

Successful Embolization of Collaterals from the Round Ligament Artery during Uterine Artery Embolization for Traumatic Uterine Leiomyoma Rupture: A Case Report

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Abstract

We describe the case of a 48-year-old woman who presented with traumatic rupture of a giant leiomyoma and massive hemoperitoneum caused by slipping and falling in the bathroom. She was in shock on arrival, and resuscitation was performed. Contrast-enhanced computed tomography showed massive intra-abdominal hematoma and extravasation from the subserous leiomyoma. Uterine artery embolization was performed, but she went into shock again after 6 h. The second contrast-enhanced computed tomography revealed persistence of extravasation. During 2nd UAE, an angiogram revealed extravasation originating from left round ligament artery. After the embolization of the left round ligament and bilateral uterine arteries, the patient recovered from shock. Total abdominal hysterectomy was performed on day 2 of admission to prevent re-bleeding and infection, then she discharged on day 19 of admission.

Key words: pedunculated leiomyoma, uterine fibroid, round ligament artery, hemoperitoneum, spontaneous avulsion

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Introduction

Uterine leiomyomas are common tumors that occur in approximately 75% woman of reproductive age [1]. Although often asymptomatic, it may cause menorrhagia, metrorrhagia, infertility, pain, pressure manifestations, and repeated abortions [2]. Life-threatening hemoperitoneum secondary to the rupture of a uterine leiomyoma is an extremely rare complication [3].

Transcatheter arterial embolization (TAE) is commonly performed for the treatment of hemorrhages of various etiologies, including those related to obstetric and gynecologic diseases. Compared to surgical therapy, TAE has the advan-

tage of being fast, repeatable, less invasive.

To achieve hemostasis via TAE, it is necessary to understand the anatomy of the affected area. The uterine artery is a branch of the anterior division of the internal iliac artery. Bilateral uterine artery embolization (UAE) is usually performed in cases of uterine bleeding, and embolization of the internal iliac arteries may be performed in emergency situations [4]. On rare occasions, it is necessary to occlude the collateral blood supply from the bilateral internal iliac arteries [5].

Here, we have reported a case of a patient who presented with a life-threatening hemoperitoneum resulting from the traumatic rupture of a pedunculated uterine leiomyoma measuring 24 cm and underwent TAE to achieve hemostasis,

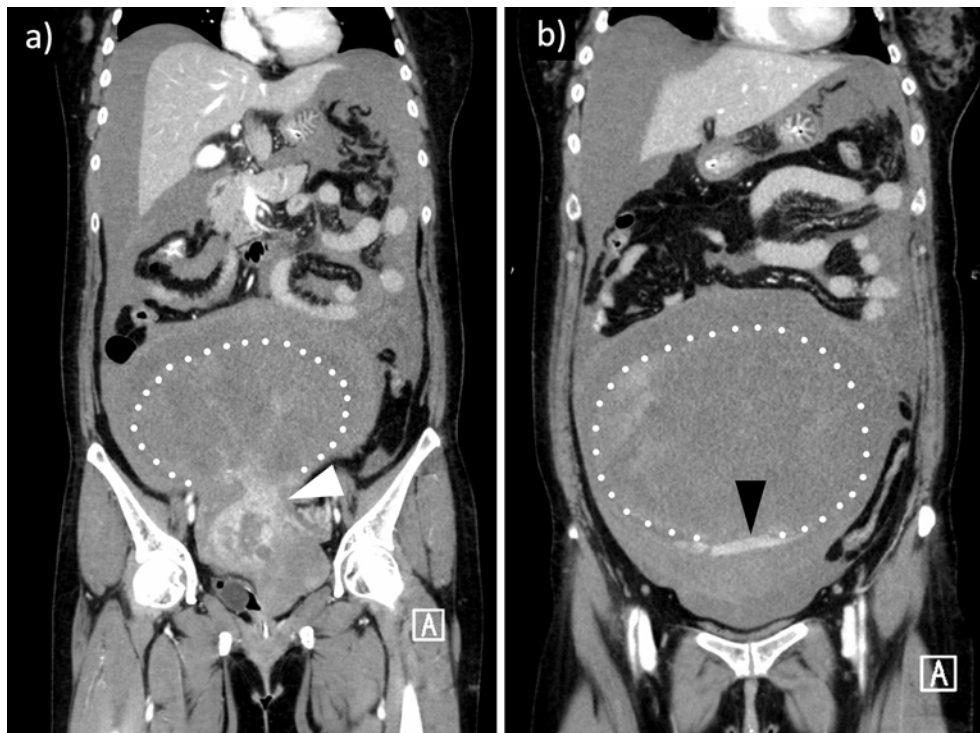


Figure 1. First abdominal contrast enhanced computed tomography images. a) Coronal view 1. b) Coronal view 2. These images show a giant uterine leiomyoma (white dotted lines), the stalk of the leiomyoma (white arrowhead), and a massive intra-abdominal hematoma. Extravasation (black arrowhead) is visible from the caudal aspect of the leiomyoma.

with one of the embolized arteries being the left round ligament artery.

Case Report

A 48-year-old woman, gravida 1 para 0, slipped and fell in the bathroom and bruised her abdomen. She presented with breathing difficulties and was transported to our hospital directly. Her past medical history was unremarkable other than the presence of a leiomyoma. She had no surgical history.

Her vital signs were as follows: blood pressure, 69/40 mmHg; heart rate, 129 beats per minute; oxygen saturation, 99% (O_2 10 L/min); Glasgow coma scale score, E3V4M5; and body temperature, 36.8 ° C. Physical examination revealed abdominal swelling, cyanosis, and anemia. A focused sonographic assessment for trauma revealed massive abdominal hemorrhage and a giant tumor in the lower abdomen. Contrast-enhanced computed tomography (CECT) revealed a massive intra-abdominal hematoma, a subserous leiomyoma, and extravasation originating from the leiomyoma (**Fig. 1**). Fluid resuscitation did not stabilize condition of the patient. Tracheal intubation and emergency massive blood transfusions were performed. Because the patient was in shock on arrival, emergent hysterectomy under general anesthesia was considered risky and time consuming. Therefore, the patient was transferred to the angiography room for UAE.

The uterine arteries were catheterized using a 4-Fr

MOHRI-type catheter (MEDIKIT, Tokyo, Japan) and a 1.7-Fr microcatheter (Progreat λ ; Terumo, Tokyo, Japan). Extravasation was observed using fluoroscopy. Embolization was performed using gelatin sponge particles (Serescue; Nihonkayaku, Tokyo, Japan). The aorta and external iliac arteries were not examined during the first UAE. Her vital signs stabilized, and bleeding was reduced on internal examination. She was admitted to the intensive care unit (ICU).

However, she went into shock again 6 h after UAE. The second CECT revealed increased intra-abdominal bleeding and extravasation from the leiomyoma. Therefore, bilateral UAE was performed again (**Fig. 2**).

Extravasation was observed on fluoroscopy, similar to that observed on the first UAE. Aortography suggested that the ovarian arteries were associated with the bleeding. Although we attempted to engage the ovarian artery, it was unsuccessful. Therefore, UAE was performed until the ovarian arteries were visualized, and ovarian arterial flow stagnated. However, the bleeding persisted on internal examination. The left external iliac arteriogram revealed that the left round ligament artery originating from the left inferior epigastric artery supplied blood to the left part of the uterus. Aortography findings at the second UAE were carefully reviewed, and the left round ligament artery originating from the left inferior epigastric artery was identified as a possible cause of residual bleeding. The external iliac artery angiogram confirmed this finding. A 1.7-Fr microcatheter was inserted into the vessel. Angiography of the vessel showed extravasation. Therefore, the left inferior epigastric artery was em-

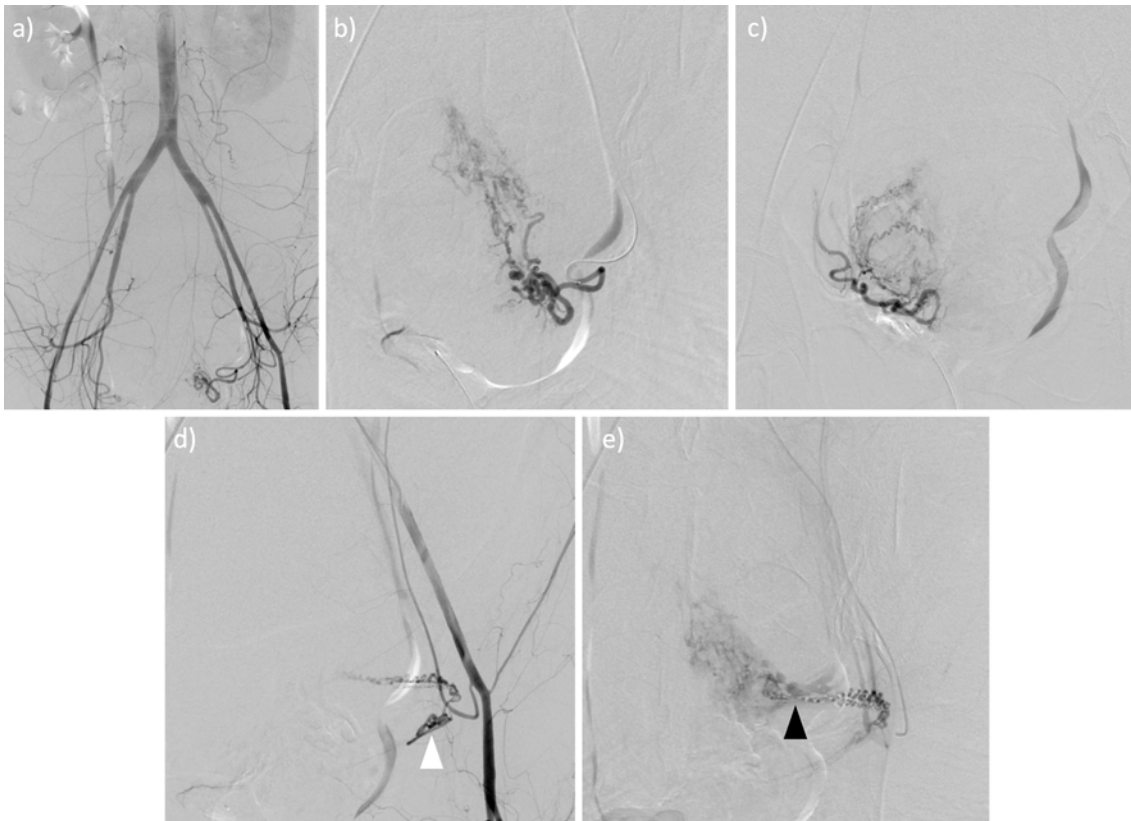


Figure 2. Angiography images during the second UAE before embolization. a) Pelvic angiography. b) Left uterine artery angiography. c) Right uterine artery angiography. d) External iliac artery angiography shows the left round ligament artery (white arrowhead) arising from left inferior epigastric artery. e) Selective angiography of left round ligament artery shows extravasation (black arrowhead).

bolized using gelatin sponge particles (Serescue; Nihonkayaku, Tokyo, Japan). The final arteriogram revealed devascularization of the leiomyoma.

In total, the patient received 14 units of packed red blood cells, 40 units of platelets, and 18 units of fresh frozen plasma. Thereafter, her vital signs stabilized, and she no longer required blood transfusion. Total hysterectomy with hematoma evacuation was performed to prevent re-bleeding and infection on day 2 of admission. Laparotomy revealed 4.2 L of intra-abdominal blood. A subserous leiomyoma weighing 2 kg was resected before hysterectomy (Fig. 3). The patient was discharged on day 19 of admission.

Discussion

Uterine leiomyomas are the most common pelvic tumors in women of reproductive age [1]. They are benign monoclonal smooth muscle tumors that originate from the myometrium. Most leiomyomas are asymptomatic. However, when symptoms occur, women can experience abnormal genital bleeding, anemia, and lower abdominal pain [2].

Hemoperitoneum due to rupture of a uterine leiomyoma is rare, with less than 100 cases reported in the literature [6]. Based on previous reports, most cases correspond to spontaneous avulsion of the uterine leiomyoma in the absence of any trauma. Traumatic rupture of leiomyomas is extremely

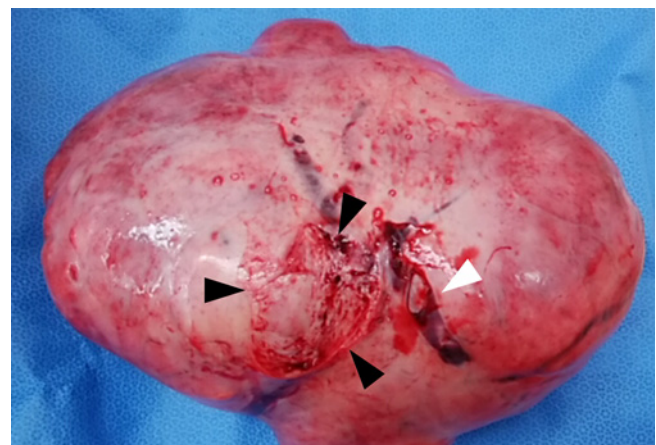


Figure 3. Gross specimen of the resected uterine leiomyoma. The major axis is 24 cm. Laceration (white arrowhead) is recognized next to the cut section of the stalk (black arrowhead).

rare, and to the best of our knowledge, only one case has been reported by Estrade-Huchon et al. reported in the last decade [7]. The treatment approach for leiomyoma rupture varies by facility. Levai et al. reviewed 25 reported cases and concluded that myomectomy and hysterectomy were performed in most cases, while UAE was performed in only two cases (8%, 2/25) [6].

UAE is commonly performed for the management of

critical obstetric and gynecologic hemorrhages. The advantages of UAE include low complication rates, avoidance of surgery, preservation of fertility, and shorter hospital stay [4]. Embolization of the bilateral internal iliac arteries is occasionally performed in severe situations, such as hypovolemic shock. It is important to fully understand the vasculature of the pelvis and uterus as well as its anatomic variants. In a review of the arterial anatomy of the female pelvis and uterus, many anastomoses have been reported between the uterine artery and branches of the internal iliac artery [5]. In addition, a branch of the external iliac artery can provide significant blood supply to the uterus. Leleup et al. found that 16 round ligament arteries were responsible for postpartum hemorrhage in 11 of 147 patients treated with UAE [8]. In postpartum bleeding, it is assumed that collaterals to the uterus are remarkably developed [9]. In contrast to such cases, the probability of requiring occlusion of a branch of the external iliac artery is low in women with leiomyomas who undergo UAE. In contrast to postpartum bleeding, embolization of the round ligament artery is less frequently required in uterine leiomyomas. We found only one case report in which embolization of the round ligament artery was required for the treatment of uterine leiomyoma [10].

In our patient, we inserted the MOHRI catheter directly into the bilateral uterine arteries without pelvic aortography to shorten the procedure. This could be the reason why the initial angiogram failed to reveal the round ligament artery feeding the leiomyoma. Aortography was performed prior to the second UAE, revealing that the left round ligament artery, originating from the inferior epigastric artery, supplied blood to the leiomyoma.

There are many potential collateral vessels around the uterus. Therefore, it is important to investigate these collateral blood vessels when bleeding occurs [5]. According to our experience in the present case, even if a patient is not pregnant or has no history of surgery, a collateral vessel other than the internal iliac artery can be present. In cases of persistent or recurrent hemorrhage after embolization, collateral arteries, such as the round ligament arteries, should be investigated.

In conclusion, hemoperitoneum due to traumatic rupture of the uterus is an extremely rare complication. UAE is an option for achieving hemostasis in cases of critical genital bleeding. If complete hemostasis is not achieved after UAE, embolization of arteries other than the uterine arteries may

be required.

Conflict of Interest: All of authors declare that they have no conflict of interest.

Disclaimer: Haruyuki Takaki is one of the Senior Editors of Interventional Radiology and on the journal's Editorial Board. He was not involved in the editorial evaluation or decision to accept this article for publication at all.

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