

Recommendations for cross-sectional imaging in cancer management, Second edition

Endometrial cancer

Faculty of Clinical Radiology

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Carcinoma of the endometrium

Clinical background

The incidence of endometrial cancer in the United Kingdom has increased by approximately 50% since the 1990s, with an incidence of 8,500 new cases in the UK in 2011.¹ This significant rise is predominantly due to a large increase in incidence in women aged 60–79.¹ The increase in prevalence of obesity and decreases in fertility may partly account for the observed rapid increase in incidence and imply that endometrial cancer in postmenopausal women will become a more substantial public health problem in the future.² Ninety per cent of endometrial cancers arise from the uterine epithelium and, of these, 72% are well or moderately differentiated endometrioid histology (Grade 1 and 2).³ Prognosis depends on a number of factors, including stage, depth of myometrial invasion, lymphovascular invasion, cervical stromal invasion, nodal status, histological grade, age cardiopulmonary disease. Depth of myometrial invasion is an important morphologic prognostic factor, correlating with tumour grade, lymph node metastases and overall patient survival. The incidence of nodal metastases increases with depth of myometrial invasion.⁴ Therefore, MRI can assist in preoperative assessment and treatment planning by accurately predicting depth of myometrial invasion, cervical stromal invasion and lymph node involvement. Demonstration of cervical stroma invasion may also determine that a radical rather than a simple hysterectomy is undertaken.

Who should be imaged?

At present, indications for MRI of the endometrium are not firmly established due to differing surgical practice with respect to

lymphadenectomy. Nevertheless, there is general consensus that all patients with histological high-grade tumours should undergo MRI preoperatively. In some centres, all patients with histologically proven endometrial carcinoma undergo MRI to identify patients with deep myometrial invasion or cervical stroma involvement who would then be candidates for lymphadenectomy.

Staging objectives

- To identify whether there is myometrial invasion and, if so, to determine its depth (that is, whether greater than 50% of myometrial thickness).
- To assess whether the tumour has spread outside the body of the uterus into the cervical stroma.
- To identify whether the tumour has spread into the parametrium, the serosa or adnexa.
- To identify lymph node enlargement. (Note: retroperitoneal nodes are considered regional.)
- To identify distant spread.

Staging

MRI

MRI is the technique of choice for staging of endometrial cancer; MRI can also provide additional useful information such as uterine size, tumour volume, ascites and adnexal pathology which, in turn, may determine whether the surgical approach is transabdominal, transvaginal or laparoscopic.⁵ Pelvic or cardiac phased array coil is used. Bowel relaxants are helpful for improving the quality of images by reducing motion artefact.

MRI protocol for staging of endometrial cancer

Sequence	Plane	Slice thickness/gap	Field of view	Reason
T2W**	Sagittal (SE)	4 mm/2 mm	Whole pelvis	
T2W**	Axial (SE)	4 mm/2 mm	Whole pelvis	
T2W**	Oblique axial (SE) (perpendicular to long axis of uterus)	3 mm/0.5 mm	Small	To view the relationship between the primary tumour and the myometrium in a second plane
*Diffusion-weighted images (b-value 0, 500)	Sagittal	4 mm/0	Small	
*Diffusion-weighted images (b-value 0, 800)	Oblique axial (perpendicular to long axis of uterus)	4 mm/0	Small	
T1W + fat sat pre-contrast medium **	Oblique axial (perpendicular to long axis of uterus)	4 mm (3D)		Pre contrast oblique axial view
Dynamic multiphase T1W + fat sat + IV contrast medium at pre, 60 and 120 seconds**	Sagittal	4 mm (3D)		To view the depth of myometrial invasion
T1W + fat sat + IV contrast medium at 180 seconds**	Oblique axial (perpendicular to long axis of uterus)	4 mm (3D)		To view the relationship between the primary tumour and the myometrium in a second plane
T1W	Axial	5 ± 2 mm	Standard	Mid-renal hilum to symphysis for lymph node staging

* This sequences are optional and the exact choice of b-values depends on the scanner manufacturer.

** see Tips

CT

CT is of limited value for local staging, but is recommended for evaluation of metastatic disease in the abdomen in cases of unfavourable histology such as serous papillary and clear cell carcinoma or high-grade uterine sarcomas.

- Oral administration of 1 litre of water or iodinated contrast medium.
- 100–150 ml of intravenous iodinated contrast medium injected at 3–4 ml/sec.

- MDCT is commenced at 60–75 seconds post-injection through the abdomen and pelvis.
- 5 mm axial sections using spiral technique.
- Using MDCT, slice thickness will depend on scanner capability. In general, images are reconstructed from one acquisition. Image slice thickness ranges from 1–5 mm. Thin sections are needed for multi-planar reformats, for viewing in the coronal or sagittal planes.

Values of $CTDI_{vol}$ should normally be below the relevant national reference dose for the region of scan and patient group (see Appendix and section on Radiation protection for the patient in CT in Section 2).

PET-CT

PET-CT is not indicated for routine preoperative staging of patients with endometrial cancer. It may be useful for evaluation of metastatic disease cases of unfavourable histology such as serous papillary and clear cell carcinoma or high-grade uterine sarcomas. It is recommended before exenterative surgery to exclude presence of distant metastasis. It can also have a useful role in patients with suspected recurrence of endometrial carcinoma when other imaging is equivocal.⁶

Follow-up

Frequency

This depends on the stage and histology of the disease at presentation. More advanced disease of higher grade histology is reviewed every six months following surgery, for up to two years. If treated only with radiotherapy, follow-up is to assess response.

Technique

MRI is the optimal modality of choice if local pelvic recurrence is suspected. Technique is modified and in general will include only:

- Sagittal and axial spin-echo (SE) T2W sequences through the pelvis

- Axial or coronal SE or gradient-echo (GRE) T2W sequences through the abdomen
- Axial and sagittal diffusion weighted images through the pelvis.

If distant metastatic disease is suspected, CT or FDG PET-CT may be used.

Tips

- Data suggest that overall no significant statistical difference exists between T2W and contrast-enhanced sequences in predicting myometrial invasion. However, it is agreed that the two sequences are necessary in combination to optimise accuracy and ease interpretation, particularly when uterine distortion (for example, due to congenital abnormality of the uterus or due to leiomyomas) or other pitfalls (such as loss of junctional zone definition, poor tumour to myometrium contrast and adenomyosis) are present. There is increasing evidence that diffusion-weighted imaging might be useful in evaluating depth of myometrial invasion. As the sensitivity for prediction of extension beyond the endometrium is the most important diagnostic parameter, it is better to rely on that sequence which indicates the most extensive disease.
- In cases of unfavourable histology such as serous papillary and clear cell carcinoma or high-grade uterine sarcomas, staging CT of the abdomen +/- chest is recommended in addition to MRI for evaluation of metastatic disease.

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