MR staging in carcinoma of the endometrium and carcinoma of the cervix

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SUMMARY

This study aimed to evaluate MR as an imaging modality for the assessment of myometrial and cervical invasion in endometrial carcinoma and for the assessment of parametrial and lymph node involvement in cervical carcinoma. Twenty-eight patients with a preoperative histological diagnosis of endometrial carcinoma/cervical carcinoma were included in the study. The findings were compared with the surgical staging and the histopathological report of the hysterectomy specimen. Accuracy in detecting myometrial and cervical involvement in patients with endometrial carcinoma was 78% for both. Accuracy in detecting parametrial and lymph node involvement in patients with cervical carcinoma was 71% and 86% respectively. MR is a reliable method for preoperative assessment of endometrial and cervical carcinoma. It helps decide operability, the type of operation and aids in the selection of patients who need to be considered for specialist referral to a gynaecologist oncologist.

INTRODUCTION

Endometrial and cervical carcinoma represent the first and third most common cancers of the female genital tract in UK. In Northern Ireland there were 97 new cases of invasive cervical and 146 new cases of endometrial carcinoma in 2000.1 The peak age at presentation for endometrial carcinoma is approximately sixty years. Ninety percent of these women present with abnormal vaginal bleeding and seventy-five percent present with stage 1 disease.

The peak age at presentation for cervical carcinoma is between thirty-five and fifty years. Invasive cervical carcinoma may be asymptomatic. If not detected at screening it can present as intermenstrual, postcoital or postmenopausal bleeding. It is imperative to have a high index of suspicion for both these cancers. The tissue diagnosis is achieved by traditional means of hysteroscopy and dilatation and curettage or endometrial biopsy for endometrial cancer, and by cervical biopsy for cervical cancer.

One of the most important aspects of successful patient management with endometrial and cervical cancer is to accurately stage the disease at the time of diagnosis, thus initiating the right treatment plan without causing any unnecessary patient morbidity. Prognostic factors, which influence the treatment algorithm in endometrial carcinoma, include grade of tumour, histological type of tumour, depth of myometrial invasion, cervical involvement and lymphadenopathy. The prognostic factors for cervical carcinoma include disease staging, volume of the primary tumour and presence of lymph node metastases.

Spread of tumour to adjacent tissues is assessed by a combination of clinical and imaging

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modalities. Cross sectional imaging such as computed tomography (CT) and magnetic resonance imaging (MR) are not officially part of the FIGO staging. Pelvic MR, however has the advantage of multiplanar data acquisition and is reported to be superior to CT and ultrasound because of inherent excellent soft tissue contrast.\(^2\)

In our retrospective study we compared the accuracy of MR in

a) determining myometrial invasion and cervical involvement in endometrial carcinoma and

b) determining parametrial and lymph node involvement in cervical carcinoma.

The MR staging was compared with the surgical and histopathological findings.

MATERIALS AND METHODS

Twenty-eight patients with a histological diagnosis of endometrial cancer/cervical carcinoma underwent preoperative MR at the Royal Victoria Hospital, Belfast from January 1998 - December 2001 (Figure 1). The MR was performed using a General Electric (Milwaukee, W.I., USA), Signa 1.5 Tesla super-conducting magnet using a body coil. Gadolinium (Magnevist, Schering, Germany) was used as intravenous contrast in a dose of 0.1ml/kg. All images were reported by a single consultant radiologist (BK). The imaging protocols used were

a) Cervical carcinoma: axial T1W, axial T2W, sagittal T2W and axial fat suppression.

b) Endometrial carcinoma: axial T1W, axial T2W, sagittal T2 and sagittal T1W post-contrast.

Carcinoma endometrium:

The parameters assessed were

1. Widening/heterogeneity of signal intensity within the endometrial canal with an intact junctional zone on the T2 weighted images = stage 1A.

2. Myometrial invasion was diagnosed if the normal low signal intensity of the junctional zone was lost in T2 weighted images. The depth of myometrial invasion was considered to be deep (1C) if more than 50% of the myometrium was involved and superficial (1B) if less than 50% was involved.

3. Cervical involvement was diagnosed if there was abnormal signal intensity in the cervical canal/disruption of the normal low signal intensity of the junctional zone in the cervix on T2-weighted images.

Cervical carcinoma:

1. On T2 weighted sequences tumour was identified as a hyperintense mass replacing part or all of the cervical tissue.

2. Parametrial invasion was diagnosed by the high intensity signal in the parametria with loss of the normal low signal intensity of the exocervical stroma on the axial STIR images and T2 weighted images.

3. Vaginal/bladder/rectal involvement was diagnosed by the disruption of the low intensity signal in the bladder/rectal walls on T2 weighted images.

Lymph node involvement was diagnosed if the largest nodal diameter was 1 cm irrespective of the signal intensity.

The MR staging was based on the FIGO 1989 staging of carcinoma of the endometrium and the FIGO 1995 staging for cervical cancer.

All the histology was reviewed by a gynaecological pathologist (WGM).

RESULTS

There were 19 patients with cervical and 9 patients with endometrial cancer (Fig. 1). Twelve patients had advanced cervical carcinoma (FIGO staging greater than 2A) and were excluded as they had primary treatment with radiotherapy or chemoradiation and therefore surgical correlation was not possible. These comprised seven patients with clinical stage 2B, three patients with stage 3 and two patients with stage 4 disease. Endometrial carcinoma: We studied nine patients with
endometrial carcinoma (Table I). We understaged two patients with endometrial carcinoma, one of whom had coexistent leiomyomata. The second patient had tumour in the fallopian tube, which was not picked up on MR (Table I). One patient with leiomyomata was overstaged as having stage 2A. Histology revealed that the tumour extended into the isthmus but not into the cervical canal. Our accuracy in assessing myometrial and cervical involvement in patients with endometrial carcinoma was 78% for both (Table II).

Cervical carcinoma:

We understaged one patient in whom the tumour had just breached into the parametrium. One of the patients was overstaged as stage 2A whereas histology revealed the tumour to be restricted to the cervix (Table III). Our accuracy in assessing parametrial and lymph node involvement in patients with cervical carcinoma was 71% and 86% respectively (Table IV).

### Table I

Comparison of MR staging and surgical staging of patients with endometrial carcinoma (n=9)

| No. | MR staging | Surgical/Histological staging | Coexistent pathology |
|-----|------------|-------------------------------|----------------------|
| 1   | 1C         | 1C                            | adenomyosis          |
| 2   | 1A         | 2B                            | Leiomyomata          |
| 3   | 1C         | 1C                            |                      |
| 4   | 1B         | 1B                            |                      |
| 5   | 1B         | 1B                            |                      |
| 6   | 1B         | 1B                            |                      |
| 7   | 2A         | 1B                            |                      |
| 8   | 1B         | 1B                            |                      |
| 9   | 1A         | 3A                            |                      |

### Table II

Accuracy of MR in endometrial staging

|              | Accuracy | Literature |
|--------------|----------|------------|
| Myometrial invasion | 78%      | 74%-85%    |
| Cervical invasion     | 78%      | 80%        |

### Table III

Comparison of MR staging and surgical staging in patients with cervical carcinoma (n=7)

| No. | MR staging | Surgical/histological staging |
|-----|------------|-------------------------------|
| 1   | 1B         | 1B                            |
| 2   | 2A         | 1B                            |
| 3   | 1B         | 1B                            |
| 4   | 1B         | 2B                            |
| 5   | 1B         | 1B                            |
| 6   | 1B         | 1B                            |
| 7   | 1B         | 1B                            |

### Table IV

Accuracy of MR in staging cervical carcinoma

|              | Accuracy | Literature |
|--------------|----------|------------|
| Lymph node involvement | 86%      | 72%-90%    |
| Parametrial invasion     | 71%      | 67%-94%    |
DISCUSSION

Endometrial carcinoma

Prior to 1988 endometrial carcinoma was staged by examination under anaesthesia, hysteroscopy and dilatation and curettage. This resulted in understaging of 13-22% of cases. Routine surgical staging (total abdominal hysterectomy and bilateral salpingo-oophorectomy with peritoneal washes with or without pelvic and para-aortic lymphadenectomy) was recommended by FIGO in 1988.

Deep myometrial invasion to the outer half of the myometrium (FIGO stage IC) is a poor prognostic factor, which is associated with an increased risk of pelvic, and para-aortic lymph node metastases.

MR permits accurate assessment of myometrial involvement preoperatively. This is useful in selecting patients who require pelvic lymphadenectomy and hence referral to specialised centralised gynaecological oncology centres. Large polypoidal tumours, leiomyomata, adenomyosis, congenital anomalies, small uterus, indistinct zonal anatomy and other factors may make it difficult to assess myometrial invasion at MR imaging. Two of our patients who were inaccurately staged had coexistent leiomyomata. The use of the whole body coil and the coexistent pathology in two of our patients may have affected our accuracy in assessing myometrial invasion.

The accuracy rates for estimating extent of myometrial invasion in the literature are 74%-84%. Our accuracy in predicting myometrial invasion was 78% (Table II). Cervical involvement is seen in approximately 10%-15% of endometrial carcinoma. The presence of cervical stromal invasion would be an indication for radical hysterectomy. MR, although relatively insensitive in diagnosing superficial cervical involvement, is accurate in detecting cervical stromal invasion. Some would argue that superficial cervical involvement is not a prognostic factor. In our series the accuracy in assessing cervical invasion was 78%, which compares favourably with studies from the literature.

Cervical carcinoma

Radical surgery for cervical cancer confined to the cervix (stage 1) shows a 5-year survival rate of up to 90%. Surgical cure can be realistically achieved if tumour free excision margins are at least one centimetre and there is no lymph node involvement. Surgical treatment for tumours stage 2A or greater involves extensive radical surgery, i.e. pelvic exenteration. Most units in UK would prefer to use radiotherapy or chemoradiation as the first line of management. Traditionally, the staging of this disease has involved examination under anaesthesia, cystoscopy and intravenous urography/ultrasonography (to rule out hydronephrosis). Clinical staging has been shown to be inaccurate and often results in understaging. The overall accuracy of MR in the evaluation of parametrial involvement is 67%-94%. Our accuracy in assessing parametrial invasion compares favourably with studies from literature. False negatives can be due to microscopic tumour spread into the parametrium and false positives due to cervical stromal and adjacent parametral tissue oedema.

The presence of lymph node metastases does not change the FIGO staging. However, it affects the adjuvant treatment (patients with positive lymph nodes would require radiotherapy or chemoradiation) and prognosis. Lymph node metastases are present in approximately 18.6% of cervical carcinoma lesser than or equal to stage 2A and in 44.3% greater than stage 2B. The reported accuracy rates for lymph node evaluation is 72-90%. In our series, the accuracy for lymph node assessment was 86%.

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