Analysis of Late Radiation Proctitis Among Patients Treated for Cervical Cancer: A Comparative Study Between Linear Accelerator and Cobalt Teletherapy


Abstract

Concurrent chemo-radiation forms the standard of care in majority of carcinoma cervix and radiation proctitis is one of the commonly encountered side-effect. In this study we analysed sixty six patients of carcinoma cervix treated with radiation therapy and observed an increased incidence of radiation proctitis in patients treated using conformal radiotherapy as opposed to conventional therapy.

Background: Concerns have been raised over adequate target volume coverage with conventional 2-dimensional planning owing to wide variations in pelvic anatomy between individual patients. To improve tumor volume coverage, increasing numbers of patients are being treated with 3-dimensional conformal radiotherapy (3DCRT), resulting in increased treatment volume as opposed to conventional planning. This study compares the occurrence of late radiation proctitis among patients with carcinoma of the cervix treated with 3DCRT using a linear accelerator (LINAC) versus conventional therapy using a telecobalt unit. Patients and Methods: A total of 66 patients with carcinoma of the cervix treated with curative intent between August 2006 and August 2012, having a minimum of 6 months of posttreatment follow-up, were reviewed retrospectively. Whole-pelvis irradiation was administered in cobalt teletherapy using the box-field technique (33 patients) or using 3DCRT on a 6-MV LINAC (33 patients), followed by low-dose-rate intracavitary brachytherapy to a dose of 30 Gy. Results: The median ages of patients treated on cobalt teletherapy and LINAC were 50 and 52 years, respectively, and the median follow-up durations were 24 and 18 months, respectively. Seven patients (21%) developed radiation proctitis in the cobalt teletherapy arm, compared with 12 patients (36%) in the LINAC arm ($P = .03; \chi^2$ test). Conclusion: There is a significant increase in the incidence of late radiation proctitis in patients treated with the 3DCRT technique compared with the conventional technique. The effect of associated factors such as rectal dose during brachytherapy needs to be studied before a definitive conclusion can be drawn.

Clinical Ovarian and Other Gynecologic Cancer, Vol. 6, No. 1/2, 46-9 © 2014 Elsevier Inc. All rights reserved.

Keywords: Carcinoma of the cervix, Conformal, Conventional, Late toxicity, Radiotherapy
conventional bony landmark–based planning. This study is an effort to determine whether this increase in volume results in increased long-term complications, particularly radiation proctitis. The aim of the study was to compare the occurrence of late radiation proctitis among patients treated with conformal radiotherapy using a linear accelerator (LINAC) versus those treated with conventional therapy using a telecobalt unit.

Patients and Methods

The authors reviewed 66 patients with histologically proven carcinoma of the uterine cervix treated with curative intent between August 2006 and August 2012. Staging was done according to the FIGO (International Federation of Gynecology and Obstetrics) staging system. Patients who received external radiotherapy on cobalt teletherapy or LINAC along with concurrent chemotherapy followed by low-dose-rate intracavitary brachytherapy with a minimum posttreatment follow-up of 6 months were included in the study. Postoperative cases and patients with a history of bleeding per rectum, comorbid medical illness, or coagulation abnormalities were excluded. All patients were treated initially with external beam radiotherapy. Whole-pelvis irradiation was administered in cobalt teletherapy using the 4-field box technique or using 3-dimensional conformal radiotherapy on a 6-MV LINAC to a dose of 45 to 46 Gy in 23 to 25 fractions. All patients were treated with low-dose-rate intracavitary brachytherapy using cesium-137 sources to a dose of 30 Gy to point A. Medication records and proctoscopic examination, if performed, were reviewed and documented. Rectal complication was graded according to modified RTOG/EORTC criteria (Radiation Therapy Oncology Group/European Organisation for Research and Treatment of Cancer). The $\chi^2$ test was used to determine the difference between the 2 groups. A value of $P \leq .05$ was considered to be significant.

Results

The patient characteristics are given in Table 1. Squamous cell carcinoma was noted in all 66 patients (100%). The median age was 51 years (range, 30-80 years). The median follow-up durations of patients treated with cobalt teletherapy or LINAC were 24 months (range, 6-48) and 18 months (range, 6-36), respectively.

The grades of proctitis are listed in Table 2. There was a significant difference in the occurrence of radiation proctitis in patients treated using the conventional technique (21%) versus 3DCRT (36%) ($P = .03$). The characteristics of the medication prescribed for patients developing radiation proctitis are listed in Table 3. The comparison between bony landmark–based planning and conformal planning in axial and sagittal sections with respect to the volume of rectum included in 95% isodose coverage is shown in Figures 1 and 2, respectively.

## Table 2 Grades of Proctitis

<table>
<thead>
<tr>
<th>Therapy</th>
<th>No. of Patients with Proctitis</th>
<th>Proctitis Grade $\leq 2$</th>
<th>Proctitis Grade 3</th>
<th>Proctitis Grade $\geq 4$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>7/33 (21%)</td>
<td>6/33 (18%)</td>
<td>1/33 (3%)</td>
<td>Nil</td>
</tr>
<tr>
<td>LINAC</td>
<td>12/33 (36%)</td>
<td>9/33 (27%)</td>
<td>3/33 (9%)</td>
<td>Nil</td>
</tr>
</tbody>
</table>

## Table 3 Characteristics of Medication Prescribed for Radiation Proctitis

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Reassurance Only</th>
<th>Fiber Supplement/ Stool Softeners</th>
<th>Steroid Enema/Anti-Inflammatories</th>
<th>Argon Plasma Coagulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobalt</td>
<td>1/7 (14%)</td>
<td>6/7 (85%)</td>
<td>2/7 (28%)</td>
<td>1/7 (14%)</td>
</tr>
<tr>
<td>LINAC</td>
<td>1/12 (8%)</td>
<td>7/12 (58%)</td>
<td>5/12 (41%)</td>
<td>3/12 (25%)</td>
</tr>
</tbody>
</table>
The cure rates in patients with cervical carcinoma are reasonably good with the current standard of care. However, among those who achieve cure, the majority will be left with chronic toxicities, such as chronic proctitis, chronic cystitis, and chronic enteritis, throughout their life, and these chronic toxicities severely compromise the quality of life.8

This study represents the first clinical comparison of late radiation proctitis in patients with carcinoma of the cervix treated with conventional and 3-dimensional planning. With low-dose-rate intracavitary brachytherapy being common in both arms, patients treated with conformal therapy had increased incidence of late proctitis. A similar dosimetric study comparing conventional and conformal planning in carcinoma of the cervix found significantly larger field sizes in 3DCRT plans compared with conventional planning.9 The limitations of the present study are that it was retrospective and that it had a small number of patients.

**Conclusion**

There is a significant increase in the incidence of late radiation proctitis in patients treated with 3DCRT technique compared with conventional technique. The effect of factors such as rectal dose from brachytherapy needs to be studied before a definitive conclusion can be drawn.

**Clinical Practice Points**

- Proctitis is a well known accompaniment in the treatment of carcinoma cervix with radiation therapy. There is paucity of
clinical studies comparing the occurrence of radiation proctitis between conventional and conformal radiation therapy.

- Use of conformal therapy has lead to better target volume coverage when compared with conventional therapy but has also lead to increased volume of rectum in the field of irradiation.
- With the advent of high dose rate brachytherapy, the use of volume based therapy and limiting the dose to the rectum, can decrease the incidence of radiation proctitis.

Disclosure

The authors have stated that they have no conflicts of interest.

References


