

CASE REPORT

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Successful treatment of submucosal myoma with acute severe uterine hemorrhage by emergency uterine arterial embolization followed by early hysteroscopic myomectomy: a report of two cases

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Abstract Two submucosal myoma cases with acute severe uterine hemorrhage were initially treated by emergency uterine arterial embolization for hemostasis. Then, after improvement of the general condition, early hysteroscopic myomectomy was performed. In one patient, complete resection was achieved. In another patient, the initial resection was incomplete because of the large tumor size. However, the remaining myoma tissue was spontaneously expelled later with no complications. Red blood cell transfusion was not required in either patient.

Keywords Submucosal myoma · Uterine hemorrhage · Uterine arterial embolization · Hysteroscopic myomectomy

Introduction

Uterine myomas are a common, benign neoplastic disorder [1]. Although only 5–10% of myomas are submucosal, these lesions sometimes, even in small cases, induce severe clinical symptoms such as iron-deficiency anemia due to metrorrhagia and were traditionally frequently treated by hysterectomy. With technical progress in recent years, hysteroscopic myomectomy has become a standard procedure as a minimally invasive treatment for submucosal myoma [2]. However, in an emergency case with acute severe uterine hemorrhage, those performing the procedure sometimes encounter difficulty in controlling bleeding during and after surgery, and hemostasis even by hysterectomy may be required [3].

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Uterine arterial embolization (UAE) has long been used to manage uncontrollable postpartum hemorrhage [4]. Application of UAE for treating symptomatic myoma has recently become established as one of the techniques used in the elective treatment of myoma-related symptoms [5]. Although complications including severe infection have been discussed [6], the hemostatic effect of UAE for uterine hemorrhage is immediate and reliable [4].

For safer execution of hysteroscopic myomectomy, a trial utilizing UAE for hemostasis together with subsequent early hysteroscopic myomectomy was performed to treat two patients with submucosal myoma with acute severe hemorrhage, without the need for red blood cell transfusion. The outcomes are reported herein.

Methods

Evaluation of the submucosal myoma

The conditions of submucosal myoma, including tumor size, protrusion ratio into the uterine cavity, and location, were evaluated by transvaginal ultrasonography (Sonovista-Color FD, Mochida-Siemens Medical Systems, Japan), magnetic resonance imaging (MRI; Signa Excite 1.5T, GE-Yokogawa Medical Systems, Japan), and virtual hysteroscopy aided by a 16-multislice computed tomography scanner (Aquilion Multi 16, Toshiba Medical, Japan) as previously described [7].

Uterine arterial embolization

UAE was performed under digital subtraction angiographic guidance by the AXIOM Artis FA angiography system (Siemens-Asahi Medical Technologies, Japan). Prior to UAE, an intravenous line and Foley catheter were placed. Subcutaneous administration of 40 mg morphine hydrochloride (Takeda Pharmaceutical, Japan) and 5 mg droperidol (Droleptan, Sankyo, Japan)

in 20 ml physiological saline was started by a dose-controllable syringe pump (Terumo, Japan) 1–2 h before the procedure and continued overnight. Patients received 1 g flomoxef (Flumarin; Shionogi Pharmaceutical, Japan) for prophylaxis.

At UAE, a 4-Fr vascular sheath was placed into the right common femoral artery under local anesthesia. Under fluoroscopic guidance, a 4-Fr pigtail flush catheter (Clinical Supply, Japan) was advanced into the abdominal aorta. A nonselective pelvic angiogram was obtained to identify the right and left uterine arteries. Once identified, the uterine arteries were selectively catheterized by a 4-Fr catheter (Glidecath; Terumo, Japan). If further selection was necessary, a 2.7-Fr microcatheter (Clinical Supply, Japan) was advanced. An embolic agent, gelatin sponge particles made from gelatin sponge sheets (Spongel; Yamanouchi Pharmaceutical, Japan), was injected directly into the uterine arteries to induce thrombosis. After embolization of both uterine arteries, a complete angiogram was performed to confirm that arterial occlusion had occurred.

Hysteroscopic myomectomy

An osmotic cervical dilator (Lamicel, Medtronic, Mystic, CT, USA) was inserted into the cervical canal to dilate and ripen the cervix 2–3 h before surgery. Under spinal anesthesia, hysteroscopic surgery was performed by a continuous-flow resectoscope (Karl Storz Endoscopy Japan) with an outer diameter of 8 mm under delivery of sorbitol distension medium (Uromatic S, Baxter, Japan) by gravity flow.

Case report

Patient 1

A 34-year-old, gravida 2, para 2, married Japanese woman had been diagnosed with submucosal myoma at

another hospital in May 2003. Because severe anemia was repeatedly caused by menorrhagia due to submucosal myoma, her doctor strongly recommended abdominal hysterectomy. However, she refused to have surgery, and oral iron supplementation was self-initiated. On 17 November 2003 she was referred to our outpatient clinic because of sudden severe uterine hemorrhage. At initial examination, her hemoglobin value was 9.0 g/dl. Because massive bleeding persisted, both spontaneous hemostasis and successful medical treatment seemed difficult. The patient was urgently admitted for examination and treatment of submucosal myoma. After surgical and medical options, including hysterectomy, for managing hemorrhage due to submucosal myoma were discussed with the patient and her husband, she expressed a strong desire for uterine preservation. Emergency MRI examination showed a submucosal myoma 5 cm in diameter arising from the posterior wall (Fig. 1a).

Because uterine bleeding had increased after admission and the hemoglobin value had dropped to 7.1 g/dl by the next morning, emergency UAE was performed to achieve hemostasis. At UAE, major vascular flow to the submucosal myoma was noted to come from the left uterine artery (Fig. 1b). First the left and then the right (Fig. 1c) uterine arteries were occluded by embolization. Vascular flow to the myoma node was intercepted by this treatment, and uterine hemorrhage immediately decreased.

After UAE, the patient received daily intravenous iron supplementation for anemia treatment, and her general condition gradually improved. The hemoglobin value recovered to 9.2 g/dl on the 7th day after UAE, and the situation of submucosal myoma was evaluated by virtual hysteroscopy with iodine contrast media enhancement (Fig. 2a). Because the protrusion ratio was nearly 100% and the blood supply to the myoma node seemed to be intercepted by embolization, as the iodine-enhancement effect was lacking in the myoma node, hysteroscopic myomectomy was performed. Endometrium covering the myoma node had turned blackish-red

Fig. 1 **a** Sagittal T2-weighted magnetic resonance image of submucosal myoma arising from the posterior wall of the uterus before uterine arterial embolization. **b** Selective left uterine arteriogram before embolization. **c** Selective right uterine arteriogram before embolization

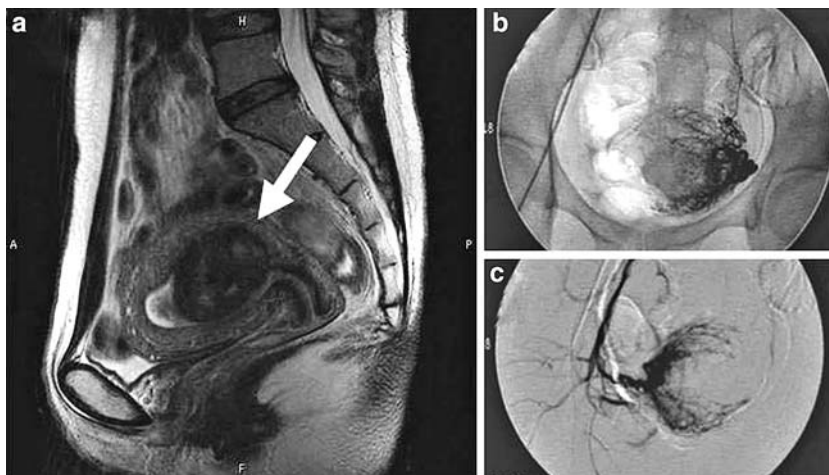
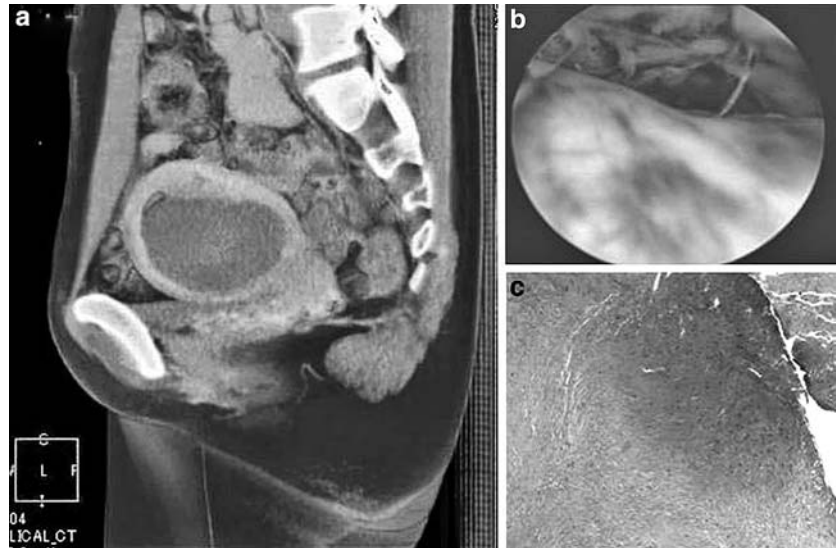


Fig. 2 **a** Sagittal iodine-enhanced virtual hysteroscopic image of submucosal myoma showing a lack of enhancement 7 days after uterine arterial embolization (UAE). **b** \Hysteroscopic finding of myoma surface showing necrotic change after UAE. **c** Histological finding of myoma tissue showing acute necrotic change



(Fig. 2b), suggesting necrotic change of the underlying myoma tissue. The resected weight of the myoma tissue was 62 g, and the surgical duration was 27 min. Pathological findings also showed acute necrotic change of the myoma node (Fig. 2c).

The patient was discharged the next day, and her postoperative course was uneventful. Her hemoglobin value was 11.9 g/dl on 5 December 2003. Her menstrual bleeding dramatically decreased, and no recurrence has been noted 12 months later.

Patient 2

A 45-year-old, gravida 2, para 2, Japanese woman who had recently become widowed was admitted to another hospital because of severe uterine bleeding on 3 March 2004. At midnight the next day, she was transferred to the emergency room of our hospital in a semishock state due to persistent uterine hemorrhage. On arrival, her hemoglobin value was 7.7 g/dl, and blood pressure was

74/45 mmHg. On transvaginal ultrasonography (Fig. 5a) and emergency MRI (Fig. 3a), a submucosal myoma measuring 7 cm in diameter arising from the anterior wall of the uterus was identified. Her general condition improved with rapid fluid transfusion, and we decided to use vaginal gauze packing and observe her that night. Because the hemoglobin value had further dropped to 6.2 g/dl the next morning, we decided to perform emergency UAE to achieve hemostasis, based on the patient's desire for uterine preservation.

At UAE, major vascular flow to the submucosal myoma was from the right uterine artery (Fig. 4b). First the right and then the left (Fig. 4c) uterine arteries were occluded by embolization. Vascular flow to the myoma node was intercepted by this treatment, and uterine bleeding immediately decreased.

After UAE, the patient received daily intravenous iron supplementation, and her general condition improved. Her hemoglobin value recovered to 8.1 g/dl on the 8th day after UAE. Transvaginal ultrasonography (Fig. 5b) and virtual hysteroscopic examination

Fig. 3 **a** Sagittal T2-weighted magnetic resonance image of submucosal myoma arising from the anterior wall of the uterus before uterine arterial embolization. **b** Selective right uterine arteriogram before embolization. **c** Selective left uterine arteriogram before embolization

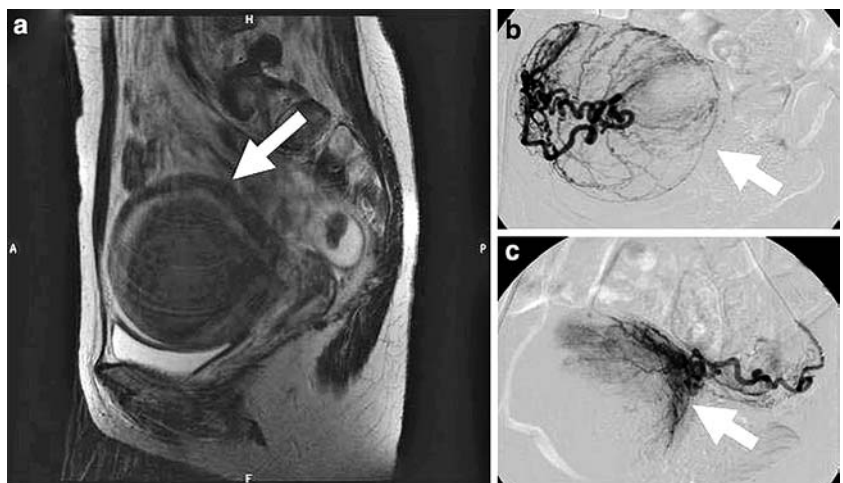


Fig. 4 **a** Cross-sectional, iodine-enhanced virtual hysteroscopic image of submucosal myoma 7 days after uterine arterial embolization (UAE). **b** Hysteroscopic finding of myoma showing the exfoliated endometrial tissue after UAE. **c** Histological finding of myoma tissue showing acute necrotic change

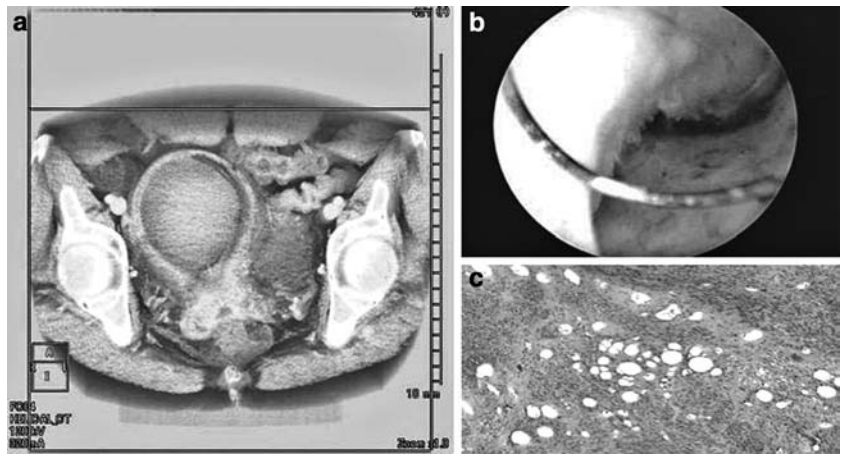
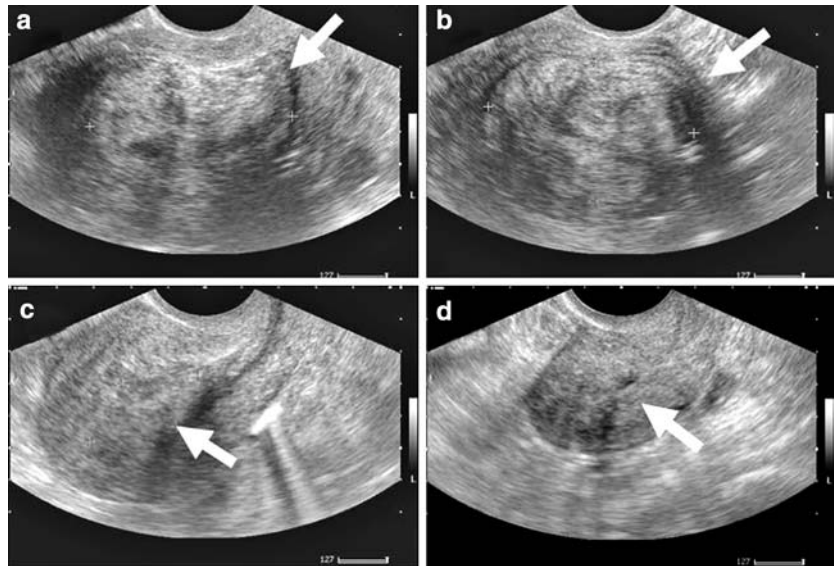


Fig. 5 Changes on transvaginal ultrasonographic images of the submucosal myoma during the treatment course. **a** Submucosal myoma at the first examination. **b** Submucosal myoma after uterine arterial embolization. **c** Submucosal myoma remnant that started being expelled 12 days after hysteroscopic myomectomy. **d** Disappearance of remnant myoma tissue after spontaneous expulsion 3 months after hysteroscopic myomectomy



(Fig. 4a) were performed. The myoma size was still 7 cm, which is above our indication for one-step hysteroscopic myomectomy [7]. After explaining the possibility of incomplete resection and the necessity of repeated hysteroscopic surgery, hysteroscopic myomectomy was performed. Endometrium covering the myoma node was exfoliated, and irregularly-shaped myoma tissue was exposed (Fig. 4b). Almost 70% of the myoma node was resected, and surgery was stopped at that point because of the risk of uterine perforation. The resected weight of the myoma node was 87 g, and the surgical duration was 68 min. Pathological findings also showed necrotic change of the myoma node (Fig. 4c).

The patient was discharged 3 days after surgery, and her postoperative course was uneventful. Remnant myoma tissue started being spontaneously expelled 2 weeks after hysteroscopic myomectomy (Fig. 5c), and complete expulsion was noted 3 months later (Fig. 5d). Her hemoglobin value was 13.4 g/dl 3 months postoperatively. After a temporary amenorrhea period lasting for 2 months, the patient's menstrual bleeding resumed

with decreased amounts, and no recurrence of symptoms has been noted.

Discussion

Abnormal uterine bleeding and menorrhagia caused by submucosal myoma are usually chronic [1]. However, patients may also encounter acute severe uterine hemorrhage that can become life-threatening [8], and managing such bleeding can be one of the most difficult challenges that gynecologists encounter.

Since medical treatment options such as GnRH agonists are not applicable in an acute setting, hysterectomy has traditionally been the mainstay of treatment for submucosal myoma in such a situation. This technique, however, is associated with loss of the reproductive organ as well as a significant risk profile including general anesthesia and surgical complications, especially when performed under a hemodynamically unstable condition [8].

As the demand of myoma patients for uterine preservation as well as minimally invasive treatment has increased recently, hysteroscopic myomectomy [2] and UAE [5] were reported to be effective to manage symptomatic submucosal myoma. However, one significant complication after UAE for submucosal myoma is infection due to obstruction resulting from the sloughing of necrotic myoma tissue that interferes with the passage of intrauterine discharge. Such infection may require hysterectomy [6]. Hysteroscopic myomectomy may also have some difficulties when managing cases showing massive bleeding [3].

Our aim in the present investigation was to efficiently use the advantages of each procedure to treat cases of submucosal myoma with acute severe hemorrhage: the reliable hemostatic ability of UAE and the resection of myoma tissue by hysteroscopic myomectomy.

To safely perform hysteroscopic myomectomy, preoperative evaluation of the lesions, including protrusion ratio, thickness of adjacent myometrium, and shape and number of myoma nodes, is most important. For this evaluation, we mainly use virtual hysteroscopy [7] in addition to sonohysterography and MRI. At present, we select cases that show a tumor diameter < 5 cm and more than 50% protrusion ratio as indications for one-step hysteroscopic myomectomy [7], and we have managed most cases well without encountering significant complications. However, as the number of cases increased, we encountered patients in whom managing bleeding from the cutting surface by electrocoagulation was difficult. For intraoperative and early postoperative hemorrhage, balloon tamponade [3], created by inserting a Foley catheter into the uterine cavity, can effectively manage bleeding in most cases. However, in a high-risk case showing massive uterine hemorrhage before surgery, we encountered uncontrollable bleeding during hysteroscopic myomectomy, and emergency UAE was required for hemostasis in that particular case.

UAE is a long-established technique for treating various obstetric and gynecologic conditions associated with uncontrollable hemorrhage [4], but it has only recently been used to effectively treat symptomatic uterine myoma [5]. In submucosal myoma, spontaneous expulsion after UAE was reported [9]. However, because severe infective complications due to ascending infection from the vagina that required emergency hysterectomy were also noted [6] in submucosal myoma, early hysteroscopic resection may be required for preventing complications due to infection.

We experienced two cases of submucosal myoma that were treated by emergency UAE followed by early hysteroscopic myomectomy and showed a satisfactory clinical course. In our experience in this acute setting, the advantages of UAE are that the procedure does not require general anesthesia and the hemostatic effect was immediate and nearly complete. Then after achieving hemostasis by UAE, we had time to achieve anemia improvement by intravenous administration of iron supplement only, thus avoiding red blood cell transfusion in these patients.

At the present time, we believe the combination of UAE and subsequent early hysteroscopic myomectomy could be a new treatment strategy for submucosal myoma cases with acute massive uterine hemorrhage from the perspective of uterine preservation and minimal invasiveness. However, for safer treatment, close collaboration between the gynecologist and interventional radiologist is essential [6] during the management of cases such as those reported in the present study.

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