ORIGINAL RESEARCH PAPER

Radiodiagnosis

A STUDY OF MRI IN EVALUATION OF CARCINOMA CERVIX

KEY WORDS:

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ABSTRACT

The proverb that "Prevention is always better than cure" is absolutely valid for the disease of carcinoma of uterine cervix.The disease has gained great importance in last half of the 20th century because of the availability of facilities of its early detection and treatment.,non-invasive pre operative evaluation of carcinoma cervix is playing a vital role in the management of the patients and has an effect on longterm survival of the patients.

MRI plays a vital role in the staging of carcinoma and also in the evaluation of recurrence of the lesion and complete resolution in cases of post concurrent radiotherapy and chemotherapy.Patients presenting fromDECEMBER 2016 to OCTOBER 2018to the departments of Oncology &gynaecology , MNJ Institute of oncology and research centre , Hyderabad who are suspected to have carcinoma cervix.

we conclude that MR imaging should be used as routine for imaging study for preoperative staging of uterine cervical carcinoma

INTRODUCTION

The proverb that "Prevention is always better than cure" is absolutely valid for the disease of carcinoma of uterine cervix, which was a well known disease in India and Egypt even before the birth of Christ. The disease has gained great importance in last half of the 20th century because of the availability of facilities of its early detection and treatment.

There is a potential role for accurate non-invasive staging of Cervical carcinoma. This is because clinical staging based primarily on pelvic examination, cystoscopy, and proctoscopy is inaccurate, and because surgical staging for clinical stages II to IV generally is not routinely performed and has significant morbidity. Up to 12% of patients with clinical stage I disease will have a planned Hysterectomy aborted by intra operative findings, usually gross extension of pelvic disease or periaortic lymphadenopathy. Patients treated with radiation therapy only, for example those with stage II and III, may be under stage or over stage, with effects on mortality. For these reasons, non invasivepre operative evaluation of carcinoma cervix is playing a vital role in the management of the patients and has an effect on longterm survival of the patients.

MRI plays a vital role in the staging of carcinoma and also in the evaluation of recurrence of the lesion and complete resolution in cases of post concurrent radiotherapy and chemotherapy

METHODOLOGY—PATIENTS AND METHODS

Source of data:

Patients presenting to the departments of Oncology &gynaecology , MNJ Institute of oncology and research centre , Hyderabad who are suspected to have carcinoma cervix.

Time period : DECEMBER 2016 to OCTOBER 2018

Sample size : 40 patients

Type of study : Prospective study

INCLUSION CRITERIA:

1) Newly detected cases of carcinoma cervix confirmed by cytology/HPE.

2) Suspected cases of recurrence following treatment.

EXCLUSION CRITERIA:

1) Patients with cardiac pacemakers, prosthetic heart valves, cardiac implants, any other metallic implants.

2) Patients with claustrophobia.

3) Patients who donot consent to be a part of study.

Technique

MR IMAGING TECHNIQUE

Patient Preparation: To limit bowel motion, It is recommended that patients fast 4-6 hours prior to imaging. In addition, an antiperistaltic medication is administered intravenously or intramuscularly at the beginning of the examination.MRI was performed on the 1.5 Tesla system (Philips)using a pelvic array coil for the pelvic scan and a torso phased-array coil for the paraaortic scan.

THE FOLLOWING SEQUENCES ARE OBTAINED IN ALL THE PATIENTS:

- T2-W SPIN ECHO Axial; sagittal and oblique axial perpendicular to cervical axis (renal hilum-pubis)
- T1-W SPIN ECHO Axial (renal hilum-pubis)
- DWI-EPI (mandatory)Axial TR/TE: 3000/68,---Tumor detection, lymph nodes, post-treatment evaluation
- PD fatsat axial and sagittal

OBSERVATION AND RESULTS:

TABLE NO:1 AGE GROUP DISTRIBUTION IN CARCINOMA CERVIX

Age group affected	No. of patients
31-40	07
41-50	15
51-60	13
61-70	04
71-80	01

TABLE NO 2: STAGING OF THE CASES

Stage of carcinoma cervix	No. of patients	percentage
Ib 1	3	7.5%
Ib 2	4	10%
II A	3	7.5%
II B	15	37.5%
III A	1	2.5%
III B	1	2.5%
IV A	8	20%
IV B	3	7.5%
POST RT CT NO LESION	2	5%

Table :3 SHOWS UTERINE CORPUS INVOLVEMENT

UTERINE	NO. OF PATIENTS	PERCENTAGE
INVOLVEMENT		
PRESENT	20	50%
ABSENT	20	50%

FIG :1 SHOWS UTERINE CORPUS INVOLVEMENT

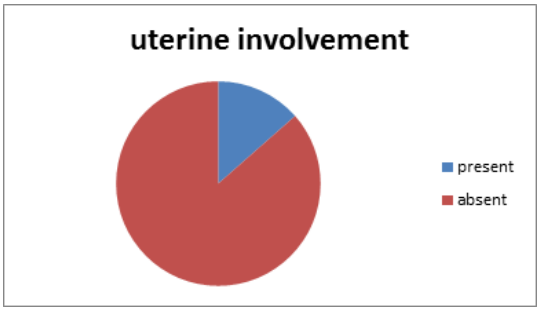

TABLE NO: 4CASES WITH INVOLVEMENT OF VAGINA

VAGINA	NO. OF PATIENTS	PERCENTAGE
INVOLVEMENT		
UPPER 2/3	23	57.5%
LOWER 1/3	02	5%
FREE OF TUMOR	15	37.5%

FIG 2 SHOWS CASES WITH INVOLVEMENT OF VAGINA

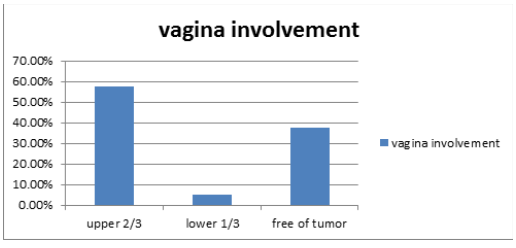

TABLE NO: 5CASES WITH INVOLVEMENT OF PELVIC SIDEWALL

PELVIC SIDEWALL	NO.OF PATIENTS	PERCENTAGE
INVOLVEMENT		
PRESENT	36	90%
ABSENT	04	10%

FIG :3SHOWS CASES WITH INVOLVEMENT OF PELVIC SIDEWALL

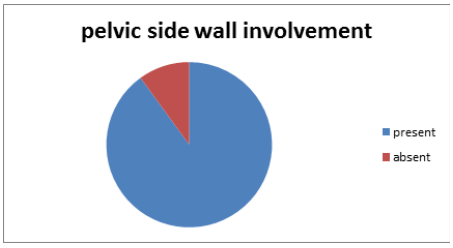

TABLE NO: 6 CASES WITH LYMPHNODE INVOLVEMENT

LYMPHNODE INVOLEMENT	NO.OF PATIENTS	PERCENTAGE
PRESENT	14	35%
ABSENT	26	65%

FIG :4 SHOWS CASES WITH LYMPHNODE INVOLVEMENT

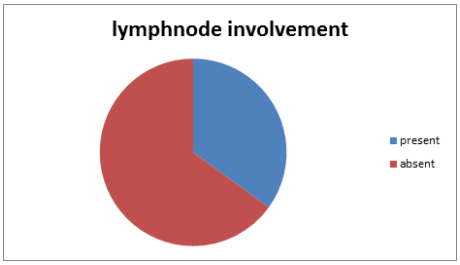

TABLE NO: 7 CASES WITH ENDOMETRIAL COLLECTION

ENDOMETRIAL COLLECTION	NO.OF PATIENTS	PERCENTAGE
PRESENT	25	62.5%
ABSENT	15	37.5%

FIG :5 SHOWS CASES WITH ENDOMETRIAL COLLECTION

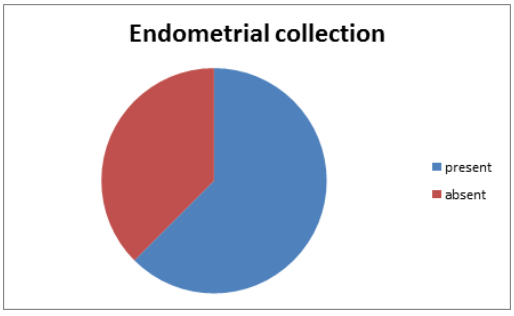

TABLE NO: 8 CASES WITH INVOLVEMENT OF BLADDER

BLADDER	NO.OF PATIENTS	PERCENTAGE
INVOLVEMENT		
PRESENT	13	32.5%
ABSENT	27	67.5%

TABLE NO: 9 CASES WITH INVOLVEMENT OF PARAMETRIUM

PARAMETRIUM	NO.OF PATIENTS	PERCENTAGE
INVOLVEMENT		
PRESENT	27	67.5%
ABSENT	13	32.5%

TABLE NO: 10 CASES WITH INVOLVEMENT OF RECTUM

RECTAL	NO. OF PATIENTS	PERCENTAGE
INVOLVEMENT		
PRESENT	03	7.5%
ABSENT	38	92.5%

DISCUSSION

From December2016 to October 2018, fourty patients diagnosed of cervical carcinoma were examined with MR imaging at our hospital. Primary uterine cervical carcinoma was diagnosed histologically in 38 patients. The other two patients were previously diagnosed cases of carcinoma, who underwent radiotherapy and chemotherapy. They were referred with a suspicion of recurrence.

The ages of the patients ranged from 35 to 72 years (mean, 48 years) with peak incidence being in the age group of 40 to 60 years . This data is agreed by most of the previous studies done earlier.MR staging were based on previously reported criteria. At

MR, a tumor was considered stage IB when a tumor was confined to the cervical stroma.

At MR imaging when loss of the low signal intensity of the normal vaginal wall was seen, especially on T2 weighted sagittal images, the tumor was considered stage IIA. Post biopsy specimens in two of the cases which were diagnosed to be having upper two third of the vagina being involved , have been found to be free of the tumor. This is because of the false prediction due to large endovaginal component of the tumor. Sensitivity of MRI in detection of vaginal extent was about 85%.

A tumor was considered stage IIB when there were areas of abnormal signal intensity, within the parametrial region with complete loss of the low signal intensity of normal cervical stroma, a tumor was considered stage IIIB when stage IIB findings were seen to extend to the pelvic side wall. The negative predictive value was 100% for cases of parametrial non invasion when the criteria of intact stromal ring of atleast 3mm was considered. At MR imaging, tumor was considered stage IVA when there was loss of the low signal intensity of the normal bladder or rectal wall, especially on T2 weighted sagittal images. A tumor is considered to be stage 4b when there is evidence of distant metastasis. At both CT and MR imaging, pelvic lymph nodes were considered to be abnormal if they were greater than 1.0cm in diameter.

Togashi K, et al[1] in their study consisting nineteen patients with histologically proved cervical carcinoma were evaluated with magnetic resonance (MR) imaging. Clinical, MR, and surgical findings were compared to determine accuracy and clinical usefulness of MR in demonstrating mass and extent of disease. MR imaging enabled clear differentiation of corpus uteri, cervix, vagina, uterine ligaments, and tumor. Tumor was demonstrated as a high-intensity mass deforming the low-intensity cervix; the low background intensity of normal structures provided high contrast to the mass

In our study tumor was visible in 37 cases on MR images probably because the size of the tumor was big enough by the time of diagnosis. On T2 weighted images, all the 37 cases showed higher signal intensity than did normal cervical stroma. The rest of the three cases which are post radiotherapy and chemotherapy cases showed no evidence of t2 hyperintensity in the cervix. There was significant t2 hypointensity in the previously involved region with no evidence of diffusion restriction suggesting that there is no residual or recurrent lesion of cervix. There is a limitation in this study for there was no case of Stage IA cases for comparing the percentage of tumor detection by MRI in the early stage. Few cases which were clinically diagnosed as stage IIB turned out to be stage IV A on imaging due to bladder wall invasion which could not be made out clinically.Hricak H, et al[2] in their retrospective study in 57 consecutive patients in whom the extent of disease was surgically confirmed, The accuracy of MR imaging in determination of tumor location was 91% and for determination of tumor size within 0.5 cm, 70%. Its accuracy was 93% for vaginal extension and 88% for parametrial extension. Togashi K, et al[3] in their study to demonstrate and stage carcinoma of the cervix with magnetic resonance (MR) imaging evaluated prospectively in 67 patients with histologically proven lesions. Findings were correlated with surgical / pathologic results obtained within 2 weeks. MR imaging had an accuracy of 95% in demonstrating invasive disease (stage IB or higher).Sheu MH, et al[4,5] in their assessment of parametrial invasion and lymph node metastasis with MRI concluded in assessing parametrial invasion, MRI had an accuracy of 94%.

n a study conducted by SeungHyup Kim et al[6] which included thirty patients diagnosed of uterine cervical carcinoma, comparison of CT and MR findings were done.

Twelve patients had parametrial involvement out of which MR had an accuracy of 92% as compared to 70% of CT. In another study done by Vick et al[7] which included sixteen patients of newly diagnosed cases of cervical carcinoma, false positive cases of parametrial involvement was high on CT when the criteria of prominent parametrial strands were used as compared to the irregular lateral cervical margins and parametrial mass. The accuracy rate was only 58%. In this study parametrial involvement was seen in 27 patients of which clinically ten cases were diagnosed as stage IB with normal parametrium which showed loss of hypointense stromal rim on T2 MRI. Five cases have been clinically staged as IIB due to indurated parametrium which showed intact rim on MRI suggestive of false positive parametrial invasion clinically. Janus CL, et al.[8] in a prospective study concluded compared to CT, MRI showed a high degree of accuracy in correctly demonstrating involvement of the vagina, parametria and sidewalls, bladder, and lymph nodes.

In a study conducted by SeungHyup Kim et al[6] the over all accuracy in tumor staging was 63% for CT and 83% for MRI as compared to clinical staging. The downstaging rate was 10% and upstaging rate was 27% for CT. In another study done by Kim SH et Al in ninety nine patients of cervical carcinoma MRI was superior in over all staging with 77% accuracy as compared with 69% accuracy on CT. In this study which consisted of thirty eight cases of primary carcinoma cervix three patients were stage IB1 , four patients stage IB 2, three patients stage II A, fifteen patients of stage IIB, one patient each of stage IIIA and stage IIIB, eight patients of stage IV A, and three patients of stage IV B. The limitation in our study is we did not have any case of Stage IA. Bladder involvement was seen in thirteen cases and rectal involvement is seen in only three cases .In one of the case which was clinically staged as IIB based on parametrial invasion turned out to be stage IIIB on imaging due to the pelvic sidewall invasion causing right hydroureteronephrosis.
In our study a total of twenty cases of uterine extension were found. In a study done by Mitchell DG, Synder B et al[9], in 208 patients biopsy proven invasive cervical carcinoma. They concluded MRI is superior to CT for evaluating uterine body invasion.half of the patients in this study had uterine corpus involvement.

In our study fourteen cases of lymph nodal involvement was seen of which most of them were iliac group of nodes. One of the case had distant metastasis to inguinal group of lymphnodes. Although detection will help in proper treatment planning the detection of lymph node involvement will not change the staging. However patients with lymphnodal involvement had poor prognosis when compared to those with no involvement.

In our study we had three cases of distant metastasis one involving the ovaries, one involving the inguinal lymphnodes and the third case showing diffuse peritoneal metastasis. In a study done by Walsh and Goplerud [10] in seventy five patients with diagnosis of cervical carcinoma, two cases were having inguinal lymph node involvement.

In our study three cases of post chemotherapy and post radiotherapy have been referred to us in suspicion of recurrence .no abnormal high signal intensity has been seen on imaging suggesting that there was no recurrent lesion . CT cannot differentiate an irradiated uterus from central tumor recurrence which will be better appreciated at MR imaging.

CONCLUSION

The greatest impact of MR imaging on the staging of uterine cervical carcinoma is in the evaluation of parametrial status, which has been one of the most significant limitations of CT staging. Hence it is possible to infer from this prospective study that MR imaging has the greatest accuracy in detection of parametrial invasion, which is one of the most crucial points in pre operative staging of uterine cervical carcinoma. MR imaging also is accurate in detecting the presence of residual and recurrent lesion in a post op and post radiotherapy and chemotherapy cases which is not possible on ct. This is because of better soft tissue resolution of MRI. MR imaging has several other advantages over CT, such as high-contrast resolution and multiplanar capability which usually demonstrate well the relationship of the uterus, the vagina, the urinary bladder, and the rectum on sagittal images. At this point we conclude that MR imaging should be used as routine for imaging study for preoperative staging of uterine cervical carcinoma.

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