

Role Of Conventional MRI With Functional Imaging(DWI & DCE) In Assessment Of Cervical Carcinoma

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ABSTRACT:

Cervical cancer is a common gynecological malignancy and a frequent cause of death. Patient outcome depends on tumor stage, size, nodal status, and histological grade. Correct tumor staging is important to decide the the treatment strategy. Magnetic Resonance Imaging is accepted as a preferred imaging modality to assess the prognostic factors.

Key words: Carcinoma; cervix; MRI; staging

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I. Introduction:

MR imaging of cervix has evolved over the past two decades as the most useful imaging. It is not only useful for preoperative staging but it also helps in identification of recurrent/residual tumors in treated patients¹.

Cervical cancer remains the fourth most common cancer in women worldwide, showing particularly high incidence in countries with low socioeconomic status².

MRI, is superior to clinical examination alone for correctly evaluating cervical carcinoma stage. This is of particular importance in regard to the identification of parametrial invasion and the correct assessment of tumor size, given their important implications for the choice of treatment, i.e. fertility-sparing surgery versus neoadjuvant chemotherapy³. Preoperative assessment of lymph node stage using imaging may have great clinical importance.

Conventional MRI is the preferred imaging modality for evaluating the local extent of cervical cancer due to its excellent soft tissue contrast⁴. Recently developed MRI techniques, namely diffusion weighted imaging (DWI) and dynamic contrast enhanced MRI (DCE-MRI)—also termed multiparametric MRI—are already part of the standard MR work-up.

AIMS & OBJECTIVES:

To evaluate the role of conventional MRI in combination with functional MRI (dynamic contrast diffusion weighted imaging) in

- To correlate MRI findings with FIGO staging of carcinoma cervix.
- To study the role of MRI in detecting the recurrence of carcinoma cervix in patients treated with radiotherapy.

Materials & methods:

- A prospective study carried on 60 patients having clinical signs & symptoms of uterine malignancy referred to Radio diagnosis department, Great eastern medical school & hospital.
- Imaging was done with 1.5 Tesla unit (GE)
- Conventional MRI, contrast enhanced MRI & diffusion weighted imaging were done.
- All cases staged with aid of T2WIs, DCE-MRI, DWI.

INCLUSION CRITERIA:

- Carcinoma cervix patients who were referred to our department for MR imaging both newly diagnosed and those who were on post treatment followup.

EXCLUSION CRITERIA:

- Patients with cardiac pacemakers, new implants, clips within the body and other contraindications of MR imaging like claustrophobia were excluded.

II. Results

A total of 100 patients who are biopsy proven cases of carcinoma cervix are included in the study. Both newly diagnosed and patients treated with chemoradiotherapy are included. FIGO stage is assigned both clinically and with MRI and the parameters are compared

TABLE 1: OVERALL EFFICIENCY OF MRI SEQUENCES

FINDINGS PRESENT	NEW (N=37)	RECURRENT (N=63)
T2W	36	42
DWI	36	31
CONTRAST	34	23
T2W+DWI	35	20
T2W+CONTRAST	34	21

TABLE 2: CORRELATION BETWEEN CLINICAL AND MRI STAGING IN NEW CASES

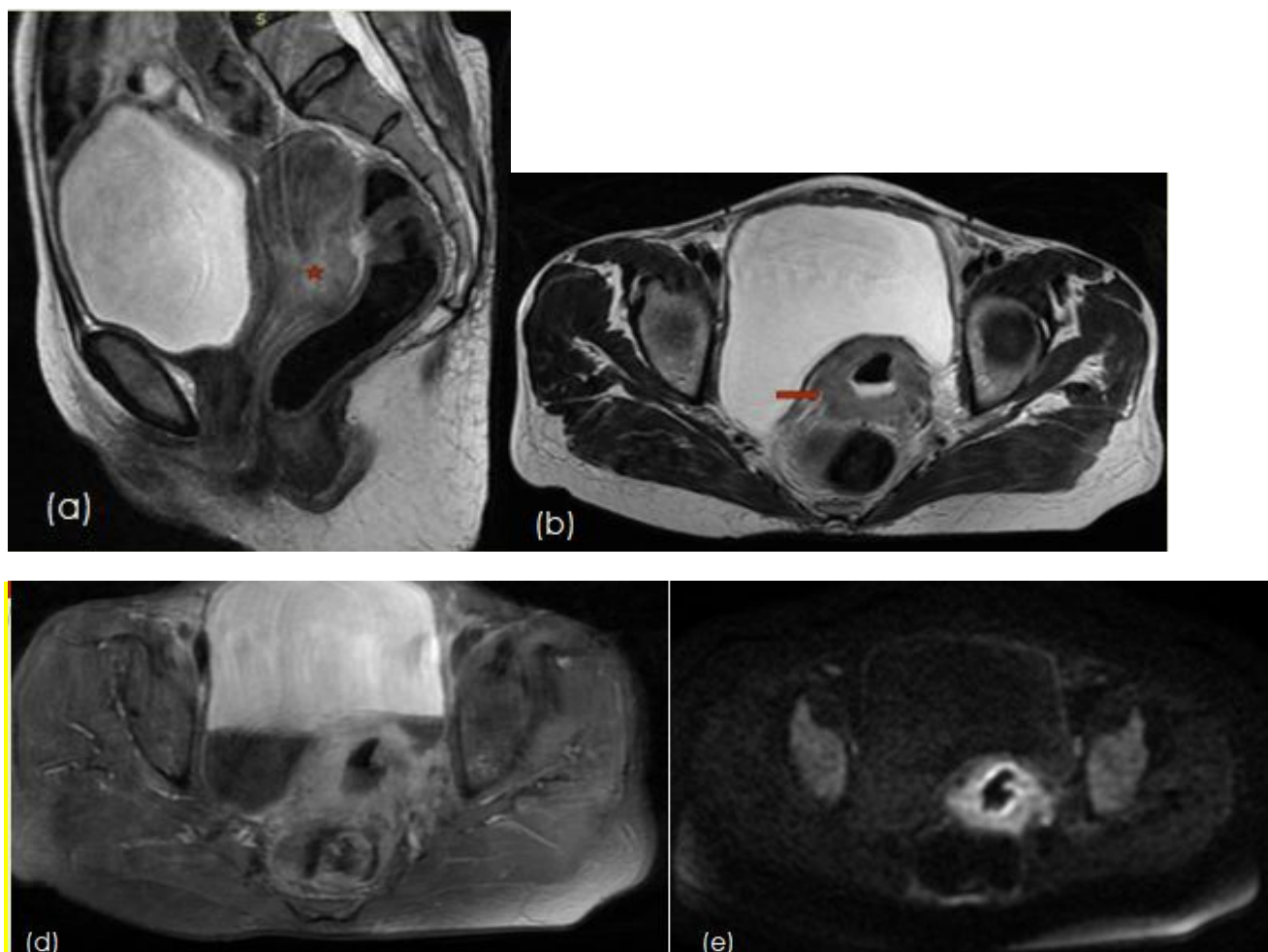
NEWLY DIAGNOSED	MRI STAGING		
CLINICAL STAGING	LOWER STAGING	CORRELATED	HIGHER STAGING
I A	2	0	1
I B	0	0	2
II A	1	0	4
II B	2	9	2
III	4	0	8
IV	0	2	0
TOTAL	9	11	17

TABLE 3: COMPARISON BETWEEN CLINICAL ASSESSMENT AND MRI

CLINICAL ASSESSMENT VS MRI	NEW	RECURRENT
SENSITIVITY	88%	88.89%
SPECIFICITY	0%	30%
POSITIVE PREDICTIVE VALUE	92.59%	53.33%
NEGATIVE PREDICTIVE VALUE	95.65%	75%
ACCURACY	88.19%	57.89%

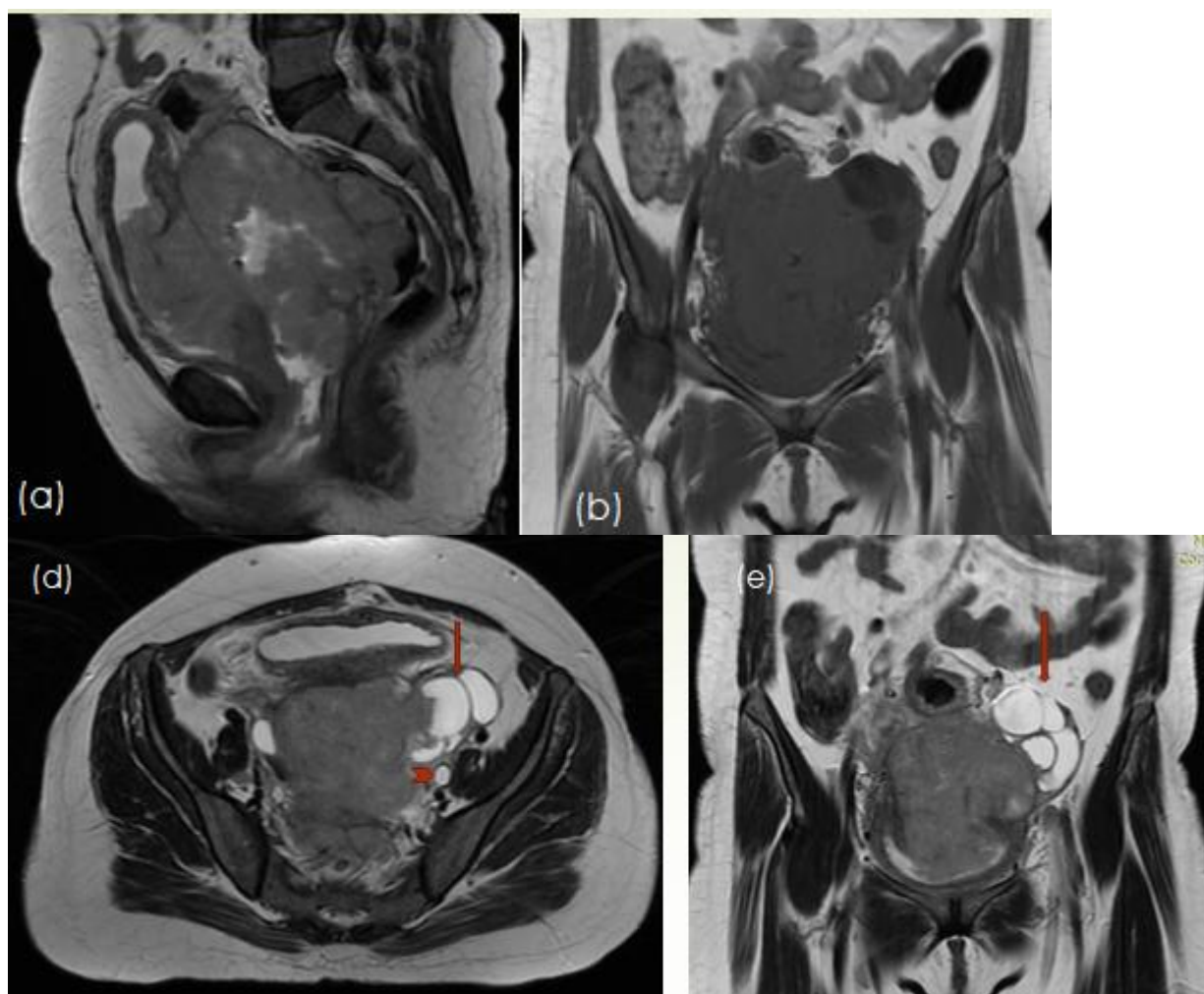
CASE 1: MRI sagittal (a), axial (b) T2WI of patient with cervical carcinoma (Stage IIB), axial T1WI post contrast FS (d), DWI (e) images of cervical carcinoma (Stage IIB)

A well defined T1 isointense, T2 hyperintense mass lesion noted in cervix involving lower uterine segment & surrounding parametrial tissues (arrow). Air-fluid/blood-fluid level noted in lower uterine & cervical canal with heterogenous enhancement on post contrast & diffusion restriction on DWI.



CASE- 2. MRI sagittal(a)T2WI, coronal(b) T1WI , axial(d), coronal(e), T2WI images of cervical carcinoma(Stage IV).

- An ill defined mass lesion showing T1,T2 heterogeneously isointense signal noted occupying entire uterus,cervix with extension upto upper 2/3 rd of vagina & bilateral parametrial extension.
- Lesion causing T2 hyperintense fluid collection in endometrial cavity of upper uterine cavity.
- The lesion is seen extending into bladder anteriorly & anterior wall of rectum posteriorly.
- Evidence of T2 isointense tubular structures(d,) with internal septations noted in the left adnexa measuring -suggestive of left hydrosalpinx(arrow).
- The lesion is causing compression of left distal ureter(arrow head) causing dilatation of left ureter proximal to it- Obstructive uropathy.



III. Discussion

- Two categories of patients are considered for study- 37 newly diagnosed patients (37% of study population) and 63 treated cases (63% of study population).
- **MRI without contrast is reliable in assessing the parametrium and pelvic side wall invasion.** T2 W images give good information. This is in agreement with the study by Freeman SJ et al., and Hawighorst et al.,
- **MRI scores better in delineating the invasion of adjacent organs.** In our study, significantly, 8 cases which were diagnosed as stage III B clinically were found to be stage IV A by MRI. Two cases of clinically staged IIA were actually found to have bladder invasion on MRI and hence staged as IV A. MRI evaluation prevented unnecessary surgical intervention in these patients. **Invasion of bladder and rectum can be ruled out with sufficient confidence with MRI.** This is in accordance with the previous study done by Kim et al.
- For all the newly diagnosed cases staged with FIGO system using clinical examination and **MRI, correlation was the best for stage II B disease and higher staging was given with MRI to clinical stage III disease.** MRI staging correlated with clinical staging in 31% of new cases and there was up staging with MRI for 42% of cases and down staging for 27% of cases. This was due to the reason that all the stage III disease patients diagnosed clinically had minimal bladder wall/rectal wall invasion which was missed and the cases were misclassified. So MRI is advocated in all advanced cases for proper staging and prognostication.
- From our study involving post treatment cases, it is clearly evident that **there is no added value of routine contrast imaging for all post radiotherapy cases.** It has an added value in case of discrepancies between findings in T2 W imaging and DWI where it serves as a problem solving tool. In our study, the number of patients showing lesions on T2 W, DWI, and contrast studies are 42, 31 and 23 respectively. A combination of T2 W imaging and DWI is able to diagnose all the 20 cases and also excludes the 2

false positive cases in T2W imaging. Kinke et al., in his work found that in the first five months after radiotherapy, inflammatory changes may be responsible for the early enhancement that may mimic recurrence. This finding is in concordance with the study by Lucas et al., who reported a higher accuracy for the combination of T2 WI and DWI in the diagnosis of the lesion.

IV. Conclusion:

Conventional MRI plays a key role in the evaluation of cervical cancer, showing good results for the assessment of tumour extent and parametrial invasion.

New techniques, such as DWI and DCE show promise as tools for viewing cervical tumours and for quantitative analysis of tumour biology and the microenvironment.

The addition of DWI to T2W sequences improves the determination of tumour extension and the detection of lymph node metastases. Our results support the inclusion of DWI in the initial MRI protocol for the detection of cervical cancer recurrence, leaving DCE sequences as an option for uncertain cases.

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