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RESEARCH ARTICLE

Comparison of FIGO 2009 and 2018 Staging of Cervical Cancer and Its Impact on Post-operative Adjuvant Therapy

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ABSTRACT

Objective: To compare pre-operative and post-operative staging in early-stage cervical cancer as per the FIGO 2009 and 2018 staging system

Methods: This retrospective study was conducted on cervical cancer cases treated surgically over five years in a tertiary care teaching hospital after approval from the IEC and written informed consent. Out of the total 99 cases identified in records, 93 were managed by the FIGO 2009 staging system and 6 by the FIGO 2018 staging system. Records were searched to tabulate demographic details, pre-op stage as per clinical and radiological findings and post op stage as per histological details, both by 2009 and 2018 staging systems. Pre op and post op stage distribution by two systems was compared using the kappa score and statistical significance was assessed by *p-value* using SPSS version 20.

Results: The majority of early-stage cervical cancer cases were in the 40 to 60 years age group, had early age at marriage and were multiparous menopausal women. The cervical growth was mostly exophytic, well-differentiated, squamous cell type on histology. Agreement between the pre-operative stage by the FIGO 2009 and 2018 staging systems was poor (38.7%, k = 0.243 (Poor) (p <0.001). The comparison of pre-operative and post- operative staging by the FIGO 2009 system shows moderate agreement (77.41%, k = 0.555) (p <0.001), while that by the 2018 system showed substantial agreement (81.8%, k=0.774) (p <0.001).

Conclusion: The FIGO 2018 staging system is more accurate compared to the 2009 staging system when comparing prep and post op staging of disease.

KEYWORDS
Peter's criteria, Sedlis criteria, Parametrial disease, Lymph node metastasis, Atromal invasion, MRI, Histopathology

INTRODUCTION

Cervical cancer is the fourth most common cancer among women globally, with 6.5% incidence. It is one of the most common causes of death, accounting for 7.7% of all cancer-related deaths in females. In India, this is the second most common cancer with 13.1% age standardised incidence, 127,356 new cases and 77,348 deaths. Due to significant advances in the screening and treatment of cervical intraepithelial lesions, 5-year overall survival (OS) is about 60% in all stages, and 70 to 90% in early-stage cervical cancer.[1]

Accurate staging is an important factor that affects the treatment plan and prognosis for all stages of cervical cancer. Unlike staging of most gynaecological cancers that rely on surgery and histopathological analysis, cervical cancer was staged clinically until 2018. Cystoscopy, proctoscopy and primitive imaging techniques (chest and skeletal radiography, intravenous pyelography, and barium enema) were used when clinically indicated. Research has shown that some patients have occult metastases in pelvic lymph nodes detected on post-operative histopathology. Hence, cervical cancer staging by clinical methods was considered less accurate, with 20 to 40% of stage IB–IIIB cancers under-staged and up to 64% of stage IIIB cancers over-staged. The older staging system did not include assessment of lymph node metastases, an important determinant for prognosis and treatment planning.[2] To compensate for these shortfalls, FIGO released a revised

staging system in 2018 that allowed the use of imaging and pathologic assessment for staging. They included modern cross-sectional and functional imaging such as computed tomography (CT), magnetic resonance imaging (MRI) and positron emission tomography (PET). Such pretreatment imaging could spare many women from the toxic combination of surgery, chemotherapy and radiation.[3]

Primary treatment options for early-stage disease include radical hysterectomy, fertility-sparing surgery, or radiotherapy with or without chemotherapy. The choice of therapy depends on tumour stage and patient factors.[4] Adjuvant therapy may be added after surgery when post-operative pathological examinations reveal high-risk factors for recurrence, as per Peters criteria (lymph node metastasis, parametrial invasion, or vaginal cuff involvement), or intermediate risk factors, as per Sedlis criteria (tumour size >4 cm, deep stromal invasion, or LVSI). Adjuvant radiotherapy (RT) or concurrent chemo radiotherapy (CCRT) after radical surgery (RS) can reduce the risk of local and extra pelvic recurrence.[5] Peters *et al*.[6] showed that adjuvant CCRT for high-risk patients was superior to RT alone after RS in both overall survival (OS) and progression-free survival (PFS). Cochrane reviews[7] suggest that adjuvant RT may decrease the risk of disease progression compared with no further treatment in stage IB cervical cancer and the addition of chemotherapy to adjuvant RT (CCRT) may improve survival in women with early-stage cervical cancer (IA2-IIA) with risk factors for recurrence.

The present study aimed to find the level of agreement between the pre-op and post-op stage by retrospectively analysing operated cases of cervical cancer. Simultaneously, the FIGO 2009 and 2018 staging were compared for the need for adjuvant therapy.

MATERIAL AND METHODS

This retrospective cohort study was conducted in the Gyne Cancer Control Unit of a tertiary care teaching hospital over a period of 18 months. Ethical clearance was obtained from the institutional ethics committee (396/Ethics/2020). Hospital records were searched for cervical cancer cases treated surgically over 5 years (January 2016– Dec 2020), which listed 99 cases after removal of any duplication.

Details of demographic features, pre-operative clinical findings, radiological and histological reports were documented in the case pro forma and then findings were tabulated in the master sheet with indexing. Out of 99 cases recorded, 93 were staged and treated as per FIGO 2009 staging, while 6 were treated as per FIGO 2018 system after its introduction.

The first 93 cases were re-staged with the FIGO 2018 staging system as per clinical and radiological findings in the records. The pre-operative stage by the FIGO 2009 and FIGO 2018 system were compared to document the impact of new staging.

Post-operative HPE records were obtained from the pathology department to assign a post-operative stage. Pre-op and post-op stages were compared to find the level of agreement between the two.

Out of 99 cases, those requiring dual treatment with surgery and adjuvant CCRT/RT were analysed to assess the risk factors for recurrence as per Peters and Sedlis criteria that led to the addition of adjuvant therapy.

Statistical analysis was performed using SPSS v20.0. Data is presented in numbers and frequencies. Strength of correlation was assessed using the Kappa score and a *p-value* of <0.5 was considered significant.

RESULTS

Table 1 shows the demographic details and histological types of cases. The majority of cases aged between 40 and 50 years were multiparous and menopausal. The cervical growth was mostly exophytic, and well-differentiated squamous cell histology.

Table 2 shows a comparison of pre-operative staging by the 2009 and 2018 systems. Agreement between the pre-operative stage by FIGO (2009) and FIGO (2018) staging system was poor (38.7%, k = 0.243 (Poor)(p <0.001)**.**

Table 3 shows the comparison of pre-operative and post-operative staging by the FIGO 2009 system that statistically amounts to moderate agreement (77.41%, k=0.555) (p <0.001).

Table 4 shows the comparison of pre-operative and post-operative staging by the FIGO 2018 system, which statistically amounts to substantial agreement (81.8%, k=0.774) (p <0.001).

Table 5 shows the distribution of high-risk and intermediate-risk factors. Out of 99 cases, 65.6% were low risk for recurrence, 23.2% were high risk and 11.1% were intermediate risk. The majority (56.6%) had lymph node metastasis followed by parametrial invasion.

Out of 34 cases with high or intermediate risk factors, 88.2% received adjuvant CCRT while 11.7% received adjuvant RT.

DISCUSSION

The age distribution in cervical cancer is bimodal with peaks at 35 to 39 and 60 to 64 years, with the mean age of diagnosis at 50 years.[8] The majority (64.6%) of women in this study were aged above 40 years and the peak was seen at 40 to 50 years, with a comparable mean age of diagnosis at 49.24 years. The single peak seen in this study, instead of a bimodal distribution, may be due to the inclusion of only early-stage cases. Cervical cancer is reported to be higher in rural India in other studies,[9] but an almost similar proportion of urban and rural residents was seen in the present study. This may be due to the setting of a category B city and early-stage cases.

The known risk factors for cervical cancer are HPV infection, low socio-economic status, smoking, early age at

Table 1: Demographic and Histological distribution of cases (n = 99)

		Number	*Percentage*
Age	>20–40 yrs	23	23.2
	>40–60 yrs	64	64.6
	>60–80 yrs	12	12.1
Habitat	Urban	56	56.6
	Rural	43	43.4
Parity	P0	1	1.0
	P1–2	25	25.3
	P3–4	49	49.5
	>P4	24	24.2
Menopausal status	Premenopausal	33	33.3
	Postmenopausal	66	66.7
Growth type	Exophytic	75	75.7
	Endophytic	4	4.0
	Ulcerative	20	20.2
Histology	Squamous cell	98	99.0
	Adenocarcinoma	1	1.0
Grade	Well differentiated	55	55.5
	Moderately differentiated	29	29.2
	Poorly differentiated	15	15.1

Table 2: Comparison of pre op stage by FIGO 2009 and 2018 staging

Stage (FIGO 2018)	*No. of pts (2018)*	*Stage (2009)*			
		IA	*IB1*	*IB2*	*IIA1*
Stage IA	4	4			
Stage IB1	16		16		
Stage IB2	36		36		
Stage IB3	6			6	
Stage IIA1	16				16
Stage IIA2	2				2
Stage IIIC r	13		13		
Number of cases in concordance	36	4	16		16
Coincidence rate of stages	38.7%	100%	51.6%		88.8%
k = 0.243 (Poor); $p < 0.001$					

marriage, young age at first coitus, multiple sexual partners and high parity.[9-11] The present study confirmed that the majority of cases belonged to the lower middle class, were illiterate, got married by 18 years, had high parity, and engaged in tobacco abuse. The cervical cancer lesions are mostly exophytic, though they can be endophytic and ulcerative too. The present study also found that the majority of cases had exophytic lesions. Squamous cell carcinoma (SCC) is the predominant histological type, accounting for 90%, adenocarcinoma and adenosquamous carcinoma represent 10 to 15% and other or unspecified histology represents 10 to 15% of cervical cancer.[12,13] The present study showed similar findings with almost all SCC and more than half of the well-differentiated cases.

Ozsarlak *et al.*[14] found the diagnostic accuracy of CT and MRI as 53 and 93%, respectively for pre-operative staging of cervical cancer. Toure *et al.*[15] evaluated the concordance between pre-op and post-op stages of operated cases by the FIGO 2009 staging system and found a poor concordance rate of 18.07%. Moderate concordance between pre-op and post-op stage (77.4%, k=0.555) was found in the present study, whichwas statistically significant (p = 0.001). The lack of concordance leads to post-operative adjuvant chemoradiation in a large proportion of cases.

FIGO 2018 cervical cancer staging has moved from clinical staging to surgical pathological staging, and the pre-operative use of advanced imaging modalities like CT and MRI[14,15] to evaluate cervical cancer has been established.

Elisabeth *et al*[16] found that the maximum cases (44.3 and 44.4%, respectively) belonged to stage IB1 among operated cervical cancer cases as per FIGO 2018 staging. In the present study, the maximum (70%) cases belonged to stage IB1 by the 2009 staging, but only 17% by the FIGO 2018 staging pre-operatively. Postoperatively, 60% belonged to stage 1B1 by the 2009 system and 16% by the 2018 system. As per FIGO 2018 staging, maximum cases belonged to stage IB2 both pre-operatively (38%) and postoperatively (30%). by. On comparing clinic-radiological pre op stage with surgical pathological post op stage by the 2018 system, a high level of concordance was observed (83.3%, k = 0.750; substantial) and the difference between the two was not statistically significant (p = 0.22). This emphasises the useful role of imaging modalities in pre-op staging.

Yan *et al.*[17] retrospectively studied cervical cancer patients to evaluate the relationship of 2009 and 2018 FIGO stage They found that 17.3% of IB1, 44.5% of IB2, 25.4% of IIA1 and 37.1% of IIA2 cases by FIGO 2009 system were upgraded to stage IIIC1 and 2.1% of IB1, 3.0% of IB2, 3.1% of IIA1 and 2.1% of IIA2 were upgraded to stage IIIC2 by FIGO 2018 System. Daniella Pinho *et al*[18] in a retrospective study on pre-op staging of 116 cervical cancer cases by the FIGO 2009 system found that 21 patients had stage I, 56 had stage II, 24

Table 3: Agreement between pre-operative and post-operative stage FIGO 2009

FIGO 2009 STAGE Pre-op.		*Post op stage (based on HPE)*							
Stage	*n*	*IA2*	*IB1*	*IB2*	*IIA1*	*IIA2*	*IIB*	*cases in concordance*	*Coincidence rate of stages*
IA	4	4						4	100%
IB1	71		56	7	3		5	56	78.8%
IIA1	18				12	1	5	12	66.6%
Total	93	4	56	7	15	1	10	72	77.41%
k = 0.555 (Moderate); $p < 0.001$									

Table 4: Agreement between pre-operative (clinic-radiological) and post-operative stage by FIGO 2018 system

PRE-OP STAGE (2018)	*N*	*Post op stage (based on HPE)*										
		IA1	*IA 2*	*IB 1*	*IB 2*	*IB 3*	*IIA 1*	*IIA 2*	*IIB*	*IIIC 1*	*IIIC2*	*Cases in concordance*	*Coincidence rate*
Stage IA	6	2	4									6	100%
Stage IB1	18			16	2							16	88.8%
Stage IB2	37				28		3		5		1	28	78.3%
Stage IB3	6					6						6	100%
Stage IIA1	17						13	1	3			13	76.4%
Stage IIA2	2								2			0	-
Stage IIIC	13					1				12	0	12	92.3%
Total	99	2	4	16	30	7	16	1	10	12	1	81	81.8%
k = 0.774 (Substantial); $p < 0.001$													

Table 5: Distribution of high-risk and intermediate risk cases according to risk factors (n=34)

	Histological parameters	*Number*	*Percentage*
High Risk Peters criteria (n = 23)	Lymph node metastasis	13	13.1%
	Parametrial invasion	10	10.1%
Intermediate risk Sedlis criteria (n = 11)	Lympho-vascular invasion	2	2%
	Deep stromal invasion	2	2%
	Tumour diameter > 4 cm	3	3%
	Tumour diameter >4 cm +DSI	2	2%
	Tumour diameter > 4 cm +LVSI	1	1%
	LVSI+ Tumour diameter > 4 cm + DSI	1	1%

had stage III and 15 had stage IV disease. Imaging findings were reviewed and stages were reclassified based on the FIGO 2018 system, which changed the distribution to 12 in stage I, 14 in stage II, 7 in stage III (A+B), 68 in stage IIIC and 15 in stage IV disease. Overall, 75% patients had a change in stage by the FIGO 2018 system. In the present study, re-staging of cases by the FIGO 2018 system showed that an overall upstaging was seen in 61.2% (95% CI 0.506–0.712) of cases. Other similar studies have also reported stage change in 48 to 75% cases with an agreement level ranging from 25 to 52%.[19]

Bhatla *et al.*[3] also analysed various imaging modalities (Ultrasound, CT, MRI, PET) as per resource setting to provide information on tumour size, nodal status, and localor systemic spread. MRI is found to give the best radiologic assessment of primary tumours above 10 mm in diameter. PET CT is more accurate than CT and MRI for the detection of nodal metastasis above 10 mm, with a 4 to 15% false negative rate.

These findings are supported by Mansoori *et al.*[20] and Elisabeth *et al.*[16]

In the present study, operated cases of cervical cancer were re-staged by the FIGO 2018 system on the basis of pre-op MRI or CT reports that were available in 21.2% patients. About 18.1% cases were up-staged, such that surgery was justified in only 5% cases. This indicates that if these patients were pre-operatively staged with the FIGO 2018 system, they would have received chemoradiation as the primary treatment. The comparison of pre-op and post-op stages with the FIGO 2018 system also showed a high level of agreement (81.8%, k = 0.774; substantial) and this agreement was statistically significant (p <0.001). Post-operative upstaging was seen in 16.1% and downstaging in 1.01% cases only.

Surgery is the preferred primary treatment for early stages of cervical cancer, but post-operative adjuvant therapy may be required to reduce extra-pelvic and local recurrence, along with survival benefits. GOG 92 trial[21] showed that tumour size, tumour involvement of the capillary-lymphatic spaces, and depth of tumour invasion of the cervical stroma were independent predictors of disease-free interval. A risk assessment model was created that divided patients into 3 groups for the need of adjuvant therapy. The low-risk group has a relative risk [RR] of 7.5 to 40, the intermediate-risk group has an RR of 41 to 120 and the high-risk group has an RR above 120. Apart from the high-risk parameters of Peter's criteria, these factors were assessed under Sedlis criteria and categorised under intermediate risk group.[22,23] In the present study, about one-fourth of cases had high-risk factors and one-tenth had intermediate risk factors, while the majority (two-thirds) had low-risk factors. Lymph node metastasis was the most common high-risk factor, followed by parametrial invasion. In the intermediate risk group, bulky tumour (BT) was the most common, followed by LVSI and deep stromal invasion. This adjuvant therapy rate is lower and the distribution of risk factors is comparable to other studies. The choice of adjuvant therapy is decided on the basis of Peters criteria and Sedlis criteria, as per the STAR trial. In the present study, the majority (30.3%) received CCRT, similar to other studies.[24]

CONCLUSION

The FIGO 2018 staging of cervical cancer is more accurate than the FIGO 2009 system, reducing the disparity between pre-op and post-op stages. This helps in better decisions on primary treatment for early-stage cervical cancer cases and reduces the need for adjuvant therapy.

AUTHOR CONTRIBUTION

Professor Nisha Singh conceived and designed the study, provided continuous academic and clinical supervision throughout its execution, and critically reviewed and approved the final manuscript to ensure scientific accuracy and integrity.

Dr. Divya Sharma collected the clinical and observational data, performed the statistical analyses with precision, and interpreted the results to support the study's objectives.

Dr. Riddhi Jaiswal conducted the histopathological examination (HPE) of all cases, ensured diagnostic accuracy, and contributed to reviewing and refining the manuscript. Dr. Kirti Srivastava, with her clinical expertise, guided the planning and coordination of adjuvant therapy, including radiation and chemotherapy, and supported key treatment-related decisions throughout the study.

CONFLICT OF INTEREST

There is no conflict of interest for any of the authors.

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