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Review

# Literature review of outcomes and prevalence and case report of leiomyosarcomas and non-typical uterine smooth muscle leiomyoma tumors treated with uterine artery embolization

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ABSTRACT

*Objective:* To describe the early and late outcomes of uterine smooth muscle tumors that are either malignant or have the potential for recurrence (MRUSMTs) after uterine artery embolization (UAE).
*Design:* Literature review of MRUSMTs in case reports and in studies on patient outcome after UAE and reports of one case of leiomyosarcoma (LMS) and 2 cases of bizarre leiomyoma (BL) after UAE.
*Setting:* University hospital.
*Intervention(s):* Main outcome measure(s) and clinical outcome of UAE and prevalence of MRUSMT.
*Result(s):* In the review of clinical trials, six cases of sarcomas were reported after UAE treatment in 8084 procedures. One of the six sarcoma cases and one case of intravenous leiomyomatosis occurred more than two years after the UAE.

Thirteen cases of LMS, two cases of BL and no cases of MRUSMTs after UAE were identified in the published case reports. Six of the thirteen patients with sarcomas exhibited a good initial clinical response, but their symptoms relapsed after six months. UAE had a failed outcome in the two BL cases.
*Conclusion(s):* MRUSMTs are rarely treated using UAE; late malignant transformation is infrequent but may be underreported. UAE treatment of leiomyosarcomas does not seem to spread the disease, but this approach may impair prognosis by delaying diagnosis. Tumors with low malignant potential may initially exhibit volume reduction and a good clinical response, but these tumors may exhibit persistent enhancement with contrast-enhanced magnetic resonance imaging (MRI). Special attention is required in cases with or without a limited response to UAE.



**Contents**



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## Introduction

A leiomyoma (LM) is the most common benign neoplasm in women of reproductive age [1]. Minimally invasive surgical techniques for LMs are well known and have a reduced risk of operative morbidity and mortality. Techniques such as power morcellation may spread an occult cancer during surgery and worsen the patient's outcome; this challenge has made it increasingly important to differentiate benign from malignant uterine smooth muscle tumors. Nevertheless, the development of a safe and secure morcellation bag must also have high priority [2].

The outcome of an occult cancer after treatment with uterine artery embolization (UAE) has been described in a few case reports [3–14],

We report a case of the late development of a leiomyosarcoma (LMS) and two cases of bizarre leiomyoma (BL) after UAE. These cases raise concerns regarding the risks of worsening a patient's prognosis by treating uterine sarcomas with UAE and whether benign LMs, smooth tumors of uncertain malignant potential (STUMPs) or bizarre tumor types undergo malignant transformation after UAE. To address these concerns, we performed a Medline search to evaluate cases of other STUMPs and LMSs. The aim was to perform a condensed review of the outcome after UAE in cases of these rare tumors.

## Methods

The Medline and Cochrane databases were systematically searched for studies using the following search terms: "uterine artery embolization AND uterine sarcoma", "leiomyosarcoma", "endometrial stromal sarcomas", "bizarre leiomyoma", "aplastic leiomyomas", "mitotically active leiomyoma", "cellular leiomyoma", "myxoid leiomyoma", "epithelioid leiomyoma", "STUMP, and "uterine artery embolization AND outcome". Thirteen relevant case reports were identified, and none of the cases involved BL or other LMs with little potential for recurrence, STUMP or UAE. Moreover, we searched studies on the outcomes and complications after UAE. We restricted the search to studies with more than 100 patients. The search ended on March 2014.

Uterine smooth muscle tumors that are malignant or have the potential for recurrence or metastasis include uterine sarcomas, STUMPs, BLs, intravenous leiomyomatosis and benign metastasizing LMs. In this review, these tumors are referred to as malignant or possibly recurrent uterine smooth muscle tumors (MRUSMTs). Uterine smooth muscle tumors are classified according to their pathologic features and involve a combination of three histological features, including atypia, mitotic rate and type of necrosis [15]. LMSs typically exhibit diffuse moderate to severe atypia, a mitotic count $\geq$10 per 10 high power fields (HPFs) and tumor cell necrosis [16]. Uterine sarcomas are rare and account for less than 3% of all female genital tract malignancies [1]. Various studies report an incidence of LMS ranging from 0.24 to 1.4% [15,17]. Uterine sarcomas are classified as LMSs, endometrial stromal sarcomas (ESSs), adenosarcomas, undifferentiated sarcomas and other types of sarcomas. Those tumors that cannot be classified unequivocally as benign ordinary LMs or malignant are termed STUMPs [16] with recurrence and/or metastatic potential [18,19]. A BL, also referred to as atypical, pleomorphic or symplastic LM, belongs to a group of rare LM variants with a lower mitotic count and a lower potential for recurrence and/or metastasis compared with STUMPs (Table 1). The carcinogenesis of LMs can be mediated through cytotoxic, oncotic or apoptotic necrosis and a regenerative response following cellular loss [20–22]. The majority of LMSs arise de novo, and less than 5% are believed to arise from the malignant transformation of an existing symplastic LM [19].

## Cases

### *Case 1*

A healthy premenopausal woman with menorrhagia was treated with UAE. Preoperative transvaginal ultrasound (TVUS) and contrast-enhanced magnetic resonance imaging (MRI) scans revealed a 5 × 6 × 5.5-cm submucosal LM in the posterior wall of the uterus with contrast enhancement of the peripheral portions and no enhancement of the central region (Fig. 1.1).

Two months later, the embolization procedure was performed [23].

At the three-month follow-up, TVS revealed a reduction in the LM size to 2.4 × 3 × 2.8-cm.

A control contrast-enhanced MRI scan seven months later revealed a submucosal LM 2.2 × 2.6 × 2-cm in size with perfusion

**Table 1**
Classification of uterine smooth muscle tumors other than leiomyoma and leiomyosarcoma.

| | |
|---|---|
| **Recurrent and/or metastatic potential** | •Stromal tumor of undetermined malignant potential<br>•Intravenous leiomyomatosis<br>•Benign metastazing leiomyoma |
| **Reduced risk of recurrence or no recurrence and/or metastatic potential** | •Bizarre leiomyoma (atypical, pleomorphic or symplastic leiomyoma)<br>•Mitotically active<br>•Dissecting<br>•Myxoid<br>•Epitheloid<br>•Diffuse leiomyomatosis |