

Original Investigation

Effect of tumor morcellation in patients with early uterine sarcoma: a multicenter study in Germany

Gitas et al. Effect of early uterine sarcoma morcellation

George Gitas¹, Kubilay Ertan², Sascha Baum¹, Achim Rody¹, George Pados³, Kristina Wihlfahrt⁴, Christos Kotanidis⁵, Leila Allahqoli⁶, Antonio Simone Laganà⁷, Soteris Sommer¹, Ibrahim Alkatout⁴

¹Department of Obstetrics and Gynecology, University Hospital of Schleswig Holstein, Campus Luebeck, Luebeck, Germany

²Department of Obstetrics and Gynecology, Municipal Hospital of Leverkusen, Leverkusen, Germany

³First Department of Obstetrics and Gynecology, Aristotle University of Thessaloniki, Thessaloniki, Greece

⁴Department of Obstetrics and Gynecology, University Hospital of Schleswig Holstein, Campus Kiel, Kiel, Germany

⁵Department of Obstetrics and Gynecology, Vivantes Humboldt, Berlin, Germany

⁶Endometriosis Research Center, Iran University of Medical Sciences, Tehran, Iran

⁷Department of Obstetrics and Gynecology, Filippo Del Ponte Hospital, University of Insubria, Varese, Italy

Address for Correspondence: George Gitas

e.mail g.gitas@gmail.com ORCID: orcid.org/0000-0002-9242-8041

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Abstract

Objective: The use of power morcellation at laparoscopy may worsen survival rates for patients with malignancy. The aim of the present study was to report the outcome of patients with early-stage uterine sarcoma after morcellation or total en-bloc resection, and evaluate potential signs of sarcoma preoperatively.

Material and Methods: This multicenter retrospective study consisted of patients, who underwent surgery for FIGO-stage-I uterine sarcoma. Twenty-four patients were divided into a non-morcellation group and a morcellation group. Clinical records and the outcomes of patients, including one-, three- and five-year survival rates were reviewed. Preoperative characteristics of patients with sarcoma were compared to those of a control group with uterine myoma (1:4 ratio), matched by age and type of operation.

Results: Obesity was an independent risk factor for uterine myoma. Tumor growth, solitary growth, largest-diameter lesion > 8.0 cm, and anechoic areas suggesting necrosis and increased vascularization were significantly more common in the sarcoma group. A large tumor diameter was significantly associated with mortality. Patients in the non-morcellation group had a slightly lower disease-free survival, but poorer overall survival rates compared to patients in the morcellation group, however both differences were not statistically significant. Patients in the non-morcellation group, who had undergone a re-exploration experienced late recurrence, but we registered no upstaging after the operation.

Conclusion: Preoperative ultrasound characteristics could be useful to distinguish sarcoma from leiomyoma of uterus. Morcellation of a sarcoma may increase abdominal and pelvic recurrence rates, but may not be associated with overall survival in patients with FIGO stage I disease.

Keywords: Morcellation, unexpected malignancy, sarcoma, laparoscopy, survival rate

Introduction

Uterine sarcomas are rare malignancies that arise from the connective tissue or smooth muscle of the uterus, accounting for 1-2% of all malignancies of the uterus and less than 1% of all genital malignancies (1).

The prediction or diagnosis of uterine sarcomas are rendered difficult by their rarity. The existing imaging techniques do not permit the differentiation of leiomyosarcoma (LMS) from myoma preoperatively (2). A preoperative biopsy is obsolete because of the risk of tumor dissemination. Moreover, a sarcoma is not diagnosed easily during surgery because a frozen-section analysis or cytological investigation does not permit the differentiation of sarcoma from myoma (2). Thus, sarcomas tend to remain underdiagnosed and are usually treated by myomectomy or hysterectomy using morcellation techniques.

Minimally invasive surgery (MIS) is associated with lower surgical morbidity than laparotomy, but both methods have similar disease-related outcomes in patients with endometrial cancer (3-6). Despite the established advantages of MIS and the use of electromechanical morcellators (EMM), the morcellation of unexpected sarcomas during surgery has been known to cause the dissemination of tumor tissue, resulting in poor survival outcomes (7).

For patients undergoing myomectomy or hysterectomy, there was a warning, in April 2014, against the use of laparoscopic power morcellation by FDA (8). The unexpected malignancy was estimated to occur in 1 out of 350 women (8-11). After this warning, several renowned hospitals all over the world stopped using them.

The purpose of this multicenter analysis was to estimate the influence of morcellation on clinical outcomes in patients with early-stage uterine sarcomas (FIGO stage I) in Germany. Furthermore, we estimated risk factors for the presence of uterine sarcoma and analyzed preoperative ultrasound characteristics in order to determine signs of sarcoma preoperatively.

Material and Methods

A retrospective multicenter study was performed at four departments of Obstetrics and Gynecology in Germany from June 2007 to Mai 2019. The study was approved by the local ethics committee. The information system of the academic teaching hospitals of xxxxx , xxxxxx, the University Hospital of xxxxx and the University Hospital of xxxxx were used from the authors to identify women who had undergone surgery for FIGO stage IA or IB uterine sarcoma (12). Patients with carcinosarcoma and those who had been treated with endoscopic retrieval bags were also excluded.

The data of 24 patients were collected. Indications for the intervention, medical history, BMI and preoperative symptoms, histological results, and postoperative data were analyzed. Pathological slides were reviewed by two experienced pathologists. A clinically follow-up examination were performed every three months for all patients.

Tumor recurrence, disease-free survival (DFS), anatomical location of tumor recurrence and overall survival (OS) were recorded during follow-up examinations. Patients were divided into the following two groups: those who underwent total laparoscopic, abdominal or vaginal hysterectomy without morcellation (non-morcellation group), and those who underwent hysterectomy or myomectomy including vaginal, laparoscopic or abdominal, morcellation (morcellation group).

A group of patients with uterine myoma selected from all of those who underwent hysterectomy or myomectomy were matched by age and type of operation (4:1 ratio) during the same period. Patient characteristics and the indication for surgery were analyzed. Preoperatively, all patients were examined by experienced gynecologists on the basis of German guidelines (13). Preoperative ultrasound parameters (14), such as size of the tumor, anechoic areas suggesting necrosis (Figure 1), solitary growth, increased vascularization (Figure 2), an irregular lining, and endometrial thickness > 5 mm in postmenopausal patients were taken into account. Ultrasound was performed within 4 weeks before surgery, and ultrasound characteristics of patients with uterine sarcoma were compared with those of controls with uterine myoma.

Statistical analysis

Data were collected in an Excel 2010 table (Microsoft Corporation, Redmond, WA, USA) and evaluated using the SPSS software Version 26. To compare absolute and relative frequencies of clinical parameters, either a chi-square-test or a Fisher's Exact test was performed, depending on scaling and distribution of the variables. A p -value < 0.05 was considered statistically significant.

Results

The patient's characteristics summarized in Table 1. The youngest woman was 40 years old and the oldest 84 years. The mean weight of the

uterus was 324.1 grams.

The most common indication for surgery was bleeding disorders (62.5 %); the percentages of indications for surgical procedures are shown in Table 2. The types of operation at each department are summarized in Table 3. The majority of unexpected sarcomas (7/10) were diagnosed after performing laparoscopic supracervical hysterectomy (LASH).

One patient had used tamoxifen and another patient had undergone irradiation of the pelvis. Seven patients had a family history of cancer (29.1 %), and one patient a family history of sarcoma (4.2 %). The principal characteristics of patients with sarcoma are summarized in Table 1. Seven patients underwent dilatation and curettage preoperatively. The diagnostic success rate was 71.4 %; the outcome of the histological investigation was false negative in two cases.

Manual morcellation was applied in two patients who underwent laparoscopic hysterectomy as the initial procedure, while power morcellation was performed in eight patients who underwent laparoscopic myomectomy or subtotal hysterectomy as the initial procedure. In the morcellation group, five patients underwent a staging laparotomy and two a staging laparoscopy with cytological examination of fluid from the pouch of Douglas, bilateral ovariectomy, removal of the cervical stump, omentectomy, and multiple peritoneal biopsies two to four weeks after the first procedure. In the non-morcellation group, only two patients underwent a staging operation. Two patients underwent a pelvic and para-aortic lymphadenectomy; no lymph node metastasis was found. A computed tomography (CT) scan of the pelvis and the chest was performed in all patients either preoperatively or postoperatively. The staging operations and examinations did not reveal upstaging of the tumor. Subsequent treatment, the results of follow-up, and the relapse of sarcoma are shown in Table 1 and Figure 3. Four patients (16.7%) underwent a third operation at which a complete resection was performed. Four out of six patients with distant recurrence developed a metastasis in the lung. The mean age (\pm SD) of controls (55.3 ± 10.51 years) and the types of operations were similar (Table 4). Twelve women of the sarcomas group (50.0 %) were postmenopausal, and 47 (49 %) of the uterine myoma group. The average BMI of controls was 29.8 kg/m^2 . In contrast to women with sarcoma, a BMI of 25 kg/m^2 was an independent risk factor for uterine myoma ($p < 0.05$). The most common indications for surgery and potential ultrasound characteristics are shown in Table 4. The median diameter of the tumors was 5.6 cm. A large tumor diameter ($p < 0.05$) and higher tumor stage (FIGO IB) were significantly associated with mortality rates ($p < 0.05$).

Discussion

We compared the outcomes of FIGO stage I uterine sarcoma after morcellation versus hysterectomy without morcellation. Our results revealed a slightly better DFS for the non-morcellation group compared to the morcellation group, but with no benefit in OS. However, both differences were not statistically significant.

Obesity ($\text{BMI} > 25 \text{ kg/m}^2$) was not significantly predictive of uterine sarcoma, which contrasted the general view of obesity as a risk factor for malignancies, and also contrasted the opposite data registered for patients with uterine myoma. In a study comprising 31 patients with uterine sarcoma (15), Cho et al. found a $\text{BMI} \leq 20 \text{ kg/m}^2$ to be an independent risk factor of disease. Obesity is known to be a major risk factor for breast cancer (hormone receptor positive) and endometrial cancer (type I endometrioid tumor) (16). Moreover, obesity is also a major risk factor for uterine myoma, which is typically an estrogen-dependent tumor (17). Pathophysiological differences between endometrial cancer, uterine myoma, and uterine sarcoma may explain the lower BMI in women with uterine sarcoma.

In accordance with published data (18), uterine bleeding and abdominal pain were almost equally common in patients with uterine sarcoma and those with uterine myoma in our study. On the other hand, tumor growth as an indication for surgery was significantly more common in the sarcoma group, which might explain the largest diameter of tumor in sarcomas group. Radiation exposure and a history of radiation therapy of the pelvis all have been reported to increase the likelihood of developing sarcoma; the same has been noted in breast cancer patients treated with tamoxifen (19). However, in the present study only one patient had a history of radiotherapy and, also, one patient had undergone treatment with tamoxifen.

In our analysis 13 of 24 cases had abnormal uterine bleeding, however we performed dilatation and curettage preoperatively only in seven of them. The diagnostic success rate was 71.4 %; false-negative results of histology were noted in two cases. Similar data were reported in a large review of 302 sarcomas by Wais et al. (20): uterine sarcoma was diagnosed in 65 % of patients, who underwent endometrial sampling preoperatively. Another analysis demonstrated a misdiagnosis rate of 19 % for endometrial cancer and 36 % for sarcoma (21). However, abnormal uterine bleeding remains a significant clinical sign and should not be underestimated. We encourage the use of endometrial sampling in patients with suspicious myoma, especially in the presence of abnormal uterine bleeding.

Solitary tumors larger than 8 cm in size with intensified peripheral and central vascularization were the most common features of uterine sarcoma on ultrasound (14, 22). According to Exacoustos et al. (14), ultrasound features such as single lesions, increased central and peripheral vascularity, large-diameter lesions (≥ 8 cm), and cystic degeneration were significantly associated with uterine sarcoma. Viewing these features together, the authors registered a sensitivity of 100 % and a specificity of 86 %. However, the small sample size of the study (8 patients with sarcoma compared with 225 patients with leiomyoma) was a limitation to come to a conclusion. We compared ultrasound features between 24 uterine sarcomas and 96 uterine myoma, and observed the following ultrasound features predictive of uterine sarcoma: solitary growth, largest-diameter lesion > 8.0 cm, anechoic areas suggesting necrosis, and increased vascularization. However, we observed anechoic areas suggestive of necrosis in a mere 20.8 % of our cases, and high vascularization in 34.8 %. A greater frequency of sarcomas was noted in the presence of characteristics such as a solitary tumor (73.9 %) and tumor size larger than 8 cm (54.5 %). Uterine sarcomas are not easily identified.

As tumor size is known to be a prognostic factor for early leiomyosarcoma (23). In the present study the tumor size was significantly associated with mortality rates. A higher tumor stage (FIGO IB) was also significantly associated with the outcome. In a study comprising 34 patients with early leiomyosarcoma, Lin et al. evaluated the effect of morcellation on the outcome and concluded that the size of tumor outweighed morcellation; the former was more significant than morcellation in predicting a poor outcome (24). However, it should be noted that, in small studies, a slight difference in tumor size might cause a large difference in the combined statistical analysis of survival outcome.

In unexpected uterine sarcomas the use of morcellators has been reported to result in cancer upstaging and worsen survival rates (25). However, we reported no upstaging of the tumor in 10 patients who underwent staging operations at two to four weeks after the initial procedure. Our results concur with the data reported by Park et al. (26), who performed complete staging surgery in 23.9 % of their patients and observed no upstaging in any patient. In contrast, Einstein et al. (27) mention that approximately 15 % of patients were upstaged by re-exploration, particularly those with leiomyosarcoma who underwent EMM. Even in a large systematic review (28), the authors were unable to conclude

whether morcellation of sarcomas causes upstaging of cancer compared to *en bloc* removal. Different morcellation techniques could be the reason for the varying incidence of intraabdominal spread.

Published data concerning the outcome of uterine sarcoma after morcellation are not homogeneous. In a large, 58 patients' study, the authors (29) found that the median recurrence-free survival of patients with uterine leiomyosarcoma who underwent EMM was significantly shorter than that of patients who underwent total abdominal hysterectomy (10.8 vs. 39.6 months). However, the study was not limited to early-stage uterine sarcoma. On the other hand, Mais et al. reported no significant difference in survival for patients with FIGO stages I and II disease with disruption (n = 32) of uterine sarcoma compared to those without tumor disruption (n = 143) over a median follow-up period of 2.9 years. The above mentioned reports highlight the need for further investigations focusing on patients with FIGO stage I disease who have undergone surgery with or without morcellation. Moreover, studies analyzing the outcome of patients with sarcoma after morcellation must be interpreted with caution.

Our homogenous data revealed a slightly better DFS for the non-morcellation group with FIGO stage I uterine sarcoma compared to the morcellation group, but slightly worse OS. However, these differences were not statistically significant. Patients who underwent morcellation were slightly younger than the others (52.8 vs 62.7 years, $p = 0.074$), and younger age is known to be associated with a better outcome (30). Furthermore, the morcellation group had slightly higher rate of leiomyosarcomas than the non-morcellation group (80 vs 57.1 %, $p = 0.388$). However, high grade sarcomas (Grading G3), which are associated with poor prognosis, were in both groups similar (20 vs. 28 %). Raine-Bennett et al.(31) reported no significant difference in the unadjusted three-year DFS between patients with FIGO stage I uterine sarcoma who did or did not undergo morcellation. In our study, patients who underwent morcellation experienced an intra-abdominal recurrence more often (80%) than did patients in the non-morcellation group (40%). Notably, in two cases we observed dissemination of sarcoma after morcellation on both sides of the abdominal wall, in the area of trocar placement at the first operation. In contrast, Lin et al. (24) reported that morcellation of sarcoma did not increase the abdominal pelvic recurrence rate, but may be associated with poorer survival in unexpected FIGO stage I disease. Besides tumor morcellation, any type of tumor injury may aggravate hematogenous spread of tumor cells. The most common site of extra-pelvic recurrence in our patients was the lungs (67 %), which is in accordance with the published literature (32). Factors that primarily affect the outcome of disease in patients with uterine sarcoma remain unclear. Notwithstanding the above mentioned negative outcome (33), the rarity of uterine sarcoma and its inherent poor prognosis should not affect the use of minimally invasive surgery for this condition.

We assumed a favorable prognosis for patients who had undergone a second operation with longitudinal laparotomy due to an unexpected morcellated sarcoma. Three patients who did not undergo re-exploration after morcellation of sarcoma experienced recurrent disease within 12 months. Of the remaining seven patients with morcellated sarcoma who underwent a re-exploration, only two experienced a recurrence after 12 months. In a review comprising 47 published studies, Tantitamit et al. reported that early re-exploration (within 30 days) led to lower mortality rates and a better prognosis (34) compared to late re-exploration (> 30 days). Based on our data, we conclude that LASH or myomectomy as the first operation was no significant predictor of a poor prognosis when a re-exploration was performed. Our short re-operation interval (2 to 4 weeks) might have contributed to this result. However, the small number of patients does not permit definite conclusions.

As mentioned earlier, the main limitation of the present study is the small number of patients, which reduced the statistical power of the analysis. Although patients with sarcomas and those with uterine myoma were matched by age and type of operation, factors such as the gynecologists performing the ultrasound examination and the ultrasound device were not matched. On the other hand, detailed preoperative and postoperative information were available for all patients, and both groups of patients were followed up for a relatively long period of time. To our knowledge, published data concerning predictions and the outcome of FIGO stage I uterine sarcoma are limited and inhomogeneous. Our data contribute significantly to the published literature on the subject.

Conclusion

We were not able to determine patient characteristics that could be clinically useful in the preoperative diagnosis of early-stage uterine sarcoma. Obese women are at no greater risk of developing uterine sarcoma. Ultrasound characteristics such as solitary and large tumors measuring more than 8 cm in size, with anechoic areas indicative of necrosis and high vascularization, might serve as signs of uterine sarcomas. In addition, a combination of BMI, age, and ultrasound characteristics may enhance the accuracy of preoperative diagnosis of uterine sarcoma. Sarcoma morcellation may increase abdominal pelvic recurrence rates, but may not be associated with OS in patients with FIGO stage I disease. The effects of surgical techniques involving tumor disruption on survival remain controversial. Further studies should be designed to assess the positive effects of re-exploration after morcellation of occult sarcomas. The limited number of cases investigated in the present study, the low incidence of the disease, the level of evidence for risk factor, and the outcome of morcellated uterine sarcoma does not permit any specific recommendations about the treatment of uterine sarcomas. Future studies should be focused on the preoperative diagnosis and outcome of early-stage uterine sarcoma, while the rarity of the disease does not permit prospective investigations.

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| Table 1. Patient characteristics, adjuvant management and survival outcome | | | | | |
|---|----------|-------------------------------|---------------------------|--------------|--------------|
| | N | Non-Morcellation Group | Morcellation Group | Total | p |
| Age (years) | 24 | 52.8 ± 15.48 | 62.7 ± 12.48 | 58.6 ± 14.89 | 0.074 |
| BMI (kg/m ²) | 22 | 29.12 ± 7.81 | 24.17 ± 2.51 | 26.87 ± 6.40 | 0.159 |
| <u>Menopause status</u> | | | | | |
| Premenopausal | 24 | 3 (21.4 %) | 6 (60.0 %) | 9 (37.5 %) | 0.092 |
| perimenopausal | 24 | 2 (14.3 %) | 1 (10.0 %) | 3 (12.5 %) | 0.629 |
| Postmenopausal | 24 | 9 (64.3 %) | 3 (30.0 %) | 12 (50.0 %) | 0.098 |
| Tumor size > 8 cm | 22 | 8 (61.5%) | 4 (44.4%) | 12 (54.5 %) | 0.666 |
| Abnormal bleeding | 24 | 8 (57.1%) | 7 (70.0%) | 13 (54.2 %) | 0.697 |
| High vascularisation | 23 | 5 (35.7%) | 3 (33.3%) | 8 (34.8 %) | 0.633 |
| LMS | 24 | 8 (57.1%) | 8 (80.0 %) | 16 (66.7 %) | 0.388 |
| ESS | 22 | 6 (50.0 %) | 2 (20.0 %) | 8 (36.4%) | 0.204 |
| <u>Grading</u> | 19 | | | | 0.524 |
| 1 | | 7 (50.0 %) | 3 (60.0 %) | 10 (52.6 %) | |
| 2 | | 3 (21.4 %) | 0 | 3 (15.8 %) | |
| 3 | | 4 (28.6 %) | 2 (40.0 %) | 6 (31.6 %) | |
| <u>FIGO</u> | 20 | | | | 0.639 |
| IA | | 4 (40.0 %) | 3 (30.0 %) | 7 (35.0 %) | |
| IB | | 6 (60.0 %) | 7 (70.0 %) | 13 (65.0 %) | |
| Upstaging | 20 | 0 | 0 | 0 | - |
| Chemotherapie | 23 | 1 (7.1 %) | 1 (11.1 %) | 2 (8.7 %) | 0.640 |
| Therapy with Gestagene | 24 | 0 | 2 (20.0 %) | 2 (8.3 %) | 0.163 |
| Recurrence | 24 | 5 (35.7 %) | 5 (50.0 %) | 10 (41.7 %) | 0.678 |
| <u>Location of recurrence</u> | | | | | |
| -Abdomen/pelvis | | 3 | 1 | 3 | |
| -Distant (bone, lungs, liver, kidney) | | 1 | 3 | 4 | |
| -Both | | 1 | 1 | 2 | |

| | | | | | |
|--|----|------------|--------|--------|--------------|
| DFS 1 year | 23 | 70 % | 78.6 % | 75.5 % | 0.537 |
| DFS 3 years | 21 | 56 % | 61.5 % | 59.0 % | 0.623 |
| DFS 5 years | 15 | 29 % | 37.5 % | 33.3 % | 0.573 |
| OS 1 year | 23 | 100 % | 92.9 % | 95.8 % | 0.565 |
| OS 3 years | 18 | 87.5 % | 80 % | 85.7 % | 0.588 |
| OS 5 years | 12 | 80 % | 71.4 % | 72.7 % | 0.636 |
| DFS 1 year -after reoperation -without reoperation | | 0% 100% | | | |
| DFS: disease free survival, OS: overall survival. | | | | | |

| Table 2. Indications for surgery. | |
|--|---|
| Indications for abdominal-vaginal hysterectomy, TLH, LASH, and myomectomy | Patients who underwent surgery n |
| Bleeding disorders | 13 (54.1 %) |
| Uterine growth | 10 (41.6 %) |

| | |
|---|------------|
| Histological diagnosis of sarcoma with D&C | 5 (20.8 %) |
| Abdominal pain | 5 (20.8 %) |
| Urinary disorders (incontinence or obstruction) | 3 (12.5 %) |
| D&C: dilatation and curettage | |

Table 3: Type of operations and their percentages

| Type of operation | LASH | TLH | LM | VH | TAH | AM |
|--|------|-----|----|----|-----|----|
| n Patients with sarcoma % | | | | | | |
| xxxxxxxxx Municipal Hospital | 3 | 1 | 0 | 2 | 3 | 0 |
| University Hospital of xxxxx | 2 | 1 | 1 | 0 | 2 | 1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| University Hospital of xxxxx | 2 | 1 | 0 | 0 | 2 | 0 |
| xxxxxxxxxxxxxxxx, xxxx | 0 | 2 | 0 | 0 | 1 | 0 |
| Multicenter analysis | 7 | 5 | 1 | 2 | 8 | 1 |
| <i>Preoperatively known sarcoma</i> | 0 | 2 | 0 | 0 | 3 | 0 |
| <i>Unexpected sarcoma without morcellation</i> | 0 | 2 | 0 | 2 | 5 | 0 |
| <i>Morcellated sarcoma</i> | 7 | 1 | 1 | 0 | 0 | 1 |
| LASH: laparoscopic supracervical hysterectomy, TLH: total laparoscopic hysterectomy, LM: laparoscopic myomectomy, VH: vaginal hysterectomy, TAH: total abdominal hysterectomy, AM: abdominal myomectomy | | | | | | |

| Table 4. Ultrasound characteristics of patients and survival outcome | | | | | |
|---|-----|--------------|----------------|--------------|--------------|
| Characteristics of the patients | N | Myomas Group | Sarcomas Group | Total | p |
| Ultrasound | | | | | |
| Tumor size >8 cm | 118 | 19 (19.8 %) | 12 (54.5 %) | 31 (26.3 %) | 0.001 |
| Solitary tumor | 119 | 34 (35.4%) | 17 (73.9%) | 51 (42.5 %) | 0.001 |
| Irregular lining | 120 | 18 (18.7 %) | 5 (20.8 %) | 23 (19.2 %) | 0.770 |
| High vascularization | 119 | 9 (9.4 %) | 9 (39.1 %) | 18 (15.1 %) | 0.001 |
| Anechogenic areas with suspicion for necrosis | 120 | 7 (7.3%) | 8 (33.3%) | 15 (12.5%) | 0.002 |
| Indications for Operation | | | | | |
| Bleeding disorders | 120 | 37 (38.5 %) | 15 (62.5 %) | 52 (43.3 %) | 0.045 |
| Uterine growth | 120 | 21 (21.8 %) | 12 (50.0 %) | 32 (27.5 %) | 0.006 |
| Type of operation | | | | | |
| Hysterectomy | 119 | 84 (88.4 %) | 23 (95.8 %) | 107 (89.9 %) | 0.455 |
| Myomectomy | 120 | 4 (4.2 %) | 1 (4.2 %) | 5 (4.2 %) | 0.739 |

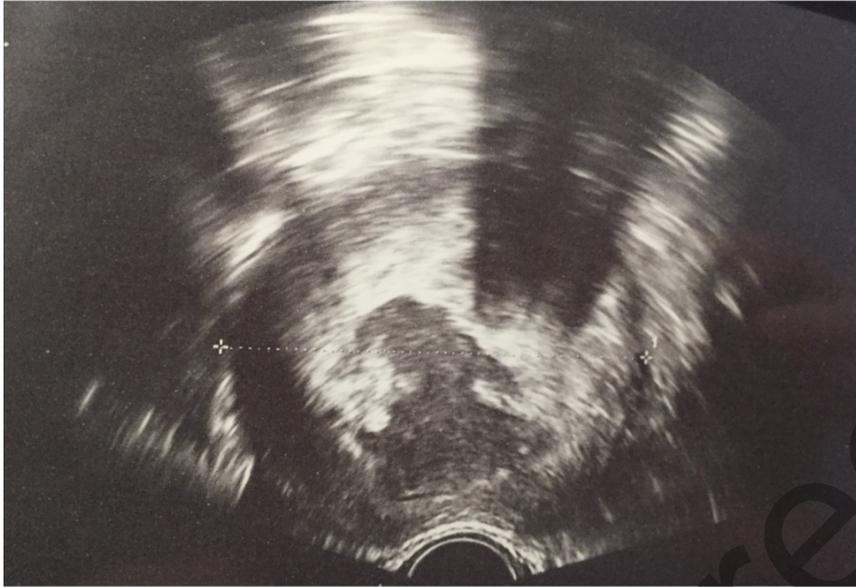


Fig. 1. Transvaginal ultrasound showing the sagittal diameter of the fundus of the uterus and the size of the tumor. Inhomogeneous appearance, central hypoechoic area, degenerative cystic changes atypical for myoma.

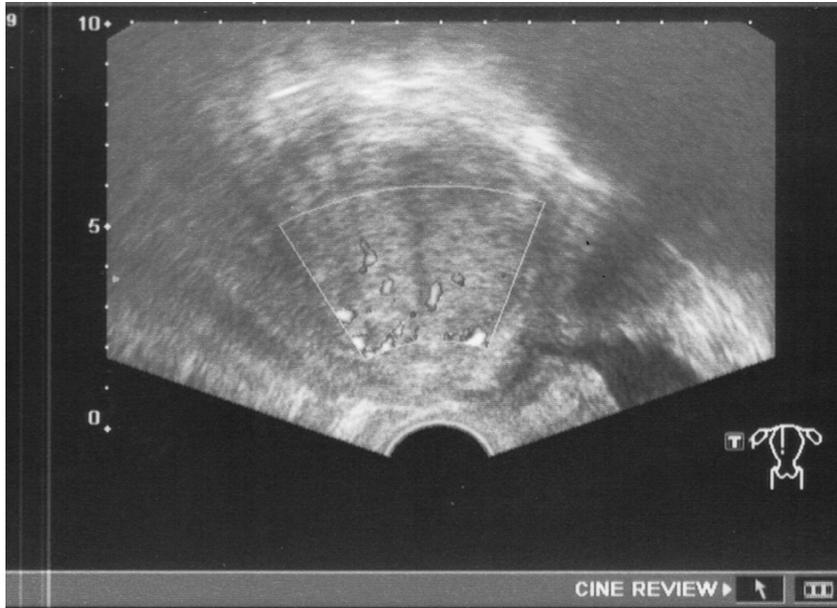


Fig. 2. Transvaginal color Doppler ultrasound shows increased central vascularization in the heterogeneous tumor (transverse orientation of the ultrasound probe).

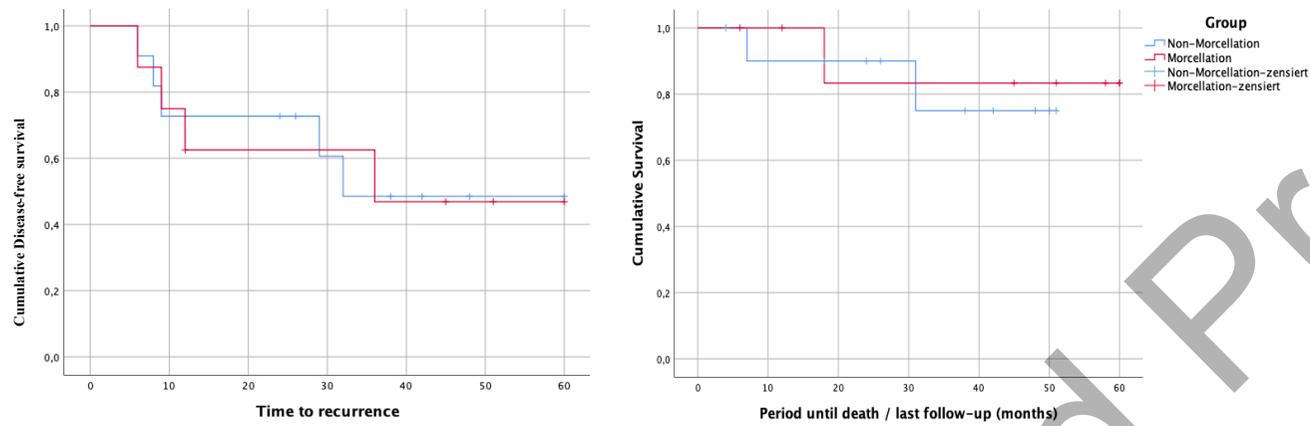


Fig. 3. Oncologic outcome of 24 patients with apparently early uterine sarcoma in relation with tumor morcellation (overall survival at the right and disease-free survival at the left).

Uncorrected Proof