Uterine Necrosis after Uterine Artery Embolization for Postpartum Hemorrhage

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Uterine necrosis is a rare and fatal complication of uterine artery embolization (UAE). We report a case of uterine necrosis after UAE for postpartum hemorrhage (PPH). Two days after UAE, the woman had a high fever, which lasted for 18 days. After the hysterectomy, pathological examination confirmed the uterine necrosis associated with acute necrotizing endometritis. Only few cases of uterine necrosis after UAE for PPH have been reported to date, and this is an extremely rare case in which clinical symptoms related to uterine necrosis developed only 2 days after UAE.

Key Words: Necrosis, Postpartum hemorrhage, Uterine artery embolization

Introduction

Uterine artery embolization (UAE) is a safe and effective procedure for postpartum hemorrhage (PPH), with a success rate ranging from 61–100%.¹ Despite the low incidence rate of adverse events, some health-care providers have had patients with fatal complications after UAE.² Uterine necrosis is a rare complication of angiographic embolization for refractory PPH, and 21 cases have been reported worldwide to date.^{1,3,4} While transient fever is one of the most common complications of UAE,² it is important to differentiate it from the symptoms related to uterine necrosis. Herein, we report an extremely rare case of uterine necrosis demonstrating persistent fever occurred 2 days after selective UAE for PPH.

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Case

A 39-year-old woman, gravida 1 para 0, after *in vitro* fertilization visited Asan Medical Center at 34 weeks and 4 days of gestation with a diagnosis of placenta previa totalis. Transvaginal ultrasonography revealed that the placenta completely covered the internal cervical os. The patient underwent planned cesarean delivery under general anesthesia at 37 weeks and 6 days of gestation. After removal of the placenta, massive bleeding continued despite uterine compression, uterotonic administration, and several hemostatic sutures. The estimated blood loss during the operation was >2,000 mL. Owing to the persistent vaginal bleeding after the operation, the patient received two units of packed red blood cells and fresh frozen plasma in the recovery room. As conservative treatment failed to stop the bleeding, bilateral UAE was planned to manage the PPH.

On arteriography, both uterine arteries showed diffuse hypertrophy; thus, selective embolization for both uterine arteries was performed by injecting absorbable gelatin sponge (SpongostanTM; Ferrosan Medical Devices, Soeborg, Denmark). After the UAE, vaginal examination revealed that the bleeding had stopped and there were no immediate complications. After the patient was transferred to the intensive care unit, her vital signs were stable. On day 2 after the UAE, the patient presented with fever (37.8°C). As she complained

of breast engorgement with pain, breast massage with ice pack was applied first to control the fever. On day 3, the patient was discharged without fever. However, she visited the emergency department of the other hospital on the same day because of fever ($>38.0^{\circ}\text{C}$) and abdominal pain. She was treated with antibiotics for a week. However, despite the antibiotic treatment, the fever persisted; therefore, abdominal computed tomography (CT) was performed. The findings showed decreased myometrial enhancement without active contrast extravasation, which could be considered as intrauterine hematoma (Fig. 1A). Because of the persistent fever with suspected intrauterine hematoma, she

was transferred to Asan Medical Center on day 10 after the UAE. As her C-reactive protein level was elevated up to 12.9 mg/dL, we decided to continue the empirical antibiotics therapy. The results of the blood and vaginal cultures did not show any pathogen. The transabdominal ultrasonography findings showed a clear endometrial line with subinvolution of the uterus, and therefore, we ruled out intrauterine hematoma (Fig. 1B).

On day 19, to determine the cause of refractory fever ($>38.0^{\circ}\text{C}$) and abdominal pain, pelvic magnetic resonance imaging (MRI) was performed, and the findings showed an enlarged uterus without enhancement of the inner myometrium and

Fig. 1. Comparison of computed tomography (A) and ultrasonography findings (B). (A) Sagittal reconstructed enhanced pelvic computed tomography scan shows an enlarged uterus with decreased myometrial enhancement and air bubbles in the endometrium. (B) Transabdominal ultrasonography image shows a clear endometrial line and mixed echogenicity in the myometrium.

Fig. 2. Magnetic resonance images of the patient. (A) Sagittal T2-weighted image and (B) enhanced fat-saturated T1-weighted image of the pelvis show signal void in the endometrium, which suggests air bubbles (arrows) and absence of enhancement involving nearly the full thickness of the myometrium, which correlates with uterine necrosis and combined infection.

Fig. 3. Gross photo before (A) and after hysterectomy (B). Circumferential necrotic tissue in the inner myometrium and endometrium.

endometrium, which correlated with uterine necrosis (Fig. 2). On day 20, the patient underwent hysterectomy. A gross specimen of the uterus showed diffuse brownish necrotic tissue with multifocal hemorrhage inside the myometrium, and pathological examination confirmed the uterine necrosis associated with acute necrotizing endometritis (Fig. 3). After the hysterectomy, she was discharged without other adverse events.

Discussion

To the best of our knowledge, only one case of uterine necrosis after UAE for PPH presented with high fever in the early period after the procedure,⁵ and this is the second case that showed a similar clinical manifestation. In the previous reports, the mean time interval between UAE and diagnosis of uterine necrosis was 21 days, and the major symptoms were fever, abdominal pain, menorrhagia, and leukorrhea.¹ Clinical symptoms related to uterine necrosis extremely rarely develop immediately after UAE, which makes uterine necrosis difficult to be diagnosed by clinicians.

As fever above 38°C is common in the first few days after surgery and usually resolves spontaneously,⁶ whether it is a sign of fatal complications related to uterine necrosis is difficult to ascertain. In our case, the patient had a high fever on day 2 after UAE, which persisted for 18 days. The most common complication of UAE is transient fever, which commonly subsides in 2 or 3 days.⁷ Although the incidence is rare, when the patients

demonstrates persistent fever after UAE associated with abdominal pain and subinvolution of the uterus, uterine necrosis should be suspected.

Our patient underwent both CT and MRI to determine the cause of the persistent fever. The CT scan showed an enlarged uterus filled with low-attenuation lesion surrounded by peripheral enhancement of the myometrium, which correlated with subacute hematoma. However, intrauterine hematoma could be ruled out using transabdominal ultrasonography. Furthermore, MRI with contrast enhancement revealed no enhancement of the inner myometrium and endometrium with air bubbles in the uterine cavity, which suggested uterine necrosis combined with infection. MRI can be an additional useful tool for diagnosing uterine necrosis that precisely shows hypo- or non-enhancement of the myometrium of the necrotic uterus.

Embolizing agents commonly used for PPH are absorbable gelatin sponge and polyvinyl alcohol (PVA) particles.¹ The risk of uterine necrosis after UAE is related to the size of embolizing agent. Gelatin sponge particles or PVA particles that are too small (<300–500 µm) can block distal arterial branches, resulting in ischemic complications. Therefore, current guidelines recommend the use of relatively large absorbable particles in embolization for PPH.¹ In this case, we used absorbable gelatin particles prepared using cutting technique, which allow us to make uniform sized particles and to decrease the numbers of particles smaller than 500 µm.⁸

Management of uterine necrosis includes hysterectomy and antibiotic administration without surgical procedures.^{1,4} Most

patients underwent total or subtotal hysterectomy, and when the necrosis extended to the bladder, partial cystectomy was also performed. Two cases showed improvement of clinical symptoms after antibiotic administration with evacuation of the necrotic mass.^{4,9} As uterine necrosis can be accompanied by bacteremia and sepsis, blood and tissue culture can be performed to identify the pathogen of the infection, which is crucial for choosing the appropriate antibiotics. In the management of uterine necrosis, hysterectomy and aggressive treatment with empirical antibiotics must be considered.

Uterine necrosis is a rare complication of selective embolization after PPH. As its clinical manifestation involves persistent fever, clinicians should consider that post-procedural fever is not always a simple complication that is transient and spontaneously resolves within a few days.

Conflict of interest

No potential conflict of interest relevant to this article was reported.

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