

Uterus: Malignant Disease

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Target Audience: Imagers with an interest in genito-urinary imaging.

Outcomes/objectives: To be familiar with the epidemiology and histology of malignant diseases of the uterus; to understand the role of imaging, and in particular, MRI in patients with uterine cancer; to know the best technique for imaging uterine cancer; to be familiar with the FIGO staging system; to recognize some of the pitfalls in MRI of endometrial staging; to be familiar with the imaging appearances of rare tumours of the uterus.

Background

Endometrial carcinoma is the most common uterine malignancy and is now the commonest malignancy of the female genital tract. The increased incidence of endometrial cancer in recent years is related to the increasing incidence of obesity, one of the key underlying factors. Patients typically present with abnormal intermenstrual or post-menopausal bleeding. The initial investigations include ultrasound and hysteroscopy and endometrial sampling. Following the histological diagnosis of endometrial cancer, MRI may be indicated in order to determine the stage of disease in order to further plan the extent of surgery.

MRI in endometrial cancer

The staging classification for endometrial cancer is that of the International Federation of Gynaecology and Obstetrics (FIGO), which is based on the surgical-pathological findings. TNM classification may also be used. The FIGO staging classification will be presented in relation to the imaging findings on MRI.

MRI is the most widely used imaging tool for loco-regional staging of endometrial cancer. Optimisation of the MRI sequences and protocols is essential in order to obtain the best staging results.

Patient preparation includes fasting for 4 to 6 hours in order to reduce artifact from bowel peristalsis. An anti-peristaltic agent may be administered prior to imaging. Ideally, the bladder should be emptied about 30 minutes prior to examination to allow limited partial filling. The patient is ideally imaged in the supine position with a pelvic multichannel phased array coil.

The standard sequences include a wide field of view axial T1 and T2W sequences from the renal hila to perineum to evaluate para-aortic and pelvic nodes and rule out hydronephrosis; sagittal T2W pelvis is ideally in the axis of the uterus; a small FOV oblique axial T2W sequence is set up

to be perpendicular to either the endometrial cavity (in endometrial cancer). The sagittal and oblique axial sequences are then be repeated using a diffusion weighted sequence and/or dynamic contrast enhancement.

Endometrial cancer. MRI has been the workhorse of pre-operative staging in those centers that select patients for lymphadenectomy or nodal sampling. The standard treatment for patients with endometrial cancer is full surgical staging according to the FIGO classification, which includes hysterectomy, bilateral salpingo-oophorectomy and lymphadenectomy. However, full lymphadenectomy is a highly specialized procedure that increases the duration of the primary surgical procedure and increases the morbidity to the patient. In addition, there is considerable controversy over the benefit in terms of patient outcome following lymphadenectomy. The identification of patients that are unlikely to have lymph node metastases could potentially obviate the need for surgical lymphadenectomy and help to direct adjuvant radiotherapy. Histologic grade is an important risk factor and this is available pre-operatively. However, other risk factors for lymph node involvement include the depth of myometrial invasion, the presence of cervical involvement and tumour volume.

MRI has been shown to be accurate in the assessment of the depth of myometrial invasion and in detecting or ruling out cervical invasion. The most widely validated sequences are high resolution T2-weighted and dynamic contrast enhanced sequences. DWI is gaining acceptance as providing additional information concerning detection of drop metastases as well as in determining the depth of myometrial invasion. Tumour volume as measured by MRI has also been found to be of significance in predicting nodal involvement. Information from MRI may allow triage of patient care: in low grade tumours, if there is no deep myometrial invasion or cervical involvement, a patient may be triaged to surgery in their local cancer unit, without lymphadenectomy; conversely, if deep myometrial invasion or cervical involvement is demonstrated on MRI, the patient should be triaged for treatment in a gynecologic oncology centre where lymphadenectomy and adjuvant therapies may be considered.

Nodal metastases. The diagnostic performance of MRI for the diagnosis of nodal metastases is relatively poor. A high specificity for nodal metastases can be achieved using a short axis diameter cut-off of 10mm or greater, and some morphological features can indicate metastatic involvement (such as necrosis). However, the sensitivity for detection of metastases in nodes less than 10mm in short axis diameter remains relatively poor. The evidence in support of DWI will be discussed.

MRI of rare uterine tumours

Endometrial sarcoma and leiomyosarcoma are very rare tumours of the uterus. These tumours are typically diagnosed at histology. However, some imaging features may raise the possibility

of a sarcoma prior to histological confirmation. The imaging appearances of sarcomatous lesions will be presented and the FIGO staging of endometrial sarcoma will be described.

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