

**Original Research Article****The Role of Computed Tomography (CT) Scan in Assessment of the Parametrial Involvement in Early Stage Cervical Carcinoma**Mohamad Nasir Shafiee (✉)<sup>1</sup>, Nazimah Idris<sup>2</sup>, Rushdan Mohd Noor<sup>2</sup><sup>1</sup>Department of Obstetrics and Gynaecology, Faculty of Medicine, UKM.<sup>2</sup>Gynaecologic Oncology Unit, Department of Obstetrics and Gynaecology, Hospital Alor Setar, Kedah, Malaysia.**Abstract**

This retrospective study is aimed at evaluating the role of CT scan in predicting parametrium involvement in early stage of cervical carcinoma. It was conducted in a Gynaecologic Oncology Centre, Hospital Alor Star from January 2004 till December 2008. All patients with operable stage I and II cervical cancer had pelvic CT scan for evaluation of parametrium involvement before undergoing radical hysterectomy and pelvic lymphadenectomy. Parametrial streakiness or presence of infiltration suggested local invasion. Following radical hysterectomy, the specimens sent for histological confirmation and the correlation between the CT scan finding and the histopathology result was studied. The result revealed a total of 104 patients with operable stage cervical carcinoma had pelvic CT scan. The sensitivity and the specificity of CT scan in assessing parametrial involvement was 33.3% and 84.8%, respectively. In conclusion, CT scan had high specificity but low sensitivity in determining parametrial involvement in early stage of cervical cancer. Hence, routine preoperative pelvic CT scan has a limited role in assessing parametrial involvement in early stage cervical carcinoma.

**Keywords:** Cervical cancer, computed tomography, parametrium**Correspondence:**

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**Introduction**

Invasive cervical carcinoma is the commonest female genital malignancy and has implicated a great socioeconomic burden universally. The estimated number of new cases is 371,200 per year worldwide or 9.8% of all cancers in women (1, 2). Invasive cervical carcinoma still remains imperative cause of cancer morbidity and ultimately lead to mortality although most of reports indicate a significant decline in its incidence (2). Advancement in Human Papilloma Virus (HPV) vaccination programme is most likely responsible for this favourable trend.

Direct spread is the main mode of invasion in cervical cancer consisting microscopic infiltration to the vaginal mucosa, uterus, parametrium and pelvic side walls. In more advanced stage, extension to the regional pelvic lymph nodes and retroperitoneal nodes are expected in vast majority of cases. Both direct extension and lymphatic invasion affecting tissues laterally later intrudes into cardinal ligaments and pubovesical-cervical fascia. Tumor infiltration to the lateral parametrium is more common than anterior or posterior parametrium as the covering fascia in this region is deficient. It is also due to natural lymphatic drainage to the cardinal ligaments via lateral paracervical tissues.

Staging of the cervical carcinoma is the utmost important aspect for the determination of prognosis and plan of further management. The International Federation of Gynecology and Obstetrics (FIGO) believed that any staging system should be universally feasible and applicable and it should provide a worldwide standardized classification that allowed various medical centres to compare results (3,4).

Consensus from FIGO clearly indicate that clinical staging which performed pre-treatment would be entirely reliable tool to stage the cervical carcinoma. This includes pelvic examination to evaluate rectovaginal, parametrium and pelvic side wall involvement, cystoscopy, proctoscopy and intravenous urography (5). Computed Tomography (CT) scan and Magnetic Resonant Imaging (MRI) are not generally accepted as a compulsory to stage the disease, but can be used as an adjunct assessment tool prior to treatment. It is not widely available in developing countries, variable techniques and technologies with non-standardized interpretation ability. This non synchronization provides discrepancy in cancer reporting consensus. In contrast, surgical-pathological staging is not feasible in those surgically deemed contraindicated which include advanced, inoperable disease, or even in early stage where radiotherapy may play its absolute role.

There are limitations in the FIGO clinical staging system in term of estimation of the size of the primary tumor, particularly in endocervical lesion. Accurate determination of the size is important because it is significantly correlated with lymph node metastases and prognosis is very much dependent on the volume of the primary tumour (5,6). Other limitations include evaluation of tumor extension into the parametrium and pelvic sidewalls, presence of lymphadenopathy and distant metastasis. Hence, concerns rise on utilizing CT and/ or MRI imaging as assessment tools combining with traditional clinical staging in cervical carcinoma. It is shown to be more reliable compared to clinical pelvic assessment alone in evaluating local tumour spread to the parametrium, pelvic side wall and even retroperitoneal lymph nodes (6).

This study was aimed at determining the role of pelvic CT scan in predicting parametrial involvement in the early stage of cervical carcinoma. Further, the correlation between CT scan findings and histopathology results was determined.

## Materials and Methods

This retrospective study was evaluating all cases of operable stage cervical cancer over the period of five

years from January 2004 till December 2008. The sample population consisted all patients with operable stage of cervical carcinoma (11A and below), whom underwent radical hysterectomy during the study period in Gynaecologic Oncology Centre, Hospital Alor Star. Exclusion criteria involved inoperable cases which were found intraoperatively, when radical hysterectomy was abandoned.

All patients with cervical carcinoma were staged based on universally accepted FIGO staging. The study group had a CT scan of the pelvis performed prior to the radical hysterectomy. The CT scan was performed for the purpose of obtaining additional information and not for staging purposes. Single slice spiral scanner with oral and intravenous contrast was used as a standard procedure and the findings were reported by the same team of radiologists. Parametrial involvement was reported as irregularity or nodularity of the cervical contours, increased attenuation and prominent or thick soft-tissue strands in the parametrial and/or periureteral fat, confluent soft tissue that replaces the periureteral fat or eccentric 3-dimensional parametrial soft-tissue mass.

The radical hysterectomy was performed by a trained Gynaecology team with adequate facilities. Specimens removed during the radical hysterectomy were sent for histopathological examination where the presence of parametrial involvement was confirmed. The correlation between the radiological and the histological findings was analyzed.

## Results

A total of 140 patients underwent radical hysterectomy during the period of this study. Of these, 104 patients had CT scan assessment prior to the surgery for the parametrial evaluation. Majority of the patients were Malays which contributed to the highest percentage of 57.1%, followed by Chinese and Indian (Table 1).

The classification of clinical stage was based on standardized FIGO staging criteria. Majority of patients were stage 1B1, comprised of 57.7%. The distribution of the study population who had radical hysterectomy was categorized according to the stage of disease as shown in Table 2.

From the statistical calculation, we found that the sensitivity of CT scan in detecting parametrial involvement was 33.3% but it had higher specificity of 84.8%. It showed CT scan had poor detection rate in early stage of parametrial involvement but a negative test could exclude the disease better. The

**Table 1:** Ethnicity of the study population

Race/ Number	Case	Percentage (%)
Malay	60	57.1
Chinese	32	31.4
Indian	8	8.6
Others	4	2.9
Total	104	100.0

**Table 2:** FIGO Clinical Staging

Clinical stage	No. of patient
1A2	4 (2.9%)
1B1	60 (57.7%)
1B2	28 (26.9%)
2A	12 (11.5%)
Total	104 (100%)

**Table 3:** Correlation between CT scan finding and Histopathological confirmation

CT Scan	Hpe		Total
	Positive	Negative	
Positive	4	14	18
Negative	8	78	86
Total	12	92	104

positive predictive and negative predictive values were 22.2% and 90.7% respectively (Table 3).

**Discussion**

Previous data revealed that CT evaluation of parametrial invasion had overall accuracy of 76%, a positive predictive value of 58%, and a negative predictive value of 85% (7). However, in our study we found the same trend of results with lower positive predictive value of 22.2% but the negative predictive value was almost the same, 90.7%. Most probably, the longer study period with higher number of cases should be recruited and interpretation of CT scan by different radiologist might affect the findings of the CT scan.

In the assessment of parametrial tumour invasion, the reported false positive rate of CT scan was in the range of 35% to 70%. It was also implicated to the ‘under staging’ of the disease in 12% to 33% of patients with clinical stage IIb and IIIb, due to inability of CT scan in detecting microscopic tumor invasion in the parametrial region (8). However, the accuracy of CT scan prediction is increased in the advanced stage, being as high as 92% in evaluating patients with stage IIIb to IVb disease (7). In general, the accuracy of CT in the overall staging of cervical cancer was reported as 58-88% (7,8), which consistent to our findings of 84.8%.

However, there are pitfalls and limitations of CT scan in the assessment of parametrium in the cervical cancer. Normal parametrial vessels and/or uterine ligaments could be misinterpreted as evidence of parametrial tumor invasion. Parametritis secondary to surgical biopsy, cervical conisation, uterine curettage, or infection of the primary tumour have similar appearances of the irregular cervical margins and adjacent soft-tissue stranding due to parametrial tumor invasion. Therefore, adequate clinical information to the attending or reporting radiologist is the utmost important for accurate correlation of the radiological findings.

Previous studies found CT scan is more reliable for the assessment in patients with advanced disease invading beyond uterus- namely stage IIb and beyond, evaluating lymph nodes enlargement and guided biopsy, and delineating the urinary systems (9).

Alas, CT scan has limited reliability in determining tumour size and detecting early tumour invasion to the parametrium which shown in our study, and further supported by previous studies (7,8,9).

Consensus by FIGO clearly stated that, clinical staging by an experienced Gynaecologic Oncologist is more accurate than CT scan in evaluating patients with stage Ib or IIa tumours. This statement is further supported by the The Royal College of Obstetricians and Gynaecologists, UK (RCOG) guideline which not favouring routine CT scan in staging early cervical cancer. In this study, bias for the clinical staging is minimized by designating a trained Gynaecologist or a supervised gynae-oncology trainee to perform the evaluation.

We conclude that, CT scan has high specificity and low sensitivity value in predicting the parametrial involvement of early stage of cervical cancer. On the other hand, MRI may have an exceptional soft-tissue contrast resolution, which may exceed CT and ultrasonography (US). Therefore, MRI is significantly more important than CT scan and US in the evaluation of the tumour size, the depth of cervical invasion, and the local-regional extent of the disease (direct invasion of the parametrium, pelvic sidewall, bladder, or rectum) (10). CT and MRI are relatively have comparable value and more excellent than US, in evaluating enlarged lymph nodes thus, play more accurate staging modalities than ultrasound scan (10). Although MRI shown to be superior to CT scan, but most literatures still recommend later imaging technique for evaluation pretreatment cervical carcinoma. This attributed to insignificant effect of MRI findings to the clinical decision-making or on

the choice of therapy (11,12). In general, CT scan and perhaps MRI are not warranted in patients with small-volume early disease (stage Ib disease and cervical tumor diameter <2.0 cm) because of the low probability of parametrial invasion and nodal metastasis. Imaging with CT or MRI is appropriate when the cervical tumor is larger than 2.0 cm, when the size of the tumor cannot be adequately evaluated during clinical examination, or when the tumor is endocervical (11,12).

### Conclusion

We found that CT scan had low sensitivity and positive predictive values but had high specificity in excluding tumour invasion in early stage cervical cancer. Therefore, a routine CT scan assessment of the parametrium in the early stage of cervical cancer has a limited role.

The clinical staging of cervical cancer by a trained Gynaecologist is of paramount importance and CT scan could be used as an adjunct investigation before the definitive treatment. Probably, CT scan is more helpful in the advanced stage, for the nodal assesment or detection of distant metastasis.

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