Comparison of Clinical Manifestations and Survival Outcomes between Neuroendocrine Tumor and Squamous Cell Carcinoma of the Uterine Cervix: Results from a Tertiary Center in Southern Thailand

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Objective: *To study the clinical manifestations and survival outcomes of neuroendocrine tumor of the uterine cervix (NTUC) and compare them with those of squamous cell carcinoma (SCCA)*

Material and Method: *A case-control study was conducted. In the study group, we included patients whose tumors were described in the original pathology reports as NTUC. For the control group, we calculated the sample size based on a formula according to survival rate. The ratio of cases to controls was 1:4. Patients with a diagnosis of SCCA of the uterine cervix and treated between January 2003 and December 2011 in Songklanagarind Hospital were included in the control group according to stage and year of NTUC diagnosis. The patients' characteristics, method of treatment, treatment outcomes, and survival of the two groups were compared. The prognostic factors among patients with NTUC were analyzed using the Cox regression.*

Results: *Of the 2,835 cervical carcinoma cases studied, 44 (1.6%) were NTUC. NTUC patients had a lower mean age at diagnosis, received more multimodality treatments, had a lower complete response rate, a higher recurrence rate, and more distant metastasis than their SCCA counterparts. A significantly lower 2-year and 5-year survival was detected in NTUC compared with SCCA (62% and 52% vs. 97% and 85%, respectively, $p<0.01$). In the univariate analysis, the number of sexual partners, stage of disease, surgery treatment, status of response, and site of recurrence predicted a poorer overall survival in NTUC. However, these factors were not found to be statistically significant prognostic factors on multivariate analysis.*

Conclusion: *A poorer treatment outcome and prognosis were found in NTUC compared with SCCA. Moreover, a poorer prognosis was observed in NTUC patients with an advanced-stage disease, non-surgery treatment, progressive disease, and distant metastasis recurrence than in those with SCCA patients. Multimodality treatments should be considered in NTUC to improve survival. Additionally, close monitoring may be necessary in this group of patients.*

Keywords: *Neuroendocrine tumor, Cervix, Clinical manifestation, Survival*

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Carcinoma of cervix uteri is one of the most common malignant tumors of the female genital tract. In 2008, an incidence of 529,000 new cases and 275,000 deaths were reported worldwide. More than 85% of the global burden and about 88% of mortalities occur in developing countries[1]. The incidence in Thailand is 16.7 cases per 100,000 women[2], and in Songkhla[3], Southern Thailand, it is14.1 cases per 100,000 women.

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The most common types of cervical cancer are squamous cell carcinoma (SCCA) and adenocarcinoma. Other types are endometrioid adenocarcinoma, adenosquamous carcinoma, clear-cell carcinoma, and neuroendocrine tumor of the uterine cervix (NTUC). Typically, surgery is the primary form of treatment for early-stage cervical cancer of all types, and adjuvant treatment depends on prognostic factors. Concurrent chemo-radiation using a platinum base is the standard treatment in advanced disease in most types of cervical cancer. However, treatment in early-stage NTUC involves adjuvant chemotherapy. Concurrent chemotherapy such as etoposide/cisplatin is used in some cases, and substitutes cisplatin alone in the treatment of advanced-stage of NTUC[4,5].

NTUC is subdivided into four types, carcinoid tumor, atypical carcinoid tumor, large cell, and small cell[6,7]. It represents up to 2% of all cervical malignancies[4,5,8,9]. Large-cell and small-cell are more frequently found than the other two types, and tend to be more aggressive and progress rapidly, similarly to lung cancer. The 5-year overall survival (OS) for NTUC has been reported at 35.7%, compared to that of SCCA, 60.5%[10].

Previous studies on the nature of SCCA and adenocarcinoma have enabled gyne-oncologists to better comprehend their treatment and improve the overall survival of the affected patients[11-13]. However, a few studies have been conducted on cell types such as NTUC. In the present study, we aimed to assess the clinical manifestations and overall survival in women with NTUC, and compare those findings with the ones from SCCA patients.

Material and Method

This retrospective study was carried out at Songklanagarind hospital, a tertiary referral center in Southern Thailand. Our institutional review board's approval was sought prior to the study. The medical records of patients diagnosed for carcinoma of the uterine cervix between 2003 and 2011 were reviewed. In the study group, we included all patients whose tumors were described in the original pathology reports as NTUC. For the control group, we calculated the sample size based on a formula according to survival rate. Patients with a diagnosis of SCCA of the uterine cervix were included in the control group according to stage and year of NTUC diagnosis. The ratio of cases to controls was about 1:4. The total number of patients in each stage and year were divided by four and then randomized to the control group according to ascending hospital numbers. Patients who refused treatment or received incomplete treatment were excluded from both groups.

Histological criteria

Currently, histomorphology is used in the diagnosis of NTUC. According to the World Health Organization (WHO), the classification for cervical tumors, which is similar to the one used for pulmonary cancer, comprises four categories of neuroendocrine tumors of the cervix, typical carcinoid tumor, atypical carcinoid tumor, large-cell neuroendocrine carcinoma, and small-cell carcinoma. "Carcinoid tumors exhibit trabecular, organoid, nested or cord-like growth patterns, minimal or no necrosis, and small uniform cells with round nuclei, and finely granular chromatin. Atypical carcinoid tumors exhibit the above features with increased mitotic activity (usually 5 to 10 mitoses per 10 high power fields), a greater degree of nuclear atypia, and/or conspicuous necrosis. Large-cell and small-cell neuroendocrine carcinomas exhibit necrosis, abundant mitoses (usually >10 mitoses per 10 high power fields), and a progressive loss of organoid architecture. However, in difficult cases, immunoperoxidase studies, neuron-specific enolase (NSE), synaptophysin, and chromogrannin A may be helpful in identifying neuroendocrine differentiation"[7].

"SCCA is diagnosed by the following criteria: 1) a desmoplastic response in the adjacent stroma, 2) focal conspicuous maturation of the neoplastic epithelium with prominent nucleoli, 3) blurring of the epithelial-stromal interface, and 4) loss of polarity of the nuclei at the epithelial-stromal border with absence of the palisaded pattern characteristic of cervical intraepithelial neoplasia (CIN)"[7].

Demographic data such as age at diagnosis, parity, age at first sexual intercourse, smoking, number of partners, contraceptive method, and chief complaint were obtained from the patients' medical records. Data concerning tumor profiles such as tumor size, tumor histology, immunohistochemistry (IHC), lymphovascular space invasion (LVSI), lymph node status, and International Federation of Gynecology and Obstetrics (FIGO) stage were reviewed. According to the treatment guidelines, patients with an early stage of disease were usually treated with primary radical hysterectomy plus pelvic lymphadenectomy. The pathological findings were used as indicators for further individualized adjuvant therapy, which consisted of radiation therapy (RT), concurrent chemoradiation therapy (CCRT), and chemotherapy (CMT). Patients with advanced-stage disease were typically treated with radiation with or without chemotherapy. The majority of the patients with early-stage NTUC received adjuvant chemotherapy after primary surgery. However, CCRT involved chemotherapy with cisplatin/etoposide in patients with advanced-stage disease.

Additionally, information related to method of treatment, status of response according to Response Evaluation Criteria In Solid Tumors (RECIST) criteria, site of recurrence, follow-up, and relapse was collected from records of clinic visits and correspondence with patients and their physicians. The authors defined multimodality as having received more than a single treatment, and divided it into bi-modality (receiving

two methods of treatment) and tri-modality (receiving three methods of treatment). The authors defined early stage as FIGO stages I-IIA and advanced stage as stages IIB-IVB. We defined overall survival as the time from the date of diagnosis to the date of cancer-related death, last follow-up, or censoring, whichever came first.

The data were analyzed using program R, version 2.14.2 (R Development Core Team [2012]). The comparison of categorical variables between NTUC and SCCA was analyzed using either the Chi-square or Fisher's exact test. The continuous variables were analyzed by means of the unpaired t-test or Wilcoxon rank-sum test, as appropriate. Survival was presented by a Kaplan-Meier curve and the difference between cell types, stages and tumor histology was calculated using the log rank test. The independent prognostic factors of NTUC were analyzed via Cox regressions, represented by hazard ratios and 95% confidence intervals. A *p*-value of less than 0.05 was considered to indicate statistical significance.

Results

During the study period, there were 2,835 patients diagnosed with cervical cancers in Songklanagarind Hospital. Of these, there were 2,219 (78%) patients with SCCA and 44 patients had a diagnosis of NTUC. The incidence of NTUC during this eight-year period was 1.6%. Because there was inadequate number of patient with SCCA in some stage and year of diagnosis, the control group was only 155 patients.

Table 1 showed the patients' characteristics by cell type. Only the age of patients in NTUC was significantly lower than that in SCCA; the other characteristics were not significantly different. The methods and results of treatment by cell type were presented in Table 2. Patients with NTUC received a multimodality treatment, underwent surgery, and had recurrence more often than SCCA patients, but fewer of them achieved a complete response. These results were significantly different with those of patients with SCCA. Distant recurrence in the NTUC group involved brain, thyroid, lung, breast, lymph node, liver, and bone metastasis; in the SCCA group, brain, lung, lymph node, liver, and bone metastasis were observed.

The 2-year and 5-year survival rates for NTUC were significantly lower than those for SCCA (62% and 52% vs. 97% and 85%, respectively), with *p*-value of <0.01, as shown in Fig. 1a. When comparing early and advanced stage, the survival rate for NTUC was not significantly different from that of SCCA in early-stage, but significantly lower than in advanced-stage SCCA, as in Fig. 1b and 1c, respectively.

Table 1. Patient characteristics by cell type

Factor	NTUC	SCCA	*p*-value
Age	n = 44	n = 155	0.01
Mean (SD)	45.6 (11.2)	51.4 (10.7)	
First SI	n = 27	n = 89	0.23
Median (IQR)	20 (17, 24.5)	19 (17, 22)	
Parity	n = 44	n = 146	0.98
≤1	6 (13.6)	18 (12.3)	
>1	38 (86.4)	128 (87.7)	
Partners	n = 31	n = 107	0.98
≤1	20 (64.5)	69 (64.5)	
>1	11 (35.5)	38 (35.5)	
Smoking	n = 24	n = 77	0.33
No	24 (100)	71 (92.2)	
Yes	0 (0)	6 (7.8)	
Contraception	n = 20	n = 69	0.19
Pill	4 (20.0)	29 (42.0)	
No pill	16 (80.0)	40 (58.0)	
Chief complaint	n = 44	n = 141	0.35
Abnormal vaginal bleeding	24 (54.5)	80 (56.7)	
Postcoital bleeding	9 (20.5)	20 (14.2)	
Discharge	5 (11.4)	29 (20.6)	
Other	6 (13.6)	12 (8.5)	
Tumor size (cm)	n = 44	n = 155	0.37
≤4	23 (52.3)	95 (61.3)	
>4	21 (47.7)	60 (38.7)	
LVSI	n = 9	n = 21	0.43
No	6 (66.7)	9 (42.9)	
Yes	3 (33.3)	12 (57.1)	
LN metastasis	n = 8	n = 32	0.26
No	6 (75.0)	29 (90.6)	
Yes	2 (25.0)	3 (9.4)	
PM metastasis	n = 8	n = 30	0.19
No	6 (75.0)	28 (93.3)	
Yes	2 (25.0)	2 (6.7)	
Stage (FIGO)			0.89
Early stage	n = 11	n = 32	
IB1	11 (25.0)	32 (20.7)	
Advanced stage	n = 33	n = 123	
IIB	22 (50.0)	80 (51.6)	
IIIB	10 (22.7)	40 (25.8)	
IVA	1 (2.3)	3 (1.9)	

NTUC = neuroendocrine tumor of the uterine cervix; SCCA = squamous cell carcinoma; SI = sexual intercourse; LVSI = lymph vascular space invasion; LN = lymph node; PM = parametrium

Table 2. Method and result of treatment by cell type

Factor	NTUC n = 44	SCCA n = 155	*p*-value
Treatment			0.02
Single	10 (22.7)	59 (38.1)	
Bi-modality	29 (65.9)	92 (59.3)	
Sx + CMT	3 (6.8)	0 (0)	
Sx + RT	0 (0)	8 (5.2)	
CCRT	26 (59.1)	84 (54.2)	
Tri-modality			
Sx + CCRT	5 (11.4)	4 (2.6)	
Surgery			0.02
No	33 (75.0)	123 (79.4)	
Yes	11 (25.0)	32 (20.6)	
Status of response			<0.01
Complete	33 (75.0)	154 (99.4)	
Partial	0 (0)	1 (0.6)	
Progressive	6 (13.6)	0 (0)	
Unknown	5 (11.4)	0 (0)	
Recurrence			0.01
No	25 (56.8)	126 (81.3)	
Local	4 (9.1)	6 (3.9)	
Distant	15 (34.1)	23 (14.8)	

Single = surgery alone, chemotherapy alone or radiation alone; Sx = surgery; CMT = chemotherapy; RT = radiation; CCRT = concurrent chemoradiation therapy

Among NTUC cases, the subtypes were genuine small-cell carcinoma in 33 patients (75%), large-cell carcinoma in one patient (2.5%), atypical carcinoid tumor in one patient (2.5%), and mixed-type tumor in nine patients (20%). Pure morphology was used to diagnose NTUC in 11 patients and morphology combined with IHC in 33 patients (75%). In these groups, 91% (10/11) were found positive for NSE, 87% (12/14) for cytokeratin (CK), 82% (27/33) for chromogrannin A, 75% (9/12) for epithelial membrane antigen (EMA), and 65% (13/20) for synaptophysin.

The survival rate of early-stage NTUC cases was better than that of advanced-stage ones, in terms of both 2-year (81% vs. 55%) and 5-year survival (81% vs. 39%), showing a statistical significance of $p = 0.02$ (Fig. 2).

The 2-year and 5-year survival rates of pure NTUC were lower than those of mixed-type (NTUC plus another type); however, these differences were not significant (62% and 48% vs. 62% and 62%, ($p = 0.46$), respectively), as shown in Fig. 3.

Based on the univariate analysis, the prognostic factors for survival in NTUC were number of partners, stage of disease, surgery treatment,

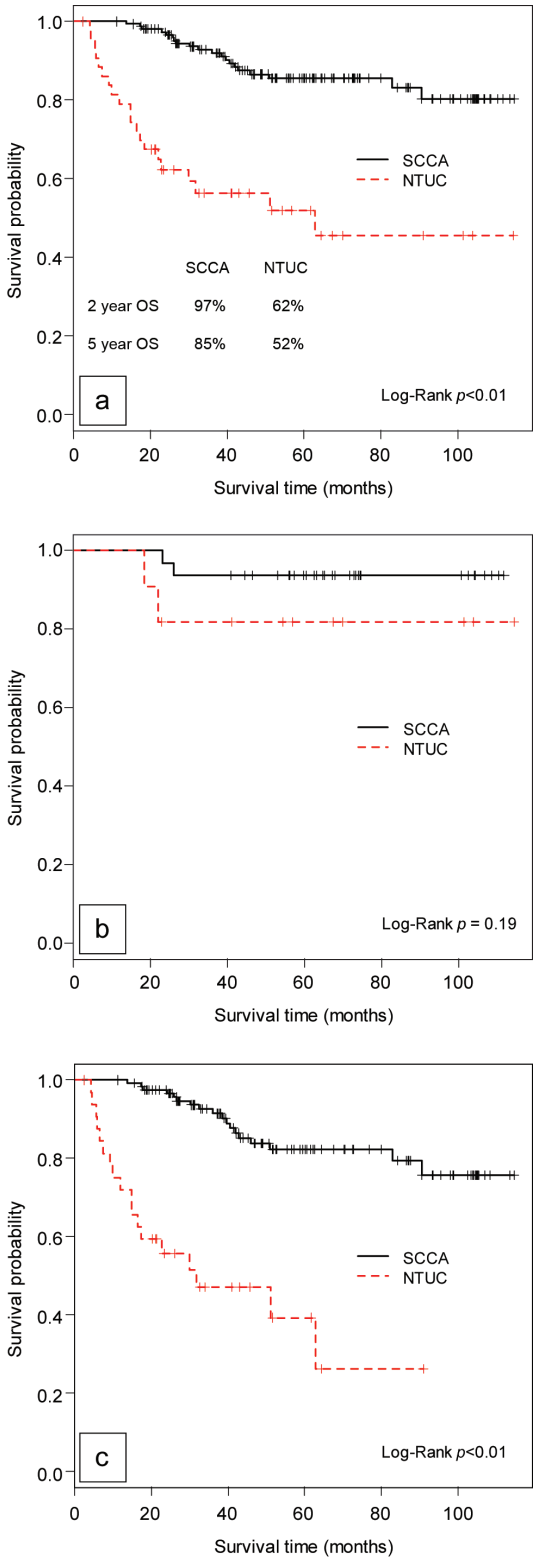

Fig. 1 Survival curve by cell type: a) Overall, b) Early stage, and c) Advanced stage.

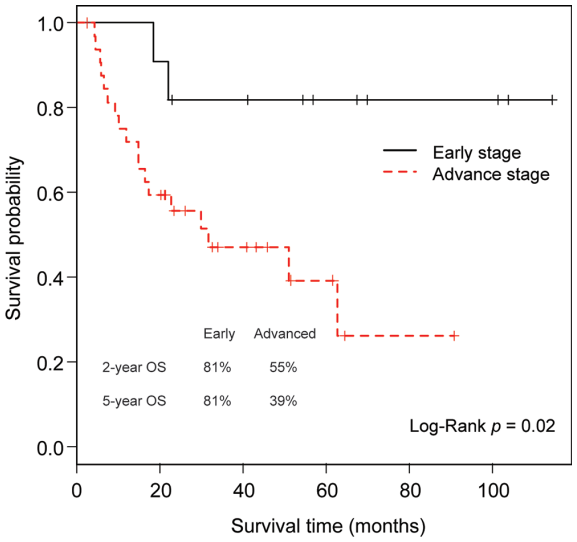

Fig. 2 Survival curve of NTUC group by stage.

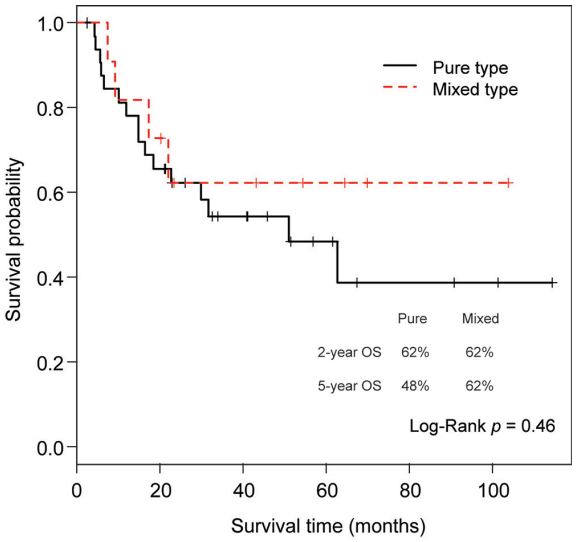

Fig. 3 Survival curve of NTUC group by tumor histology.

status of response, and site of recurrence (Table 3). The significant factors detected in the univariate Cox regression analyses were not identified in the multivariate analyses.

Discussion

Neuroendocrine tumor of the uterine cervix is a rare type among malignant cervical tumors. In the present study, the incidence of NTUC was 1.6% of all the cervical cancer cases, compared to that of other studies, which varied from 0.6% to 0.8%[8,9,14]. However, these studies recruited only small-cell

Table 3. Factors associated with survival in NTUC by univariate Cox regression

	HR (95% CI)	*p*-value
Age		0.89
≤45	Reference	
46-60	0.91 (0.36, 2.31)	
>60	0.69 (0.15, 3.21)	
Parity		0.89
≤1	Reference	
>1	0.92 (0.27-3.14)	
First SI (year)		0.99
≤16	Reference	
>16	0.99 (0.21-4.69)	
Partners		0.02
≤1	Reference	
>1	0.22 (0.05, 0.97)	
Contraception		0.30
No	Reference	
Pill	0.40 (0.05-3.09)	
Non-pill	0.48 (0.17-1.39)	
Tumor histology		0.46
Pure type	Reference	
Mixed type	0.66 (0.22-1.99)	
Stage		0.01
Early stage	Reference	
Advanced stage	5.04 (1.15-22.07)	
Tumor size (cm)		0.15
≤4	Reference	
>4	1.97 (0.78, 4.95)	
Treatment		0.28
Single	Reference	
Bi-modality	0.74 (0.28, 2.00)	
Tri-modality	0.23 (0.03, 1.93)	
Surgery		0.01
Yes	Reference	
No	5.41 (1.23-23.69)	
LVSI		0.54
No	Reference	
Yes	2.45 (0.15-39.72)	
Etoposide		0.22
No	Reference	
Yes	0.51 (0.18-1.45)	
Status of response		<0.01
Complete clinical remission	Reference	
Progression	21.3 (4.79-94.62)	
Site of recurrence		0.01
No	Reference	
Local	0.89 (0.11-7.24)	
Distant	4.95 (1.82-13.47)	

HR = hazard ratio; Sx = surgery; CMT = chemotherapy; RT = radiation therapy; CCRT = concurrent chemo-radiation therapy; LVSI = lymph vascular space invasion

carcinoma cases; our study included all types of neuroendocrine tumors.

In the present study, the mean age at the diagnosis of NTUC was 45.6 years, which was similar to that of other studies (43-45 years)[10,15]. The mean age of patients in the NTUC group was statistically significantly lower than that in the SCCA group (45.6 vs. 51.4 years, $p = 0.01$), similar to what was reported by Intaraphet et al[15] (43 vs. 51 years, $p<0.01$). However, Chen et al found no significant difference when comparing the age at diagnosis with the mean age of the group ($p = 0.32$)[10]. It is important to note that, in the present study, patients in the SCCA group were selected based on stage of the disease and year at diagnosis. This may have resulted in selection bias.

The most common method of treatment in both the NTUC and SCCA groups was bi-modality treatment (65.9% and 59.4%, respectively), but the use of other methods of treatment like RT alone, surgery alone, surgery with CCRT, surgery with CMT and surgery with RT varied. Tri-modality treatments such as surgery and other adjuvant therapies were employed in NTUC to achieve the highest possible response rate. The most common treatment in SCCA used to be RT; however, it has been replaced by CCRT since 1999[11-13]. Yet, in our institution, CCRT was initiated in 2006. Intaraphet et al have reported surgery and chemotherapy as major forms of NTUC treatment in their settings because the majority of their patients had early-stage disease[15]. Conversely, our study found early-stage NTUC in merely 25% of the total number of cases.

Due to the aggressive nature of NTUC, the rates of recurrence and distant metastases were higher compared with those of SCCA (43.2% vs. 19.2% and 34.1% vs. 15.2%, respectively), similar to the findings of the study by Viswanathan et al[16].

NTUC is a more aggressive tumor than SCCA and has a poorer prognosis. We observed that the 5-year overall survival rate of NTUC patients was lower than that of SCCA ones (52% vs. 85%) - a finding that was similar to those of previous studies (29%-48% vs. 60%-60.5%)[10,15,16]. The higher survival rate of SCCA in our study may be as a result of the treatment method employed (CCRT), which was different from those of previous studies (RT alone)[10]. In study of Intaraphet, CCRT was the standard treatment in SCCA, the same as in our study, but the majority of patients in our study had stage IIB (50%), whereas those in previous studies had stage III and IV (34.2% and 11.8%, respectively)[15].

Intaraphet et al reported that the survival rate of NTUC was significantly lower than SCCA in both early and advanced stages[15]. Our results demonstrated that the survival rate for NTUC was also lower in both early and advanced stages. However, when compared to SCCA, the data showed a significantly lower rate only in advanced-stage disease, but not in the early-stage group. However, it is important to mention that an inadequate number of patients in the early-stage group of our study may have affected this finding.

Additionally, the 5-year survival rate in early-stage NTUC was significantly higher than that in advanced-stage disease (81% vs. 39%, $p = 0.02$); this concurred with the findings of other studies (36%-62% vs. 8%-34%)[17-19]. The higher NTUC survival rate in our study may be attributed to the combination of both types of tumor histology; other studies selected only patients with pure type. Therefore, we analyzed the overall survival according to pure and mixed-cell types and found that the 5-year overall survival in pure-type was lower than that in mixed-type tumors. Nevertheless, this difference was not statistically significant (48% vs. 62%, $p = 0.46$).

According to the univariate analysis, the prognostic factors for survival in NTUC were number of partners, stage of disease, surgery treatment, and sites of recurrence. Yet, these factors did not result statistically significant in multivariate analysis. We found multiple partners to be a protective factor (HR, 0.22; 95% CI, 0.05-0.97). However, we could not satisfactorily describe and extrapolate on this finding due to issues with data unreliability and incompleteness. Similarly to previous studies, we found that the advanced stage of the disease had an impact on survival outcome (HR, 5.04; 95% CI, 1.15-22.07)[7,16-20]. Furthermore, non-surgery seemed to be a poor prognostic factor for survival (HR, 5.41; 95% CI, 1.23-23.69); this was similar to the findings of the study by Chen et al that compared surgery vs. no treatment (HR, 0.46; 95% CI, 0.22-0.96)[10] and the one by Cohen et al that compared surgery vs. non-surgery (HR, 0.62; 95% CI, 0.41-0.94)[19]. Our result was in line with those of previous studies because the majority of patients with early-stage cancer underwent surgery as the primary treatment, and both of these factors affected prognosis. Furthermore, distant metastases and progressive disease were found to be prognostic factors (HR, 4.95; 95% CI, 1.82-13.47 and HR, 21.3; 95% CI, 4.79-94.62). This may be so due to the characteristics of the cancer itself, not a response to treatment.

The authors found that age at diagnosis was not a prognostic factor (HR, 1.06; 95% CI, 0.38-2.98), which was different to other studies' findings[10,17]. Intaraphet et al classified the patients into two groups, early and advanced-stage, and found the same as our report that age was not significant in the group of patients with early-stage disease. Moreover, limitations related to the size of the study group may have affected their results. Contrary to the study by Viswanathan, tumor size was not found to be a prognostic factor in our study (HR, 1.97; 95% CI, 0.78-4.95)[16]. The size of the tumor, which was evaluated by clinical staging, may have been inaccurate, and was not related to the advanced stage of the disease. Additionally, the majority of the patients in this study suffered from advanced-stage cancer.

The limitation of the present study was its retrospective review nature. Some clinicopathologic information, especially that on the depth of stromal invasion, was lacking. It was indeed difficult to retrieve all the patient information retrospectively, particularly that related to tissue diagnosis. Our hospital is a referral center in Southern Thailand, which serves all of the 14 districts in the Southern Region. Therefore, it was practically impossible to collect tissue samples for histological review and IHC from every case.

In conclusion, NTUC had some different manifestations and a poorer prognosis compared with SCCA. The poorer prognosis of NTUC was evident in those with an advanced-stage disease, non-surgical treatment, progressive disease and distant metastasis recurrence. Multimodality treatments should be considered in NTUC to improve patient survival, and close monitoring may be necessary in such patients. Further study is recommended to determine the optimal treatment modalities.

What is already known on this topic?

NTUC is a unique type of malignant tumor on progression and diagnosis. Various modalities of treatment affect prognosis of disease. Most studies were from other countries.

What this study adds?

From the present study, NTUC has a different nature of malignant compare to SCCA, which was mostly found in younger age, various treatments, and lower response rate. Furthermore, NTUC has more recurrence rate, poorer prognosis compare to SCCA, especially in the patient with advanced diseases.

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Potential conflicts of interest

None.

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เปรียบเทียบลักษณะทางคลินิกและผลของการรอดชีวิตระหว่างมะเร็งนิวโรเอนโดครายและมะเร็งเซลล์สความัสของปากมดลูก: ผลการศึกษาจากสถาบันตติยภูมิซึ่งอยู่ทางใต้ของประเทศไทย

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วัตถุประสงค์: *ศึกษาลักษณะทางคลินิกและผลของการรอดชีวิตของมะเร็งนิวโรเอนโดครายเปรียบเทียบมะเร็งเซลล์สความัสของปากมดลูก*

วัสดุและวิธีการ: *ทำการศึกษาแบบกลุ่มศึกษา ในกลุ่มศึกษารวบรวมผู้ป่วยที่ได้รับการวินิจฉัยว่าเป็นมะเร็งนิวโรเอนโดคราย สำหรับกลุ่มควบคุมได้จากการคำนวณหาจำนวนตามสูตรคำนวณของอัตราการรอดชีวิต โดยมีอัตราส่วนของกลุ่มศึกษาต่อกลุ่มควบคุมเป็นหนึ่งต่อสี่ กลุ่มควบคุมเป็นผู้ป่วยมะเร็งเซลล์สความัสของปากมดลูกโดยคิดตามระยะของโรคและปีที่วินิจฉัยของมะเร็งนิวโรเอนโดครายระหว่างเดือนมกราคม พ.ศ. 2546 ถึง พ.ศ. 2554 ที่มหาวิทยาลัยสงขลานครินทร์ ลักษณะของผู้ป่วย วิธีการรักษา ผลของการรักษาและอัตราการรอดชีวิตได้รับการเปรียบเทียบ ปัจจัยพยากรณ์ในกลุ่มมะเร็งนิวโรเอนโดครายใช้การวิเคราะห์ด้วยตัวแปรเดียวและพหุตัวแปร*

ผลการศึกษา: *จำนวนผู้ป่วยมะเร็งปากมดลูกจำนวน 2,835 ราย พบเป็นโรคมะเร็งนิวโรเอนโดครายจำนวน 44 ราย หรือ ร้อยละ 1.6 โรคมะเร็งนิวโรเอนโดครายมีอายุเฉลี่ยขณะวินิจฉัย ได้รับการรักษาแบบหลากหลาย มีการตอบสนองต่ำกว่า มีอัตราการกลับเป็นซ้ำสูงกว่าและพบการกลับเป็นซ้ำที่ห่างไกลมากกว่า อัตราการรอดชีวิตที่ 2 และ 5 ปี ต่ำกว่าอย่างมีนัยสำคัญทางสถิติในกลุ่มโรคมะเร็งนิวโรเอนโดคราย ที่ร้อยละ 62 และ 52 กับร้อยละ 97 และ 85 ตามลำดับ เมื่อเปรียบเทียบกับมะเร็งเซลล์สความัส ในการวิเคราะห์ตัวแปรเดียวพบว่าจำนวนคู่นอน ระยะของโรค การผ่าตัด สถานะของการตอบสนอง และตำแหน่งของการกลับเป็นซ้ำเป็นตัวบ่งชี้ของการพบอัตราการรอดชีวิตที่แย่ในมะเร็งนิวโรเอนโดคราย แต่ปัจจัยดังกล่าวไม่มีนัยสำคัญทางสถิติเมื่อวิเคราะห์แบบพหุตัวแปร*

สรุป: *ผลของการรักษาและพยากรณ์โรคที่แย่พบในมะเร็งนิวโรเอนโดครายเมื่อเปรียบเทียบกับมะเร็งเซลล์สความัส พยากรณ์โรคที่แย่ของมะเร็งนิวโรเอนโดครายมี ระยะโรคลุกลาม การไม่ได้รับการผ่าตัด ตัวโรคที่ไม่ตอบสนองและการกลับเป็นซ้ำที่ห่างไกล การรักษาแบบหลากหลายควรได้รับการพิจารณาในมะเร็งนิวโรเอนโดครายเพื่อเพิ่มอัตราการรอดชีวิต การติดตามอย่างใกล้ชิดในกลุ่มมะเร็งนิวโรเอนโดครายอาจจะเป็นสิ่งที่จำเป็น*