

ORIGINAL RESEARCH

Evaluation of Hemoglobin Levels Before and During Chemoradiotherapy in Locally Advanced Carcinoma Cervix: An Institutional Based Study

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ABSTRACT

Background: Cervical cancer remains the second most common malignancy in women worldwide. The present study was conducted to assess importance of hemoglobin levels before and during chemoradiotherapy in locally advanced carcinoma cervix. **Materials & Methods:** The present study was conducted among 60 patients with carcinoma of the cervix. Pretreatment hemoglobin levels at presentation and during concurrent chemo radiotherapy were studied. Blood transfusions and the time point when transfusions were given were recorded. The level of significance for all tests was $P < 0.05$. **Results:** In the present study, 63.33% patients had Hb $>10\text{g/dl}$ and 36.66% had $<10\text{g/dl}$. In our study, 36.66% were diagnosed with anemia before the start of radiation therapy, 16.66% (10 patients) developed anemia during radiation therapy. All 22 patients with pretreatment anemia were transfused with PRBC before RT and 10 patients were transfused during Radiation therapy (RT). The mean baseline hemoglobin in our study in Stage IIB, IIIA, IIIB, and IV A was 11.45, 10.34, 11.12, and 10.6 respectively. Out of the 22 patients who received transfusion before RT, 3 patients had complete response. Out of the 10 patients who received transfusion during radiation, 4 had complete response. **Conclusion:** The present study concluded that Pretreatment hemoglobin and hemoglobin levels during radiation therapy were prognostic factors as Hb levels decreased during Radiotherapy.

Keywords: Anemia, Radiation Therapy, Cervical Cancer.

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INTRODUCTION

Although cervical cancers are generally considered radiosensitive, underlying tumor hypoxia may be associated with radio resistance for a subset of patients.^{1,2} The prevalence of anemia ranges from 67% to 82% of patients affected by cervical cancer.³ Anemia is one of the most common systemic symptoms accompanying cancer. Although the exact patho physiologic mechanisms of cancer-related anemia are not fully understood, suggested reasons include changes in iron metabolism, suppression of erythroid progenitor cells by releasing tumor cytokines, impaired erythropoietin response on erythroid progenitor cells, and hemorrhage.⁴ The

clinical impact of correcting Hb level during therapy by transfusions or recombinant human erythropoietin (rhEPO) administration remains to be determined.^{5,6} The influence of anemia on the outcome of treatment was first recognized in the 1940s in cervical cancer patients and later in patients with other tumors such as head and neck squamous cell carcinoma, carcinoma of the lungs, bladder, prostate, and anus.⁷ Hemoglobin levels during radiation therapy are considered to be a very important prognostic factor, apparently second only to stage in importance.⁸ Therefore, the present study was conducted to assess importance of hemoglobin levels before and during

chemoradiotherapy in locally advanced carcinoma cervix.

MATERIALS & METHODS

The present study was conducted among 60 patients with carcinoma of the cervix in Department of Radiation Oncology, Government Medical College, Haldwani, Uttarakhand, India. Before the commencement of the study ethical approval was taken from the ethical committee of the institute and informed consent was taken from the patient after explaining the study. Patients received definitive chemoradiation with a total dose of 50 Gy in 25 fractions, 2 Gy/fractions, 5 fractions per week, by three-dimensional conformal radiotherapy/intensity-modulated radiation therapy technique through a 6Mv photon linear accelerator, along with weekly injection cisplatin (35 mg/m²)/carboplatin (AUC 2), followed by intracavitary (7.5 Gy in 3 sessions) or interstitial (4 Gy in 4 sessions) high-dose rate brachytherapy. Pretreatment hemoglobin levels at presentation and during concurrent chemo radiotherapy were studied. Blood transfusions and the time point when transfusions were given were recorded. Hemoglobin level of 10 g/dL was taken as an arbitrary value by us in this study based on the mean hemoglobin levels of female patients at our oncology center. Patients with hemoglobin <10 g/dL were transfused. The first

follow-up was done after 4 weeks. A complete gynecological examination was performed and subsequent follow-up was done every month. Complete response was taken as an absence of cervical lesion on gynecological examination. Patients who had persistent tumor on completion of radiation therapy were subjected to a biopsy and biopsy confirmed patients were considered to have a partial response. Data were analyzed for frequency, percentage, mean, and standard deviation. Chi-square test was used to determine the statistical significance. The level of significance for all tests was $P < 0.05$.

RESULTS

In the present study, 63.33% patients had Hb >10g/dl and 36.66% had <10g/dl. In our study, 36.66% were diagnosed with anemia before the start of radiation therapy, 16.66% (10 patients) developed anemia during radiation therapy. All 22 patients with pretreatment anemia were transfused with PRBC before RT and 10 patients were transfused during Radiation therapy (RT). The mean baseline hemoglobin in our study in Stage IIB, IIIA, IIIB, and IV A was 11.45, 10.34, 11.12, and 10.6 respectively. Out of the 22 patients who received transfusion before RT, 3 patients had complete response. Out of the 10 patients who received transfusion during radiation, 4 had complete response.

Table 1: Patients characteristics

Variable	N(%)
FIGO stage	
IIA	3(5%)
IIB	14(23.33%)
III A	7(11.66%)
III B	18(%)
III C	11(30%)
IV A	7(11.66%)
Pretreatment Hb (g/dl)	
>10	38(63.33%)
<10	22(36.66%)
Time of transfusion	
Before RT	22(36.66%)
During Ist week of RT	1(1.66%)
2 nd week of RT	1(1.66%)
3 rd Week of RT	2(3.33%)
4 th week of RT	2(3.33%)
5 th week of RT	3(5%)
During brachytherapy	1(1.66%)

Table 2: Correlation of stage and hemoglobin

FIGO stage	Mean ±SD
IIA	13.06±0.000
IIB	11.45±1.885
III A	10.34±3.256
III B	11.12±1.884
III C	9.04±0.000
IV A	10.06±1.945

DISCUSSION

Anemia represents one of the most frequent problems encountered by gynecologic oncologists in their clinical practice.⁹ Anemia in cancer patients has been associated with an increase in postoperative morbidity and mortality¹⁰, a decrease in quality of life, an increase in transfusion rates and a decrease in survival rates.¹¹

In the present study, 63.33% patients had Hb >10g/dl and 36.66% had <10g/dl. In our study, 36.66% were diagnosed with anemia before the start of radiation therapy, 16.66% (10 patients) developed anemia during radiation therapy. All 22 patients with pretreatment anemia were transfused with PRBC before RT and 10 patients were transfused during Radiation therapy (RT).. The mean baseline hemoglobin in our study in Stage IIB, IIIA, IIIB, and IV A was 11.45, 10.34, 11.12, and 10.6 respectively. Out of the 22 patients who received transfusion before RT, 3 patients had complete response. Out of the 10 patients who received transfusion during radiation, 4 had complete response.

Hemoglobin level in the study group did not differ significantly during chemotherapy. At the third cycle of chemotherapy and at the end of chemotherapy, hemoglobin level was significantly higher in the study group compared with the control group. Transfusion rates in the study group were significantly lower. The analysis within the study group revealed that hemoglobin level in patients who suffer at diagnosis from anemia tends to increase whereas hemoglobin level in nonanemic patients tends to decrease.³

Krystyna Serkies et al evaluated the prognostic impact of pretreatment hemoglobin (Hb) level and its changes during definitive radiotherapy by univariate and multivariate analysis in the group of 453 FIGO IB–IIIB cervical cancer patients. Pretreatment anemia (Hb<12 g/dl) was present in 148 patients (33%), and anemia at the end of irradiation in 48%; in 64% Hb level declined during therapy. Median overall survival in patients with initial Hb \geq 12 g/dl was 66 months compared to 22 months in those with lower baseline Hb levels ($p=0.0001$). This difference was mainly due to increased risk of distant spread in anemic patients (40% compared to 25% in subjects with pretreatment Hb \geq 12 g/dl; $p=0.001$). Baseline Hb \geq 12 g/dl was also associated with longer disease-free survival and improved local control. Declining Hb level during radiotherapy predicted for impaired 5-year disease-free survival and local control probability. In multivariate analysis, low pretreatment Hb level remained associated with worse overall and disease-free survival, whereas adverse impact of declining Hb level on outcome was not observed. With regard to other clinical factors, stage and tumor extension (uni- or bilateral parametrium involvement for Stage III) were the only independent determinants of prognosis.¹²

Zayed S et al found that 39 experts in gynecologic radiation oncology did not agree on a hemoglobin

transfusion threshold, highlighting significant variability in clinical practice. For both external beam RT and brachytherapy, a hemoglobin transfusion target of 9 or more g/dL and less than 12 g/dL, respectively, was agreed on by an 89% consensus.¹³ Sequeira LJ et al concluded that Pretreatment hemoglobin and hemoglobin levels during radiation therapy were prognostic factors for local control, in addition to stage and histology, which might have independently predicted the outcome.¹⁴

CONCLUSION

The present study concluded that Pretreatment hemoglobin and hemoglobin levels during radiation therapy were prognostic factors as Hb levels decreased during Radiotherapy.

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