

CASE REPORT

Myxoid pattern in smooth muscle tumor of uncertain malignant potential (STUMP) is a significant prognostic parameter with difficult diagnostic dilemmas

Ljubisa Jovanovic^{1,*} , Svetlana Milenkovic¹, Tijana Janjic^{2,3}, Luka Andric², Branka Sosic-Jurjevic⁴, Milan Dokic^{2,3}

¹Department of Pathology and Medical Cytology, University Clinical Center of Serbia, 11000 Belgrade, Serbia

²Clinic for Gynecology and Obstetrics, University Clinical Center of Serbia, 11000 Belgrade, Serbia

³Faculty of Medicine, University of Belgrade, 11000 Belgrade, Serbia

⁴Department of Cytology, Institute for Biological Research "Sinisa Stankovic", National Institute of Republic of Serbia, University of Belgrade, 11108 Belgrade, Serbia

***Correspondence**

jovanovicljubisa18@gmail.com
(Ljubisa Jovanovic)

Abstract

Background: Uterine smooth muscle tumors of uncertain malignant potential (STUMPs) represent a heterogeneous group of tumors with varying histological and biological characteristics. Tumors featuring a dominant myxoid stroma are uncommon in the uterus. This case emphasizes the importance of recognizing the myxoid pattern in smooth muscle tumors, especially within the STUMP category. **Case:** In this study, we present a 39-year-old woman with a large transmural intrauterine nodule. The findings indicated smooth muscle tumor tissue with a fascicular pattern, without significant ischemic necrosis or cytological pleomorphism. The mitotic count was 1/10 High Power Field (HPF). The tumor exhibited more than 50% myxoid histomorphology, indicative of a rare and specific type of smooth muscle differentiation. Immunohistochemical analysis showed positive reactions for smooth muscle differentiation, retained progesterone receptor expression, and no aberrant tumor protein p53 (p53) or cyclin-dependent kinase inhibitor 2A (p16) expressions. The marker of proliferation Ki-67 was low. Considering all the characteristics, this myxoid smooth muscle tumor was diagnosed as a STUMP myxoid neoplasm. The patient underwent a hysterectomy with bilateral salpingectomy and bilateral ovarian conservation. The patient is currently under follow-up and has not experienced any complications. **Conclusions:** This case illustrates an extremely rare instance of STUMP, which continues to pose challenges in both diagnosis and treatment. Myxoid patterns are exceptionally uncommon and often hard to detect, making them surprising in smooth muscle tumors. Recognizing this distinct differentiation is crucial, as accurate diagnostic criteria must be applied during the histopathological evaluation of these tumors. The presence of a myxoid pattern suggests a worse prognosis, highlighting the need for more vigilant follow-up in these patients.

Keywords

Myxoid; STUMP; Uterus

1. Introduction

Uterine smooth muscle tumors of uncertain malignant potential (STUMPs) are an uncommon and diverse group of neoplasms that differ in their histological features and clinical behavior [1]. According to the latest World Health Organization (WHO) definition, uterine STUMPs are smooth muscle tumors with characteristics that prevent a definitive diagnosis of leiomyosarcoma, although they do not meet the criteria for leiomyoma or its variants [2, 3]. These tumors raise concern that the neoplasm may behave malignantly. In previous studies, the authors proposed the criteria for diagnosing uterine STUMP. The criteria for conventional STUMP include: (i) presence of coagulative necrosis; (ii) moderate or severe atypia and mitotic counts 6–9/10 High Power Field (HPF); (iii) more than 15 mitoses per 10 HPFs; and (iv) infiltrative/irregular

margins, and vascular invasion [4, 5]. Diagnostic criteria for STUMPs may differ based on tumor differentiation (conventional, epithelioid, or myxoid). The myxoid pattern is considered a poor prognostic indicator, as it establishes more stringent thresholds for determining the biological behavior of myxoid smooth muscle neoplasms [5, 6].

Myxoid neoplasms of the uterus represent a varied group of soft tissue neoplasms that pose diagnostic difficulties for pathologists. The diagnosis of these tumors depends on clinicopathologic findings to establish an accurate differential diagnosis. Myxoid neoplasms are typically first classified according to their biological behavior and their histogenetic origin, which could include myxoid leiomyosarcoma, myxoid liposarcoma, and myxofibrosarcoma, among others [7]. The myxoid matrix is abundant in proteoglycans and glycosaminoglycans, particularly hyaluronic acid. It gives tissue a hypocellular

appearance and a distinctive soft, fleshy consistency upon macroscopic examination. Hydropic change may mimic a myxoid neoplasm. It is a degenerative change with no clinical significance. Mucin-producing tumors can also lead to the accumulation of extracellular mucin and its infiltration into the surrounding stroma. When the mucinous epithelial component is difficult to detect, the lesion may mimic the appearance of a myxoid tumor. Recognizing these possibilities and thoroughly evaluating the neoplastic cellular population ensures an accurate diagnosis [1, 6–8].

Myxoid STUMP is usually hypocellular, with cells dispersed within a myxoid matrix that is usually Alcian blue positive. Myxoid STUMPs exceed the criteria for myxoid leiomyomas, but do not fully meet the criteria for myxoid leiomyosarcomas. They lack significant cytologic atypia, coagulative necrosis, and typically have a low mitotic count, often with fewer than one mitosis per 10 HPF [1, 8].

Although the majority of patients with uterine STUMPs achieve a cure after complete surgical removal, a subset may develop recurrences, most often following a lengthy disease-free period, but sometimes with faster progression. Determining which tumors are more likely to behave aggressively remains difficult, highlighting the importance of careful and extended follow-up for all STUMP patients due to the unpredictable nature of their biological behavior [9, 10].

This study aims to highlight the importance of recognizing the myxoid pattern in smooth muscle neoplasms, particularly within the borderline tumor group, such as STUMP. Recognizing this pattern and the appropriate application of more stringent histopathological cut-offs are crucial, as they significantly impact the prognosis and patients follow-up.

2. Case report

In this study, we present a 39-year-old woman who complained of abnormal menstrual bleeding. In the past few months, the patient experienced increasingly profuse bleeding, which was accompanied by secondary anemia that did not adequately respond to continuous treatment. She also reported abdominal discomfort and dysmenorrhea. No other comorbidities were reported. Ultrasound examination revealed the uterus in a regular position with several intramyometrial nodules. One of the nodules measured 77 mm in maximum diameter and slightly compressed the uterine cavity. The endometrium appeared normal, measuring 6 mm in thickness, and the adnexal structures showed no abnormalities.

Due to the profuse and painful menstrual bleeding, the patient was advised to undergo surgical intervention. Preoperative imaging of the lungs, abdomen, and pelvis revealed no evidence of distant metastatic disease. During surgery, a transmural tumor nodule was removed from the uterine corpus. Tumor was with unusually soft consistency, and a gel-like surface on sections. The tissue was examined following standard macroscopic protocols.

The tissue was processed into standard formalin-fixed, paraffin-embedded (FFPE) samples. After hematoxylin and eosin (HE) staining, two certified gynecological pathologists independently analyzed the samples, arriving at the same diagnosis. The findings indicated smooth muscle tumor

tissue with a fascicular pattern, appearing relatively benign, without significant ischemic necrosis or marked cytological pleomorphism (Fig. 1A–E). The tumor exhibited more than 50% myxoid histomorphology, indicative of a rare and specific type of smooth muscle differentiation. The current WHO criteria for smooth muscle tumors with myxoid differentiation are very strict, particularly regarding their biological behavior [2]. After a detailed examination, one mitotic figure was identified in 10 HPF (Fig. 1F).

Immunohistochemical analysis (Fig. 2) showed positive reactions for progesterone receptor (PR), smooth muscle antigen (SMA), caldesmon, and desmin. The tumor protein p53 (p53) expression was wild-type, and cyclin-dependent kinase inhibitor 2A (p16) showed weak, patchy positivity. The marker of proliferation Ki-67 was present in no more than 5%. Alcian Blue histochemical analysis confirmed myxoid differentiation (Fig. 3).

Considering all the characteristics, this myxoid smooth muscle tumor, with no significant necrosis or atypia and a mitotic count of one per 10 HPF, was diagnosed as a STUMP myxoid neoplasm. Given the indistinct tumor demarcation from the surrounding myometrium, meticulous monitoring was recommended, as the biological behavior of such tumors remains unpredictable.

After extensive consideration by the tumor board regarding further monitoring, the patient decided to undergo a hysterectomy with bilateral salpingectomy and bilateral ovarian conservation. The following histopathological examination revealed focal remnants of the previous tumor mass, but no suspicious signs of definitive malignant behavior were noted. The patient is currently under follow-up and has not experienced any complications.

3. Discussion

The histologic distinction between benign and malignant uterine smooth muscle tumors remains challenging. The histopathological diagnostic criteria for STUMP remain controversial, and may require further refinement. Some authors emphasize the significance of mitotic count in the differential diagnosis between STUMP and leiomyomas, particularly in cases with bizarre nuclei [11–13]. The distinguishing degenerating nuclei from true mitotic figures is challenging. Another dilemma is mitotically active leiomyoma (>15/10 HPF), which is considered with minimal or no recurrent/metastatic potential. This variant was mostly found among women of reproductive ages, as submucosal localization. It should not have atypia [3].

STUMPs typically arise in women of reproductive age. Identifying STUMP before surgery and histopathological evaluation is challenging. On ultrasound or magnetic resonance imaging (MRI), approximately 50% of STUMPs measure more than 5 cm in size and present with irregularly defined borders [14]. The echogenicity in most of the STUMP cases were similar to myomas, but one third of them showed atypical findings. Some authors analyzed serum Cancer Antigen 125 (CA125) levels and did not find any abnormalities in majority of STUMP cases. To date, no definitive imaging techniques or biomarkers are available for

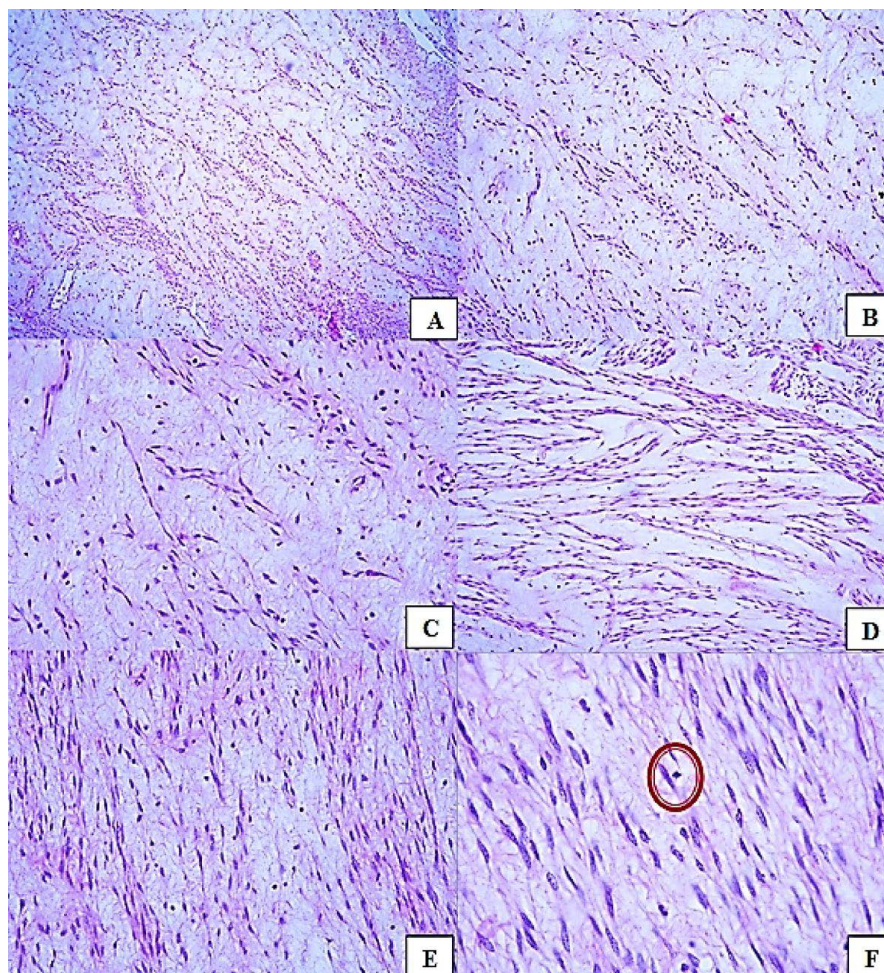


FIGURE 1. Hematoxylin and eosin (HE) staining of myxoid smooth muscle tumor of uncertain malignant potential (STUMP) in different power fields: A ($\times 50$), B ($\times 100$), C–E ($\times 200$), F ($\times 400$). Tumor shows fascicular pattern and prominent myxoid differentiation (more than 50% of entire tumor mass). There was no necrosis, or atypia. Mitosis were rare, 1/10 HPF (red circle in F).

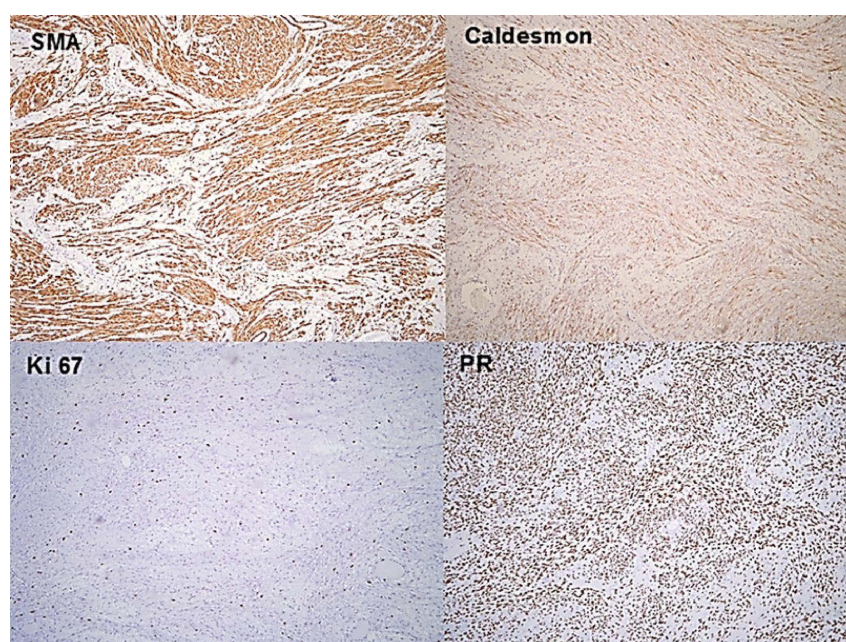


FIGURE 2. Immunohistochemical staining ($\times 100$) confirmed smooth muscle differentiation (smooth muscle antigen (SMA), Caldesmon), retained progesterone receptor (PR) and low marker of proliferation Ki-67 (5%), which imply to mostly indolent behavior of considering tumor.



FIGURE 3. Histochemical staining with Alcian Blue ($\times 400$) confirmed presence of myxoid substance, significant in differentiation from hydrops degeneration in conventional leiomyoma.

the preoperative diagnosis of STUMP [6, 11, 15].

Present results so far described used immunohistochemical markers, such as Ki-67, p53, p16, PR, which generally showed that the profile of STUMP is much closer to that of leiomyomas than leiomyosarcomas. A significant increase in Ki-67 proliferation index ($>5\%$) may be helpful in the differential diagnosis of STUMP. Loss of p16 and p53 expressions and retained PR expression is a common pattern in STUMPs, which is similar to our present case. There is no any enough specific immunomarker to distinguish STUMP from their counterparts [11, 16].

Myxoid differentiation in STUMPs requires evaluation of a broad spectrum of histological patterns, which broadens the differential diagnosis and results in overlap with various other neoplastic entities. Among the key considerations in the differential diagnosis of a myxoid uterine tumor is the inflammatory myofibroblastic tumor (IMT), which commonly displays myxoid features. IMTs are defined by the presence of myofibroblastic spindle cells along with a lymphoplasmacytic inflammatory infiltrate [7, 17]. Both tumors are composed of spindle cell proliferations arranged in a fascicular pattern, set within variably myxoid stroma. They may share similar histologic features, including mitotic activity, tumor cell necrosis, infiltrative margins, cytologic atypia, and inflammatory infiltrates. Immunohistochemical staining for smooth muscle markers, such as caldesmon, desmin, and smooth muscle actin, can be positive in both. However, unlike STUMPs, over 50% of IMTs possess a characteristic chromosomal rearrangement involving the *Anaplastic Lymphoma Kinase (ALK)* gene at chromosome 2p23, resulting in abnormal *ALK* expression and activation [1, 8]. If the tumor shows *ALK* immunoreactivity, confirmatory break-apart fluorescence *in situ* hybridization (FISH) should be done [1, 18].

One of the main differential diagnostic dilemmas is certainly distinguishing myxoid STUMP from myxoid leiomyosarcoma. Histomorphological differences are very subtle and based on

cut-off values within very narrow intervals. The recommended number of pathological mitoses defining myxoid leiomyosarcoma is 2 per 10 HPF. Any presence of marked cytonuclear pleomorphism or an irregular growth pattern in relation to the surrounding myometrium suggests malignant behavior of myxoid smooth muscle tumors of the uterus [7, 18].

Myxoid endometrial stromal sarcoma retains several characteristics of its conventional form, including invasive pattern into the myometrium with tongue-like infiltrations, spindle-shaped cells resembling endometrial stroma, and uniformly distributed small, thin-walled vessels. The myxoid matrix is often quite pronounced, typically making up more than 50% of the tumor's volume [8, 19]. Some recent study reported high-grade endometrial stromal sarcomas with prominent myxoid features and specific *ZC3H7B-BCOR fusion gene (ZC3H7B-BCOR)*. These tumors are pleomorphic, which gives them a morphology similar to that of myxoid leiomyosarcoma [20].

Myxoid smooth muscle tumors generally lack common driver mutations and gene fusions, but they frequently exhibit a high burden of copy number variations, as indicated by elevated genomic indices. Disruptions in DNA damage repair pathways are thought to contribute to the complex genomic profile seen in myxoid leiomyosarcoma. Previous research has indicated that assigning genetic alterations, such as *BCL6 Corepressor (BCOR)*, *Pleomorphic Adenoma Gene 1 (PLAG1)*, and other emerging mutations, to established morphologic tumor categories demands thorough tumor characterization. These molecular abnormalities span a broader morphologic range than current classifications account for and may ultimately lead to a redefinition of uterine sarcoma taxonomy [21–23].

While there are no established standard guidelines for managing women with STUMP, surgery is typically regarded as the main treatment approach. Fertility-preserving surgery can be an option for patients wishing to maintain fertility [24]. It is important to inform patients with STUMP, particularly those

undergoing myomectomy, about the risk of recurrence and ensure they receive careful follow-up [5, 25]. For women with STUMP who do not wish to preserve fertility, hysterectomy with or without bilateral salpingo-oophorectomy is considered the gold standard. For those concerned with fertility preservation, myomectomy may be a treatment option, provided the risks of recurrence and the desire for fertility preservation are carefully weighed. The recurrence rates are similar between the myomectomy and hysterectomy groups [6, 11].

Most STUMP relapses occur after 5 years of diagnosis. The interval to recurrence in STUMP cases varied between 2 and 194 months, with five-year overall survival rates ranging from 92% to 100% [11]. Some studies have reported a relapse rate of approximately 20%. The heterogeneous recurrence rates may be explained by inconsistencies in establishing the histological diagnosis or by differences in the duration of follow-up periods [9]. Studies highlight unprotected morcellation as a significant factor contributing to an increased risk of disease recurrence. Morcellation performed via a laparoscopic approach may result in residual tumor cells that, through microdissemination, remain in the peritoneal cavity and can lead to recurrent tumor formations after a certain period of time [9]. Lungs are found to be frequently involved as a metastatic site, and this finding supports careful chest monitoring by annual chest radiography and eventually chest computed tomographic scan in the case of symptomatic patients [3]. Surgery, with or without additional treatments, such as chemotherapy, radiotherapy, or gonadotropin-releasing hormone analogues, is the preferred approach for managing recurrence [26].

Expression of immunohistochemical markers, such as Ki-67, p53, and p16, may be useful in the prediction of the recurrence [11]. Recent studies analyzing genomic profiles of leiomyomas, leiomyosarcomas, and STUMPs have suggested that tumors with a genomic index below 10 are classified as nonrecurrent STUMPs, whereas those with a genomic index above 10 are associated with recurrences and poorer prognoses [27]. Additionally, a genomic index cut-off of 35 may serve as an indicator of poor overall survival [28].

Despite the generally favorable prognosis, long-term follow-up should be considered for STUMP cases. Some experts recommend follow-up visits every six months during the first five years, followed by annual check-ups for the subsequent five years [3, 11, 29].

One of the main limitations of this study is the relatively short duration of patient follow-up and the absence of data regarding overall survival. The inclusion of additional cases with myxoid morphology would undoubtedly enhance the scientific value and generalizability of the findings. Currently, only a limited number of studies have described the clinicopathological features of STUMP tumors, particularly those exhibiting myxoid characteristics. A recent study reported a STUMP tumor with spindle cell differentiation and a polypoid growth pattern, which posed clinical challenges in distinguishing it from a benign endometrial polyp. Histopathological analysis revealed smooth muscle differentiation of a submucosal tumor with a pseudopolypoid growth pattern, focal mild atypia, and a low mitotic index (2–3 mitoses per 10 HPF) [30]. Tinelli *et al.* [18] conducted a comprehensive review of STUMP tumors over the past two decades, underscoring the pivotal

role of histopathological evaluation in their diagnosis. The study also emphasized the importance of a multidisciplinary approach in the follow-up and management of affected patients, particularly in the context of fertility preservation [18]. Zhang *et al.* [11] analyzed 31 cases of STUMP tumors, regardless of specific differentiation, and highlighted distinct histological and clinical parameters relevant to their classification and management. To date, STUMP tumors with myxoid differentiation have not been documented in the literature. An increased number of such reported cases is necessary to better understand the biological behavior of this variant and to develop evidence-based therapeutic strategies. The present study aims to contribute to the limited but growing body of literature on this rare histopathological entity.

4. Conclusions

This case represents a very rare example of STUMP, which remains a diagnostic and therapeutic dilemma. The diagnosis of STUMP primarily depends on histopathological manifestations. Myxoid patterns are very rare and difficult to recognize, making them unexpected in smooth muscle tumors. It is crucial to identify such specific differentiation, as applying the correct diagnostic criteria during histopathological examination of these neoplasms is essential. The myxoid pattern implies a poorer prognosis and necessitates more careful follow-up of these patients [26, 29]. Further observational data is required to reach a consensus on the management of such tumors, which have no well-defined clinical course. A multidisciplinary approach is mandatory, and we encourage the collection of larger series in order to gather the most comprehensive data on this rare entity.

AVAILABILITY OF DATA AND MATERIALS

Data is contained within the article.

AUTHOR CONTRIBUTIONS

LJ—conceptualization; data curation; writing-original draft preparation; visualization. LJ, SM, TJ, LA, BSJ and MD—methodology. LJ, LA and BSJ—validation; writing-review and editing. LJ and SM—investigation. LJ, TJ, BSJ and MD—resources. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Since this is a case report, ethical committee approval was not required. Patient signed informed consent regarding publishing her data.

ACKNOWLEDGMENT

Not applicable.

FUNDING

This research received no external funding.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

- [1] Devereaux KA, Kunder CA, Longacre TA. ALK-rearranged tumors are highly enriched in the STUMP subcategory of uterine tumors. *The American Journal of Surgical Pathology*. 2019; 43: 64–74.
- [2] PPC, Croce S, Gupta M. Smooth muscle tumour of uncertain malignant potential of the uterine corpus. In WHO Classification of Tumours Editorial Board (eds.) *Female genital tumors: WHO classification of tumours*, vol. 4 (pp. 279–280). 5th edn. International Agency for Research on Cancer: Lyon. 2020.
- [3] Rizzo A, Ricci AD, Saponara M, DE Leo A, Perrone AM, DE Iaco P, *et al.* Recurrent uterine smooth-muscle tumors of uncertain malignant potential (STUMP): state of the art. *Anticancer Research*. 2020; 40: 1229–1238.
- [4] Gupta M, Laury AL, Nucci MR, Quade BJ. Predictors of adverse outcome in uterine smooth muscle tumours of uncertain malignant potential (STUMP): a clinicopathological analysis of 22 cases with a proposal for the inclusion of additional histological parameters. *Histopathology*. 2018; 73: 284–298.
- [5] Şahin H, Karatas F, Coban G, Özen Ö, Erdem Ö, Onan MA, *et al.* Uterine smooth muscle tumor of uncertain malignant potential: fertility and clinical outcomes. *Journal of Gynecologic Oncology*. 2019; 30: e54.
- [6] Liu L, Xiao Z, Li Z, Zheng J, Xu X, Zhou H. Uterine smooth muscle tumors of uncertain malignant potential: a 13-year retrospective study. *Frontiers in Oncology*. 2024; 14: 1458968.
- [7] Istrate-Ofițeru AM, Zorilă GL, Ruican D, Petrescu AM, Berbecaru EIA, Roșu GC, *et al.* Uterine myxoid leiomyosarcoma—a rare malignant tumor: the role of complex morphopathological assay. Review and case presentation. *Romanian Journal of Morphology and Embryology*. 2021; 62: 883–896.
- [8] Al Khader A, Nsour E, Abdallat AN. Perinodular hydropic degeneration in uterine leiomyoma causing rapid enlargement and mimicking a myxoid smooth muscle tumor: case report of a diagnostic challenge. *Case Reports in Women's Health*. 2019; 24: e00150.
- [9] Di Giuseppe J, Grelloni C, Giuliani L, Delli Carpini G, Giannella L, Ciavattini A. Recurrence of uterine smooth muscle tumor of uncertain malignant potential: a systematic review of the literature. *Cancers*. 2022; 14: 2323.
- [10] Borella F, Cosma S, Ferraioli D, Ray-Coquard I, Chopin N, Meeus P, *et al.* Clinical and histopathological predictors of recurrence in uterine smooth muscle tumor of uncertain malignant potential (STUMP): a multicenter retrospective cohort study of tertiary centers. *Annals of Surgical Oncology*. 2022; 29: 8302–8314.
- [11] Zhang C, Gao J, Lu S, Zhang Y, Zhu H. Uterine smooth muscle tumors of uncertain malignant potential (STUMP): a retrospective study in a single center. *European Journal of Obstetrics, Gynecology, and Reproductive Biology*. 2021; 265: 74–79.
- [12] El Hassouni F, Tligui S, Lakhdissi A, Rouas L, El Youssfi M. Uterine smooth muscle tumors of uncertain malignant potential (STUMP): a case report. *International Journal of Surgery Case Reports*. 2024; 118: 109607.
- [13] Amal C, Fadwa A, Aicha G, Boufetal H, Mahdaoui S, Samouh N. Uterine smooth muscle tumor of uncertain malignant potential (STUMP) ABOUT a CASE. *International Journal of Surgery Case Reports*. 2024; 117: 109556.
- [14] Aminzadeh P, Alibrahim E, Dobrotwir A, Paul E, Goergen S. Multiparametric MR evaluation of uterine leiomyosarcoma and STUMP versus leiomyoma in symptomatic women planned for high frequency focussed ultrasound: accuracy of imaging parameters and interobserver agreement for identification of malignancy. *The British Journal of Radiology*. 2021; 94: 20200483.
- [15] Cotrino I, Carosso A, Macchi C, Baima Poma C, Cosma S, Ribotta M, *et al.* Ultrasound and clinical characteristics of uterine smooth muscle tumors of uncertain malignant potential (STUMPs). *European Journal of Obstetrics, Gynecology, and Reproductive Biology*. 2020; 251: 167–172.
- [16] Travaglino A, Raffone A, Gencarelli A, Neola D, Oliviero DA, Alfano R, *et al.* p53, p16 and Ki67 as immunohistochemical prognostic markers in uterine smooth muscle tumors of uncertain malignant potential (STUMP). *Pathology, Research and Practice*. 2021; 226: 153592.
- [17] Busca A, Parra-Herran C. Myxoid mesenchymal tumors of the uterus: an update on classification, definitions, and differential diagnosis. *Advances in Anatomic Pathology*. 2017; 24: 354–361.
- [18] Tinelli A, D'Oria O, Civino E, Morciano A, Hashmi AA, Baldini GM, *et al.* Smooth muscle tumor of uncertain malignant potential (STUMP): a comprehensive multidisciplinary update. *Medicina*. 2023; 59: 1371.
- [19] Liu HT, Wong CN, Wong CN, Liu FS. Uterine smooth muscle tumor of uncertain malignant potential: a review of current knowledge. *Taiwanese Journal of Obstetrics & Gynecology*. 2022; 61: 935–940.
- [20] Lewis N, Soslow RA, Delair DF, Park KJ, Murali R, Hollmann TJ, *et al.* ZC3H7B-BCOR high-grade endometrial stromal sarcomas: a report of 17 cases of a newly defined entity. *Modern Pathology*. 2018; 31: 674–684.
- [21] Yoon JY, Mariño-Enríquez A, Stickle N, de Borja RJ, Ismiil N, Djordjevic B, *et al.* Myxoid smooth muscle neoplasia of the uterus: comprehensive analysis by next-generation sequencing and nucleic acid hybridization. *Modern Pathology*. 2019; 32: 1688–1697.
- [22] Michal M, Agaimy A, Croce S, Mechttersheimer G, Gross JM, Xing D, *et al.* PLAG1-rearranged uterine sarcomas: a study of 11 cases showing a wide phenotypical spectrum not limited to myxoid leiomyosarcoma-like morphology. *Modern Pathology*. 2024; 37: 100552.
- [23] Li WQ, Wu HX, Li HB, Shen Y. Uterine myxoid leiomyosarcoma: identification of a novel PLAG1 fusion partner. *Pathology*. 2024; 56: 753–755.
- [24] Tsakiridis I, Kalogiannidis I, Mamopoulos A, Dagklis T, Nikolaidou C, Athanasiadis A. Giant uterine STUMP in pregnancy: a rare case report with preservation of fertility. *Hippokratia*. 2021; 25: 169–171.
- [25] Huo L, Wang D, Wang W, Cao D, Yang J, Wu M, *et al.* Oncologic and reproductive outcomes of uterine smooth muscle tumor of uncertain malignant potential: a single center retrospective study of 67 cases. *Frontiers in Oncology*. 2020; 10: 647.
- [26] Bucuri CE, Ciortea R, Malutan AM, Oprea V, Toma M, Roman MP, *et al.* Smooth muscle tumor of uncertain malignant potential (STUMP): a systematic review of the literature in the last 20 years. *Current Oncology*. 2024; 31: 5242–5254.
- [27] Croce S, Ribeiro A, Brulard C, Noel JC, Amant F, Stoeckle E, *et al.* Uterine smooth muscle tumor analysis by comparative genomic hybridization: a useful diagnostic tool in challenging lesions. *Modern Pathology*. 2015; 28: 1001–1010.
- [28] Croce S, Ducoulombier A, Ribeiro A, Lesluyes T, Noel JC, Amant F, *et al.* Genome profiling is an efficient tool to avoid the STUMP classification of uterine smooth muscle lesions: a comprehensive array-genomic hybridization analysis of 77 tumors. *Modern Pathology*. 2018; 31: 816–828.
- [29] Lapresa-Alcalde MV, Ruiz-Navarro MJ, Sancho de Salas M, Cubo AM. A review and follow-up of uterine smooth muscle tumours of uncertain malignant potential (STUMP): a case series and literature review. *Diseases*. 2023; 11: 99.
- [30] Jena S, Sinha NK, Mishra M, Singh V, Kumar Upadhyay A. Uterine smooth muscle tumor of undetermined malignant potential (STUMP): a diagnostic challenge. *Cureus*. 2024; 16: e73115.

How to cite this article: Ljubisa Jovanovic, Svetlana Milenkovic, Tijana Janjic, Luka Andric, Branka Sosic-Jurjevic, Milan Dokic. Myxoid pattern in smooth muscle tumor of uncertain malignant potential (STUMP) is a significant prognostic parameter with difficult diagnostic dilemmas. *European Journal of Gynaecological Oncology*. 2025; 46(12): 66-71. doi: 10.22514/ejgo.2025.147.