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IMPACT OF URINARY BLADDER FILLING ON ACUTE RADIATION TOXICITIES DURING EXTERNAL BEAM RADIOTHERAPY OF CARCINOMA CERVIX: A PILOT STUDY

Oncology

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ABSTRACT

Back Ground:

Carcinoma cervix is the most common gynecological cancer and fourth most common malignancy in women in the world.Radiotherapy with or without chemotherapy has shown promising result both in terms of local control and survival rates. Toxicities due to normal pelvic organ irradiation is causing significant morbidity during and after treatment. Acute toxicities like gastrointestinal, genitourinary, complications are the most common and challenging events of radiotherapy . With the use of more conformal treatments like three dimensional conformal radiotherapy (3D-CRT), acute genitourinary and gastroinestinal toxicities can be reduced, which in turn depend largely on bladder filling during treatment.This present study aimed at assessing these common toxicities largely in relation with urinary bladder filling.

Material and Methods:

This is a retrospective study in which total 26 patients were included, and 13 patients were recruited in each arm. Patients in Arm A treated with 2-Dimensional conventional radiotherapy planning without bladder protocol and in Arm B patients treated with 3-DCRT planning with bladder protocol.In Arm A patients are asked to empty the bladder and set with knee rest immobilisation device on couch and planning was done. In Arm-B, patients are asked to empty the bladder first and then asked to drink 500 ml of water and wait for 30 minutes, after that patient was set on CT couch with Knee rest immobilization and planning CT was taken and images were transferred to treatment planning system. planning was verified and patient treated with 3D-CRT technique. Acute complications such as gastroenteritis and cystitis were documented as per RTOG toxicity criteria(6) in both arms.

Results:

Acute gastroenteritis grade 1 had been shown by 3(23%)patients in Arm A and 6(46%)patients in Arm B .5(38.4%)patients in Arm A and 2(15.3%)patients in Arm B had grade 2 reactions. 5(38.4%)patients in Arm A and2(15.3%)patients in Arm B had grade 3 reactions. Grade 4 reactions are not observed in both arms. Acute genitourinary reactions (cystitis) grade 1 has been shown by 7(53.8%)patients in Arm A and 6(46%) patients in Arm B . 3(23%)patients in Arm A and 1(7.6%) patient in Arm B had grade2 reactions.3(23%)patients in Arm A and 1(7.6%)patient in Arm B had grade3 reactions. Grade 4 reactions are not observed in both Arms.

Conclusion:

From our study, it may be concluded that over all incidence of acute gastrointestinal and genitourinary complications, especially grade 2 or more are less with bladder protocol compared to no bladder protocol during external beam radiotherapy treatment of carcinoma cervix with radical intent.

KEYWORDS

Bladder protocol, radiation toxicity, carcinoma cervix

INTRODUCTION:

According to GLOBOCAN 2018, cervical cancer is the most common gynecological cancer and fourth most common malignancy in women in the world(1). Now a days the morbidity and mortality has dramatically declined in developed countries due to effective screening and treatment of preinvasive lesions(2). But in developed countries like India, it is commonly encountered malignancy among women and is accounting for significant morbidity and mortality (3). According to GLOBOCAN 2018, in India carcinoma cervix is most common gynecological malignacy and second most common cancer among woman after breast cancer with 96,922 (16.5%) new cases(1).

Radiotherapy has shown high success rates both in terms of local control and survival rates(4). Toxicities due to normal pelvic organ irradiation is causing significant morbidity during and after treatment. Acute toxicities like gastrointestinal, genitourinary, haematological and skin reactions are common. With the use of more conformal treatments like three dimensional conformal radiotherapy (3D-CRT), acute genitourinary and gastroinestinal toxicities can be reduced, which in turn depend largely on bladder filling during treatment(5).

MATERIALAND METHODS:

The study is conducted retrospectively, total 26 patients were included, and 13 patients were recruited in each arm. Patients in Arm A treated with 2-Dimensional conventional radiotherapy planning without bladder protocol and in Arm B patients treated with 3-DCRT planning with bladder protocol.

In without bladder protocol patient is asked to empty the bladder and set with knee rest immobilisation device on couch and planning was done. In bladder protocol patient is asked to empty the bladder first and then asked to drink 500 ml of water and wait for 30 minutes, after that patient was set on CT couch with Knee rest immobilization and planning CT was taken and images were transferred to treatment planning system. planning was verified and patient treated with 3D-CRT technique. Acute complications such as gastroenteritis and cystitis were documented as per RTOG toxicity criteria(6) in both arms.

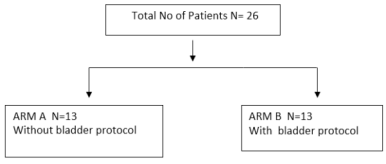
Inclusion criteria:

1.All histopathologically diagnosed cases of carcinoma cervix.
2.Those who completed entire RT schedule with or without concurrent chemotherapy with cisplatin.

Exclusion criteria

1.All postoperative cases and who received incomplete treatment
2.Those who received palliative radiotherapy

Study Design:



RESULTS:

Acute gastroenteritis grade 1 had been shown by 3(23%)patients in Arm A and 6(46%)patients in Arm B .5(38.4%)patients in Arm A and 2(15.3%)patients in Arm B had grade 2 reactions. 5(38.4%)patients in Arm A and2(15.3%)patients in Arm B had grade 3 reactions. Grade 4 reactions are not observed in both arms.

Acute genitourinary reactions (cystitis) grade 1 has been shown by 7(53.8%)patients in Arm A and 6(46%) patients in Arm B . 3(23%)patients in Arm A and 1(7.6%) patient in Arm B had grade2 reactions.3(23%)patients in Arm A and 1(7.6%)patient in Arm B had grade3 reactions. Grade 4 reactions are not observed in both Arms.

TABLE : Acute Gastro intestinal and Genitourinary toxicities in both arms

Grade	Cases of GI toxicities		Cases of GU toxicities	
	Arm A	Arm B	Arm A	Arm B
0	0	3	0	5
1	3	6	7	6
2	5	2	3	1
3	5	2	3	1
4	0	0	0	0

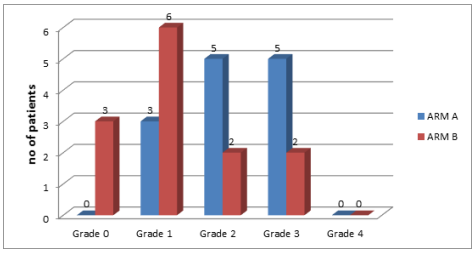


Fig 1 : Acute gastrointestinal toxicity in both arms

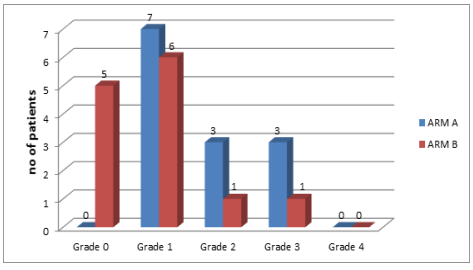


Fig 2: Acute genitourinary toxicity in both arms

DISCUSSION:

Cervical cancer is the most common gynecological cancer among Indian women which continues to be significant health burden. In india most of the cervical cancer patients presented at locally advanced stage, where surgery is not feasible, thereby making radiotherapy as the main modality of treatment. Radiotherapy includes external beam radiotherapy (EBRT) and intracavitory brachytherapy (ICBT) which was accepted as the standard treatment for carcinoma cervix until 1999 (4). But after the publication of five randomized trials (7-11), a consensus of expert opinion (12) and two meta-analysis (13,14) concurrent weekly cisplatin based chemoradiotherapy has became standard of care unless medically contraindicated.

During external beam radiotherapy changes in target and normal organs position and shape may be caused by rectum- and bladder-filling changes(15,16). If the bladder is empty small bowels will come in the radiation field leads to more gastrointestinal complications. Bladder filling during radiation delivery will move small bowels out of radiation field and also reduces bladder damage due to radiation. With development of conformal techniques in radiation delivery we can visualize the bladder filling using a standard bladder filling protocol.

In this study we have compared acute complications such gastroenteritis and cystitis in carcinoma cervix patients received external beam radiotherapy . Arm A patients treated with conventional two dimensional radiotherapy without bladder protocol and arm B patients treated with three dimensional conformal radiotherapy (3D-CRT) with bladder protocol.

We have observed that, in Arm A all 13 patients(100%) developed acute gastroenteritis and cystitis and in Arm B 10(76.6%) patients developed acute gastroenteritis, 8(61.2%) patients developed acute cystitis. Especially grade 2 or more acute gastroenteritis seen in 76.8% of Arm A and 30.6% of Arm B patients. Grade 2 or more acute cystitis seen in 46% of Arm A and 15.2% of Arm B patients. Grade 4 complications not seen in both arms

CONCLUSION:

From this study, it may be concluded that over all incidence of acute gastrointestinal and genitourinary complications, especially grade 2 or more are less with bladder filling protocol compared to no bladder filling protocol during external beam radiotherapy treatment of carcinoma cervix with radical intent.

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