

## Cervical Carcinoma: Correlation of Clinical (FIGO) and MRI Staging

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**Key words:** Cervical, MR imaging, Carcinoma, MRI, CT scan

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**Abstract:** Cervical carcinoma is a form of cancer that commonly seen in younger females. MRI in gynecologic oncology has developed during the previous two decades. MRI is essentially better than sonography and CT in the assessment of both tumor augmentations into the cervix and myometrial attack. MR imaging should be used as an adjunct to clinical evaluation and in treatment planning for patients, especially in cases with advance stages. The study area covers a population of mostly low socio-economic status. This was a retrospective study conducted at the MRI center, Department of Radiodiagnosis, Krishna Hospital and Medical Research Center, Karad; aimed at correlating the clinical and MRI staging in cervical carcinoma. Total 48 patients of cervical carcinoma are included in the study with majority of patients in 50-70 years age group. This study conclude that MR imaging is a promising method in evaluating carcinoma of the cervix.

## INTRODUCTION

Cervical carcinoma is the third most common gynecologic malignancy and is typically seen in younger women, often with serious consequences (Nicolet *et al.*, 2000). In recent decades, the implementation of Papanicolaou (Pap) check has culminated in a diminishing incidence and mortality of invasive squamous carcinoma of the cervix. The relative frequency of adenocarcinoma, on the other side, has risen because it is less readily observed by the exfoliative cytology obtained by the Pap examination (Kaur *et al.*, 2003). Diagnostic staging of cervical cancer is accurate in about 60% of cases which is much lower than surgical staging accuracy (Choi *et al.*, 2006). MRI has been demonstrated to be better than CT in arranging of endometrial and cervical carcinoma. In fact, there is proof that MRI can be effective in separating radiation fibrosis from intermittent tumor. MRI is essentially better than sonography and CT in the

assessment of both tumor augmentations into the cervix and myometrial attack (Sala *et al.*, 2007). The role of MRI in gynecologic oncology has developed during the previous two decades. There is currently a considerable group of proof that MRI is valuable in assessing harmful states of the pelvis (Hamm and Forstner, 2007).

### Aim and objectives

**Aim:** Correlation of clinical (FIGO) and MRI staging in cervical carcinoma.

**Objectives:** To assess MRI staging in cervical carcinoma in relation to clinical (FIGO) staging.

**Literature review:** The phenomenon of MRI was proposed by Bloch and Purcell in 1946 but was limited in its application to physics and chemistry. It was in 1973 when Lauterbur applied MR phenomenon in body imaging for which he received the Noble Prize in the year

2003. The ability of MR to produce images in multiple planes and its superior soft tissue contrast sensitivity make it an ideal method for such purposes. These advantages prompted to study the potential of MRI in the female pelvis.

The report by Hedvig Hricak in 1983 on initial experience with MR imaging of the female pelvis evaluated the potential of MR imaging in 21 female subjects which showed that MR imaging has features that suggest useful applications in the pelvis: tissue characterization, direct multiplanar imaging and in the magnetic field range used clinically with no known biological harmful effects (Hricak *et al.*, 1983). Butler *et al.* (1984) evaluated the pelvic pathologies in 23 women by using 0.3 Tesla field strength MR imaging. To study its relative capability, these patients were also evaluated by sonography and/or CT which showed that more important than image degradation or scanning planes is the capability of the MRI to distinguish normal from abnormal tissue (Butler *et al.*, 1984). By Hricak (1986) showed that MR imaging of the female pelvis offers unique display of pelvic anatomy (Laval-Jeantet *et al.*, 1985). In the same year, Togashi *et al.* (1986) evaluated 19 patients of histologically proven cervical carcinoma with MR imaging and showed the usefulness of MR imaging in demonstrating mass and extent of disease (Hricak, 1986). Peppercorn *et al.* (1999) showed that MR imaging appear accurate in the prediction of myometrial tumor involvement, hence, the patient's suitability for trachelectomy.

## MATERIALS AND METHODS

The study group comprise of 56 patients who presented at Krishna Institute of Medical Sciences, Karad from November 2009 through May 2011 with cervical carcinoma. The patient's age ranged from 30-74 years with majority of patients in the 50-70 years age group. Patients were referred for MR imaging after histological confirmation of invasive cervical cancer on biopsy. Full clinical workup of the patients following FIGO guidelines were performed by the gynecologist with other diagnostic tests performed at their discretion which included pelvis examination under anaesthesia, if indicated. MR imaging is performed as part of the pre-treatment workup to help in the treatment planning. Patients who were treated with surgery followed by radiotherapy/chemotherapy or those treated with radiochemotherapy alone were also included in this study, provided they had recurrence/residual tumour and were allotted a FIGO staging. PD coronal sequences are taken including the aortic bifurcation for better evaluation of lymph nodes. Data were recorded in pre and post-treatment cases for presence of uterine, vaginal and parametrial extension, involvement of pelvic side wall, urinary bladder and rectum involvement along with enlarged lymph nodes. Data analysis done using

rates, ratios and percentages of different tumor staging done by clinical (FIGO) and MR imaging and their correlation is computed and compiled.

## RESULTS AND DISCUSSION

Out of 48 female patients of cervical carcinoma the patient's age range from 30-74 years with majority of patients in the 50-70 years age group. Out of 48 cases, 2 cases were referred for post-treatment follow up with no prior clinical stage as there was no mass in the cervix, similarly there was no mass on MRI but bone mets was seen in lumbar vertebrae and sacrum, therefore, allotted MRI stage IVB. Rest 46 cases had clinical staging and they were allotted MRI staging as per MRI imaging findings based on guidelines as mentioned in previous studies (1, 25). Out of 46 cases, 23 (50%) showed MR staging different from FIGO staging and in 23 (50%) cases MR staging was same as that of FIGO staging. The 5 (10.86%) out of 46 cases reported as MR staging IB1, 2 (40%) were having same FIGO staging, however, 3 (60%) were designated as FIGO stage IIB. There were 3 (6.52%) cases out of 46 with MR staging IB2 out of which 1 (33.3%) case was given FIGO stage IIB and 2 (66.66%) were allotted FIGO stage IB1. Out of 46 cases, 4 (8.69%) cases were given IIA MR staging, 2 (50%) cases had same FIGO staging and 1 (25%) of each cases were staged FIGO IB2 and IIIB, respectively. There were 14 (30.43%) cases with MR staging of IIB out of 46 cases having 8 (57.14%) cases with same FIGO staging and 3 (21.42%) with IIIB, 2 (14.28%) with IIA and 1 (7.14%) case with FIGO stage IB2. Out of 46 cases, 1 (2.17%) case with MR staging as IIIA and 4 (8.69%) cases with MR staging as IIIB were given same FIGO staging. Of the 46 cases studied, 11 (23.91%) cases were given MR staging of IVA out of which 4 cases (36.36%) had no change in staging, however, 6 (54.54%) cases were stage as IIIB and 1 (9.09%) case was IIB as per FIGO staging. There were 4 (8.69%) out of 46 cases studied with MR staging of IVB, 2 (50%) cases were with FIGO stage IVA and 1 (25%) case each with IIB and IIIB FIGO staging, respectively. Out of 46 cases having mass lesion in the cervix necrosis is present in 12 (26.08%) cases, cystic component in 7 (15.21%) cases and calcification in only 3 (6.52%) cases. Uterine corpus involvement was present in 24 (52.17%) cases out of 46 cases. In 6 (13.04%) out of 46 cases had encasement of either unilateral or bilateral ureter by the tumor. Collection in uterine cavity was present in 24 (52.1%) cases out of 46 cases; however, in 2 cases hysterectomy was done. There were 12 (25%) cases out of 48 cases with lymph nodes involvement having primary group involvement in 10 (83.33%) cases and secondary group in 2 (16.66%) cases. Out of 48 cases, 6 (12.5%) cases had distant metastases to skeleton (lumbar vertebrae and sacrum).

The overall mortality from cancer of the cervix has decreased significantly in the past. On MRI, the cervix

has three separate parts. The outer zone changes from medium to high intensity signal with longer TR times. There is a higher-intensity central part probably representing the cervical mucus (water is the most abundant component) within the epithelial glands and lumen. The difference in the appearance of the cervix throughout the menstrual cycle is manifested by the change in the width of the high-intensity central part (Hricak *et al.*, 1983). In this study "Cervical Carcinoma: Correlation of clinical (FIGO) and MRI staging", 48 patients were studied of which FIGO staging was given in 46 cases and MR staging in 48 cases because of distant metastases in the lumbar spine and sacrum in 2 cases. The patient's age ranged from 30-74 years with majority of patients in the 50-70 years age group which corresponded with study by Engin *et al.* (2011) who correlated clinical and MRI staging in a study group of 42 patients in age ranging from 27-74 years.

Togashi *et al.* (1986) in their study with 1.5 T MRI, considered involvement of cardinal and sacrouterine ligament which surrounds the cervix as pelvic wall invasion, however, in our study because of low field strength of MRI (0.35T), these findings are not taken into consideration. Poor correlation between clinical and MR staging in IIIB can also be attributed to inaccurate clinical assessment which showed pelvic wall involvement but on MR imaging there was no involvement of ureter or pelvic side wall extension (Pannu *et al.*, 2001). Out of 7 cases with FIGO stage IVA, 3 (42.85%) cases were given IVB stage on MRI as there were distant mets to peritoneum and skeleton in one case and in either of two in other cases; however in other 4 (57.14%) cases staging as the same in MRI and FIGO.

The principal limitation of this study was the use of a 0.35-T system with body coil. Moreover, the lack of surgical and pathological correlation is and additional important limitation. In this study neither additional MR sequences were taken nor CT was done to evaluate lung, liver or retro-peritoneal lymph nodes metastasis and therefore staging of distant metastasis is incomplete.

## CONCLUSION

MR imaging is expensive but it results in net cost savings (cost minimization) because it replaces a number of less-expensive procedures in early stages and provide important additional information in advance stages which are not easily assessed on clinical examination. MR imaging is superior to clinical evaluation in the assessment of tumor size and provide additional information regarding the lymph node, uterine involvement and collection in uterine cavity which helps in treatment planning of the patient. In this study, the correlation between clinical and MRI findings was good only in the initial stages (upto IIB) and poor in the advance stages (IIIB, IVA and IVB). MR imaging should be used as an adjunct to clinical evaluation and in

treatment planning for patients, especially in cases with advance stages. Although no surgical and pathological correlation is done in this study but it can be conclude that MR imaging is a promising method in evaluating carcinoma of the cervix.

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