

Preoperative Ultrasound local Staging of Endometrial Carcinoma in Correlation to Intraoperative and Histopathology Findings

Original
Article

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ABSTRACT

Objectives: The current study aimed to accurate preoperative local staging of patient with endometrial cancer.

Patients and Methods: This prospective cross-sectional study was performed at Zagazig University Hospital department of obstetrics and gynecology from May to December 2021. During the study period (6 months), 8 cases/ month, 48 cases were included as a comprehensive sample. The cases with following criteria were included in the present study, cases diagnosed as having endometrial carcinoma by endometrial sampling (blind D&C, pipelle, or hysteroscopy).

Results: The current results found that the sensitivity was 81%, specificity was 50% and the accuracy of ultrasound detection degree of myometrial invasion was 67%. The ultrasonography had 0% sensitivity in diagnosis of LN involvement and 100% specificity, 87.5% NPV and accuracy 87.5%. Our findings revealed that ultrasonography in diagnosis patients with cervical involved was moderate in accuracy about 73%

Conclusion: Ultrasound imaging was significantly accurate for endometrial carcinoma staging preoperatively. There was a good correlation of TVUS with pathological results. TVUS evaluation proved to be a potential preoperatively guiding tool for non-bulky tumors and a remarkable sensitive tool for excluding or detecting invasion.

Key Words: Carcinoma, endometrial cancer, transvaginal, ultrasonography.

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INTRODUCTION

Endometrial carcinoma considered the most prevalent pelvic cancer in females. The developing countries had elevated incidences come with higher age and obesity^[1].

The accurate tumor staging aids for the most reliable treatment course, detecting cases with necessity of pelvic lymphadenectomy, and therefore need a special treatment and surgical experience, and avoid radical hysterectomy caused by cervical stroma invasion^[2].

The prognosis of the tumor affected by the grading, lymph nodes invasion, histopathological subtype, tumor size, myometrial invasion site, and age^[3].

Preoperative endometrial carcinoma staging has been assessed by many tools including computed tomography (CT), transvaginal ultrasonography (TVUS), and magnetic resonance imaging (MRI), these tools had a potential sensitivity for the assessment of myometrial infiltration depth. The transvaginal probes have been developed with

a range of frequency from 5 to 9 MHz, which provides higher resolution for myometrium and endometrial cancer tissues^[4].

The aim of this study to accurate preoperative local staging of patient with endometrial cancer.

PATIENTS AND METHODS

This prospective cross-sectional study was performed at Zagazig University Hospital department of obstetrics and gynecology from May to December 2021.

Sample Size

During the study period (6 months), 8 cases/ month, 48 cases were included as a comprehensive sample. The cases with following criteria were included in the present study, cases diagnosed as having endometrial carcinoma by endometrial sampling (blind D&C, pipelle, or hysteroscopy).

Patients with following characteristics were excluded including patient unfit for surgery, presence of other gynecological cancers, recurrent cancer, and received radiotherapy or chemotherapy.

The study was approved by Zagazig university Institutional Review Board (IRB), approval number ZU-IRB#:7018/26-6-2021 and approval date 26-6-2021. Study participants were counseled and informed consent was obtained.

Tools: Endometrial cancer assessment using ultrasound technique (Voluson 730 system) with 6-9 MHz transvaginal transducer.

Steps of Performance

A written consent was taken from the included patients. The included patients underwent: - full history taken, examination (general examination-abdominal examination). The patients who were confirmed to have endometrial cancer (blind D&C, Pipelle, or hysteroscopy guided) in this study and underwent US examination both trans-vaginal and complementary trans- abdominal. Surgical staging was done to the cases and the excised specimen underwent to histopathology examination.

The staging was evaluated according to International Federation of Gynecology and Obstetrics (FIGO), 2008 staging system for carcinoma of corpus uteri^[5].

Statistical Analysis

Data was analyzed by Statistical Package for the Social Sciences software (SPSS) version 20. Sensitivity, specificity, positive (PPV) and negative (NPV) predictive values were used to measure correlation of ultrasound in local staging of endometrial carcinoma to intraoperative surgical staging and histopathology findings. All continuous data were expressed as mean and SD. Calculation of sensitivity, specificity, PPV and NPV, Cohen's kappa agreement test and. ROC curve was used to calculate performance of cut-off of certain marker in diagnosis of health problem. The level of Significance was taken at the $P \leq 0.05$ is significant.

RESULTS

The demographic data of our patients showed that most of our patients were ≥ 55 years, 54% were diabetic, 56 % hypertensive, $BMI \geq 30.85$ kg/m², 23% were of low parity and positive history of cancer in the family breast and colorectal cancer 4%,6% respectively (Table 1).

(Table 2) showed that by using ultrasound myometrial invasion was $>50\%$ in 70.8% of our patients, cervical involvement was in 41.7% of our patients, while all our included patients showed no lymph node involved

by ultrasound. Regarding surgical staging and FIGO classification on patients, 29.2% were at staging Ia, 8.3% were at stage Ib, and 41.7% of them were at stage II, 16.7% were at stage III while remaining 4.2% were at stage IV.

Concerning histopathology examination of the excised specimen, there was no myometrial invasion in 16.7% ,myometrial invasion $<50\%$ was 16.7% and $>50\%$ was 66.7% while as regard cervical involvement 35.4% of the patients showed cervical involvement and as regard lymph node involvement 8.7% showed patients lymph node involvement, also this table shows that histopathology type was 95.83% of endometrioid type and 4.1% of non-endometrioid type, 25% was of grade I and 47.9% was of grade II – 27.1% was of grade III (Table 3).

The current results found that the sensitivity was 81%, specificity was 50% and the accuracy of ultrasound detection degree of myometrial invasion was 67% (Table 4).

(Table 5) showed that ultrasonography had 0% sensitivity in diagnosis of LN involvement and 100% specificity, 87.5% NPV and accuracy 87.5%.

Our findings revealed that ultrasonography in diagnosis patients with cervical involved was moderate in accuracy about 73% (Table 6).

Table 1: Demographic data of the studied patients

	N=48	%
Age (year):		
• Mean \pm SD	55.58 \pm 10.27	
• Range	45– 65	
BMI (kg/m ²)		
• Mean \pm SD	30.85 \pm 2.98	
• Range	28 – 38	
Comorbidity:		
• No	7	14.6%
• Diabetes	32	66.6%
• Hypertension	21	43.7%
• Others	7	14.5%
Parity		
• Range	0 – 10	
• Nullipara	5	(10%)
• Para 1	6	(12.5%)
• multipara	37	(77%)
Menopausal state:		
• No	8	16.7%
• Yes	40	83.3%
Positive history of cancer in the Family:		
• Negative	43	89.5%
• Positive:		m
• (breast cancer)	2	4.2%
• (colorectal cancer)	3	6.3%

Table 2: Ultrasonographic findings and staging of the studied patients

	N=48	%
Myometrial invasion:		
• No	3	6.3%
• <50%	11	22.9%
• >50%	34	70.8%
Cervical involvement:		
• No	28	58.3%
• Yes	20	41.7%
Pelvic LN involvement:		
• No	48	100%
Staging:		
• Ia	14	29.2%
• Ib	4	8.3%
• II	20	41.7%
• III	8	16.7%
• IV	2	4.2%

Table 3: Post operative results of histopathology

	N=48	%
Myometrial invasion		
• No	8	16.7%
• <50%	8	16.7%
• >50%	32	66.7%
Grade:		
• I	12	25%
• II	23	47.9%
• III	13	27.1%
Type :		
• Endometrioid carcinoma	46	95.83%
• Non endometrioid carcinoma	2	4.16%
LN involvement:		
• No	42	91.3%
• Yes	6	8.7%
• Cervical involvement	17	35.4%
• Ovarian involvement	9	15.2%

Table 4: The diagnostic value of preoperative ultrasonographic assessment of myometrial invasion in relation to histopathology

Myometrial invasion by US	Myometrial invasion by histopathology	Total (US)
0 - <50%	>50%	
0 - <50%	8	6
>50%	8	26
Total (pathology)	16	32
Sensitivity	Specificity	PPV
81.3%	50%	76.5%
NPV	Accuracy	kappa
57.1%	66.7%	0.309
p		0.035*

Table 5: Performance of preoperative ultrasonographic assessment of lymph node involvement in relation to pathology

US	Lymph node involvement	
	Free	Involved
Free	42	6
Sensitivity	PPV	NPV
0%	100%	0%
	87.5%	87.5%

Table 6: Performance of preoperative ultrasonographic assessment of cervical involvement in relation to pathology

US cervical involved	Cervical involvement by pathology	
	No	Yes
No	23	5
Yes	8	12
Total	31	17
Sensitivity	Specificity	PPV
70.6%	74.2%	60%
NPV	Accuracy	kappa
88.5%	72.9%	0.4
		p
		<0.001**

DISCUSSION

Endometrial cancer occurs in the lining of uterus (endometrium), as an abnormal cellular growth with the capability of metastasis, and it is common after menopause. Pelvic pain, urination pain, pain during intercourse, and non-menstrual vaginal bleeding are the prevalent symptom^[6].

According to Faria and colleagues, the accurate tumor staging aids for the most reliable treatment course, detecting cases with necessity of pelvic lymphadenectomy, and therefore need a special treatment and surgical experience, and avoid radical hysterectomy caused by cervical stroma invasion^[2].

Regarding the demographic data in the current findings, most cases were ≥ 55 years, 54% were diabetic, 56% hypertensive, $BMI \geq 30.85$ kg/m², 23% were of low parity and positive history of cancer in the family breast and colorectal cancer 4%, 6% respectively. Ultrasonographic findings of our studied patients revealed that myometrial invasion was >50% in 70.8% of our patients, cervical involvement was in 41.7% of our patients, while all our included patients showed no lymph node involved by ultrasound.

Pineda and colleagues conducted a cohort study on 152 cases for the assessment of myometrial infiltration by comparing gross examination during the operation and preoperative TVUS, they reported that the mean age was 60.9 years, 17.1% of cases were premenopausal, mean BMI was.

28.3 Kg/m², mean parity was 1.6. The myometrial infiltration was $\geq 50\%$ in 43 cases, and < 50% in 109 cases assessed with TVUS^[7].

Ahmedzade *et al.* studied the relationship between grading and ultrasound color Doppler in endometrial carcinoma assessment, they reported that the mean age was 63±9 years, the mean weight was 66±6 kg^[8].

Regarding surgical staging and FIGO classification on our patients, 29.2% were at staging Ia, 8.3% were at stage Ib, and 41.7% of them were at stage II, 16.7% were at stage III while remaining 4.2% were at stage IV. By histopathology examination of the excised specimen of our patients, there was no myometrial invasion in 16.7%, myometrial invasion <50% was 16.7% and >50% was 66.7% while as regard cervical involvement 35.4% of the patients showed cervical involvement and as regard lymph node involvement 8.7% showed patients lymph node involvement, histopathology type was 95.83% of endometrioid type and 4.1% of non-endometrioid type, 25% was of grade I and 47.9% was of grade II – 27.1% was of grade III.

We also analyzed the diagnostic value of preoperative ultrasonographic assessment of myometrial invasion in relation to histopathology. We found that the sensitivity was 81%, specificity was 50% and the accuracy of ultrasound detection degree of myometrial invasion was 67%. Ultrasonography had 0% sensitivity in diagnosis of LN involvement and 100% specificity, 87.5% NPV and accuracy 87.5%. We also found that ultrasonography in diagnosis patients with cervical involved was moderate in accuracy about 73%.

The study of Jonsdottir and colleagues included 1401 women, 91% of cases were diagnosed with adenocarcinoma of endometrium, 32% of cases had deep myometrial invasion, 61% of endometrial carcinoma were TVUS evaluated, and 83% were in FIGO Stage I. 6% of the cases with endometrial carcinoma were assessed with gross examination, 17% of cases with non-endometrioid were assessed with gross examination. TVUS had a low sensitivity (65.6%), and accuracy (80.3%). They have reported that gross examination had better specificity and accuracy (71.9% and 93.6%, respectively) than TVUS^[9].

Maryam and colleagues performed a similar study in which the mean parity was 3.9, mean gravid was 3.93, mean age was 54.5, 35.6% of cases were in stage IB had mean endometrial thickness of 38.5 mm, 64.4% of cases were in stage IA had endometrial thickness of 18.4 mm. TVUS revealed 81.3% of specificity, 88.9% of sensitivity, accuracy of 84.1% PPV of 76.5%, and NPV of 88.9% also showed positive predictive value (PPV) of 76.5%, negative predictive value (NPV) of 88.9%, sensitivity of 81.3%, specificity of 85.7%, and accuracy of 84.1% for evaluation of myometrial invasion depth^[10].

In a similar study by Akbayir and colleagues conducted on 219 cases, they found that TVUS in myometrial

infiltration ≥50% had 62% of sensitivity, 81% of specificity, PPV of 60%, NPV of 82%, and accuracy of 75%, while gross examination showed 61% of sensitivity, 88% of specificity, PPV of 70%, NPV of 83%, and accuracy of 79%. The combined tests had 78% of sensitivity, 76% of specificity, PPV of 60%, NPV of 88%, and accuracy of 70%^[11].

On intraoperative macroscopic examination in the study of Pineda and colleagues, 111 cases had myometrial infiltration <50% and as 41 cases with ≥50%. Regarding Definitive histopathological diagnosis, 114 cases had myometrial infiltration with <50%, 38 cases with ≥50%, 3 cases diagnosed with carcinosarcoma, 146 cases with adenocarcinoma, and 3 cases were tumor-free.

Concerning grading, 88 cases were with well-differentiated carcinoma, moderately differentiated presented in 48 cases, 13 cases with poorly differentiated. 12.9% of cases with lymph node infiltration, 2 cases had myometrial infiltration <50, 10 cases had myometrial infiltration ≥50%. Myometrial infiltration <50% was assessed with intraoperative gross examination and TVUS^[7].

Teefey and colleagues studied the association between TVUS and gross examination in 16 cases with endometrial carcinoma, gross examination showed accuracy of 80%, while TVUS showed accuracy of 93%^[12].

Berretta *et al.* in a study of the comparison of TVUS and gross examination conducted on 75 cases with endometrial cancer, they revealed that intraoperative gross examination had higher accuracy (83%) than TVUS (73%)^[13].

Savelli and colleagues analyzed TVUS accuracy in endometrial carcinoma staging on 155 cases, they found that TVUS had 75% of sensitivity, 89% of specificity, PPV of 86%, NPV of 79%, and accuracy of 81% the accuracy^[14].

Sobocan and colleagues studied the significant role of TVUS and pathological assessment of tumor in the management of cases with endometrial cancer, they reported that preoperative TVUS and surgical pathological evaluation of Type I and Type II tumors agreed in 95 % (174/184) and 54 % (12/22) of cases, respectively. TVUS had sensitivity of 76% and specificity of 81.7%. TVUS had accuracy of 95% in Type I EC, and 54% in Type II EC^[15].

CONCLUSION

Ultrasound imaging was significantly accurate for endometrial carcinoma staging preoperatively. There was a good correlation of TVUS with pathological results. TVUS evaluation proved to be a potential preoperatively guiding tool for non-bulky tumors and also a remarkable sensitive tool for excluding or detecting invasion.

CONFLICT OF INTERESTS

There are no conflicts of interest.

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