

Endometrial cancer: preoperative evaluation of myometrial infiltration magnetic resonance imaging versus transvaginal ultrasonography

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Summary

From January 1996 to December 1998, 33 patients with endometrial carcinoma were preoperatively examined in our department; 30 women underwent transvaginal ultrasonography (TVUS) and magnetic resonance imaging (MRI), and 3 only TVUS.

Diagnosis was obtained by histopathological examination of the tissue removed by hysteroscopically controlled biopsy or by curettage of the uterine cavity.

TVUS and MRI were performed a few days before surgery.

After surgery the uterus was histopathologically examined by a pathologist in order to evaluate the depth of myometrial invasion. The results were compared with TVUS and MRI data to determine sensibility and specificity, positive predictive value (PPV) and negative predictive value (NPV) of the two methods.

According to the results of the present study we conclude that:

- TVUS is a low cost, easily performed and reliable method in a high percentage of cases if carried out by a skilled ecographist.
- MRI, is more expensive and has a lower specificity and sensibility index; it is a valid method if the cervical canal is involved and/or myometrial invasion is > 50% (M2) and if lymphatic invasion has to be investigated.

Key words: Endometrial cancer; Myometrial invasion; Staging; Magnetic resonance imaging; Transvaginal ultrasonography.

Introduction

Endometrial cancer is an increasing malignancy. In Italy the incidence can be compared to that of cervical carcinoma (the 10:1 ratio of the 1960s today has risen to 1:1) [1].

Annual incidence is 18 new cases among 100,000 women and is closely related to age and menopause; 63% of the cases occur between 50 and 70 years, 25% in premenopausal age, with only 2% under 40 years [2, 3].

The most important risk factors are: prolonged oestrogen exposition – endogenous as well as exogenous of the endometrium, nulliparity, early menarche, late menopause, obesity due to the higher conversion of androstenedione into oestrone by the adipous tissue, and tamoxifen therapy [4, 5]. Negative effects of oestrogens occur if there is no progestinic association. Furthermore, women with positive family anamnesis of endometrial cancer and/or Lynch Syndrome II are considered to be at risk; both cases imply a hereditary hypothesis of endometrial cancer in some subjects [6, 7].

With reference to prognosis, several factors have been considered: stage, histotype, grading, metastases, lymph nodes, peritoneal cytology, depth of myometrial invasion, etc. [8]. Today the depth of myometrial invasion is considered the most important prognostic factor. In fact, local recurrence, lymphatic invasion, distant metastases, and survival of the patient seem to be related to the extension of the myometrial neoplastic invasion [9-12].

Correct presurgical staging is very important for choosing an adequate therapy. Magnetic resonance imaging (MRI) and transvaginal ultrasonography (TVUS) are considered to be the most reliable methods.

Many authors report a high sensibility and specificity of MRI and TVUS in the evaluation of myometrial infiltration without showing any statistically significant difference between the two methods [13].

The purpose of the present study was to determine the accuracy of the two methods comparing them with the histopathological examination of the after-surgery uterus.

Materials and Methods

From January 1996 to December 1998 33 patients, aged between 48 and 88 years (average 65 yrs), with endometrial carcinoma were preoperatively examined in our department. Thirty women underwent TVUS and MRI, and 3 only TVUS.

Diagnosis was obtained with histopathological examination of the tissue removed by hysteroscopically controlled biopsy or by curettage of the uterine cavity. TVUS and MRI were performed a few days before surgery.

Ultrasound was carried out with an ALOKA SSD-1700 echograph with colour Doppler and endovaginal probe (4-7,5 MHz).

By longitudinal and transversal scanning the maximal endometrial thickness was evaluated including the two myometrial-endometrial interfaces (double layer), echogenic properties, presence of fluids and/or polyps in the uterine cavity, and myometrial invasion according to Fleischer (A/Bx100, where A=mm of myometrial invasion and B=mm of myometrium from endometrial interface to serosa) [14].

According to the depth of myometrial invasion, all patients were divided into 3 groups:

Table 1.

Surgery	No of cases (%)
Abdominal hysterectomy + bilateral salpingo-oophorectomy	8 (24.2%)
Abdominal hysterectomy + bilateral salpingo-oophorectomy + lymphadenectomy	18 (54.5%)
Radical hysterectomy + bilateral salpingo-oophorectomy + lymphadenectomy	5 (15.1%)
Vaginal hysterectomy + bilateral salpingo-oophorectomy	2 (6%)

Table 2.

Histotypes	No of cases (%)
Endometrioid	24 (72.7%)
Adenoacanthoma	4 (12.1%)
Papillary serous	4 (12.1%)
Adenosquamous	1 (3%)

Table 3. — Staging FIGO

Stage	No of cases (%)
Ia	4 (12.1%)
Ib	14 (42.4%)
Ic	10 (30.3%)
IIa	2 (6.1%)
IIIa	1 (3%)
IIIc	2 (6.1%)

Table 4. — Grading

Grade	No of cases (%)
G ₁	3 (9%)
G ₂	28 (84.8%)
G ₃	2 (6%)

M0 - absence of infiltration
M1 - infiltration < 50%
M2 - infiltration > 50%.

MRI was performed acquiring weighed T1 and T2 images after gadolinium administration; patients were divided into three groups with the same criteria [15].

Evaluation criterium for myometrial invasion was given by the tumor-myometrium interface, measuring the deepest invasion point of the tumor profile [16].

Operative tissue was histopathologically examined and the results were compared with TVUS and MRI data to determine the concordance. Afterwards sensibility and specificity were evaluated [17].

Results

Of the 33 patients only 30 underwent both TVUS and MRI, whereas the remaining 3, suffering from claustrophobia, refused MRI.

According to TVUS results, the group was subdivided as follows: 4 (12.1%) M0, 17 (51.5%) M1, 12 (36.4%) M2.

Table 5a. — Sensibility and Specificity of MRI

MRI	Histopathological findings		
	M0	M1	M2
M0	3	2	1
M1	18	2	13
M2	9	—	3
Total	30	4	17

Table 5b.

	M0	M1	M2
Sensibility	50%	76.5%	66.7%
Specificity	96.1%	61.5%	85.7%
PPV	60%	73.3%	66.7%
NPV	94.5%	63.5%	85.7%

Table 6a. — Sensibility and Specificity of TVUS

TVUS	Histopathological findings		
	M0	M1	M2
M0	4	3	1
M1	17	1	15
M2	12	—	2
Total	33	4	18

Table 6b.

	M0	M1	M2
Sensibility	75%	83.3%	90.9%
Specificity	96.5%	86.7%	90.9%
PPV	75%	87.6%	84.5%
NPV	96.5%	83%	94.6%

Average myometrial thickness was 14.3 mm (± 5 S.D.) with a range of 7-30 mm.

According to MRI results, patients were subdivided as follows: 3 (10%) M0, 18 (60%) M1, 9 (30%) M2.

All patients underwent surgery (Table 1).

Histopathological examination revealed the histotypes shown in Table 2.

Furthermore grading and staging of the tumor were performed (Tables 3, 4).

Two of the 23 patients who underwent lymphadenectomy presented lymphnodal metastases; the histotype of these tumors was papillary-serous, grading G2.

With reference to the myometrial invasion the histopathological findings revealed 4 cases with absence of infiltration (12%), 18 cases (54.4%) with infiltration < 50% (M1), 11 cases (33.3%) with infiltration > 50% (M2).

In Table 5a the comparison of histopathological findings and MRI results are shown. In Table 5b the sensibility and the specificity, as well as PPV and NPV of MRI, are summarized.

The same evaluations for TVUS are shown in Tables 6a and 6b.

Concordance of MRI and pathological results was obtained in 21 out of 30 cases (70%). In 9 cases (30%) there was no concordance: 4 overstagings and 5 understagings.

In the M0 group sensibility was 50% and specificity was 96.1% with PPV 60% and NPV 94.5%; in the M1 group

sensibility was 76.5% and specificity was 61.5%, PPV 73.3% and NPV 63.5%; in the M2 group sensibility was 66.7% and specificity 85.7%, PPV 66.7%, NPV 85.7%.

Concordance of the histopathological examination of TVUS was found in 28 out of 33 cases (84.8%). In the remaining 5 cases, there were 2 overstagings and 3 understagings. In the M0 group sensibility was 75%, specificity was 96.5%, PPV 75%, NPV 96.5%. In the M1 group sensibility was 83.3% and specificity was 86.7%, with PPV 87.6% and NPV 83%. In the M2 group sensibility as well as specificity were 90.9% with PPV 84.5% and NPV 94.6%.

Discussion

Sensibility and specificity values provided by our results are slightly inferior to those found in the literature.

However, two basic data are shown by this investigation:

– TVUS is a low cost, easily performed and reliable method in a high percentage of cases if carried out by a skilled ecographer.

– MRI is more expensive and in our cases had a lower sensibility and specificity. This method, nevertheless, is reliable if the tumor reaches the cervical canal, and infiltration in the parameters has to be investigated. Furthermore, it is useful in the investigation of the lymph nodes.

Currently, reduction of health costs is among the main concerns of the Italian Health Authorities. Therefore, we suggest TVUS as a first level exam and MRI only if there is a suspected extension of the neoplasia outside the uterus.

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