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# Nongravid incarcerated uterus with leiomyomas treated with uterine artery embolization and hysterectomy: a case report

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**BACKGROUND:** The incarcerated uterus in the nongravid patient is rare, and usually is associated with uterine leiomyomas. Leiomyomas may be treated with uterine artery embolization, but the use of embolization has been reportedly rarely in treating nongravid uterine incarceration. **CASE:** A 50-year-old gravida 2 para 2 woman presented with acute abdominal and flank pain and urinary retention. Her medical history included uterine leiomyomas and nephrolithiasis. Physical examination showed an enlarged uterus (size, 22 weeks). Magnetic resonance imaging showed an incarcerated uterus, complete bladder outlet obstruction, uterine retroflexion and enlargement, and leiomyomas. She was treated with an indwelling Foley catheter, preoperative uterine artery embolization, and total abdominal hysterectomy.

**CONCLUSION:** Preoperative uterine artery embolization may be a useful adjunct to hysterectomy in the treatment of the nongravid incarcerated uterus associated with leiomyomas in women who have completed family planning.

Key words: fibroids, hysterectomy, urinary retention, uterine retroversion

#### Introduction

Uterine incarceration in pregnancy is uncommon, may affect 0.03% of pregnant patients, and has been reported in only 162 patients as of 2016.<sup>1,2</sup> Although uterine retroversion may be present in 6% to 15% of pregnancies at conception, persistent retroversion is

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rare after 14 to 16 weeks.<sup>1,3–6</sup> With advancing gestation, the growing, retroverted uterus may become incarcerated between the sacral promontory and pubic symphysis.<sup>1,2</sup> The patient may develop pelvic pain, urinary retention, hydronephrosis, and obstetrical complications such as increased miscarriage risk, fetal growth restriction, and fetal demise.<sup>1,7,8</sup>

Risk factors that predispose to the development of uterine incarceration include persistent uterine retroflexion, malformation, or prolapse, large leiomyomas, endometriosis, adhesions, and multifetal gestation.<sup>2,8,9</sup> Although spontaneous repositioning may occur,<sup>10</sup> treatment of the incarcerated uterus in pregnancy typically involves nonoperative uterine disimpaction with bladder catheterization, manual reduction, vaginal balloon, or colonoscopy.<sup>1,7,11–13</sup> After successful disimpaction, a pessary may prevent recurrence during the same pregnancy.<sup>8,11</sup> Uterine incarceration is especially rare in the nongravid patient, and literature search showed only few reported cases that were associated with uterine leiomyomas and treated with myomectomy or hysterectomy.<sup>14–17</sup>

Uterine artery embolization with polyvinyl alcohol or tris-acyl gelatin

particles (diameter, 500–1000  $\mu$ m) is a treatment used commonly for uterine leiomyomas and is under investigation for adenomyosis.<sup>17–19</sup> The procedure causes ischemic necrosis of leiomyomas and may decrease the size of leiomyomas by 50% to 60% and the size of the uterus by 40% to 50%.<sup>17,20</sup> Uterine artery embolization may be associated with a change in uterine orientation from retro- to anteversion several months after the procedure.<sup>20</sup> However, literature search showed limited use of uterine artery embolization in treating nongravid uterine incarceration.<sup>14</sup>

We treated uterine incarceration associated with leiomyomas in a nongravid patient with uterine artery embolization before abdominal hysterectomy. The purpose of this report was to describe the application of this method in treating this rare condition.

#### Case

A 50-year-old gravida 2 para 2 woman Ht 5ft 3in Ht 127lb BMI 22.5 presented to the emergency room with 4 days of abdominal and flank pain associated with urinary frequency, urgency, and dysuria. Past medical history included uterine leiomyomas and recurrent nephrolithiasis. Examinations by an emergency room physician and

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gynecologist were noncontributory. Computed tomography showed an enlarged uterus  $(10 \times 12 \text{ cm})$  with leiomyomas but no retroflexion or impaction, and there was moderate bladder distension but no hydronephrosis. Ultrasonography showed multiple leiomyomas (maximum diameter, 7 cm). Laboratory results revealed normal chemistry and WBC 9.2 Hb 110. The urinalysis was normal and no urine culture was performed, but she was treated with empiric outpatient oral antibiotics for a presumed diagnosis of urinary tract infection.

She returned 3 days later because of worsening pain and urinary retention, voiding only 1 teaspoon at a time. Foley catheterization resulted in drainage of 1 liter of urine and resolution of pain. She was instructed to catheterize herself and discharged to home. In follow-up with a gynecologist 1 week later, physical examination showed an enlarged uterus (size, 22 weeks). Magnetic resonance imaging (MRI) showed an incarcerated uterus with complete bladder outlet obstruction, uterine retroflexion and enlargement (diameter,  $14 \times 11 \times 10.5$  cm) associated with leiomyomas, and uterine body entrapment at the sacral promontory Figure 1. It was concluded that the uterine configuration caused urethral stretching and bladder neck compression.

She was admitted to the hospital for pain management and indwelling Foley catheterization. Treatment options were discussed including uterine artery embolization, open myomectomy, or abdominal hysterectomy. As she had completed her family planning, she elected total abdominal hysterectomy as definitive treatment. Both laparoscopic and open approaches were discussed with the patient. Given the size of the uterus which extended supraumbilical at time of presentation, the decision was made to proceed with an open midline hysterectomy. Preoperatively, she underwent uterine artery embolization with a 5-French Roberts uterine catheter through the right common femoral artery and polyvinyl alcohol particles to decrease uterine size and potentially minimize the risks of having surgical

complications during hysterectomy associated with an enlarged uterus. She was discharged to home and returned 2 weeks later for an open total abdominal hysterectomy through a midline subumbilical incision. Surgical findings included an enlarged and retroflexed uterus (size, 18 weeks) that was smaller than observed on the MRI scan before embolization. The uterus was located in the pelvis between the sacrum and symphysis pubis, with multiple leiomyomas. The uterus was removed from the pelvis with difficulty, and total hysterectomy was completed without any complications. Examination of the surgical specimen on pathology showed an inactive endometrium, multiple leiomyomas negative for malignancy, with normal appearing cervix and bilateral fallopian tubes. She had an uneventful recovery without any residual urinary symptoms.

### Conclusion

The patient had an enlarged and incarcerated uterus associated with leiomyomas that caused pain and urinary obstruction. Removal of the incarcerated uterus during hysterectomy was difficult, but preoperative uterine artery embolization facilitated the surgery by partially decreasing uterine size.

In the present patient, the diagnosis was delayed because of the nonspecific findings on history and physical examination with this uncommon condition. Delay in diagnosis was associated with worsening pain and urinary obstruction, as reported previously.<sup>7</sup> The CT scan and ultrasonogram were not diagnostic of uterine incarceration, but the MRI scan provided greater detail and confirmed that the uterus was retroflexed and incarcerated between the sacrum and pubic symphysis, consistent with previous reports.<sup>9</sup>

Treatment of an incarcerated uterus in the nongravid patient may depend on factors such as feasibility, patient preference, age, and future fertility. In a previously reported case, a postgravid 34-year-old woman who developed hematometra and uterine incarceration after a suction dilation and curettage at 12 weeks of gestation was treated successfully with laparoscopic manual reduction, suction dilation and curettage, and temporary placement of a Foley catheter. The present patient elected hysterectomy, consistent with previous reports of nongravid uterine incarceration in women before or after completion of childbearing.<sup>14,15</sup>

The present case was unique because of the use of uterine artery embolization, which decreased the size of the incarcerated uterus, relieved symptoms before surgery, and facilitated the hysterectomy. In 1 patient aged 29 years reported previously who had uterine artery embolization followed by myomectomy for treatment of acute and recurrent urinary retention associated with posterior leiomyoma, the size of the leiomyoma was unchanged despite interruption of blood flow after embolization.<sup>14</sup> Embolization is minimally invasive, typically performed by an interventional radiologist under local anesthesia, and may decrease vaginal bleeding, leiomyoma-related dyspareunia, and urogenital symptoms by occluding the uterine arteries and decreasing uterine size.<sup>18</sup> When used as an adjunct before hysterectomy, embolization may improve surgical visualization and minimize surgical complications. The difficulty of the surgical procedure in the present patient would have been greater without the decrease in uterine size resulting from preoperative embolization. Therefore, preoperative embolization may be a useful adjunct to hysterectomy in the treatment of the symptomatic, nongravid incarcerated uterus associated with leiomyomas in women who have completed family planning.

#### Author agreement statement

We the undersigned declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us. We

#### FIGURE 1

Sagittal T2-weighted image of the pelvis showing multiple uterine leiomyomas (F) with stretched elongated cervix and sharply retroflexed uterus. The urinary bladder (B) is distended. White dashed line, endocervical canal; black dashed line, endometrial stripe.



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#### **Conflicts of interest**

The authors report no conflict of interest.

## CRediT authorship contribution statement

Katherine Kuo: Writing – review & editing, Writing – original draft, Data curation, Conceptualization. Signy Holmes: Writing – review & editing, Data curation. Jen Tomlinson: Project administration. Peter Klippenstein: Writing – review & editing. Elly Trepman: Writing – review & editing, Validation, Supervision, Formal analysis, Data curation. John M. Embil: Writing

- review & editing, Writing - original draft, Supervision.

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