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## Case Report

# Bilateral ovarian artery embolization for a symptomatic large cervical fibroid <sup>☆</sup>

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## ARTICLE INFO

## Article history:

Received 13 August 2024

Revised 27 August 2024

Accepted 3 September 2024

## Keywords:

Interventional radiology

Embolization

Cervical fibroid

Uterine artery

Ovarian artery

## ABSTRACT

Uterine leiomyomas are one of the most common smooth muscle tumors in women. Cervical leiomyomas, in contrast, are a relatively rare entity with limited available information, presenting a challenge for determining optimal treatment. Uterine artery embolization of cervical leiomyomas has been previously explored and met with some success. However, it has been associated with complications such as expulsion or incomplete embolization. This case, however, describes a patient who presented with a large cervical fibroid and was successfully treated with bilateral ovarian artery embolization, resulting in decreased fibroid burden and resolution of the patient's symptoms. Previous reports have demonstrated successful ovarian artery embolization for uterine leiomyomas, but this approach has yet to be shown for a cervical leiomyoma. Given the challenge presented by cervical leiomyomas, this case emphasizes a unique anatomical variant and the embolization method, providing an alternative, less-invasive option for reducing patient disease burden.

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## Introduction

Uterine leiomyomas, a common, benign smooth muscle tumor, are a well-known entity with a reported prevalence between 20% and 40% [1]. While uterine leiomyomas are a relatively common entity, leiomyomas of the cervix represent a rare minority, with an incidence of only 0.6% [2]. Symptoms associated with cervical leiomyomas are similar to those seen in uterine leiomyomas, consisting of abnormal uterine bleeding,

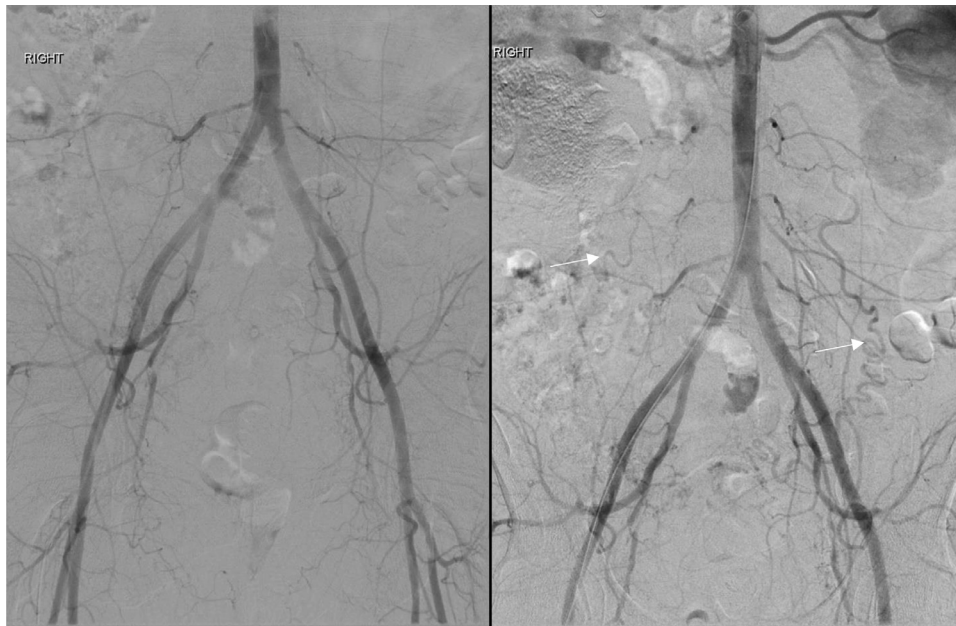
dysmenorrhea, chronic pelvic pain, and bulk symptoms such as urinary retention [1,3]. However, due to the rarity of cervical leiomyomas, there is a lack of thorough clinical studies examining the optimal treatment modality for symptomatic patients.

The most commonly reported management strategy for large, symptomatic cervical leiomyomas is surgery. The surgical resection of cervical leiomyomas is a technically complex procedure due to the position of the cervix in the pelvis and proximity to adjacent organs, resulting in an in-

<sup>☆</sup> Competing Interests: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The author is an Editorial Board Member/Editor-in-Chief/Associate Editor/Guest Editor for *Radiology Case Reports* and was not involved in the editorial review or the decision to publish this article.

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**Fig. 1 – Intraprocedural aortograms—demonstrate uterine arterial supply originating from the ovarian arteries (white arrows).**

creased risk of intraoperative hemorrhage and damage to adjacent structures [1]. This complexity underscores the need for less invasive treatment options, particularly when a fertility-preserving approach is warranted due to patient preferences.

Given the complexity of surgical management, less-invasive methods may be preferable as first-line management strategies for symptom reduction in patients with large cervical leiomyomas. While uterine artery embolization is an established method for treating uterine leiomyomas, few studies have examined its efficacy for treating cervical leiomyomas. The cervical arterial supply demonstrates significant variability and can originate from several vessels; thus, identifying a single dominant arterial supply can be challenging [4]. Consequently, uterine artery embolization can result in insufficient leiomyoma infarction, with recent studies demonstrating a success rate between 55.5% and 80% [1,4].

Therefore, a thorough investigation of the pelvic vasculature should be conducted before embolization to identify the dominant arterial supply of the cervical leiomyomas and any collateral vessels. For uterine leiomyomas, the ovarian artery has been reported to contribute to the tumors' vascular supply in approximately 25% of cases [5]. Ovarian artery embolization has been previously demonstrated for treating uterine leiomyomas, with previous studies reporting considerable efficacy when indicated [5]. However, ovarian artery embolization for a cervical leiomyoma has yet to be described. Cervical leiomyomas more commonly derive their vascular supply from uterine artery branches; this can be in the form of a plexus of branches or a single branch [4]. This variability has likely contributed to the relative lack of information on embolization as a treatment for cervical leiomyomas. In this case, the cervical leiomyoma was supplied primarily by the bilateral ovarian arteries, a unique anatomic variant providing an opportunity for selective embolization. All identifying information regarding

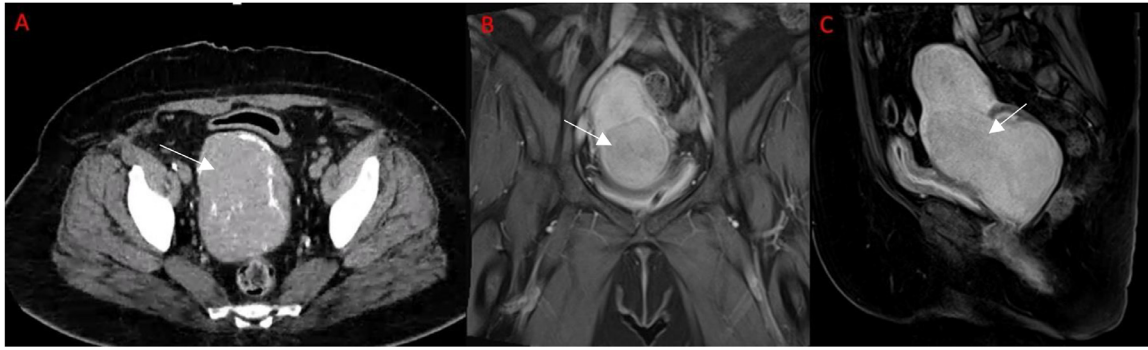
this patient has been removed to preserve patient confidentiality.

### Case presentation

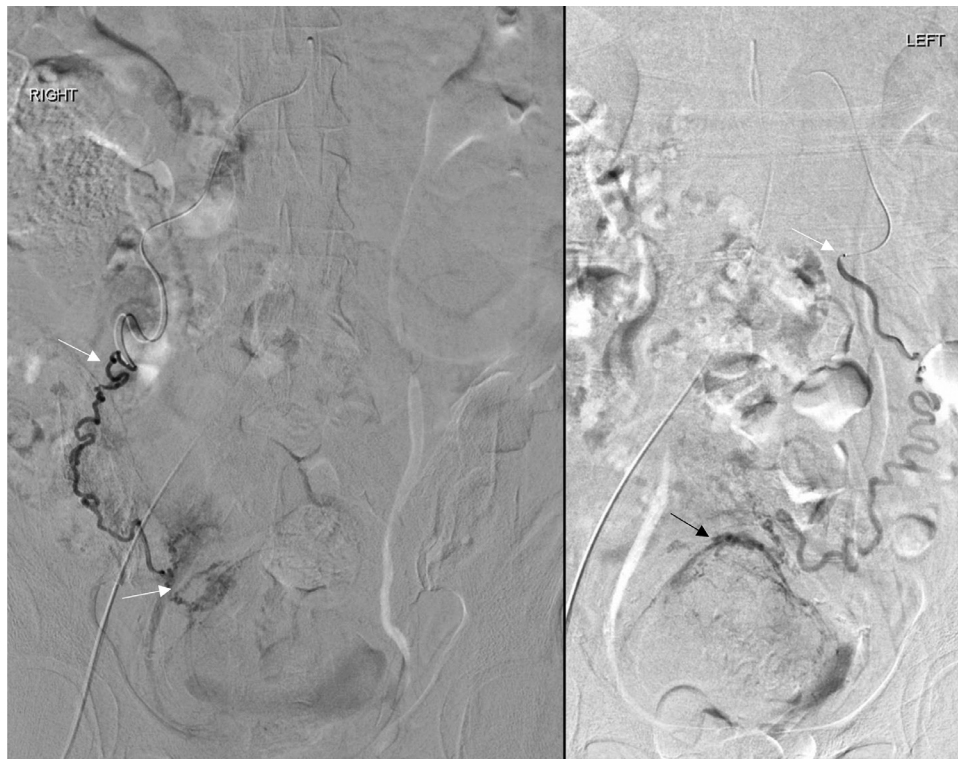
A 54-year-old woman with a past medical history of hyperlipidemia, hypertension, diabetes mellitus, anemia, asthma, and recurrent urinary tract infections presented to interventional radiology with a large cervical leiomyoma. She first presented to her obstetric gynecologist with a newly diagnosed cervical mass and was experiencing occasional bouts of heavy bleeding every 3 to 4 months. She has not had a menstrual cycle in several years and stated that she had been experiencing hot flashes for approximately 10 years. At the time of her presentation to obstetric gynecology, she was unable to empty her bladder, and a Foley catheter was placed to relieve her urinary retention.

The initial pelvic exam showed blood on the perineum, a round white mass in the posterior cul-de-sac, and a non-palpable cervix. A magnetic resonance imaging (MRI) study with and without contrast was conducted and revealed a cervical leiomyoma—measuring  $6.7 \times 7.2 \times 11.3$  cm—extending into the cervical canal and prolapsing into the vaginal canal. Due to the size of the leiomyoma and the accompanying urinary retention experienced by the patient, she was referred to interventional radiology for a uterine artery embolization to reduce the size of the fibroid to relieve the patient's bulk symptoms.

After the patient was anesthetized and prepped, an intra-procedural flush aortogram demonstrated that the dominant arterial supply for the leiomyoma originated from the bilateral ovarian arteries (Fig. 1). Intra-procedural CT angiography fur-



**Fig. 2 – Intraprocedural angio-CT and preprocedural MRI with contrast—(A) Demonstrating the large enhancing cervical leiomyoma (white arrow) without nontarget enhancement. (B) Contrast-enhanced coronal T1. (C) Contrast-enhanced sagittal section.**



**Fig. 3 – Intraprocedural images of bilateral ovarian arteries—Right and left images demonstrate the injection of contrast agent (white corresponding to the injection site, black arrow corresponding to blush created by the leiomyoma) into the bilateral ovarian arteries supplying the cervical leiomyoma.**

ther showed enhancement of the leiomyoma with minimal enhancement in nontarget tissues (Fig. 2A). With the dominant arterial supply arising from the bilateral ovarian arteries, the focus shifted from the uterine to the bilateral ovarian arteries. Both ovarian arteries were embolized using 500-700  $\mu\text{m}$  embospheres® (Merit Medical, South Jordan, UT) followed by 700-900  $\mu\text{m}$  embospheres® (Merit Medical) (Fig. 3). Digital subtraction angiography was performed after each embolization, with both demonstrating adequate stasis in the leiomyoma (Fig. 4).

The procedure concluded without immediate complications, and the patient was admitted to the interventional radiology service overnight for observation and pain control. She experienced an uneventful postprocedural recovery with minimal pain and nausea and was discharged to home the following day. At her 1-month follow-up appointment, there were no signs of leiomyoma expulsion or abnormal bleeding; her urinary retention had significantly improved, and the Foley catheter was removed. Two months postprocedure, the patient had no reported complaints and was asymptomatic.





**Fig. 4 – Post-embolization aortogram—Flush aortogram following ovarian artery embolization demonstrated adequate stasis of flow.**

## Discussion

Uterine leiomyomas are among the most common benign smooth muscle tumors in women [1]. In contrast, cervical leiomyomas are rare and lack sufficient evidence to recommend a single best treatment approach. Management options are similar to uterine fibroids, consisting of surgical treatment, treatment by interventional radiology, or conservative treatment.

For patients wishing to pursue a fertility-sparing approach, conservative management with careful observation can be a viable option. One case study described a patient with a cervical leiomyoma who was able to conceive and carry a term infant without intervention [6]. However, the patient did experience several episodes of bleeding, one requiring a blood transfusion, during her pregnancy, and there was an observed enlargement of the cervical fibroid; however, the fibroid did degenerate during the postpartum period [6]. While this man-

agement strategy can be successful, it is not without risks. In patients with large cervical leiomyomas, a more active management strategy may be preferred to avoid excessive bleeding and other complications.

Surgical excision is possible in cases where conservative management is not preferred. It is estimated that approximately 88% of patients with cervical leiomyomas are treated with surgical excision [1]. However, in contrast to uterine fibroids, the excision of cervical fibroids is significantly more challenging due to the positioning between an anteriorly displaced bladder, the rectum posteriorly, and the proximity to the ureters [7]. This challenging anatomy can increase the risk of intraoperative hemorrhage. Thus, there is significant interest in developing new methods to reduce these associated risks. Several cases have been published demonstrating new techniques and strategies, such as preoperative uterine artery embolization to decrease intraoperative blood loss and double-J stenting to avoid ureter injury [7,8]. Despite these recent advancements, there is still a significant risk of damag-

ing the reproductive structures. Thus, in patients wishing to preserve fertility, surgical management may not be the best strategy.

Embolization, therefore, holds a unique position as a less invasive approach for treating cervical leiomyomas. Uterine artery embolization is a well-established practice for treating uterine leiomyomas. The rarity of cervical leiomyomas, however, has resulted in relatively few cases of uterine artery embolization upon which to draw meaningful clinical conclusions. Of the available published literature, no cases demonstrate the successful treatment of a cervical fibroid via ovarian artery embolization.

This approach was possible since the dominant arterial supply to the cervical leiomyoma was via the ovarian arteries. While a cervical leiomyoma treated with ovarian artery embolization has yet to be reported, the literature supports this approach in the treatment of uterine leiomyomas. Ovarian artery blood supply to uterine leiomyomas has been suggested as a source of incomplete leiomyoma infarction following uterine artery embolization [5,9]. Yet, ovarian artery embolization presents a unique set of challenges. Due to their small caliber, the ovarian arteries may be absent on angiography and have been reported as appearing on only 20% of flush aortograms [5]. However, if the vessels are of normal caliber and fail to appear on imaging, their significance for the survival of the leiomyoma postembolization is unclear. Ovarian artery embolization also carries an increased risk of ischemic injury to the ovaries, potentially impairing reproductive and hormonal functioning. Successful cases of ovarian artery embolization resulting in no impairment have been reported, but patients should still be counseled on this risk [10].

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## Conclusion

This case demonstrated the treatment of a large cervical leiomyoma via ovarian artery embolization without uterine artery embolization. This approach was possible due to the cervical leiomyoma being predominantly supplied by the bilateral ovarian arteries. While ovarian artery embolization can be a viable method for treating symptomatic cervical leiomyomas, sparing the patient from a potentially complicated surgery, patients should be counseled on the potential risk to fertility and hormonal functioning.

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## Patient consent

Verbal and written consent was obtained from the patient in accordance with institutional protocols.

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