

## Spontaneous Rupture of the Left Common Iliac Vein: Management with Surgical Repair and Endovascular Stent<sup>1</sup>

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We report here on a case of spontaneous rupture of the left common iliac vein that was diagnosed preoperatively with computed tomography (CT), and the patient was successfully treated with surgery and stent placement. A 60-year-old woman was referred to our emergency room because of sudden left lower abdominal pain and swelling of the left lower extremity. CT revealed a huge retroperitoneal hematoma and extrinsic compression of the left common iliac vein with acute thrombosis of the deep veins of the left lower extremity. Venous patch angioplasty was performed at the site of spontaneous rupture. After performing thrombectomy with using a Fogarty catheter, a stent was placed at the occluded segment of the left common iliac vein under C-arm fluoroscopic guidance. The follow-up CT scans taken at 10 days and 8 months after the initial examination demonstrated a venous stent with preserved luminal patency and the striking resolution of the deep vein thrombosis of the left lower extremity.

**Index words :** Veins, stenosis or obstruction  
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Spontaneous rupture of the iliac vein has been rarely reported on in the medical literature (1 - 3). This situation is life-threatening and it must be diagnosed and treated correctly. However, most of the previously reported cases were operated on under a misdiagnosis, and the surgery was associated with substantial mortality and morbidity. Cho et al. (4) reported a case of spontaneous rupture of the left common iliac vein for which conservative treatment was successful. Yet surgery or conservative treatment does not prevent the development of deep vein thrombosis and pulmonary embolism. Zieber et al. (2) reported on two cases that were

successfully managed by emergency endovascular repair with using covered stents. In light of the immediate cessation of extravasation and the restoration of venous patency in the patient with spontaneous iliac vein rupture associated with May-Thurner syndrome, the endovascular approach using covered stent alone or with using uncovered stent after surgical repairing the site of rupture should be considered. We report here a case of spontaneous rupture of the left common iliac vein that was diagnosed preoperatively with CT and this was successfully treated with surgery and stent placement.

### Case Report

A previously healthy 60-year-old woman with no recent history of trauma was referred to our emergency room because of sudden left lower abdominal pain after she abruptly bent over. Thereafter, she complained of

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swelling of the left lower extremity.

On arrival, her blood pressure was 90/50 mmHg and her pulse rate was 110 beats/min. On physical exam, there was a tender mass in the left lower abdomen and diffuse swelling of the left lower extremity. Laboratory tests revealed a hemoglobin level of 10.8 g/dL and a hematocrit of 35.3%. The other blood chemistry parameters were within the normal ranges.

CT was performed with 16-channel multidetector row CT (Emotion, Siemens, Germany). An abdominopelvic CT scan obtained 3 minutes after injection of contrast medium revealed a huge retroperitoneal hematoma in the left lower abdomen and pelvic cavity that measured  $4.6 \times 6.2 \times 10$  cm. The retroperitoneal hematoma was contiguous to the hematoma around the acutely thrombosed left common iliac vein (Fig. 1A). There was extrinsic compression of the left common iliac vein between the body of L5 and the right common iliac artery with acute thrombosis of the deep veins of the left lower extremity down to the level of the popliteal, anterior and posterior tibial veins and the peroneal veins (Fig. 1B). The compressed segment of the proximal left common iliac vein contained thrombus of which the density was lower than that in the distal common iliac vein. This suggested that there was underlying iliac vein compression syndrome. On the basis of the CT findings, the differential diagnosis included spontaneous rupture of iliac vein associated with May-Thurner syndrome and spontaneous retroperitoneal hematoma that caused deep vein thrombosis. However, considering the history of sudden onset lower abdominal pain after bending over, spontaneous rupture and occlusion of the left common iliac vein due to May-Thurner syndrome with thrombosis of the deep venous system of the left lower extremity was preferentially diagnosed.

Emergency laparotomy was performed via the retroperitoneal approach through a skin incision made in the left lower abdomen. A huge retroperitoneal hematoma was evacuated and the left common iliac vein was exposed. About a 1.2 cm sized tear was noted at the anteromedial wall of the left common iliac vein, but there was no active bleeding at the rupture site (Fig. 1C). A recently formed thrombus was found to completely occlude the lumen of the left common iliac vein and it extended to the left external iliac vein. The thrombus was removed through the site of rupture with 6-Fr Fogarty arterial embolectomy catheter (Edwards Lifesciences, Irvine, CA, U.S.A.). Venous patch angioplasty was performed at the site of spontaneous rupture

with using a branch of the greater saphenous vein. A transverse incision was made at the left femoral vein and the distal thrombus was removed with compression by using an Esmarch band.

The venogram obtained after insertion of a 9-Fr introducer sheath (Radifocus Introducer II, Terumo, Tokyo, JAPAN) through the transverse incision at the left femoral vein showed occlusion of the left common iliac vein, which was consistent with May-Thurner syndrome. A  $12 \times 60$  mm stent (Niti-S, Taewoong, Seoul, KOREA) was placed at the occluded segment of the left common iliac vein. The left common iliac vein showed luminal patency after placement of the stent (Fig. 1D). A temporary arteriovenous fistula was created between the left superficial femoral artery and the greater saphenous vein to improve blood flow. Anticoagulation with low molecular weight heparin was started 12 hours after the operation.

The patient's left limb swelling improved after the operation and she was discharged without complications. Three months after operation, the temporary arteriovenous was repaired.

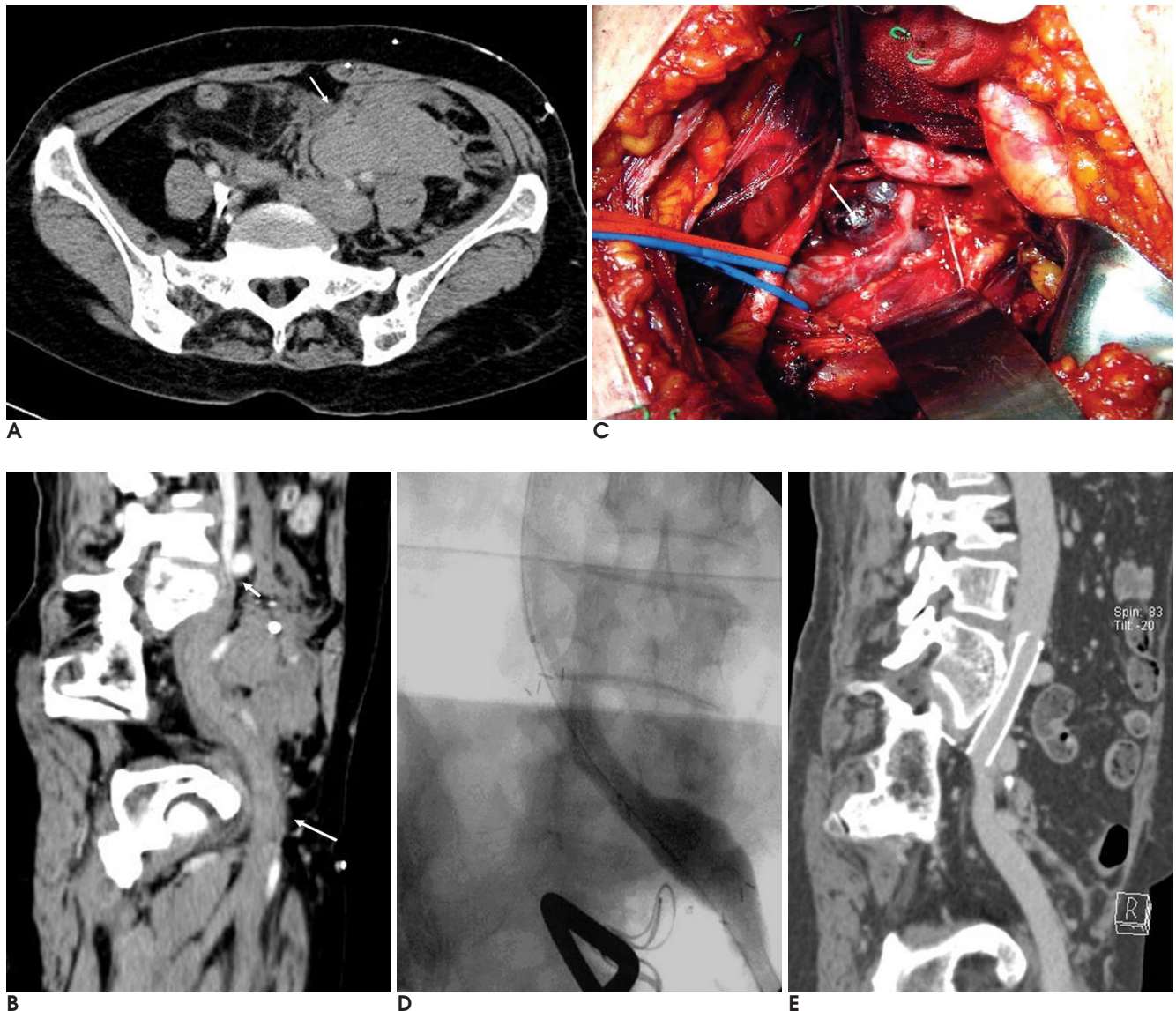
The follow-up abdominal CTs taken at 10 days and 8 months after operation and stent insertion demonstrated the preserved luminal patency without recurrent thrombosis (Fig. 1E).

## Discussion

Rupture of an iliac vein is a rare medical event and it primarily results from major trauma or injury during pelvic surgery; spontaneous rupture of the iliac vein is even rarer. There are only a few reported cases of spontaneous rupture of the iliac vein (1 - 6), and most of them are middle-aged or elderly women with rupture that predominates on the left side. Sudden onset hypotension, lower abdominal pain and distension with a nonpulsatile mass in the iliac fossa, and edema of the lower extremity on the affected side without a history of recent trauma are the symptoms of the cases of spontaneous rupture of the iliac vein. While the causes of the spontaneous rupture of the iliac vein remain obscure, several hypotheses have been proposed. Venous hypertension triggered by an overlying thrombus or a Valsalva's maneuver such as coughing, defecation, bending or similar efforts has been the most frequently suggested predisposing factor (3). Proximal venous obstruction by the overlying right common iliac artery or an endothelial spur (May-Thurner syndrome) could be a

contributing factor. Thus, the rupture predominantly occurs on the left side. In our case, the cause of spontaneous rupture of the left common iliac vein was believed to be related to May-Thurner syndrome. Yet venous obstruction alone is unlikely to cause rupture as veins can be used as an arterial substitute without problems. Thrombophlebitis can result in weakening of the intima and so it can play an important role for venous

rupture. The predominant occurrence of spontaneous venous rupture in middle-aged or elderly women reflects the occult thrombotic or phlebitic complications of pregnancy (3). The other hypothesis is the hormonal effect (4). Estrogen induces relaxation of the smooth muscle and softening of collagen fibers in general, which in turn increases the distensibility of veins (7). With loss of this effect, the distensibility of veins will be decreased.



**Fig. 1.** A 60-year-old woman with sudden left lower abdominal pain

**A.** The abdominal CT scan at the level of the common iliac vein reveals a large retroperitoneal hematoma (arrow) that is contiguous with the thrombosed left common iliac vein.

**B.** The CT scan with curved planar reformation along the course of the left common iliac vein reveals extrinsic compression of the left common iliac vein between the fifth lumbar vertebra and the right common iliac artery (short arrow), and acute thrombosis in the deep veins of the left lower extremity (long arrow).

**C.** Operative photograph shows an about 1.2 cm sized tear at the anteromedial wall of the left common iliac vein (arrow).

**D.** Venogram obtained after placement of a stent reveals restoration of venous patency.

**E.** The follow-up CT scan with curved planar reformation obtained 8 months after treatment demonstrates a venous stent between the distal IVC and left common iliac vein with preserved luminal patency as represented by the proximal and distal venous flow.



Considering that most of the reported cases were middle-aged or elderly women and the rupture occurred on the left side in most cases, loss of the estrogenic effect or thrombophlebitis combined with a sudden rise in intraluminal pressure in a segment of the vein between the inguinal ligament and the right common iliac artery may be one of the possible explanations for the spontaneous rupture of the iliac veins (4).

Because hypovolemic shock is the chief presenting symptom, emergency exploratory surgery is required in most cases of ruptured iliac vein. However, most of the cases in the literature were operated under a misdiagnosis of a ruptured aortic aneurysm or an abdominal catastrophe due to gynecologic problems. Thus, the correct preoperative diagnosis is prerequisite for both reviving the patient and the surgical management; CT may play an important role in this regard. In our case, the diagnosis of a ruptured left common iliac vein was made preoperatively with the CT findings. The CT findings of spontaneous rupture of the left iliac vein have been reported in the literature (2, 4). According to these reports, the major findings are large left retroperitoneal hematoma and left lower extremity deep vein thrombosis.

The ideal course of treatment consists of instituting immediate cessation of bleeding and maintaining continuity in the deep-lying venous network. Depass (1) emphasized that prompt resuscitation and emergency surgical management are essential for treating spontaneous rupture of the iliac vein. Primary repair with performing prophylactic postoperative anticoagulation appears to decrease the risk of postoperative deep vein thrombosis. According to 17 previously reported cases that were summarized by Gaschignard *et al.* (6), repair was achieved by direct suture in most cases, and with insertion of a caval filter in three cases. However, postoperative thromboembolic complications were frequent: there were six cases of iliofemoral thrombosis, one case of caval thrombosis and one case of pulmonary embolism. Possible surgical alternatives to direct suture are venous patch angioplasty and ilioiliac crossover bypass reconstruction combined with a temporary arteriovenous fistula at the groin. Conservative treatment can be a therapeutic alternative to surgery in selected cases in which there is no evidence of further bleeding, leg ischemia or impending venous gangrene (4). However, according to a report by Cho *et al.* (4), deep vein thrombosis extending from the left common iliac vein to the distal superficial femoral vein developed 3 days after

conservative treatment. Although the left limb swelling was controlled with elevation and an elastic stocking without anticoagulation in his case, we presume that the risk of developing post-thrombotic syndrome may be increased during the follow-up period. Emergency endovascular repair with using covered stent is another therapeutic option according to a report by Zieber *et al.* (2). In their cases, marked symptomatic improvement of the left lower extremity swelling and stabilization of the retroperitoneal hematoma were achieved after endovascular repair. They proposed that an endovascular approach to life-threatening venous rupture certainly warrants consideration. O'Sullivan *et al.* (8) have reported that endovascular management of May-Thurner syndrome is safe and effective, and this type procedure may replace surgical reconstruction or anticoagulation alone. He hoped that the ability to reestablish normal venous flow by stent placement would diminish the incidence of post-thrombotic syndrome and its long-term consequences. In our case, we performed surgical repair at the rupture site to control bleeding, and thrombectomy was done to treat the edema of the left leg. We additionally placed a stent in the occluded segment of the left common iliac vein through a transverse incision in the left femoral vein under fluoroscopic guidance to prevent post-thrombotic syndrome. The left common iliac vein showed luminal patency after placement of the stent. We believe that stent insertion combined with surgical repair is the ideal course of treatment in terms of immediately controlling the bleeding and reducing the incidence of post-thrombotic syndrome by reestablishing normal venous flow.

Spontaneous rupture of the iliac vein is a vascular emergency that should be treated immediately. Having a high clinical suspicion and the CT findings both play an important role in the correct preoperative diagnosis. For the middle-aged or elderly women who present with left-sided retroperitoneal hematoma and deep vein thrombosis, the possibility of a ruptured left common iliac vein should be considered. In the case showing spontaneous rupture of the iliac vein associated with May-Thurner syndrome, placing an endovascular prosthesis combined with surgery can be another therapeutic option with an excellent result for achieving immediate cessation of extravasation and restoring the venous patency.

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