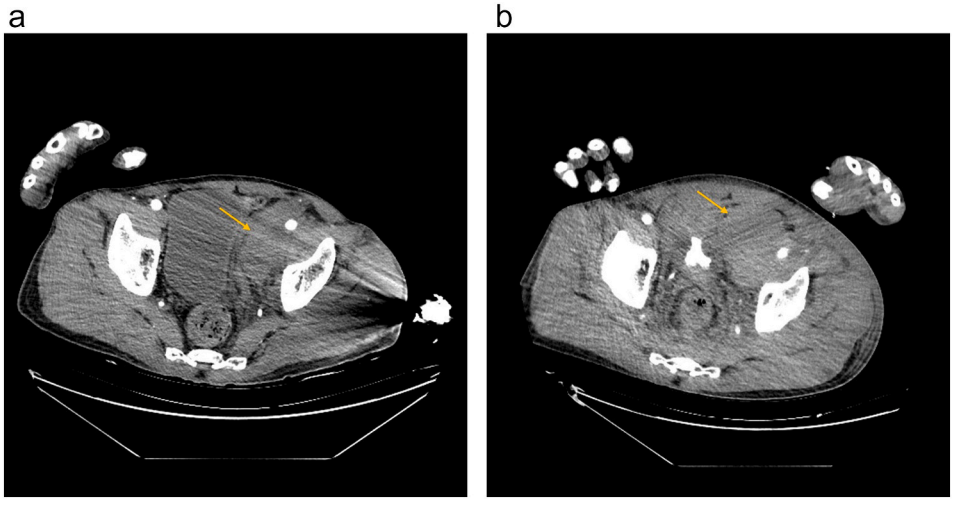

Fig. 1. Contrast-enhanced CT images. A: Initial CT scan. B: A day after embolization for arterial bleeding. The amount of hematoma around the distal left external iliac artery (yellow arrows) increased without contrast extravasation. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

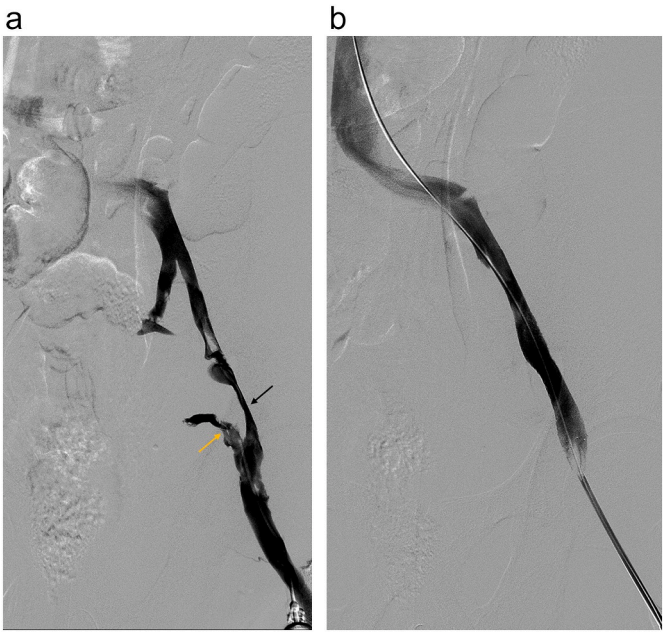

Fig. 2. Ascending venography via the left common femoral vein. A: Initial venography. Active contrast leakage at the distal external iliac vein (yellow arrow) and proximal stenosis (black arrow) due to compression by the hematoma and possible intimal injury was noted. B: Venography after bare-stent deployment. No contrast extravasation and venous outflow improvement was observed. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Fig. 3. Follow-up contrast-enhanced CT image six months after the procedure. Patent external iliac vein bare stent and resolution of previous left pelvic hematoma were noted.

Conclusion

Although further studies are required to verify bare-metal stent placement in traumatic iliac vein rupture, it can be an effective treatment option. Furthermore, it has many advantages over covered stent graft for life-threatening iliac vein injuries.

Declaration of competing interest

The authors declare that they have no conflicts of interest.

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