RESEARCH COMMUNICATION

Endometrial Cancer in Thai Women: Clinico-pathological Presentation and Survival

Siriwan Tangjitgamol[1]*, Sumonmal Manusirivithaya[1], Sunamchok Srijaipracharoen[1], Jakkapan Khunnarong[1], Sujitra Tanvanich[2], Kanyarat Katanyu[3], Thaovalai Thavaramara[1], Kamol Pataradool[1]

Abstract

Objective: To assess the characteristic features, treatment, survival, and prognostic factors of Thai endometrial cancer (EMC) patients. Methods: Clinico-pathological data of EMC patients who were treated in the institution from 1992 to 2008 were collected. Survival rates and prognostic factors were studied. Results: The mean age of the 261 patients was 55.4 ± 9.92 years. The most common complaint was abnormal uterine bleeding (87.3%). More than half (75.4%) had other medical illnesses or other cancers (10.7%). The majority (78%) had early stage disease. Post-operative adjuvant therapy was given in 41.4%; the most common was radiation therapy (37.2%). From a median follow-up of 57.5 months (range 0.03-212.3 months), progressive disease was encountered in 16 patients. Eighteen experienced recurrence (three local, 13 distant metastases and two local and distant). Overall, 30 patients died of cancer, while 18 died of other medical illnesses. The 5-year progression-free, cancer specific, and overall survivals (95% confidence intervals) were 86.5% (82.1-90.8%), 88.0% (83.9-92.2%), and 83.6% (78.7-88.4%), respectively. Significant prognostic factors for survival were: histology, grade, depth of myometrial invasion, cervical involvement, lymphovascular invasion, lymph node status, and Her-2/ neu expression. Conclusion: Most endometrial cancer patients in Thailand present at early stages and experience good survival outcomes.

Keywords: Endometrial cancer - characteristic features - survivals - prognostic factors

Asian Pacific J Cancer Prev, **11**, 1267-1272

Introduction

According to World Health Organization (WHO) data (Ferlay et al., 2010), the incidence of each female genital cancer varies in various parts of the world. In the more developed regions, endometrial cancer (EMC) is the most common female genital tract malignancy, with an estimated incidence of 12.9 per 100,000 women. In less developed regions, where cervical cancer is more common, EMC has an estimated incidence of 5.9 per 100,000, or 4.3 per 100,000 women in Thailand.

EMC is generally divided into type I and type II, which have different pathophysiologic pathways and clinicopathological features. Type I EMC involves an exposure to high levels of either endogenous or exogenous estrogen, while type II is independent of hormonal influence (Sherman 2000). Some studies from the West proposed another type of EMC, involving hereditary non-polyposis coli or BRCA genes (Berchuck and Boyd, 1995; Gruber and Thompson, 1996).

The mainstay of EMC treatment is surgery. The International Federation of Gynecology and Obstetrics (FIGO) staging procedure for EMC includes: total hysterectomy, bilateral salpingo-oophorectomy, and selective pelvic and para-aortic lymphadenectomy (Pecorelli, 2009). Adjuvant treatment is required when there are unfavorable clinicopathological prognostic factors e.g. old age, non-endometrioid histology, high grade tumor, deep myometrial invasion, cervical involvement, and extrauterine extension including pelvic and para-aortic lymph nodes meatstasis. Pelvic radiation, which is the most common form of adjuvant therapy, yields good control of loco-regional but not distant or systemic disease (ASTEC/EN.5 Study Group et al., 2009). Chemotherapy may have a role in advanced disease or early stage disease with high risk of distant failure (Susumu et al., 2008).

Generally, a prognosis of women with EMC is good, with a high overall survival rate (Altekruse et al., 2010). In women with localized diseases, the 5-year survival rate was reported as high as 96% (Altekruse et al., 2010). However, other co-medical illnesses are not uncommon in this patient age group; some of which may be so severe to contraindicate surgery, or may be more threatening than EMC itself.

Most data on EMC come from more developed regions

*[1]Department of Obstetrics and Gynecology, [2]Department of Anatomical Pathology, [3]Department of Radiation, Bangkok Metropolitan Administration Medical College and Vajira Hospital, Bangkok, Thailand. *For correspondence : siriwanonco@yahoo.com*

Table 1. Clinical Characteristic Features of Endometrial Carcinoma Patients

Characteristic features	N	%
Gynecologic history (n=160)		
Nulliparous (single or infertile)	49	30.6
Parous	111	69.4
Other medical illnesses (n=187)		
Yes [a]	141 [b]	75.4
No	46	24.6
Symptoms (n=213)		
Abnormal uterine bleeding	127	59.6
Pelvic mass [b]	19	8.9
Combined symptoms of mass and bleeding	59	27.7
Abnormal Pap smear [c]	8	3.8

[a]Each patient had one or more of the following medical illnesses (excluding cancers): diabetes mellitus, dyslipidemia, hypertension, ischemic heart diseases, obesity, past history or current thyroid diseases; [b]Pelvic masses were either uterine adenomyosis and/ or myoma (62 patients) or ovarian tumors (16 patients). Ovarian masses were metastatic EMC in six cases, synchronous ovarian cancer in six, and benign ovarian tumor in the other four; [c]From 8 patients with abnormal Pap smear, 4 were revealed from hysterectomy specimen to have cervical involvement (one with stage IIIC-grade 2 endometrioid carcinoma, the other three had stage IIIC-serous, stage IIA-clear cell, or stage IIB-grade 3 endometrioid carcinoma), one with EMC extending to lower uterine segment (stage IIIC-grade 2 endometrioid carcinoma), and three had no cervical lesions (stage IB, IC, IIIA-grade 2 endometrioid carcinoma).

Table 2. Type of Surgery and Surgico-Pathological Findings of Endometrial Carcinoma Patients (N=261)

Surgico-pathological features	n	%
Type of surgery		
Complete surgical staging [a]	248	95.0
Incomplete surgical staging	11	4.2
Post radiation surgery	2	0.8
Histopathology		
Endometrioid carcinoma (EC)	202	77.4
EC + other components [b]	40	15.3
Carcinosarcoma	9	3.5
Others [c]	10	3.8
Cervical involvement		
No	204	78.2
Cervical glandular involvement	27	10.3
Cervical stroma involvement	30	11.5
Myometrial invasion		
Endometrium only	20	7.7
Inner half	152	58.2
Outer half	89	34.1
Peritoneal cytology (N=202)		
Negative	192	95.0
Positive	10	0.5
Staging (N=259)		
Stage I	171	66.0
Stage II	31	12.0
Stage III	50	19.3
Stage IV	7	2.7

[a]Complete surgical staging referred to hysterectomy plus salpingoophorectomy and lymph node sampling ± omentecotmy; [b]Other components were: squamous (n=33), serous (n=3), clear (n=2), muicnous (n=1), neuroendocrine (n=1); [c]Other histopathology were: clear cell carcinoma (n=4), serous carcinoma (n=3), villoglandular carcinoma (n=2), secretory carcinoma (n=1)

and Western countries. Because some authors recognized that race has an impact on some characteristic features and survival outcomes (Connel et al., 1999), we aimed to evaluate the clinico-pathological features, treatments and outcomes of EMC patients who are all Asian and were treated in our institution.

Materials and Methods

After approval from the Ethics Committee for Research involving Human Subjects of the institution, we searched the archives of the Department of Anatomical Pathology; Gynecologic Oncology Unit of the Department of Obstetrics and Gynecology; and Radiation Oncology Unit of the Department of Radiology, to identify EMC patients treated between January 1992 and December 2008. We included patients who underwent operations at the institution, or elsewhere and were referred for further management. Exclusion criteria were patients who had uterine sarcoma other than carcinosarcoma, patients who had fertility sparing treatment, and had no available medical records or surgico-pathological reports.

The following data were collected: age, presenting symptom, other co-morbidities or other cancers, type of primary surgery, stage of disease, histopathology, tumor grade, expression of ER, PR, and Her2/neu, lymphvascular invasion, depth of myometrial invasion, peritoneal cytology, cervical or any extrauterine involvement, adjuvant therapy, and treatment outcomes. Complete surgical staging referred to hysterectomy and salpingo-oophorectomy was performed together with retroperitoneal lymph node sampling, with or without omentectomy. Staging was assigned according to the FIGO 1988 criteria (FIGO news, 1989). ER, PR, and Her2/neu expression were obtained from the data set of our previous study (Srijaipracharoen et al. 2010).

Progression-free survival (PFS), overall survival (OS), and cancer-specific survival were determined. PFS was defined as interval from the end of treatment to the time of recurrence, disease progression, or dead from other causes. For the patients who were lost to follow-up, PFS data was right censored at the time of the last evaluation, or contact when the patients were known to be progression-free. OS and cancer-specific survival were defined as the time from the date of diagnosis to the date of all deaths from any causes and EMC death, respectively. For the patients alive at the time of the study, survival data were right-censored at the date of the last follow-up visit.

Data were analyzed using SPSS statistical software, version 11.5 (SPSS, Chicago, IL). Descriptive statistics were used to analyze demographic data and were summarized as numbers with percentage or median with range. OS and PFS were analyzed by the Kaplan-Meier method and were compared between groups with log rank test. *P*-values of <0.05 were considered significant.

Results

From the study period, 264 EMC patients were identified. Two patients who had no available pathological

Table 3. Adjuvant Treatment According to Stage of Disease in Endometrial Cancer Patients (N=106*)

Stage	Adjuvant treatment					
	ERT	ICRT	ERT/ ICRT	ERT/ ICRT plus chemotherapy	Chemotherapy	Hormonal therapy
I						
IB	1	10	11	-	-	3
IC	6	1	16	-	-	-
II						
IIA	-	2	9	-	1[a]	-
IIB	1	-	7	-	-	-
III						
IIIA	3	1	7	-	2[a]	-
IIIC	1	-	19	2	1	2[b]
Total	12 (4.6%)	14 (5.4%)	69 (26.4%)	2 (0.8%)	4 (1.5%)	5 (1.9%)

* Two patients in stage III had adjuvant radiation therapy with no specified type in the other hospitals; [a]One patient in stage IIA and another one in stage IIIA had chemotherapy for their synchronous ovarian cancer; [b]Two stage IIIC had megestrol acetate: one who had gross nodal disease had palliative hormonal treatment due to her poor performance status while another who had microscopic nodal disease declined radiation therapy had megestrol acetate for 3 months

data and one who had fertility sparing treatment were excluded. Mean age of 261 patients recruited into the study was 55.4 ± 9.92 years.

Approximately 1/3 of patients were single, had chronic anovulation or fertility problems while 3/4 had other medical illnesses. Four patients reported long term use (> 2 years) of hormone replacement therapy for their menopausal symptoms. Another premenopausal woman had taken herbal medicine (constituents unrevealed) for over 10 years. Six patients had been treated with tamoxifen for 4-10 years for breast carcinoma. Aside from the past history of breast cancer, a history of colon cancer (two patients) and invasive cervical cancers treated with radiation therapy (one patient) were also revealed. Only two patients reported history of maternal EMC or ovarian cancer in a sibling, the remaining had no records regarding family history of cancers.

Abnormal uterine bleeding (with or without pelvic mass) was the most common symptom (186 patients, 87.3%). Among 59 patients (27.7%) who had uterine bleeding accompanied by pelvic masses, 49 had pre-operative endometrial histological diagnosis of cancer, while 10 (16.9%) were discovered intra- or post-operatively to have EMC. Pelvic mass alone was found in 19 patients (8.9%). Eight patients presented with abnormal Papanicolaou smear, class V in seven patients and high grade squamous intraepithelial lesion in one. Clinical characteristic features of the patients are shown in Table 1.

Two patients had radiation prior to surgery due to clinical parametrial involvement. Among 259 patients who had primary surgery, 11 patients with disease confined to the uterus or with suboptimal condition for extensive surgery had only simple hysterectomy and bilateral salpingo-oophorectomy. Pelvic lymph node (PN) and para-aortic lymph node (PAN) resections were additionally done in 248 patients (93.1%) and 184 patients (70.5%), respectively. The corresponding median number of PNs and PANs retrieved were 18 nodes (range, 1-51 nodes) and 3 nodes (range, 1-19 nodes), respectively. Positive nodes were found in 38 cases: isolated PN in 26 cases and PAN in six, positive at both sites in six cases. Among these 38 cases with positive nodes, 12 had nodal metastasis as the only site of extra-uterine lesions.

To be noted, radical hysterectomy was performed instead of simple hysterectomy in six patients due to positive preoperative cervical curettage; pathological cervical invasion was found in only three hysterectomy specimens. One patient had additional hemi-vulvectomy for a co-incidental finding of early stage vulvar squamous cell carcinoma.

The majority of patients had early stage disease. Other surgico-pathological findings of EMC patients are shown in Table 2. Aside from one patient with vulvar carcinoma mentioned earlier, an additional 10 patients were discovered at the time of EMC diagnosis to have other cancers or pre-cancerous lesions: synchronous ovarian cancer (six patients); colon carcinoma (one); pre-invasive cervical carcinomas (two); and appendiceal carcinoid tumor (one).

Post-operative adjuvant therapy was given in 108 patients (41.4%): 48 stage I, 20 stage II, and 40 stage III. Radiation therapy was the most common type of adjuvant treatment (Table 3). From a median follow-up of 57.5 months (range 0.03-212.3 months), progressive diseases were encountered in 16 patients (6.1%): seven stage IVB patients, six stage IIIC, and three stage IIIA. Eleven of these patients had no adjuvant treatment, four had pelvic radiation, and one had only palliative hormonal therapy due to poor performance status. Eighteen patients (6.9%) experienced recurrences: three local recurrences (stage IB, IIA, IIIC), 13 distant metastasis (one patient of each stage IB, IC, IIA and ten of stage IIIC), and two local plus distant recurrences (stage IC and IIIC). Overall, 30 patients were died of cancer (11.5%) while 18 died from unrelated causes (6.9%). During follow-up, seven patients developed cancers at various sites, 2-8 years after EMC treatment: lung cancers, thyroid carcinoma, breast with colon carcinomas, and vaginal cancer. The overall incidence of other cancers found in our EMC patients was 10.7% (28/261 patients). Details of other metachronous or synchronous cancers in association with EMC are summarized in Table 4.

Of note, 10 EMC patients in our study had some form of hormone replacement after cancer treatment: one stage IA patient, four stage IB, two stage IIA, one stage IIIA, and two stage IIIC. All except one patient with stage IIIC disease, who had recurrence at the supraclavicular lymph node, were alive without evidence of disease ranging from

Table 4. Metachronous and Synchronous Cancers Found in Endometrial Cancer Patients (N=28)

Other cancers	Duration in relation to endometrial CA	Endometrial CA		
		age	stage	Adjuvant therapy
Prior to endometrial cancer (n)	(years prior)			
Invasive ductal carcinoma of breast (7)	4 -10	50-78	IB-IIIC	varied
Colonic adenocarcinoma (2)	4,8	48	IB	no
		64	IIIC	XRT/ ICRT
Invasive cervical squamous cell carcinoma (1)	19	66	IC	no
Co-incidental with endometrial cancer(n)				
Epithelial ovarian cancer [a] (5)	NA	34-57	IB-IIIC	no or chemoRx
Sertoli Leydig cell tumor [b] (1)	NA	62	IB	no
Colon carcinoma (1)	NA	54	IIB	XRT
Cervical squamous cell carcinoma in situ (2)	NA	58	IB	no
		65	IB	no
Appendiceal carcinoid tumor (1)	NA	50	IIIC	XRT/ ICRT
Sqaumous cell carcinoma of vulva (1)	NA	58	IIB	XRT/ ICRT
After endometrial cancer (n)	(years after)			
Papillary thyroid carcinoma (1)	8	61	IB	no
Lung cancers (4)				
Squamous cell carcinoma	4	68	IB	no
Unknown histology	5	58	IIA	ICRT
Small cell neuroendocrine carcinoma	7	55	IC	XRT/ ICRT
Unknown histology	9	61	IIIC	XRT/ ICRT
Breast and colon carcinoma (1)	2	42	IB	no
Vagina squamous cell carcinoma (1)	7	54	IC	XRT/ ICRT

[a]Five patients had synchronous ovarian endometrioid carcinoma (same histology as endometrial cancer) of stage IA (two), stage IC (two), or stage IIC (one); [b]One patient had Sertoli-Leydig cell tumor of stage IA

Table 5. Survival of Patients According Various Clinico-Pathological Characteristic Features (N=261)

Characteristic features	n	5-year DFS (95% CI)	P value	5-year OS (95% CI)	P value	5-year CA specific survival (95% CI)	P value
Age							
≤ 60 years	179	87.4 (82.3-92.5)	0.553	85.8 (80.4-91.2)	0.261	90.0 (85.4-94.5)	0.253
> 60 years	82	84.5 (76.4-92.6)		78.2 (68.0-88.3)		83.4 (74.6-92.2)	
Stage (N=259)							
Early	202	97.3 (94.9-99.6)	<0.001	92.6 (88.5-96.7)	<0.001	97.0 (94.4-99.6)	<0.001
Advance	57	47.2 (33.0-61.4)		52.2 (37.8-66.6)		55.9 (42.5-69.4)	
Histopathology							
Endometrioid	239	89.6 (85.5-93.6)	<0.001	86.9 (82.2-91.6)	<0.001	91.3 (87.5-95.1)	<0.001
Others	22	54.2 (33.2-75.1)		47.7 (25.6-69.8)		54.6 (33.7-75.4)	
Grade							
I	59	100.0	<0.001	96.7 (90.2-100.0)	0.001	100.0	0.002
II-III	202	82.6 (77.2-88.1)		79.8 (73.9-85.7)		84.6 (79.4-89.8)	
Myometrial invasion							
No or less than 1/2	172	95.1 (91.7-98.4)	<0.001	91.7 (87.1-96.3)	<0.001	95.0 (91.6-98.4)	<0.001
More than 1/2	89	69.5 (59.3-79.8)		67.9 (57.4-78.4)		74.5 (64.9-84.1)	
Cervical involvement							
No cervical involvement	204	91.8 (87.8-95.8)	<0.001	87.9 (82.9-92.9)	0.002	92.5 (88.7-96.3)	<0.001
Cervical gland involvement	27	70.2 (52.8-87.5)		68.3 (49.9-86.6)		68.3 (49.9-86.6)	
Cervical stroma involvement	30	66.2 (49.1-83.3)		68.4 (51.1-85.7)		76.5 (61.3-91.7)	
Lympohvascular invasion							
No	207	92.4 (88.7-96.1)	<0.001	88.9 (84.2-93.6)	<0.001	92.6 (88.8-96.4)	<0.001
Yes	54	63.3 (49.3-77.2)		70.0 (57.1-82.9)		70.0 (57.1-82.9)	
Lymph node status (N=249)							
Negative	211	95.4 (92.5-98.4)	<0.001	90.9 (86.5-95.2)	<0.001	95.2 (92.0-98.3)	<0.001
Positive	38	39.8 (22.4-57.1)		47.4 (29.4-65.3)		52.6 (35.9-69.4)	
Immunohistochmeical study (N=157)							
ER expression							
Negative	73	78.7 (69.0-88.3)	0.179	75.2 (64.9-85.5)	0.117	80.8 (71.3-90.3)	0.159
Positive	84	87.8 (80.0-95.5)		87.6 (79.6-95.6)		91.2 (84.9-97.5)	
PR expression							
Negative	55	79.4 (68.5-90.3)	0.370	77.2 (65.8-88.6)	0.482	82.8 (72.5-93.1)	0.516
Positive	102	85.9 (78.6-93.2)		84.4 (76.5-92.2)		88.2 (81.6-94.8)	
Her2/ neu expression							
Negative	152	85.3 (79.4-91.2)	0.003	83.4 (77.1-89.7)	0.045	88.1 (82.8-93.5)	0.001
Positive	5	40.0 (0-82.9)		40.0 (0-82.9)		40.0 (0-82.9)	

12-134 months (median 73 months).

Median PFS and OS of our EMC patients had not been reached, while 5-year PFS and 5-year cancer specific survival were 86.5% (95% confidence interval (CI), 82.1-90.8%) and 88.0% (95% CI, 83.9-92.2%), respectively, with 5-year OS of 83.6% (95% CI, 78.7-88.4%). We evaluated various clinico-pathological features as potential prognostic factors for survival. Early stage disease, endometrioid histology, grade 1 tumor, absence or less than half myometrial invasion, absence of cervical or lymphovascular space invasion, no LN metastasis, and negative Her-2/neu expression, were all associated with significantly longer survival by univariable analysis (Table 5). By multivariable analysis, disease stage, nodal status, and Her-2/neu expression, were found to be significant prognostic factors for survival.

Discussion

The high incidence of EMC in Western countries has given us a large body of evidence of EMC (Ferlay et al., 2010). The dominating incidence of cervical cancer in Asia has led to shortcomings in the data on EMC regarding etiology, natural course, and outcomes of treatment.

Our study attempted to identify the association of risk factors in Thai EMC patients. Some features were similar to reports from the West regarding the imbalance of the hormonal milieu, represented by chronic anovulation or infertility problems (Klip et al., 2000; Weiderpass et al., 2000). We found that approximately 75% of our EMC patients had associated medical disorders, which was higher than the 38%-48%, previously reported in other studies from Asia (Wang et al., 2004; Kodama et al., 2005). The difference might derive from differences in the age of the population studied, or in the consistency of patient record keeping. The 10% rate of synchronous or metachronous cancers, occurring pre-, co-incidentally or post-EMC diagnosis; was higher than the 7% reported in the Japanese study which focused only on the prior history of malignancy (Kodama et al., 2005). Genetic or familial risk was not explored in either studies and may be under-reported. This rate of familial risk was better understood when the information from a retrospective study was examined. This finding should alert physicians, especially in countries where the genetic risk is not yet well understood, to conduct future studies on this feature.

Similar to previous reports most of our EMC patients presented with abnormal uterine bleeding (Kodama et al., 2005). Identification of a pelvic mass alone or mass accompanied with bleeding, comprised nearly 40% of presenting symptoms in our patients. The majority of which were from benign lesions or synchronous ovarian cancers, while only a few (six patients) were caused by metastatic EMC to the ovaries. Of interest, approximately 17% of patients who presented with mass and bleeding, were found incidentally to have EMC. This should alert all primary caregivers to perform a thorough preoperative endometrial evaluation before a surgical exploration for any presumed benign mass. Nearly 4% of our EMC patients presented with abnormal cervical Pap smear, which was lower than the previously 15%-30% (Eddy et al., 1997; Fukuda et al., 1999). Association of preoperative abnormal cervical cytology with high grade or aggressive histology and extra-uterine disease, was confirmed in this study and others (Eddy et al., 1997; Fukuda et al., 1999).

Almost all of our EMC patients had primary surgical treatment and the majority had LN resection, 93% for PN and 71% for PAN. We generally perform surgical practice according to the standard FIGO staging procedure including selective lymph node resection if indicated. Our data supported the diagnostic value of LN evaluation, since 12/38 patients were upstaged from their positive nodal status as the only sites of extrauterine diseases. However, our data could not address a therapeutic benefit of LN resection, due to the limited number of patients not having the nodal procedure.

Generally, post-operative adjuvant radiation therapy is generally recommended for patients who have risk (s) of recurrence. The question whether pelvic external-beam radiation therapy was mandatory or whether brachytherapy alone would suffice in selected patients with early stage diseases was beyond the scope of this study and will not be discussed in detail. In brief, our EMC patients who were found to have stage IB and higher, had some form of adjuvant therapy. Generally, disease stage along with patient age, grade of tumor, and other prognostic factors were important considerations in adjuvant treatment. Nevertheless, variations in treatment patterns were observed with many possible reasons. Firstly, this retrospective study collected data from over 10 years. Over that period there was continuous emerging data on adjuvant therapy and different training schools and experience of gynecologic and radiation oncologists at the institution, therefore the line of treatment was modified accordingly. Secondly, the most realistic situation was that most EMC patients had some coincidental form of medical illness, which might have influenced treatment planning or actual treatment.

In concordance with other reports from the West (Altekruse et al., 2010; Ferlay et al., 2010), our EMC patients had fairly good survival outcomes. One observation was that, although the 5-year PFS and 5-year cancer-specific survivals were approaching 90%, the OS was slightly over 80%. This figure reflected the impact other medical illnesses had on the survival of the EMC patients.

Several clinico-pathological features such as age, histologic grade, lymph-vascular space involvement, depth of myometrial invasion, cervical invasion, and extrauterine involvement; including LN status, were reported as prognostic factors for EMC (Morrow et al., 1991; Mariani et al., 2002). Although most studies demonstrated the positive prognostic role of ER, PR (Palmer et al., 1998) and negative role of HER-2/neu expression in EMC, some could not demonstrate this association (Morris et al., 1995; Jeon et al., 2006). Our study also found that early stage disease, endometrioid histology, grade 1 tumor, absence or less than half of myometrial invasion, absence of cervical or lymphovascular space invasion, and negative lymph node metastasis were good prognostic factors. We also demonstrated the negative impact of Her-2/neu expression on survival. However, this was not observed with ER or

PR expression. The difference might lie on a percentage of the population with low grade tumors, which affects the rate and survival influence of hormonal expression.

In conclusion, Our study showed that Thai endometrial cancer patients presented more frequently in early stage. Prognosis and survival outcomes are good and comparable to those reports from the West. Early stage disease, endometrioid histology, grade 1 tumor, absence or less than half of myometrial invasion, absence of cervical or lympho-vascular space invasion, no lymph node metastasis, and negative Her-2/neu expression were good prognostic factors. Medical co-morbidities were common and were the cause of death in a modest number of patients. All of these findings should be taken into consideration in treating endometrial cancer patients, especially in the use of adjuvant treatment after surgery.

Conflict of interest

The authors declare no conflicts of interest.

References

Altekruse SF, Kosary CL, Krapcho M, et al (2010). SEER Cancer Statistics Review, 1975-2007, National Cancer Institute. Bethesda, MD, http,//seer.cancer.gov/csr/1975_2007/, Available at http,//seer.cancer.gov/statfacts/html/corp.html. Accessed July 4, 2010.

ASTEC/EN.5 Study Group, Blake P, Swart AM, Orton J, et al (2009). Adjuvant external beam radiotherapy in the treatment of endometrial cancer (MRC ASTEC and NCIC CTG EN.5 randomised trials), pooled trial results, systematic review, and meta-analysis. *Lancet*, **373**, 137-46.

Berchuck A, Boyd J (1995). Molecular basis of endometrial cancer. *Cancer*, **76**, 2034-40.

Connell PP, Rotmensch J, Waggoner SE, et al (1999). Race and clinical outcome in endometrial carcinoma. *Obstet Gynecol*, **94**, 713-20.

Eddy GL, Wojtowycz MA, Piraino PS, et al (1997). Papanicolaou smears by the Bethesda system in endometrial malignancy, utility and prognostic importance. *Obstet Gynecol*, **90**, 999-1003.

Ferlay J, Shin HR, Bray F, et al (2010). GLOBOCAN 2008, Cancer incidence and mortality worldwide, IARC Cancer base No. 10 (Internet). Lyon, France, international agency for research on cancer, 2010. Available at http,//globocan.iarc.fr/. Accessed July 4, 2010.

FIGO News (1989). Corpus Cancer Staging. *Int J Gynecol Obstet*, **28**, 189-93.

Fukuda K, Mori M, Uchiyama M, et al (1999). Preoperative cervical cytology in endometrial carcinoma and its clinicopathologic relevance. *Gynecol Oncol*, **72**, 2730-7.

Gruber S, Thompson W (1996). A population based study of endometrial cancer and familial risk in younger women. *Cancer Epidemiol Biomarkers Prev*, **5**, 411-7.

Jeon YT, Park IA, Kim YB, et al (2006). Steroid receptor expressions in endometrial cancer, Clinical significance and epidemiological implication. *Cancer Lett*, **239**, 98-204.

Klip H, Burger CW, Kenemans P, et al (2000). Cancer risk associated with subfertility and ovulation induction, a review. *Cancer Causes Control*, **11**, 319-44.

Kodama J, Seki N, Ojima Y, et al (2005). Correlation of presenting symptoms and patient characteristics with endometrial cancer prognosis in Japanese women. *Int J Gynecol Obstet*, **91**, 151-6.

Mariani A, Webb JM, Keeney LG, et al (2002). Assessment of prognostic factors in stage IIIA endometrial cancer. *Gynecol Oncol*, **86**, 38-44.

Morris PC, Anderson JR, Anderson B, et al (1995). Steroid hormone receptor content and lymph node status in endometrial cancer. *Gynecol Oncol*, **56**, 406-11.

Morrow P, Bundy BN, Kurman R J, et al (1991). Relationship between surgical-pathological risk factors and outcome in clinical stage I and II carcinoma of the endometrium, a gynecological oncology group study. *Gynecol Oncol*, **40**, 55-65.

Palmer DC, Muir IM, Alexander AI, et al (1988). The prognostic importance of steroid receptors in endometrial carcinoma. *Obstet Gynecol*, **72**, 388-93.

Pecorelli S (2009). Revised FIGO staging for carcinoma of the vulva, cervix, and endometrium. *Int J Gynaecol Obstet*, **105**, 103-4.

Sherman ME (2000). Theories of endometrial carcinogenesis, a multidisciplinary approach. *Mod Pathol*, **13**, 295-308.

Srijaipracharoen S, Tangjitgamol S, Tanvanich S, et al (2010). Expression of ER, PR, and her-2/ neu in endometrial cancer, a clinicopathological study. *Asian Pac J Cancer Prev*, **11**, 215-20.

Susumu N, Sagae S, Udagawa Y, et al (2008). Japanese gynecologic oncology group. Randomized phase III trial of pelvis radiotherapy versus cisplatin- based combined chemotherapy in patients with intermediate and high risk endometrial cancer. A Japanese gynecologic oncology group study. *Gynecol Oncol*, **108**, 226-33.

Wang JL, Wang ZQ, Wei LH (2004). Primary clinical analysis of medical disorders in Chinese women with endometrial carcinoma. *Int J Cancer*, **14**, 502-7.

Weiderpass E, Persson I, Adami HO, et al (2000). Body size in different periods of life, diabetes mellitus, hypertension and risk of postmenopausal endometrial cancer (Sweden). *Cancer Causes Control*, **11**, 185-92.