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Evaluation of Level of Aortic Bifurcation in Patients of Carcinoma Cervix.

Himanshu Mishra[1], Rahat Hadi[2], Kamal Sahni[3], Ritusha Mishra[4], Mohammad Ali[5]

[1,5]Assistant Senior Resident, Department of Radiation Oncology, DR RMLIMS, Lucknow.
[2]Associate Professor, Department of Radiation Oncology, DR RMLIMS, Lucknow.
[3]Professor, Department of Radiation Oncology, DR RML IMS, Lucknow.
[4]Junior Resident, Department of Radiation Oncology, DR RMLIMS, Lucknow.

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ABSTRACT

Background: Concurrent Chemotherapy and Radiotherapy (RT) is considered as standard of care in advanced carcinoma cervix. The superior border of radiation portal is kept at L4-L5 junction to cover common iliac group of lymph nodes which lie along common iliac vessels. **Methods**: Level of aortic bifurcation in to two common iliacs was retrospectively evaluated in 90 patients of carcinoma cervix to reconsider the level of superior border of radiation portal while RT planning. Evaluation was done on contrast enhanced computed tomography (CT) simulation images of the patients who were previously treated with radical intent. **Results**: We found that aortic bifurcation occured mostly at mid vertebral level of L4 and it was above L4-L5 junction in 74.4% of the cases. **Conclusion**: With conventional simulator based RT planning the superior border of radiation Portal should be kept above mid-vertebral level of L4 while with CT- simulator based planning, it should be placed considering individual patient anatomy.

Keywords: Aorta, Cervix, Radiotherapy.

INTRODUCTION

Carcinoma Cervix is the 2nd most common cancer in Indian female and accounts for about 12% of all newly diagnosed cases of cancer annually. Concurrent Chemotherapy and Radiotherapy (RT) is considered as standard of care in carcinoma cervix (FIGO Stage IIB –IV A) patients. External beam radiotherapy (RT) and brachytherapy are two essential components of RT. The EBRT treatment volume includes the primary tumour and the regional draining lymph nodes i.e. obturator nodes, internal iliac, external iliac, common iliac and pre-sacral.[1] EBRT planning typically involves two- field or four-field box technique depending upon the antero-posterior separation of the patient and during the planning, usually the superior border of Radiation portal is kept at L4-L5 junction. The common iliac nodes lie in relation with bilateral common iliac vessels. The common iliac vessels begin as right and left divisions of abdominal aorta.[2]

Name & Address of Corresponding Author
Dr. Himanshu Mishra,
Senior Resident,
Department of Radiation Oncology,
DR RMLIMS, Lucknow.

There are a significant number of patients who are being treated by conventional X-Ray based planning using bony landmarks in many centers in our country and the traditional upper border of the radiation portal is kept at the level of L4-L5 intervertebral space in order to cover common iliac lymph nodes. However level of division of abdominal aorta in to two common iliacs may vary from individual to individual.

Aim

The aim of the study was to evaluate the level of aortic bifurcation (in to two common iliacs) in denovo carcinoma cervix patients to reconsider the level of superior border of Radiation portal while RT planning.

MATERIAL AND METHODS

This is a retrospective observational study which included 90 patients. Newly diagnosed, histo-pathologically proven cases of carcinoma cervix treated with concurrent chemoradiotherapy or RT alone with radical intent were included in the study. Post-operative cases were excluded.

For EBRT either non-contrast or contrast enhanced computed tomography (CT) simulation was done. Planning was done using system XIO (Version 5.0). Some patients were treated with 2-D while others with 3-D technique using 6-15 MV photon. Images of only Contrast Enhanced CT Simulation were considered for evaluation. Axial CT sections were

extending from L1 to mid thigh level with slice thickness varying from 3 mm to 5mm. The DICOM images loaded on to Treatment Planning System for RT planning were evaluated. For evaluation, in some patients we actually contour the clinical target volume (CTV) up to aortic bifurcation on axial sections and correlated it with the corresponding vertebral level while in others we only marked on the axial section in which the abdominal aorta is dividing and correlated it with the corresponding vertebral level.

The level of division of abdominal aorta into right and left common iliac arteries with respect to vertebral levels was determined.

RESULTS

Total 90 patients were evaluated for the study. The mean age observed was 50 years. Four levels of division could be identified- (a) L3-L4 intervertebral space; (b) Mid vertebral level of L4 (c) Lower vertebral level of L4 and (d) L4-L5 intervertebral space. Mid vertebral level of L-4 was most common site of observation i.e. in 45.6% of cases. The distribution of level of Aortic Bifurcation is described in [Table 1].

Table 1: Level of Bifurcation of Abdominal Aorta.

Aortic Bifurcation	N	%
Mid Vertebral Level of L-4	41	45.6
L4-L5 junction	23	25.6
L3-L4 Junction	15	16.6
Lower Vertebral Level of L-4	11	12.2

DISCUSSION

Complete coverage of common iliac group of lymph nodes is essential in advanced carcinoma cervix patients as with stage advancement, chances of pelvic lymph node metastasis increases. Even some studies have shown that most of the marginal recurrences after RT in treatment of carcinoma cervix occur in the common iliac nodal region [3,4] of radiation portal. Data on level of division of abdominal aorta vary according to anatomy textbooks and various studies and there is no definite consensus over it.

Anatomy textbooks like Grays' Anatomy, Hollins head's textbook of Anatomy, Cunningham's mannual of practical Anatomy and Moore clinically oriented Anatomy, all mention that aortic bifurcation occur at level of L4 vertebral body.[5-8] Among these, the first two above mentioned specify it at lower level of L4 vertebral body.

In a retrospective study, Rai et al reported aortic bifurcation above L4-L5 junction in 70.7% of patients.[9] Study by Prakash et al. had showed that the division of the abdominal aorta occurs at the level of body of L4 in 54% of the cases.[10] Present study also showed that aortic bifurcation occurs above L4-L5 junction in majority (74.4%) of the cases. However, results of studies by Greer and Bergman et al are contrary to our results and they reported division at L4-L5 junction in most of the patients.[11,12]

Results of our study are similar to many other studies; however there are studies, results of which are not similar to ours. Small number of patients is a major limitation of the present study and large sample size is required to reach up to a definite conclusion.

CONCLUSION

With conventional simulator based RT planning the superior border of Radiation Portal should be kept above mid-vertebral level of L4 in advanced carcinoma cervix patients to adequately cover common iliac group of lymph nodes . With CT-simulator based planning, it should be placed considering individual patient anatomy. (i.e. level of aortic bifurcation as evident on CT images).

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