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Incomplete vaginal expulsion of pyoadenomyoma with sepsis and focal bladder necrosis after uterine artery embolization for symptomatic adenomyosis: Case report

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The major complications secondary to uterine artery embolization (UAE) are rare. We report a case involving a patient who underwent UAE for symptomatic adenomyosis, and experienced complications including incomplete vaginal expulsion of a large focal pyoadenomyosis, sepsis and focal bladder necrosis. The serial changes of uterine echogenicity reflected the intracavity sloughing tissue, and cystourethroscopy revealed a focal bladder necrosis. Administration of appropriate antibiotics and timely expulsion of the focal pyoadenomyosis vaginally resulted in successful preservation of the uterus and spontaneous recovery of focal bladder necrosis without surgical intervention. A review of the relevant literature was conducted to explore the mechanisms of bladder necrosis after UAE, summarize post-embolization intervention and the outcome of vaginally expelled myoma, and to discuss the value of UAE for adenomyosis.

Key words: adenomyosis/bladder necrosis/embolization/sepsis/uterine myoma

Introduction

Uterine artery embolization (UAE) has become an alternative management for symptomatic leiomyomas and adenomyosis (Siskin *et al*., 2001), especially for women who desire to preserve their uterus, or have contraindications to surgery, such as symptomatic acquired immunodeficiency syndrome, severe cardiopulmonary disease or thromboembolic disease. Most reports suggest that UAE is a well-tolerated and effective treatment.

We present a case in which embolization of the uterine arteries in a woman with adenomyosis resulted in incomplete expulsion of a large focal pyoadenomyosis vaginally associated with sepsis, and focal bladder necrosis. All complications were resolved completely after non-surgical intervention. After a Medline literature review, we also postulate the mechanisms of bladder necrosis secondary to UAE for uterine leiomyoma or adenomyosis, summarize the prognosis of surgical or non-surgical management of myoma expulsion vaginally due to UAE, and assess the role of UAE in symptomatic adenomyosis.

Case report

A 41 year old woman, gravida 5, para 4, presented with a 3 year history of severe dysmenorrhoea and heavy menorrhagia with anaemia. Pelvic ultrasound demonstrated a globular enlarged uterus measuring 11.2 × 8.3 × 6.8 cm (Figure 1A). Magnetic resonance imaging (MRI) of the pelvis revealed an enlarged uterus with adenomyosis. The patient was treated with a low-dose oral contraceptive pill without success. The haemoglobin level was 10.5 g/dl despite iron supplementation for 2 months.

Hysterectomy was initially recommended, but the patient was reluctant to undergo surgery and opted for UAE instead. After informed consent was obtained, a bilateral UAE was performed via the right femoral artery using 10 ml 38% lipiodol followed by gelfoam pledgets. A 1 g prophylactic of cephalothin was administered i.v. 1 h before the procedure. The woman tolerated the procedure well, and was discharged 2 days later, with oral analgesics.

Post-embolization day 5, the patient returned to the emergency room with complaints of severe abdominal cramping and dysuria. She was feverish, with a temperature up to 41.1°C, and had chills. Her pulse was 126 beats/min. Her blood pressure was 151/80 mmHg. Her white blood cell count was 15 400/μl, with 81.1% neutrophils. Her haemoglobin level was 11.2 g/dl. Urinalysis revealed abnormal findings: 1+ leukocyte, nitrite positive, protein of 75 mg/dl, and 1+ bilirubin. The blood culture revealed a heavy growth of *Escherichia coli*. Intravenous amikacin and amoxicillin-clavulanate potassium was administered after a drug sensitivity test. A cystourethroscopy was performed on post-embolization day 11 because of

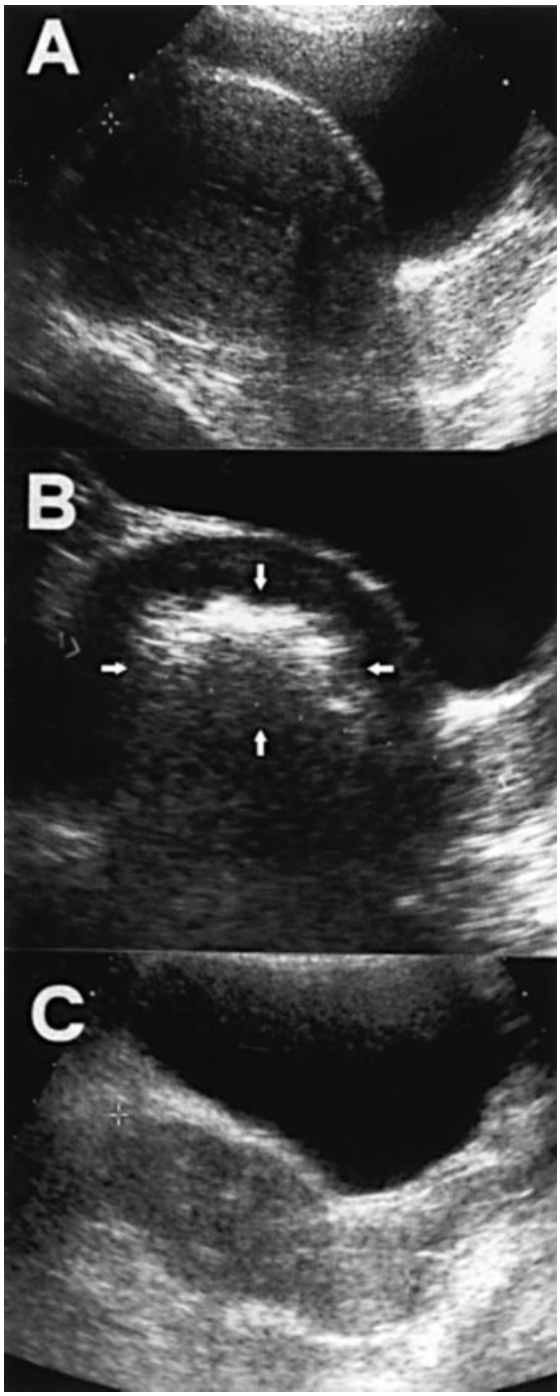

Figure 1. Abdominal ultrasound shows serial gross changes of the central area in the uterus. These are comparable midline sagittal slices. (**A**) An original feature of the uterus before UAE: enlarged uterine size with clear endometrial layer. (**B**) Note the significant echogenicity in the central area of the uterus (arrows) after UAE and before vaginal expelling of a focal pyoadenomyosis. (**C**) After the focal pyoadenomyosis expulsion, the uterine volume was reduced and the endometrial thickness appears normal.

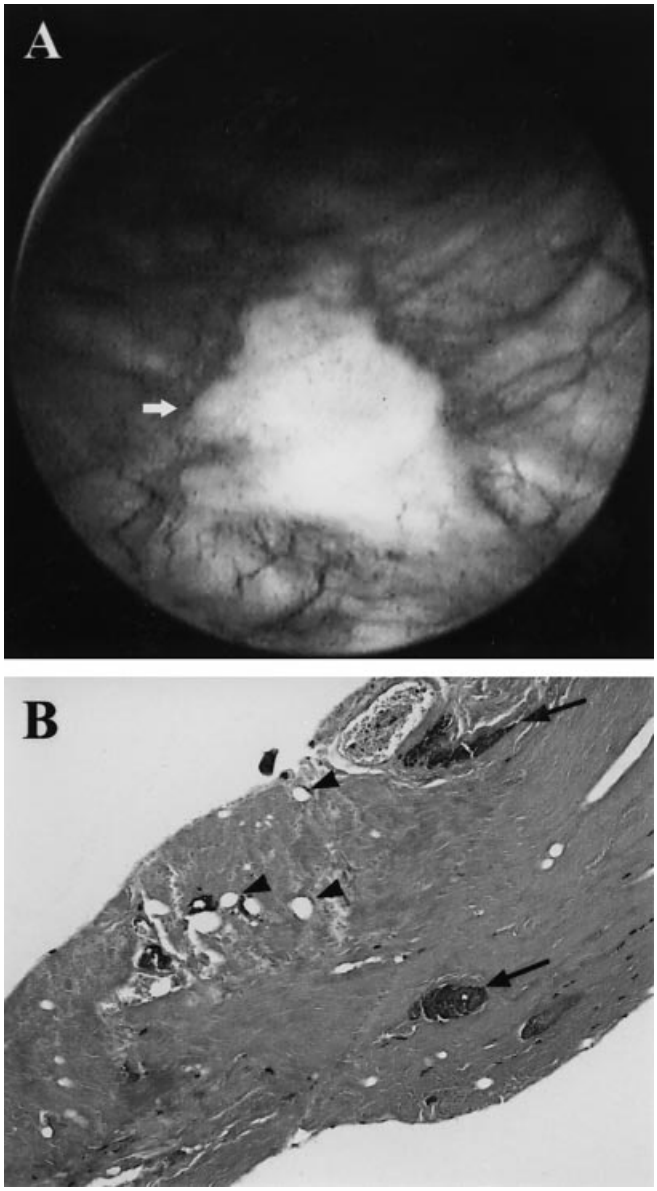

Figure 2. (**A**) Cystourethroscopy reveals a yellowish, necrotic lesion (arrow) surrounded by abundant vessels on the bladder base outside the left ureteral ostium. (**B**) The photomicrograph of bladder biopsy stained with haematoxyllin and eosin shows infarcted fibrous tissue with congested vessels (arrow), scattered small vacuoles (arrowhead). (Original magnification ×100).

persistent dysuria after parenteral antibiotics. An ulcerative foci measuring 2.0 × 1.8 cm surrounded by abundant vessels was found on the bladder base outside the left ureteral orifice (Figure 2A). A bladder biopsy was performed, and microscopic examination revealed coagulative necrosis of fibrous tissue (Figure 2B). Under continued antibiotics and hydration, the patient reached recovery on the ward on post-embolization day 16 without complaint, except for mild dysuria.

On post-embolization day 19, the patient returned to the clinic complaining of a heavy vaginal discharge. Pelvic examination revealed a 10 week, slightly tender uterus and yellowish, foul odour leukorrhoea. Pelvic ultrasound revealed a uterus measuring 9.4 × 6.7 × 6.6 cm, with a significant echogenic change measuring 5 × 4 × 2.5 cm in the central area of the uterus (Figure 1B). On post-embolization day 42, a large necrotic intracavity tissue that protruded to the cervical os was twisted out easily at an office visit with negligible bleeding. The pathological examination revealed extensive

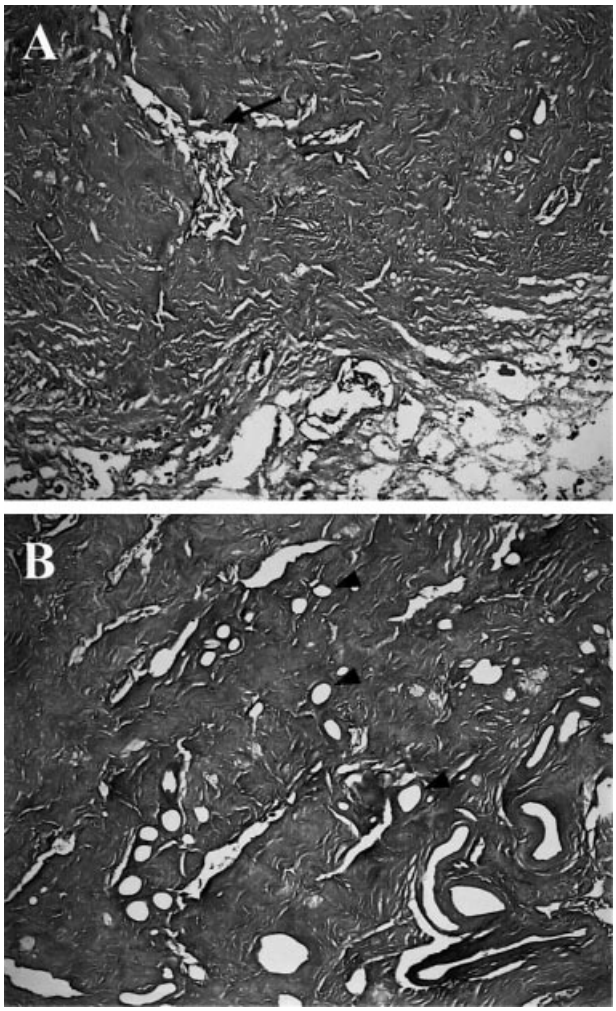

Figure 3. (**A**) The photomicrograph of vaginally expelled tissue stained with haematoxyllin and eosin is characterized by irregular gland-like spaces (arrow) in the stroma composed of pinkish interlacing bundles mimicking infarcted adenomyosis. (**B**) Scattered small vacuoles (arrowhead) are noted entrapped in the tissue. (Original magnification ×40).

coagulative and necrotic tissue measuring 6.1 × 4.9 × 2.2 cm (Figure 3A, B). Subsequent pelvic ultrasound revealed a uterus measuring 8.0 × 6.6 × 4.8 cm without central echogenic foci (Figure 1C). During outpatient follow-up, symptoms of dysuria, leukorrhoea, and cramping resolved completely by post-embolization day 49.

Discussion

Complications and side effects associated with the UAE procedure have been few (Abulafia and Sherer, 1999; Hutchins and Worthington-Kirsch, 2000). Nonetheless, UAE has resulted in a few major complications reported as amenorrhoea, pelvic infections and death (Lai *et al*., 2000). This case demonstrates that successful preservation of the uterus can be achieved with non-surgical management of a large focal pyoadenomyosis associated with sepsis, secondary to UAE of symptomatic adenomyosis. Furthermore, this unique case shows that the focal bladder necrosis can heal spontaneously under the intervention of antibiotics and hydration.

Bladder necrosis is a rarely reported entity in the literature. Sieber (1994) reported only three cases of bladder necrosis secondary to hypogastric artery embolization to control intractable pelvic bleeding. To the best of our knowledge, this is a unique case of bladder necrosis secondary to UAE of uterine leiomyoma or adenomyosis. We postulate three reasons for the focal bladder necrosis. First, undiagnosed vascular communications between uterine and vesicle arteries may result in untargeted embolization of bladder during UAE. Pelage *et al*. (1999) described the vesicle artery from a common trunk with the uterine artery in three (0.8%) of 375 cases. It was easily identified only when the bladder was full. Second, retention of lipiodol in the distal vessels of the non-target tissue may result in more ischaemia, and less potential for the collateral re-growth of the bladder. Lipiodol, an iodine addition product of fatty ethyl esters, is usually washed out during fixation of the specimen by alcohol, and is presented as multiple small vacuoles under microscopic examination (Figures 2B and 3B). Third, lipiodol escapes from uterine arteries. Although we did not observe any flow of contrast into the vesicle branches, when blood flow to the uterus is progressively diminished, lipiodol may be forceably carried into other tissues, including the vesicle arteries. We suggest that cystourethroscopy has the advantage of detecting mis-embolization of urinary bladder, especially when there are clinically unexplained symptoms.

Further invasive gynaecological intervention was unnecessary after UAE because the focal pyoadenomyosis had protruded to the cervix and could be easily removed during the office visit by twist. In the literature search there were seven major references reporting the vaginal passage of myoma with or without surgical intervention after UAE (Table I). The reported incidence, between 0.5–12.5%, is still not generally acknowledged, but seems unusual even in submucosal myomas. The relationship of myoma expulsion and the size of embolic particles are unknown based on these limited reports. There were six patients with ischaemic submucosal myoma secondary to UAE undergoing further surgical intervention including hysterectomy in one case, hysteroscopic resection in one case, and vaginal myomectomy in four cases, which then resolved completely (Bradley *et al*, 1998; Pelage *et al*, 2000; McLucas *et al*, 2001; Spies *et al*, 2001). However, surgical intervention may not be necessary because complications including vaginal bleeding, foul odour discharge, pelvic cramping, fever and leukocytosis are resolved completely after the necrotic tissue passes vaginally. Berkowitz *et al*. (1999) reported three patients with necrotic, infected myomas which resolved completely after administration of antibiotics and spontaneous passage of the sloughing tissue. Our experience demonstrated that appropriate administration of antibiotics and timely expulsion of necrotic tissue might resolve all symptoms, preserve the uterus, and avoid further surgery following UAE. Surgical options of submucosal myoma after UAE are only necessary if the sloughing tissue with intractable bleeding or critical sepsis is not passed spontaneously.

Table I. Summary of major studies of vaginal expelled myomas with or without subsequent surgical intervention after UAE

Investigator, date	*n*	Incidence (%)[a]	Material/size (μm)	Follow-up interval (weeks)	Intervention	Underlying cause/outcome
Bradley *et al*., 1998	1	12.5	PVA/150–500	6	Avulsed under general anaesthesia	Incomplete passage of an unlocated myoma/resolved
Abbara *et al*., 1999	1	N/A	PVA/500–710	3	Removed at office visit	Pedunculated submucosal myoma/resolved
Berkowitz *et al*., 1999	1	1.7	PVA/N/A	10	Antibiotics spontaneously passed	Necrotic, infected myomas/ resolved
	1			16	Spontaneously passed	Necrotic myoma/resolved
	1			28	Antibiotics spontaneously passed	broad-based, infected submucosal myomas/resolved
Goodwin *et al*., 1999	4	6.7	PVA/500–700	N/A	Spontaneously passed	Pedunculated submucosal myoma/ resolved
Pelage *et al*., 2000	4	6.2	PVA/150–300	4	Spontaneously passed	Pedunculated myoma/ resolved
	1			2	Hysterectomy	Large submucosal myoma with sepsis/resolved
McLucas *et al*., 2001	5	4.8	PVA/300–500	2–48	Spontaneously passed	Pedunculated submucosal myoma/resolved
	3			2–48	Vaginal myomectomy	Incomplete passage/resolved except one sessile type with persistent discharge for 1 month after myomectomy
Spies *et al*., 2001	1	0.5	PVA/500–700	12	Hysterocopic resection	Partial myoma expulsion without infection/resolved
Huang *et al*., 2003 (present case)	1	5.0	Lipiodol/N/A	7	Antibiotics removed at office visit	Incomplete passage of large pyoadenomyoma with sepsis/resolved

[a]Number of patients with vaginally expelled myoma/number of UAE subjects.
n = number of patients with vaginally expelled myoma; PVA = polyvinyl alcohol; N/A = not applicable.

Imaging studies were used to assess myoma size, position, number and co-morbid disease before UAE. After routine screening by pelvic ultrasound, we performed MRI instead of transvaginal ultrasound, hysterosonography, and diagnostic hysteroscopy because of its accuracy in evaluation of submucosal myomas and distinction between adenomyosis and leiomyoma (Outwater *et al*, 1998; Dueholm *et al*, 2001). However, it is not always possible to differentiate a large focal from a diffuse adenomyosis. Neither ultrasound nor MRI helped establish the location of myomas that are mentioned in some other studies (Bradley *et al*, 1998; Berkowitz *et al*, 1999). Our experience shows that rapid changes in uterine echogenicity before and after UAE may lead to early detection of the sloughing tissue.

Successful outcomes have been reported in women with adenomyosis. Goodwin *et al*. (1999) described three patients who had a pre-existing diagnosis of adenomyosis, and achieved a successful prognosis. Siskin *et al*. (2001) discussed 15 women with symptomatic adenomyosis confirmed by MRI who were treated with UAE. The overall success rate was 92.3%. One patient with diffuse adenomyosis and multiple leiomyomas did not respond, and one patient experienced amenorrhoea during the 5 months of follow-up after UAE. By 5.9 months, median uterine volume and myoma volume were reduced by 42 and 71% respectively. Some investigators consider adenomyosis a contraindication to embolization because of adenomyosis-related treatment failures (Walker, 1999). Stancato-Pasik *et al*. (1999) found adenomyosis in their one treatment failure requiring hysterectomy out of 13 patients. Goodwin *et al*. (1999) also stated adenomyosis in three of six hysterectomy specimens in women who experienced surgical intervention after UAE. Smith *et al*. (1999) mentioned a case of clinical failure of UAE due to adenomyosis. Pathological examination after hysterectomy revealed completely infarcted leiomyomas and similarly unaffected ectopic islands of endometrium. A selective effect of embolization on uterine leiomyoma with co-existing adenomyosis resulting in failure of UAE was proven. On the basis of these limited reports, the risk of treatment failure is probably increased, but adenomyosis may not be considered as a contraindication for UAE. Adenomyosis may co-exist with leiomyoma in 10–20% of patients, and it is very difficult to make a diagnosis prospectively and exclude the patient with adenomyosis from UAE (Smith *et al*., 1999). Therefore, given the frequent occurrence of adenomyosis with leiomyoma, we believe that it is likely that several patients in earlier published studies on UAE had concomitant adenomyosis, and this procedure still has benefit to adenomyosis.

In conclusion, we have reported the clinical circumstance of the incomplete vaginal expulsion of a large focal pyoadenomyosis associated with sepsis and focal bladder necrosis secondary to UAE for symptomatic adenomyosis. Non-surgical interventions including administration of antibiotics, and timely expulsion of the intracavity sloughing tissue vaginally usually result in successful preservation of the uterus, and relief of all symptoms. Identification of all

branches of the hypogastric artery, and avoidance of the escape of embolic particles from uterine artery during UAE are necessary to prevent untargeted embolization. Conservative treatment including administration of antibiotics and hydration may result in spontaneous recovery of focal bladder necrosis, and physicians should be prepared to recognize and manage this side effect.

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