

Review

Morcellation in gynecology: short review and suggestions from turkish society of minimally invasive gynecologic oncology

Taşkın et al. Morcellation in gynecology

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Abstract

Morcellation allows the removal of large uterus and fibroids through small incisions with minimally invasive surgery. It helps to prevent the complications associated with large incisions in both hysterectomy and myomectomy operations. Currently, there is a big debate on using power morcellation in laparoscopic hysterectomy and myomectomy mainly due to the risk of peritoneal dissemination of undiagnosed uterine sarcomas. Unfortunately, there is no valid preoperative diagnostic method that can differentiate sarcomas from myomas, and the currently available scientific literature regarding morcellation is insufficient. As the Turkish Society of Minimally Invasive Gynecological Oncology, we present our opinions and suggestions for on the preoperative evaluation and morcellation of fibroids in line with the recent literature.

Keywords: Myomectomy, hysterectomy, morcellation, laparoscopic surgery, vaginal surgery

Introduction

Morcellation is performed for reducing the size of uterus or myoma to ease extraction of tissues out of the abdominal cavity. History of procedure goes back to the 19th century. First applications were made after vaginal surgery mechanically for reducing size of the tissue (1). By this way, vaginal surgery can be also performed in big sized uteruses, which generally requires open surgery. In subsequent years, minimally invasive surgery started to take place

of most open and vaginal procedures and as a result, need for a new way to extract huge uteruses and myomas from smaller incisions aroused.

In 1976, a laparoscopic manual morcellator, which can work through 15 mm and 10 mm incisions, was defined (2). Technical properties of equipment's improved in timeline and devices turned into electromechanical morcellator and this turn reduced the time required for tissue extraction (3). By the year of 1993, the use of morcellator with more advanced features was approved by Food and Drug Administration (FDA) (3).

Morcellator is used in performing hysterectomy or myomectomy for large uteruses during minimally invasive surgery to avoid open surgery related morbidities. On the other hand, if morcellation is performed in the presence of uterine malignancy, especially uterine sarcoma, which could not be diagnosed preoperatively mostly, may cause the disease to upstage and have a negative effect on the patient's survival (4, 5).

In 2013, a patient was diagnosed with leiomyosarcoma after total hysterectomy which was performed with a minimally invasive approach for a presumed benign uterine fibroid and in the afterward staging surgery, intraperitoneal spread was observed. After this case, debates started about morcellator usage and in 2014 FDA discouraged the use of laparoscopic power morcellation during hysterectomy or myomectomy for uterine fibroids (6). In November 2014, FDA updated its recommendations and specified contraindications for morcellation (7):

1. Morcellators are contraindicated for removal of uterine tissue containing suspected fibroids in patients who are peri- or post-menopausal or are candidates for en-bloc tissue removal through the vagina or mini-laparotomy incision.

2. Morcellators are contraindicated in patients with uterine fibroids suspicious for malignancy.

However, the scientific basis of these advices was not clear and definition of perimenopause was not explained. Despite FDA's clear suggestions against morcellation, some societies have not stated a strict recommendation to prohibit of morcellation (8-12).

Minimally Invasive Gynecologic Oncology Society formed a working group on this subject and prepared suggestions in the light of current literature which will guide both surgeons and patients.

Uterine sarcoma types and occult sarcoma risk in presumed myoma

Endometrial adenocarcinoma constitutes nearly 95% of all uterine malignant tumors (13).

Mostly, diagnosis is obtained preoperatively endometrial sampling and it is rarely diagnosed incidentally after hysterectomy. However, preoperative diagnosis of uterine sarcomas, which make up 5% of uterine tumors, is not possible most of the time (13). These patients are the main source of the problem.

Leiomyosarcoma, endometrial stromal sarcoma and rhabdomyosarcoma are most common types of uterine sarcomas. Unfortunately, the exact rate of postoperative sarcoma diagnosis is not known in patients who presumed to have benign fibroids preoperatively. Since this is a rare situation, most of the relevant studies are retrospective and contain many biases. In a report of FDA, incidence of all sarcomas and leiomyosarcoma were reported as 1/350 and 1/458, respectively (6,7).

However, it is also seen that this rate varies according to the method of studies. In a meta-analysis of 133 studies (14), occult leiomyosarcoma risk was calculated as 1/1960 when both retrospective and prospective studies are included, but this rate dropped to 1/8300 when only prospective studies are considered. In studies investigating the incidence of sarcoma in patients who underwent morcellation during myomectomy or hysterectomy for presumed benign disorders, the highest rate was reported as 0.6% (15). Recently, two studies from Turkey reported the incidence of occult uterine sarcomas (16,17). Topdagi Yilmaz et al. reported the incidence of unexpected uterine sarcoma in the patients who underwent

hysterectomy for benign indications as 0.6% (7/1050) (16). In addition, Yorgancı et al. investigated the rate of occult uterine sarcoma in 18604 women who underwent hysterectomy or myomectomy with a pre-operative diagnosis of uterine leiomyoma and occult uterine sarcoma incidence was 0.3% (56/18604) (17).

Possible adverse effects of morcellation: sarcoma and benign conditions

Morcellation can be performed mechanically with either using scissors or scalpel, or power morcellation can be done with using electromechanical devices. It can be performed during minimally invasive surgery or vaginal surgery. Procedure can be performed un-contained, contained (in bag) or using mini laparotomic incision.

Basically, after hysterotomy, regardless of morcellation, malignant cells, if any, may spread to the peritoneal cavity. During morcellation, specimen is divided into smaller pieces in the peritoneal cavity and irrespective from its malignancy potential some problems may arise like spread of tissues into the peritoneal cavity, inability of complete removal, and microscopic residues becoming peritoneal implants. Thus, increased incidence of benign peritoneal diseases including parasitic leiomyoma, endometriosis and extensive intraperitoneal leiomyomatosis have also been reported after morcellation (18). It should be kept in mind that morcellation significantly increases these benign sequelae more than the risk of spreading malignancies.

Long-term survival is not favorable in patients with leiomyosarcoma (19) besides, there are publications supporting the idea that morcellation can worsen the stage and negatively affect survival in the presence of malignancy (5,20,21). On a study evaluating the effect of morcellation on survival, in no morcellation group 1-year mortality rate was found as 5.3% and in morcellation group this rate was 18.2% respectively (20). Patients who were diagnosed with stage 1 sarcoma or STUMP in initial surgery were operated after a median of 33 days (21) and widespread peritoneal disease was found in 28% and 25% of the patients, respectively (22,23). Although the studies are retrospective, it was found that hysterotomy affects survival negatively compared to intact hysterectomy. In morcellated sarcoma cases, the risk of abdominopelvic spread increases significantly (44% vs 12.9%) and survival decreases again significantly compared to those not performed (5). In another case series, 1-year mortality rate was found significantly higher in the morcellation group (20). Result of a meta-analysis also supported increased risk of recurrence and death (21).

After morcellation, integrity of the specimen is damaged and this can cause both difficulty in pathological examination and it may affect the diagnosis and staging procedures (23).

In-bag morcellation

In order to prevent or reduce the adverse effects of intraperitoneal un-contained morcellation, morcellation in closed peritoneal space has been suggested as a possible solution. Most popular method is in-bag morcellation. But, its potential in avoiding harmful effects and superiority over other morcellation strategies need to be studied. In addition, there is no opinion in the suggestions made by the societies that in-bag morcellation will prevent morcellation related complications.

In studies evaluating a limited number of patients, tissue or dye leakage or spreading out of the bag were observed in 9-33% of the cases when morcellation was performed in the bag (24, 25). Some of the leaks, perhaps, represent microscopic spread. However, there is no data yet on whether this will affect survival in case of malignancy.

Preoperative sarcoma diagnosis

Risk factors: Age, history of pelvic irradiation, tamoxifen usage, genetic syndromes (i.e. hereditary leiomyomatosis and renal cell cancer mutation, Lynch syndrome) and history of retinoblastoma in childhood increases risk of sarcoma (9). If the lesion shows rapid growth in the 3-month period (exact clinical and radiological criteria has not been determined), and especially if there is a lesion greater than 8 cm in the menopausal period, or lesions with

central necrosis, heterogeneous appearance, non-calcified cystic degeneration and irregular high blood supply may arise suspicion for sarcoma (9). However, none of these criteria is effective enough to establish a definitive preoperative diagnosis (26).

Preoperative endometrial biopsy: Although it is an effective diagnostic method in the diagnosis of endometrial pathologies, the effectiveness of endometrial biopsy in the diagnosis of uterine sarcomas is low. It was shown that endometrial biopsy recognized 36% of leiomyosarcomas in submucous lesions (27). In the diagnosis of endometrial stromal sarcoma, the sensitivity is 33% (28). Localization of lesions can vary significantly, therefore, endometrial biopsy is not considered as a useful preoperative diagnostic test in these lesions. Besides, in asymptomatic women no benefit has been shown. However, endometrial biopsy can help clinicians in patients with preoperative abnormal uterine bleeding.

Imaging methods: Ultrasonography is the first and most frequently used radiological method but differential diagnosis between leiomyoma and sarcoma cannot be made always (29,30). In color doppler, atypical vessel pattern, low resistance index and high systolic velocity is observed in sarcomas (31). However, depending on the variables such as location of the lesion, menopausal status of the patient, size of the lesion, ultrasonographic features of sarcoma and leiomyomas may overlap and are not distinctive in the majority of cases. Magnetic resonance imaging (MRI) may show more diagnostic accuracy in differentiation of leiomyoma and sarcoma (13,32). Features such as necrosis, rapid growth, intense contrast enhancement, and restriction at diffusion-weighted imaging can ease the diagnosis and help to differentiate sarcomas from leiomyomas. However, specificity and positive predictive value are low (32). If diffusion-weighted images and contrast imaging are used, discrimination can increase (33) but, despite the studies reported diagnostic efficacy as 88% with these methods (34), some studies reported it is not successful in the distinction of fibroid-sarcoma precisely (33). Therefore, the role of MRI should be evaluated in further studies involving more patients. Also, it is not recommended to use MRI for all lesions routinely and it should be used after ultrasonography in the presence of clinical suspicion (13).

Computed tomography and a positron emission tomography (PET) scan are not helpful to discriminate leiomyoma and sarcoma, and they should not be used preoperatively solely for this purpose.

Biochemical markers: It is thought that elevated levels of lactate dehydrogenase (LDH) may serve as an indicator of necrosis in the tumoral tissue and invasion into the intravascular area in the presence of sarcoma. Studies have shown that increased levels of LDH are significantly more frequent in the sarcoma group than in the leiomyoma group (35). In one study success rate of combination of LDH and MRI was found as 100% (32). Success in evaluations with LDH subtypes was also reported as LDH isozyme type 1 and 3 (32,35). On a study with ROC curve analysis for prediction of sarcoma in preoperative period, optimum cut-off value for LDH was found as 279.0 U/L (36). However, further studies are needed for showing importance of LDH in differential diagnosis.

Intraoperative management: Some characteristics of uterine lesions raise suspicion for sarcoma intraoperatively. These are, no clear mass borders like leiomyoma, no bulging during uterine incision, soft, homogenous, yellowish appearance and increased tissue fragility. However, these features may also present in patients with degenerative myoma or after use of preoperative hormonal treatment. But in advanced stages, sarcomas may lead to overgrowth and local invasion to adjacent organs (e.g bladder, rectum). Intraoperative frozen section analysis does not have much efficacy and diagnostic accuracy was reported as only 11-38% (37).

Postoperative management: Uniform management plan for patients with morcellated uterine sarcoma does not exist on the clinical practice. Several authors advised completion of surgery to hysterectomy in case of myomectomy and abdominal cavity can be evaluated for the

presence of metastatic implants (38). Also, patients with late surgical (>30 days) re-exploration showed higher mortality rate (39).

Opinions and suggestions: Since uterine sarcomas are rare and most of the available data are based on retrospective studies, it is difficult to access certain and conclusive suggestions. The following opinions and suggestions are presented in line with the available data. The following statements can be potentially modified or altered as per new evidence.

1. There is no method that can definitively differentiate sarcomas preoperatively in patients who are going to be operated with a preliminary diagnosis of uterine myoma.
2. Uterine sarcomas usually occur in women of advanced age. But there is no exact age limit. Especially in patients aged >35 years who are being considered for morcellation, it is recommended that the risk factors to be investigated, that the patient to be examined with advanced imaging methods in case of suspicion, and the necessary precautions to be taken to prevent peritoneal contamination in case of intraoperative suspicion.
3. Ultrasonography is the recommended first-line imaging method. Routine MRI is not recommended for every preoperative patient and should be performed when malignancy is suspected. A preoperative endometrial biopsy may only be useful in patients with abnormal uterine bleeding. Its effectiveness in diagnosing sarcomas is considerably low.
4. Survival outcomes are worse in uterine sarcomas (even in the early stages) compared to endometrial malignancies. The morcellation of sarcomas can result in disease progression and worsen survival outcomes compared to non-morcellation.
5. The peritoneal seeding resulting from morcellation increases the incidence of benign sequelae. These sequelae account for the vast majority of morcellation-related morbidities and should not be ignored.
6. Although it is assumed that morcellation with tissue containment may be protective against negative outcomes, there is not enough evidence regarding the preventive efficacy of this method. Further studies are needed to establish conclusive data.
7. Patients should be informed in detail regarding the advantages of minimally invasive surgery and the risks of morcellation. In suspicious patients, morcellation should be avoided (or not performed at all) regardless of the patient's consent.
8. In patients who will be operated with a preliminary diagnosis of uterine myoma, intact removal of the uterus may be primarily considered depending on the patients' fertility preferences and age.
9. Studies should be designed to determine the efficacy of preoperative diagnostic methods and the preventive potential of contained morcellation techniques. These studies should aim for the inclusion of as many centers as possible due to the low prevalence of the disease.

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