Original Research Paper

Radiology

ROLE OF MRI IN EVALAUTION OF CERVICAL CARCINOMA AND ITS CORRELATION WITH CLINICAL FIGO STAGING AND HISTOPATHOLOGICAL DIAGNOSIS

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ABSTRACT   *INTRODUCTION: The purpose of this study was to evaluate the role of MRI in carcinoma cervix with respect to extent, staging and correlation of the same with clinical FIGO staging and the histopathological diagnosis. METHODS: The study was a prospective study conducted on 40 patients with symptoms and signs of carcinoma cervix. RESULTS: MRI as a single imaging modality is superior in staging of carcinoma cervix with better assessment of lymph nodal status, parametrial extension , bladder ,ureter and bowel involvement when compared to FIGO staging. In cases of tumour recurrence also, MRI plays a substantial role.CONCLUSION :MRI is the imaging modality of choice and preferred modality for staging of primary cervical cancer over FIGO staging .FIGO is ineffective in predicting the accurate stage and extent of disease often underestimating /overestimating it when compared to MRI .Therefore we propose that MRI as a single imaging modality in evaluation of carcinoma cervix has a distinct edge over FIGO staging .*

KEYWORDS : MRI, cervical carcinoma, MRI staging ,FIGO staging

INTRODUCTION

Carcinoma Cervix is the most common genital cancer encountered in India. Uterine cervical cancer is the third most common malignancy in the world affecting the female genital tract in the middle age population ranging between 45 and 55 years [1,2]. Accurate staging of carcinoma cervix is crucial to patient management and greatly alters treatment options available to the patient and hence an accurate pretreatment staging of Carcinoma Cervix is of dire importance. The current staging system for cervical carcinoma is based on the International Federation of Gynecology and Obstetrics (FIGO) classification and is based on clinical assessment , physical examination under anaesthesia, colposcopy, endocervical curettage, hysteroscopy, cystoscopy, proctoscopy , intravenous urography, barium enema and chest radiography.

Staging is often inaccurate, and when compared to surgical staging, is subject to errors. Staging errors are strongly associated with poor prognosis[4].

Clinical staging underestimates the disease compared with surgical staging in 15 % to 36% of the patients. Van Nagell et al [3] found understaging in 22% of stage I tumours , 39% of stage II tumours and 38% in stage III tumours and as wells as overstaging in 38% in stage III tumours.

The FIGO staging system also suffers from deficiencies arising from the fact that it does not take into consideration relevant prognostic factors such as the tumor volume, vascularization of the malignant mass, pattern of growth whether endophytic or exophytic , degree of stromal invasion and associated lymph nodes involvement [5,6]. Metastasis to local, regional, pelvic or paraaortic lymph nodes cannot be assessed by clinical FIGO examination and also the volume and extension of the tumor / parametrial extension, extension to the bladder or adjacent bowel is difficult to define clinically, which are critically important for treatment planning.

Contrast-enhanced T1-weighted sequences have demonstrated higher accuracy than the T2-weighted in parametrial evaluation [7]. MRI is highly sensitive in the detection of vaginal invasion, with 93% accuracy [8].

Treatment alternatives and prognosis of the patient depends on the status of the lymph nodes, size of the primary tumour, depth of stromal invasion

(superficial 1/3rd , middle 1/3rd and deep 1/3rd), presence or absence of lympho- vascular invasion (LVSI) , parametrial invasion and histologic cell type . Out of the above mentioned factors, most important prognostic factor is the assessment of the lymph node status.

Squamous cell carcinoma is the most common malignancy of the cervix and accounts for approximately 85% of the total cases of carcinoma cervix. The remaining 15% includes adenocarcinoma , adenosquamous carcinoma and undifferentiated carcinoma , which have a poorer prognosis.

AIMS AND OBJECTIVES

The aims and objectives of our study were to determine the role of MRI in evaluation of primary invasive carcinoma cervix with respect to location, size, local extent and staging.

We also obtained histopathological diagnosis for each of the case included in our study, correlated the histopathological diagnosis with the imaging findings in terms of pattern of growth and location of the same and compared clinical FIGO staging with MRI staging of carcinoma cervix. Recurrence of carcinoma in treated cases was also documented by MRI.

MATERIALS AND METHODS

A prospective study was conducted on a total number of 40 patients with clinical symptoms and signs of carcinoma cervix at Susheela Tiwari Hospital Haldwani, Uttarakhand. Imaging was done with 1.5 Tesla Siemens machine using abdominal surface coils with appropriate sequences which included axial ,sagittal and coronal T1W and T2W spin echo sequences , a Trufi sagittal sequence and post contrast gadolinium T1W fat suppressed study as and when required.

RESULTS

The sensitivity and specificity of the accuracy of MRI was higher over clinical FIGO staging in determining the staging of cervical carcinoma in terms of parametrial invasion, lateral pelvic wall and ureter involvement, lymph nodal involvement , bladder / bowel involvement and metastasis. MRI also proved to be far superior in assessing tumour bulk and volume depending on the size of the lesion, degree of stromal invasion , vascularisation of the mass and tumour recurrence post therapy. Correlation of the diagnostic accuracy of MRI for cervical cancer was done with histopathology

and the pattern of growth and its location in the cervix for different histological types of tumour were correlated.

It was found that MRI was better predictor of tumour staging over FIGO staging in cases of carcinoma cervix with sensitivity of 80 % (32 out of 40 cases) versus FIGO clinical staging in 25 %(10 out of 40 cases).In detection of parametrial involvement MRI showed a sensitivity of 92.8 % (26 out of 28 cases) versus FIGO with sensitivity of 28.57 % (8 out of 28 cases).FIGO underestimated the parametrial involvement and therefore the staging in 10 out of 14 cases . This misjudgement of the parametrial invasion upstaged the tumour from Stage II A of clinical FIGO to Stage II B by MRI, thereby greatly altering the treatment modality and management. MRI in the detection of lymph nodal metastasis showed sensitivity of 93.3 % (28 out of 30 patients) . FIGO showed markedly lower sensitivity of 6.67 % (2 out of 30 patients). The assessment of lymph nodal involvement and the region of lymph node involvement is the single most prognostic factor in carcinoma cervix and this being markedly underestimated by clinical FIGO put the same on a markedly lower platform for accurate staging of carcinoma cervix when compared to MRI. MRI accurately estimated involvement of lateral pelvic wall / hydroureter / hydronephrosis in all 5 cases which shows involvement of the same subsequently. FIGO underestimated such an involvement in 3 cases as there were no signs of ureamia / urinary obstruction .MRI in detection of involvement of bladder and bowel / rectum invasion in carcinoma cervix showed sensitivity of 90 % directly upstaging the tumour staging to IV A which greatly altered the patients prognosis (18 out of 20 cases) .Error in assessment of the infiltration of the pelvic organs in vicinity of the cervix was associated with understaging. MRI was also found superior in the assessment of tumour recurrence /vault recurrence post treatment either post surgery or post radiothaerapy and chemotherapy or both. Our study also showed that MRI could detect the earliest change in the cervix as an altered signal intensity on T2W FSE sequences, which proved positive for stage I or carcinoma in situ on subsequent histopathology.

Majority of carcinoma cervix cases in our study were histopathologically proven to be of the squamous cell carcinoma type (80 %) followed by adenocarcinoma (10 to 20 %) and adenosquamous type .Neuroendocrine type accounted only for (5 %) .Our study by MRI showed that irregular fungating or ulcerative type of growth pattern was encountered most frequently in squamous cell carcinoma and this type often originated at the squamo-columnar junction . The adenocarcinoma type of carcinoma cervix presented with endophytic / infiltrative type of growth (originating in high endocervical region and endocervical canal).

In most of our cases in the initial stages, the major complaints were mainly abnormal vaginal bleeding, post coital bleeding and abnormal foul smelling vaginal discharge. The cervix with early carcinoma had a poorly circumscribed granular or eroded appearance and bled easily on contact. In the advanced cases , weight loss, features of uraemia and anemia and urinary obstruction was noted. On per rectal/ per vaginal examination ,bulky uterus with thickening and induration was noted. In the advanced stages of the disease, nodular, ulcerated or a definitive mass was encountered.

DISCUSSION

MRI is the imaging modality of choice and preferred modality for staging of primary cervical cancer over FIGO staging. Clinical FIGO is ineffective in predicting the accurate stage and extent of disease. FIGO often underestimates or overestimates the staging of carcinoma cervix, thereby greatly altering treatment options and final prognosis of the patient. MRI can accurately evaluate the extent of disease because of its high spatial and contrast resolution for pelvic organs and its ability to predict the early involvement and thereby aids greatly in planning treatment of the patient.

Endophytic growth occurs in the cervical canal with direct infiltration into the wall causing diffuse enlargement and hardening of the cervix. Some cervical carcinomas are located in the cervical canal and grow endophytically without causing gross abnormality. This is the pattern of growth often encountered in adenocarcinoma type of carcinoma cervix and in elderly patients .

Cervical squamous cell carcinoma arises from the squamo-columnar junction while adenocarcinomas arises from the endocervix. This is situated on the ectocervix in younger patients though regresses into the endocervical canal with age. Hence cervical tumours tend to be exophytic in younger patients and endophytic with advancing age.

The local extent of tumor expressed by the depth of stromal invasion in millimeters and percent of cervical wall involvement (alternatively upper third, middle third, deeper third, upper half or deeper half), and the relation to parametrium. The presence or absence of lymphatic-vascular space invasion is another important prognostic factor.

When present, parametrial invasion is associated with a higher incidence of vascular invasion, positive lymph nodes, recurrence, and death.

IMAGES

Fig 1: MRI sagittal (a) T2W image of carcinoma cervix (Stage IV a). A large heterogenous signal intensity mass is seen involving the cervix, as well as lower uterine body and upper vagina. It also involves the posterior urinary bladder wall and anterior rectal wall. Coronal (b) T2 Trufi image showing evidence of bilateral hydroureteronephrosis, more on the right side.
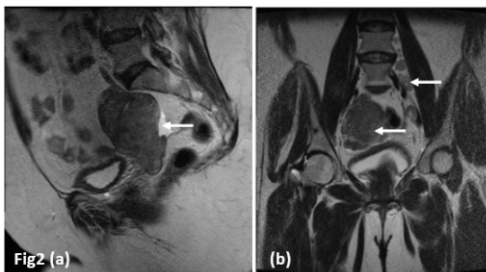

Fig 2: MRI sagittal (a) T2 W image of carcinoma cervix (Stage III A). Shows a large cervico infilterative growth seen invading the cervical stroma and extending into both parametria. (b) MRI coronal T2 W image. Few enlarged T2 hyperintense / T1 isointense to hypointense enlarged pelvic lymph nodes seen at bilateral external, internal iliac, left common iliac and left inguinal lymph nodes.
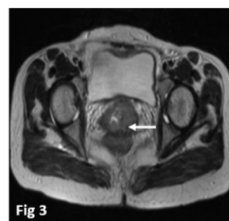

Fig 3: MRI axial T2 W image of early carcinoma cervix Stage Ib1. Showing growth in the region of cervix.

Fig 4: MRI Sagittal T2 W image of carcinoma cervix with recurrence. Showing growth at the endocervical canal with infilteration into the posterior wall of urinary bladder.

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